Casimiro Barela.
Senator 4th Senatorial District.

ANNUAL REPORT

OF THE

State Board of Horticulture

AND THE

PROCEEDINGS OF THE CONVENTION

With the Rifle Horticulturists, Held in Rifle
December 12 and 13, 1910

ALSO, THE REPORT OF THE

State Bee-Keepers' Association

and the State Entomologist

STATE OF COLORADO

For the Year 1910

EDITED BY ASSISTANT SECRETARY MARTHA A. SHUTE

THE TWENTY-SECOND VOLUME

DENVER, COLORADO
THE SMITH-BROOKS PRINTING CO., STATE PRINTERS
1911

LETTER OF TRANSMITTAL.

To His Excellency,
JOHN F. SHAFROTH,
Governor of the State of Colorado.

Sir—In compliance with the law we have the honor to transmit to your Excellency the twenty-second report of the State Board of Horticulture, with reports of county horticultural inspectors and the proceedings of the State Annual Horticultural Convention.

STATE BOARD OF HORTICULTURE,
D. B. STOTLER,
Secretary.

EXHIBIT MADE BY THE UNION PACIFIC RAILROAD AT COUNCIL BLUFFS AND CHICAGO AND OMAHA, 1910.

Annual
State Horticultural Convention

RIFLE, COLO., DECEMBER 12 and 13, 1910

The opening session of the Annual State Horticultural Convention, under the auspices of the State Board of Horticulture and the Rifle Horticulturists, was called to order at 9:30 a. m., Monday, December 12th, 1910, by President C. E. Parfet, in the Christian church, Rifle, Colorado.

INVOCATION.

REV. HORACE MANN, RIFLE, COLO.

Our Father: Thou hast given many promises to the children of men. Thou hast promised great things to the worker, the toiler. Thou hast said, "the wilderness and the solitary place shall be glad and the desert shall rejoice and blossom as the rose." But all Thy promises are conditional. Man must co-operate with Thee, and working together—the Creator and the husbandman working together—shall bring to pass the promise that "the wilderness shall be glad and the desert place blossom as the rose."

Paul said, "Study to show thyself approved unto God, a workman that needeth not to be ashamed," and this is the purpose of our coming together to-day. It is that we may study the things of nature; it is that we may grow in the knowledge of those things that help to make the country places productive and beautiful, and that makes the home helpful and loving. To this end bless us as we discuss the subjects arranged for our consideration. Give us wisdom that we may use aright the great blessings about us. May we not forget the Creator of every living thing. The Creator of the "lilies of the field" asks and expects our level best for others, so make us true, helpful, earnest, and when the work of life is over, crown us with life eternal in Thy presence forevermore. We ask it for the Master's sake. Amen.

ADDRESS OF WELCOME.

FRED G. SHAFFER, RIFLE, COLO.

A benevolent Providence could have made a more magnificent State than Colorado—but He did not.

The student of scripture cannot refrain from expressing the belief that Moses, the patriarch of the remote past, must have had Colorado in mind when, in his last conference with the children of Israel, before entering the Promised Land, he held before them this vocal panorama:

'For the Lord, thy God, bringeth thee into a good land, a land of brooks of water; of fountains and depths that spring out of valleys and hills. A land of wheat and barley and vines and fig trees and pomegranates; a land of oil, olive and honey; a land wherein thou shalt eat bread without scarceness—thou shalt not lack anything in it; a land whose stones are iron and out of whose hills thou mayest dig brass."

And as this convention of horticulturists begins its deliberations to-day in this throne-land of Pomona and Ceres, this paradise on the crest of the continent, we would be, in a measure, recreant to duty were we to fail to call the attention of the country to the wonderful transformation wrought by the lapse of time—the marvelous story of how the agriculturist and horticulturist has fought his way in storm and shine alike—battling with most persistent adversity until he is finally coming into his own.

Less than two decades back into the past the mention of the name farmer or fruit grower carried with it the suggestion of ignorance and poverty and espionage. We thought of burdensome mortgages, of gold bricks, of lightning rods, of book agents and of whiskers. Then rural free delivery was organized by virtue of a congressional enactment and the government extended to the farmer the blessing of an education in matters of common interest to him and his kind. He began to realize that the modern way was the better way; that it devolved upon him to educate himself in order to protect himself and that progress, properly applied, was his friend and not his enemy.

To-day he stands crowned king, and those who pitied him twenty or thirty years ago are the same ones who stand ready to do him homage at this time.

At the present time countless thousands are seeking surcease of sorrow in the free air of the orchard home. They are putting behind them the days of toil in the factory, the mill or at the bench. They are departing the congested centers of the east in search of a home where they can be guaranteed a shelter and a living when the sunset of life has been reached and where the children may be reared in a way that will bring honor and gratitude to their fathers and mothers.

My friends, there are two prominent pictures of modern life—the one of the young man in the city, the other of the young man in the country. In the first instance the highest aspirations of the young man, as he grows into manhood in the environments of a city, are to keep pace with the times—to annihilate space; to conquer Time; to capture the elusive millions; to shine brighter than any other star in the firmament of society, and, finally, to linger in the light of the great White Way and live within his means, if he has to borrow money to do it with. The physical, the moral and the spiritual man, under such conditions, are neglected. When the time comes that the slow and sedate hearse opens its door for him he finds that his ideals have really proven fallen idols and blasted hopes.

Now let us look upon the picture of the modest young man who lives in the orchard home. His mother may not be a devotee of society; perhaps she knows nothing of bridge whist and fashionable divorces and all these things. She is only a plain mother, with a mother's love and a mother's smile and a mother's kiss to place upon his tired brow when he seeks sleep and rest in the plain little home surrounded by the trees. She is not as beautiful, or as transient, as the butterfly. The free air and the sunshine have kissed a bronze upon her cheeks. She has, perhaps, toiled to make habitable and home-like the little cottage where the children can live, love, laugh and play about the doorway.

And what of the aspirations of a young man born of parents of this character? The joy ride is not his highest ideal of supreme happiness. In farm and orchard and garden he seeks the money that will bring with it a guarantee of happiness. He lives in an atmosphere that brews iron for the blood. He has no thought and no desire for the unclean dollar—the dollar pinched from the hand of penury and want—but from the fruitage of the earth he acquires his health, his happiness and his honor. When the ledger is made up it will show that the sum total is in his favor and that the world is a little bit better because he lived in it.

Fifteen presidents have been taken from the farm and given the highest honor in the gift of the people.

The mollycoddle, the anarchist, the criminal, the society dude and the spendthrift are all insects that will not grow in an orchard. The spray of honesty and sound sense is poison to them.

If you will pardon a second reference to the Good Book, I want to call your attention to one instance where Ecclesiastes, away prior to the Babylonian period, attempted to combine the fast life of the city with the slow life of the ranch and the orchard. The verses call attention to irrigation of orchards, even at that remote period, and is the only knock I ever heard in connection with fruit growing. You will find the verses, if

you will take the time to look, in Ecclestiastes, chapter second, and they read as follows:

"I made me great works; I builded me houses; I planted me vineyards: I made me gardens and orchards, and I planted trees in them of all kinds of fruits: I made me pools of water to water therewith the wood that bringeth forth the trees: I got me servants and maidens; also I had great possessions of great and small cattle above all that were in Jerusalem before me.

"I gathered me also silver and gold and the peculiar treasure of kings and of the provinces; I got me men singers and women singers and the delights of the sons of men, as musical instruments and that of all sorts.

"So I was great and increased more than all that were before me in Jerusalem; also my wisdom remained with me. And whatsoever mine eyes desired I kept not from them—I withheld not my heart from any joy, for my heart rejoiced in all my labors and this was my portion of all my labor.

"Then I looked on all the works my hands had wrought and on the labor that I had labored to do, and behold, all was vanity and vexation of spirit and there was no profit under the sun."

And Ecclesiastes was, apparently, "traveling the pace that kills." He was endeavoring to live the city life in the orchard home. Had it been possible for him to have enjoyed modern utilities instead of ancient luxuries, the words of the preacher might have been different.

This brings to mind the fact that the modern horticulturist is in a class peculiarly and fortunately by himself. He reads his daily papers by the electric lights. In many favored localities he steps aboard the electric car right at his front gate. He spends his summers in the orchard and his winters in the surf at some of the southern or western seaside resorts. All the blessings vouchsafed to the city man are likewise within the reach of the orchard man, and besides this he enjoys the three greatest of blessings, health, wealth and happiness.

In my comparisons to you I do not want you to understand that the orchard man is perfect. He has not reached that summit of perfection where he will pack the small apples on the top of the box. Worm holes in an apple have a habit of escaping his vision. While he is, as a rule, well educated, there are many who cannot determine the difference between the "fancy" stencil and the one that reads "seconds." Many boxes of apples shipped out are mute witnesses of the horticulturist's lack of education in this regard.

The orchard will not make the millions that can be made by the ticker on Wall Street, but through the perfume-laden trees there is no hazardous road to insolvency, despair and degradation. The horticulturist plys no vocation, follows no profession or knows no creed that takes something from the

THREE YEAR-OLD PEACH ORCHARD. OWNER, W. P. CLOUGH, RIFLE, COLORADO.

public without giving an equivalent in return. Looking back into remote ages—back to the great human drama in Eden—we find that a bite of apple has always cost something and that it has always been worth something.

The fortunes of the orchard are not phantom where energy, effort, brain and brawn are made to play their parts. Sometimes I regard the production figures as given out from time to time, showing isolated instances of phenomenal and abnormal profit, as being dangerous to the industry and dangerous to the communities which put such statements forth. As a rule, they are so far in excess of the general average, so unusual, so far as the average of the majority of the fruit growers are concerned, that disappointment must greet the effort of the recent convert to the ranks of horticulture and disappointment will ultimately mean reaction.

Here in Rifle, where the orchard is rapidly becoming a dominating influence, we feel that the average profit of an orchard in full bearing, taken year after year, would be less than $200 per acre, or a net return, year after year, on that orchard of $125 per acre—which would be twelve and one half per cent. on the land at $1,250 per acre. In making this statement I realize that we are at a disadvantage here, because in many other parts it is claimed that the orchards will earn two and three times this amount.

Notwithstanding this divergence of opinion we must concede the general point that fruit growing is one of the most remunerative industries in the great West and especially so in the fruit-producing sections of Colorado.

While horticulture in these sections is the predominating influence, and becoming more and more so with the recurrence of each year, the fact remains that it is unsafe to make any country or any section a one-resource section. History has proven beyond question of doubt that a country with a diversity of resources is the greatest producer of profit, taking the sum totals for a period of years. For this reason it is well for us to abjure the homeseeker who locates among us to regard the raising of poultry, the care of bees, the dairy interests, the feeding of hogs and cattle and all these various other resources a part of the program he is to follow. They represent the bi-products, if you please, of the orchard home.

Under such circumstances you only suffer a partial loss, a partial impairment of capital, if one or even two of these resources should fail at some time.

I cannot but feel that I am trespassing upon your time with this preachment, but I have always regarded the Colorado State Board of Horticulture as a constructive organization. It has been my pleasure to note from year to year the remedial legislation enacted as a result of the efforts of Mrs. Shute and her co-workers. There is room for more, and I

hope that this convention, before its final adjournment, will pass resolutions to be forwarded to the American Apple Congress to meet in Denver Wednesday, Thursday and Friday and to be presented to the forthcoming session of the General Assembly, incorporating the general idea that our laws should be more stringent in the matter of the packing, labeling, shipment and sale of apples and other fruits. Make it a punishable offense to dispose of wormy and unsalable apples under a brand that would lead the purchaser to believe that they were otherwise.

When we have accomplished this, a box of Colorado apples will represent an edition de luxe of the sweetest poems on earth.

Let me assure you that Rifle is deeply appreciative of the honor it enjoys in entertaining the friends of horticulture in Colorado. Adam sought the apple and was driven out of Eden. You will not be driven out of this Eden. We have no welcome arch, but we have a hosanna of welcomes for you all, and if we can accord you any service while you are in our midst, command us. Now, in conclusion, let me quote this little gem from a communication recently received by me from former Governor Alva Adams:

"If I am called in springtime no flower will be more welcome to my fleeting spirit than the apple blossom; no monument would be finer to mark my place of rest than an apple tree; and when I enter that realm where every month has its fruit, where flowers ever bloom and woman is always young and fair, I can ask no Heaven more perfect than where the fields are perennial with the purple and green of alfalfa, and the paths are embroidered with apple trees in blossom and the air fragrant with their perfume."

RESPONSE.

PROFESSOR E. P. TAYLOR, HORTICULTURAL INSPECTOR, MESA COUNTY, GRAND JUNCTION, COLO.

On behalf of the State Board of Horticulture and the fruit growers of the State here present or represented I wish to accept the stirring welcome just accorded us.

Last year as we came together in the little peach town of Palisade down the valley you invited us to meet with you in what is known as the Upper Grand Valley of the Western Slope and we respond to your invitation by our presence with you here today. We have listened to the welcome offered by Rifle through Mr. Shaffer, well known to all of us as the author of "The Triumph of the Ten-Acre Tract." We truly

feel that we are welcome and after seeing something of the promise of your ten-acre fruit tracts we are able to understand the source of inspiration of the masterpiece above quoted.

As we arrive at your railway station near the shifting embankment of the River Grand, we read upon a conspicuous sign board the inscription:

"The home of the big red apple and the luscious peach,
The range cow and the Irish potato."

Surely such a sign board carries a welcome itself sufficient to tempt the tourist and traveler and especially the fruit grower, stockman and farmer to order off his baggage and arrange for a lay-over. After he has seen the charms of your section, if he is like the most of your settlers, he is quite willing to lose for all time his unused transportation to other parts. We appreciate your welcome and know that your promises can be fulfilled. I would also mention among your attractions the shining mountain trout, your splendid water and invigorating air, your nature painted mountains and your hunter's paradise.

Although not a resident of your town or of your immediate vicinity, I have stolen away occasionally from my usual haunts in the orchards of the Grand Junction district to witness the charms of your region. I have visited the orchards, nurseries and vineyards upon the beautiful mesa to our west; I have stood wonder filled in the magnificent orchard of Mr. George Harris up the canon to our north, when the branches of the trees bent low with ruddy fruit. From the crest of the orchard ridge upon the east overlooking the comfortable homes of the town of Rifle I have gazed at the setting of the sun upon the gently sloping mesas of the great Antlers-Silt district; I have looked upon the fruit growers' homes across the river and down the valley toward your sister orchard town, Grand Valley; I have seen the great Morrisiania fruit ranch yonder on the cedar slopes of Battlement Mesa, which orchard this season yielded as many boxes of fruit as were harvested from any single orchard in Western Colorado, and, having seen all these which I mistrust are but a few of your points of orchard interest, I am fully convinced that you have a right to ask us here.

The man from the Gunnison and the Uncompahghe, the Montezuma Valley, and the Animas, the North Fork and the Lower Grand, the Arkansas Valley and Northern Colorado today meet with you of Rifle as fruit growers of the great commonwealth of Colorado. We believe that in the discussion of our common orchard problems we will be benefited. We come together for our mutual good and hope that from this meeting we may return to our homes better able to meet our orchard difficulties, pushing even higher the good reputation of Colorado fruit.

ADDRESS.

C. E. PARFET, PRESIDENT STATE BOARD OF HORTICULTURE, GOLDEN, COLO.

Horticulturists of Garfield County and Colorado, Ladies and Gentlemen:—I am not going to make an attempt at a lengthy speech. I am suffering with too severe a cold for that and really should not be here at this time. I wish to say in the start, however, that it is with a feeling of sadness that I look back a year ago to our meeting at Palisade, for at that time we had with us our President White, one of the ablest horticulturists in Colorado, who has since that time passed to his reward to that country from whence no traveler returns. For his bereaved family we are indeed sorry and our society has lost a good friend.

The year past has not been one of the best for the Eastern Slope of Colorado nor, as I understand it, been for all parts of the Western Slope. However, we are looking forward with great anticipations for the coming year. At this time all kinds of fruit trees are laden with fruit buds that give great promise for the coming season. That Colorado will have a banner fruit crop the coming year is my sincere wish.

And now with these few remarks I will turn to the program of which we have one that will take all our time to get through and a most interesting one it is. I trust you will all be benefited and go away with new ideas and a renewed determination to raise not only more fruit but better fruit. That each one will open war on that arch enemy of all good fruit, the codling moth.

I thank you.

REPORT.

D. R. STOTLER, SECRETARY STATE BOARD OF HORTICULTURE, FORT LUPTON, COLO.

Orchards—The condition of the orchards, with few exceptions, for the past year has been good. The wood growth has been unusually strong and the trees are well filled with healthful fruit buds and all indications show a heavy yield of fruit for the year 1911, provided we have normal conditions of temperature and a general use of the smudge pots.

Insects—The injurious insects have given the orchardists considerable trouble during the past season. Many letters and calls have been received at this office for formulas to destroy the pests and the closest attention has been given to each case,

personal investigations have been made, not only of fruit trees, but shade trees and ornamental shrubs; all have been thoroughly examined and the usual remedies given and suggestions as to the care of the orchards and trees.

The State Entomologist—Has done much effective work toward lessening the spread of insects injurious to tree and plant life and has been assisted by this Board and the

County Horticultural Inspectors—Who have the inspection of nursery stock shipped into the State and of all orchards already planted out. The Inspectors have been very diligent in enforcing the Orchard Inspection Laws and the regulations as prescribed by the State Board of Horticulture, that the fruit and trees may be kept clean from insect pests and all plant diseases.

Reports—From County Horticultural Inspectors received during the month of November and now on file in this office giving the acreage, bearing and not bearing, acres planted to apples, peaches, cherries, pears, plums, etc., also giving yields of fruit per acre, prices received, etc., whether insect pests are on the decrease or otherwise, if spraying has been generally and thoroughly done, also remarks on fruit culture, and the important requirements referring to the improved methods of packing and grading fruits, notes on canning and evaporating fruit, any complaints or criticisms regarding orchard work. These reports are of value and are printed in the Annual Report of this Department. We receive statements later from the Fruit Growers' Association, after the first of January.

Annual Report—Of which 2,000 copies are published by the State for free distribution among the fruit growers and in exchange with other State Boards and Societies. These reports are reliable and are highly prized by those interested in orcharding.

Tree Planting—Has increased very rapidly the past year. There have been planted something over 1,250,000 fruit trees in Colorado and of this number, probably two-thirds have been apple. By allowing eighty trees to the acre, we have an increase of something over 15,000 acres for the season of 1910. From all reports, and favorable conditions now existing, the acreage in fruit culture will be fully 35 per cent. more during the year of 1911.

APPOINTMENT OF COMMITTEES.

Committee on Resolutions—F. C. Shaffer, G. E. Harris, E. P. Taylor, J. H. Divine, J. H. Hogg.

Legislative Committee—A. C. Newton, M. A. Shute, A. Jay Garrison, Horace Mann, George J. Spear, George Stephan, P. H. Troutman, Fred G. Shaffer, O. C. Skinner, A. E. Roberts.

NEW BUSINESS.

President Parfet—Is there anything to come before this convention under "new business?"

Mr. Troutman—Mr. President, there is one thing I wish to bring before the convention this morning, and in doing so at this hour I am following in the footsteps of our friend, Mr. Shaffer, who last year sprang to his feet at the first opportunity and extended such a cordial invitation to us to meet in Rifle this year. We of the Eastern Slope, especially the lower Arkansas Valley, are very desirous of having the 1911 annual convention of the State Board of Horticulture meet with us at Canon City next year. Canon City, as you all know, has a great many attractions, and I am not going to take your time this morning by naming them over to you. It is one of the greatest fruit sections in the State of Colorado, and it can handle this convention as well as any section that I know of. Canon City shipped this year many hundreds of cars of very beautiful fruit and the promise for next year is still better. We can welcome you, and can entertain you by not only taking you through our orchards, but giving you some very beautiful scenic drives. The people of Canon City, before I came here, asked me to extend to you a very hearty and cordial invitation to be with us next winter, and I move you, Mr. President, that the convention of 1911 be held at Canon City.

Mr. Shaffer—I believe I can say in all candor that on behalf of the people of Rifle I want to second the motion made by Mr. Troutman of Canon City. Canon City is a beautiful place; they are growing some beautiful fruit there, and I, for one, want to go there next year and meet some of those fruit growers.

Mr. Garrison—I don't know whether I want to go to either Canon City or Pueblo, but I will tell you there are lots worse places than that. The Colorado legislature is a great deal worse than either one of those. I am in favor, though, of going to Canon City providing that we are guaranteed ample protection.

Mr. Troutman—We will see you have a guard all the time you are in Canon City.

Mr. Shaffer—As I understand, you will start a canning factory to can us before we get away?

Mr. Troutman—Yes, sir.

Mr. Mann—How about the temperature?

Mr. Troutman—The temperature is always splendid at that time of year.

President Parfet—It has been regularly moved and seconded that this convention be held at Canon City in 1911.

The motion was unanimously carried.

Mrs. Shute—Mr. President, we have a letter from C. R. Root, President of the National Apple Congress at Denver:

MRS. MARTHA A. SHUTE,
State Board of Horticulture,
State Capitol, City.

Dear Madam:—I am in receipt of your kind invitation for my presence at the meeting of the State Horticultural Society at Rifle the 12th and 13th of this month. I very much regret my inability to be present, since, as you know, the meeting and call of the Governor for an Apple Congress is on the 15th, 16th and 17th.

Realizing that you will have a full program, I beg but a few minutes of your time to remind you that the work as started for the American Apple Congress will grow rapidly in our great apple producing State. I can see no reason why our Congress should not receive the support of all of our neighboring states and apple producers throughout the West, as well as being open to the entire world. This assemblage will be purely educational with a view of increasing knowledge in growing, selecting, packing and marketing apples. Our State has now become recognized as a leader in the quality and quantity of winter apples, therefore I sincerely believe it should be brought to the attention of the members at your meeting to be present at our sessions if possible. There will be special rates of one fare for the round trip from the Western Slope. Many attractions will be on in Denver at that time. All duly appointed delegates will have special entertainment in the form of a theatre party, auto ride and an apple banquet. No doubt discussions of value will be conducted and the question of an apple show for 1911 will be the leading topic.

Again thanking you for your kind invitation, I remain,

Yours very truly,

C. R. ROOT.

DISCUSSION.

Mr. Troutman—Mr. Chairman, in regard to this Apple Congress, this is a new movement in the history of the apple industry of the country. We have our apple shows and they do a wonderful amount of good to the fruit industry. They are held all over the United States. Next year there will be probably double as many as there have been this year, but there is no organization for the promotion of the horticultural interests of the entire country. The National Horticultural Congress, and they have one of the best apple shows, I think, in the country, is called a horticultural congress, but the gentlemen who were there this year told me it was very much as it was last year; that their program part of it fell down, and that it is becoming nothing but an apple show. What we need is a congress built along the lines of the Irrigation Congress, one

that will bring the grower, the shipper and the consumer closer together, one that will do away with sectional lines and will draw the growers of the entire country together for the purpose of legislation controlling railroad and trade tariffs, the betterment of the grading and packing laws, the size of the fruit packages, the general character of the orchards. This congress, of course, is new; we want to make it not only a State success, but a national success and would like to see everyone who is present this morning and who will be present during this convention go to Denver and lend their support to us in this movement.

Mr. Shaffer—I heartily agree with Mr. Troutman and I was very much interested in the letter written by Mr. Root. Mr. C. R. Root is one of the most self-sacrificing boosters for Colorado that we have in the entire State. I want to say to you gentlemen that for the past fifteen years I have known Mr. Root and know that on any occasion or on all occasions, if necessary, that man will neglect his business to organize and help concerns along of this character which contemplate an educational feature either for the farmer or for the horticulturist. Now it was my good fortune twelve or fourteen years ago to be a newspaper reporter and help boost along the little mining towns. We first organized the American Mining Congress. There the work of the Irrigation Congress has been the greatest contributing factor in the Gunnison Tunnel and in the reclaiming of this vast area being reclaimed in the vicinity of Grand Junction. In talking with many of the gentlemen in Denver I find that this American Apple Congress is being brought out with the idea of making it a permanent institution and making it a national institute along educational lines, fruit packing and everything connected with the growing and marketing of fruit. We cannot at this time even contemplate the amount of good that will be accomplished, because it may result in making our pack better, the market better and every feature of horticulture and perhaps some features of agriculture which may be closely allied with agriculture—much better than it is at the present time. I feel that the people here should support them, should do everything in their power to see that Rifle and that Garfield county is well represented at that Apple Congress, and when we attend, and when we lend or tender whatever service we attend, we are simplying starting a nucleus to something that can, we are simply starting a nucleus to something that will prove a wonderful institution in years to come. I see no reason why this convention could not, if it so desire, appoint delegates, but I do not know; I suppose the State Board of Horticulture has delegates, has it not, Mrs. Shute?

Mrs. Shute—Yes, sir.

HORTICULTURAL RUTS.

LEVI CHUBBUCK, GOVERNMENT EXPERT, DENVER, COLO.

It may appear to the horticulturists of Colorado, in the face of marked successes as growers of fruit which, by its quality, wins unequaled laurels at the horticultural exhibitions and brings to the growers handsome profits, as being ungracious and hypocritical to intimate that they are following ruts. "In the older fruit-growing sections, where they send apples to market in the time-honored barrel or, possibly, loose in the wagon box," they will say, "there might be occasion to talk of ruts; but here in Colorado the industry is too young for ruts to have been formed, even if it is a natural tendency of human nature to get into grooves." It is freely and gladly admitted that Colorado fruit-growers are quite up-to-date in their methods, partly because, being intelligent and progressive, they are ambiitous to excel, and partly because conditions are such as to compel the quick adoption of all methods and expedients that science and experience point out as essential for success. And when the fruit-growers of the Mississippi valley and the Atlantic Coast regions become awakened by the noise of the boosters in proclaiming your prize-winning successes and great profits, and to the value of better methods in cultivating and handling fruits, emphasized by the fact that their home markets are being supplied by your fruits, you will have to fight for a place in the markets. A representative of a leading fruit commission house in Chicago said to me, after admitting the superior quality of inter-mountain fruit, "We watch the fruit crop reports very closely in the spring, and when we know there is going to be a full crop of apples in Missouri, Arkansas and Illinois we don't send any buyers into the inter-mountain states; we know we can get all the fruit we can handle nearer home."

Irrigation can be, and is being, made to supplement the rainfall in the eastern states and insure the fruit crops against drought; orchard heaters can be, and are being, used to save the crops from late frosts; spraying to overcome insects and disease will be extended and ultimately required by law in the eastern states; cultivation of orchards is being more and more practiced, and the demand of the market will bring into use more convenient packages, etc. The result will be sooner or later enormous crops of high class fruit close to our greatest consuming markets, and then our western fruit growers will have to hustle to retain a foothold. In other words, they must get out and keep out of ruts, otherwise they will some time find themselves rolling rapidly down there to the gulch of financial depression, and possibly into ruin's canyon. Now that sounds rather pessimistic, and I am sure it will find no place in land speculators' circulars or other "booster" literature. But let me say right here that, in my opinion, the land speculator and

booster of land values, whose interest is served by magnifying profits obtained by farmers, and minimizing and even hiding entirely the difficulties and failures, is not a friend of either producers or consumers of farm crops, two classes who should be interested each in the welfare and prosperity of the other. When an orchard has had a value of $2,000 per acre put upon it there is, or should be, a fixed charge of, say, $140 per acre per year against the crop on account of interest on the investment, and the price of fruit to the consumer must meet this charge along with the other charges, or the producer is out that much on his net returns. If it has cost, say, $1,000 an acre, including cost of raw land with water, planting the trees and bringing the same to full bearing, and land speculators have succeeded in getting $2,000 an acre in a series of advances, without adding an iota to the productive capacity of the orchard, they have got $1,000 an acre for investment on which you, the present owner, or I, the consumer of fruit, must pay interest in lower net prices received or greater prices paid.

But this is somewhat aside from ruts, and is an illustration of the fact that unless we do follow a pretty well defined line we are apt to fly off at a tangent; so ruts may have their value, and in more ways than one.

The particular rut I had in mind to speak of on this occasion is that of specializing, which is so characteristic of western agriculture. This results from farming under irrigation, which demands an intensive system and thus limits the tillage area and cropping range of the individual much more than is the case with farming in the humid regions; the quick and radical changes in soil types and climatic conditions within very narrow limits, because of the great variation in topography and altitude; and the restrictions of a limited local consuming market, and difficulties in the way of reaching the larger but more distant markets with perishable or bulky products. As a rule, 40-acre farms prevail under irrigation as compared with 160-acre in the humid regions. The most casual observer will note the wide variation in soil types within a single irrigation district or valley, or from one bench to another, and even on the same level; that one soil type is good for potatoes, another within a stone's throw is not, but may be first class sugar beet land; that a bench on one side of a canyon is fine for peaches as to soil and exposure, while another bench in sight at the same level, but with different soil and exposure, is entirely worthless for that purpose. Suitable conditions for specific crops are much less rigorously and clearly defined as to districts, by soil types, topography and altitude in the great farming area of the mid-west and eastern states than is the case in the inter-mountain, semi-arid and arid regions of the West. And in these latter the consuming population per square mile is very much less than in the former and the distances to and cost of reaching the larger markets much greater. Our farmers are limited by these facts to a narrower

range of crops which may be successfully grown and profitably marketed. So the tendency toward specialized farming is strong and inevitable here in the West. It has its advantages and disadvantages. Can we hold to the former and minimize the latter? If so, it will be well worth while to give thought to the accomplishment of this end.

What are the advantages in specialized farming? Well, one of the most important, and the only one we need to dwell upon, is that specializing in any line, by concentration of thought and constant practice, makes for more exact knowledge and greater skill with reference to that particular line. The potato growers, beet growers, melon growers and fruit growers of the West are the most intelligent and skillful of their respective classes of farmers. It was my privilege recently to attend a state soil convention in California. It was held within the citrus fruit belt, and the attendance was made up largely, almost wholly, of people engaged in growing citrus fruits, and I was deeply impressed with the very high order of intelligence indicated, the exact knowledge of their business displayed, and the deep interest manifested by the assembled citrus fruit growers through four days of a convention which had for discussion but one subject, that of soils. But, and here is the point I am after, those people apparently had no thought of soils or soil problems excepting in their relation to citrus fruit culture. They are cultivating the highest priced tillage land in the country, are using the most costly irrigation water, are spending large sums for fertilizers, and are at the extreme limit of transportation. With these and other serious handicaps, they must put the very highest degree of intelligence and skill into the production of fruit or they will go to the wall. That there are difficulties in the way of citrus-fruit growers was indicated by a remark made in the convention by one of the best informed citrus experts. He said: "The citrus industry is confronted by a gradual increase in cost of production and decline in price of product." Yet when another man undertook to show how the citrus industry might be correlated with other lines of farming with mutual advantage, and got so far as to state that 50 per cent. of all the food consumed in the citrus belt was shipped in, the chair ruled him off the floor by saying that a discussion along that line would interfere with the program as arranged. It is helpful to see "oursels as ithers see us." So let me refer to a remark I heard Prof. Cottrell make at a farmers' institute at Greeley, Colo., the audience being made up largely of potato growers. Urging that they should diversify their farming, he told them that while they were the best potato growers in the world, still they didn't know much else (as to farming) and wouldn't learn.

Now, here is the basic fault of specialized farming; the farmer, thinking along the line of his specialty, works himself, mentally and in practice, into a groove, which deepens to a rut,

and, ultimately, an arroya may be formed in which in evil times of freezes, droughts or financial panics the course is down hill.

One of the striking points of the California soil convention was as to the pressing necessity and increasing cost of supplying the citrus soils with the plant food needed by the orchards to enable them to bear profitable crops. Stable and yard manure are bought on a cubic-foot scale of prices. Here and there are individuals in the citrus belt, one of whom I visited, who have demonstrated that dairying can be made an adjunct to citrus raising so as to be profitable in itself and very helpful to the citrus side by furnishing a cheaper supply of plant food. Another citrus grower showed me from his books how he was making a small flock of hens add a goodly sum to his bank account from sales of eggs, and he was quite sure that there were increased sales from fruit as a result of the hens being in the orchard. I would like to quote at length in this connection on "Poultry and Fruit," by Prof. E. R. Bennett, of the Colorado Agricultural College, in which, after speaking of the importance of the fruit industry in Colorado, but which, he says, so far "has been a particularly specialized business,' he points out how poultry raising can be advantageously combined with fruit raising. One point of special interest is that poultry in the orchard took the place of spraying for codling moth and other insects of that character. This, in the light of the warnings given by Dr. Headden to Colorado fruit growers with reference to the too free use of arsenical sprays, should make them look with added interest upon poultry raising as an adjunct to fruit raising.

I am quite convinced that the fruit industry and other special lines of farming in Colorado and the West will all be helped if the farmers will take a broader view of their business and, systematically and intelligently, widen its scope. Not every one can do this, I grant, for the most of us are limited as to the range of our ability as managers, and each new line of crops or stock added to what one has been handling will call for more managing ability, more agricultural knowledge and more skill as a farmer, if a high standard as to yield and quality is to be maintained.

That a diversity of lines on one farm is not out of the question is probably evident to every one in the audience in examples within your knowledge, and two instances can be cited from among those present. Mr. A. Jay Garrison is a successful breeder of poultry, a fruit raiser, truck gardener, and withal a producer of new varieties of plums, corn and other useful plants. Mr. C. E. Parfet raises poultry in large numbers, runs an extensive dairy, produces lots of fruit, raises colts and pigs, and is a breeder of registered Jerseys.

It is not that Colorado fruit raisers have got deeply into ruts that leads me to offer these suggestions, but that they lead some to avoid doing so; and also in the hope that thought along

this line may bring to us larger conception of the fact that our agricultural interests dovetail naturally, and that we who are interested in their development should look upon them in this light more than we do.

DISCUSSION.

Mr. Taylor—I have been very much interested in Mr. Chubbuck's paper on the subject of "Horticultural Ruts." I think he has given us some very good things in that paper. The question comes to me in the diversified farming, whether if we try to devote ourselves too much to different vocations of farming if we do not let our competitors who are devoting themselves entirely to that one thing get ahead of us. As he says, we have a country which is adapted to specialized farming. One section, for instance, is adapted to the culture of onions, and one section is prominent for potatoes and another for peaches and another for small fruits, and for all it is well to consider the ruts that we might get into in following those specialized branches of agriculture. It is also a fact that if we try to generalize too much we do so at the expense of the industry for which our section is especially adapted. I think that I remember some remarks made by Professor Cottrell at one of his visits at Grand Junction. Every time he has visited us he has said: "You ought to get out of this purely horticultural work into other things; you want to grow hogs." In the Farmers' Institutes down there he has tried to diversify them. We find our growers will come out to a fruit meeting, but they are not going to come out to a meeting where the discussion is on a line in which they are not interested and where they are not making their living. Not that Professor Cottrell's meetings and the institutes were not beneficial; they were and have been all over the State. A wonderful amount of good has been done by those institutes, but he found he had to stick to the industry they were especially interested in. Mr. Chubbuck referred to a statement made by the commission man in Chicago who said when the fruit was good in Missouri, Arkansas and Illinois, he didn't buy fruit in the intermoun tain region. I expect that as a matter of fact that has not occurred for some years. I was located in that region for some time and visited the fruit sections there quite extensively all through that belt, and the old story, "We haven't had a crop since the year of the World's Fair," is a story we heard all along, and that thing makes it important for us to devote ourselves to the crop we sell over those sections—not diversify too much—diversify just enough in cases where it is going to help our leading industry; for instance, having poultry in connection with your orchard where it might help the orchard is a good thing, or where it might furnish a secondary source of income until the orchard is in bearing. The quotation from Green's Fruit Grower was good, but I can't entirely agree with that, in that the time is coming when we are going to have

to look to our laurels in the Eastern sections. I had occasion to go down and see our fruits in comparison with the fruits grown in other sections of the United States, and I don't think we need to be afraid those sections are going to put our fruit out of business, not but what they can grow splendid fruit, but I think we are going to continue as a fruit section, devoting ourselves, as Mr. Chubbuck says, to the secondary branches of agriculture where they work well with the orchard, devoting ourselves principally to the orchard. That applies especially to these valleys where fruit growing is general. Of course, as I say, Colorado is blessed with many different conditions which favor varied industries.

Mr. Shaffer—As I understand Professor Chubbuck, I don't know that his paper was for one man to scatter his resources too much in matters of this character. Even one man in an orchard can do these various things. He might keep poultry and bees. He has the apple blossoms and he has the orchard for the chickens to run in, and if he can use them to advantage he will be accomplishing something along the same line as our mutual friend, John D. Rockefeller did. You know he advertised to give a million dollars to anyone or any committee who could find a cure for hook worm, and the committee reported back that kerosene was the only known cure. (Laughter.)

Mr. Newton—This is a tender point with me. I believe in specializing. I don't like chickens in the orchard. I like to make a furrow across the orchard to run water in, and have the water go through it, and you can't do it with chickens in the orchard. Of course, I believe the paper was intended that we should diversify individually, but I can very well see how Mr. Parfet could do that with a large tract of ground. I couldn't do it on seven and a half acres, and I believe that is enough for any man to have in an orchard. I believe we should put out fancy fruit in special packages, and I think we are coming more and more to small orchards, intensive cultivation, and I don't believe we can raise hogs, cattle or anything of that kind for profit in an orchard of a ten-acre tract. It must come from the man next to us who can have a ten-acre tract devoted to hogs or cattle. As to the chickens in the orchard, during the summer I noticed that some of the bands on my apple trees were gone and I could not find them. After looking a little bit (and this fall again I found some gone) I found they had been scratched under the ground by the chickens, and that over one-half of my bands were taken off by the hens, and the worms taken from under them.

Mr. Garrison—I have seventeen acres. I have about two and a half acres under chicken wire. This two acres and a half has apples, Wealthy, Ben Davis, Yellow Transparent and a few other varieties, and a few cherry trees, but the most of it is in wild plums. I have always confined my chickens to

this spot of ground that has the wire around it, but this year I gave them the full range of the seventeen and a half and ten acres of my neighbors on one side and ten acres on the other, and after my chickens had ranged all over—I have some diversified farming. I raise some tomatoes. I raise about 300 chickens annually, and after I had pastured my own tomatoes and all of my neighbors' tomatoes, one of my neighbors came and said: "Garrison, why don't you buy more chickens? (Laughter.) Your chickens have protected our tomatoes and our raspberries and strawberries from the hoppers, and next year I want you to raise more chickens." (Laughter.) I have raised poultry—combined poultry raising. As Professor Chubbuck has stated, I have been engaged some in scientific plant raising, crossing various kinds of plants, and when I first began to raise chickens I began to raise them in some quantities, more than for our own table use, with the idea of testing some supposed scientific principles by cross-breeding fowls as well as plants.

President Parfet—Have you any record of what your chickens give you in returns?

Mr. Garrison—Yes, I have a record of my chickens. This year they produced about $2.25 per hen, and the expense—the cost of feed was very high this year—the expense was $1.25. My hens netted me $1.00 a piece. In the plum orchard the chickens were of great benefit. I wouldn't raise fruit without raising chickens and I wouldn't raise chickens without fruit.

Mr. Mann—I believe the best combination you could get would be fruit growing, chicken raising and preaching.

Mr. Garrison—I believe I will have to say I was a minister for over thirty years.

Mr. Mann—I will take it all back then.

Mrs. Shute—President Parfet, will you relate your experience in raising chickens?

President Parfet—My industries are rather varied. When I bought my farm in 1896, my idea was not to haul the products, such as hay and grain, to market, but rather feed it on the farm, thereby getting fertilizer for the soil, and enabling me to haul in condensed form such as butter and eggs to markets. I engaged in orcharding, also in cattle raising. Now, I think that where a person has room these varied industries work very well together. The cattle industry or dairy industry doesn't interfere with the fruit raising, because you can get out and do your other work when it is too dark to look after your fruit. We have had some very remarkable results from our chickens this year. At the commencement of the year we had about 300 hens. We have sold this year over $1,560.00 from the 300 hens, that is, in the shape of poultry produce and poultry—broilers, etc. We get really a little better market than most people could, as they are delivered in Denver to

private customers. For instance, we are getting 50 cents a dozen now for eggs. Last January when very few eggs were being produced we had 217 dozen at 50 cents a dozen. At the present time we are getting from about 600 chickens, mostly pullets, about fifty dozen eggs a week, and also getting 50 cents a dozen for them. Until the time we had cut our wheat we kept our chickens penned in so that they did not destroy anything, but when the hoppers got so bad we let them out and they kept the hoppers jumping. The way we have our poultry house might be of some interest to you. We have what they call the "open front" system. We do not use any glass whatever. We have one poultry house about 100 feet long, and we have about a four-foot opening, perhaps three feet and a half would cover it—an opening where we use canvass that we drop in very cold weather. This fall we have not had those doors down, so that there has been plenty of fresh air all the time in the hen house. People have an idea and many people say: "Well, you heat your house." I say: "No; in fact, we want to avoid heat in our house.' We make our hens work to keep warm; we scatter the grain in litter or straw, so they have to scratch for it.

Mr. Garrison—In my estimate as to the value of the hens I only included eggs—just simply eggs—none of the rest of the products at all. I was surprised when I began to raise fowls; I had a few eggs on hand once and I advertised eggs for incubators. The first two days orders were sent in for 400 eggs. I have orders from Wyoming, all over Colorado, New Mexico and Arizona.

FRUIT POSSIBILITIES ON THE WESTERN SLOPE.

LOUIS MEYER, SECRETARY MESA COUNTY BUSINESS ASSOCIATION, GRAND JUNCTION, COLO.

The possibilities of fruit growing on the Western Slope of Colorado may be no greater than in any other section of the United States, but it must be admitted that if such is the case, the growers are at least making better uses of the opportunities which nature has offered them.

Given a soil peculiarly adapted to the growing of fruit of every variety, an unlimited water supply, practically freedom from the usual insect pests which beset the orchardist elsewhere, sunshine for the entire growing season and immunity from frost, and there appears to be little more to be desired to sustain the reputation which for many years past the Western Slope has enjoyed as the one ideal orchard spot in the United States.

That our fruit growers have not overlooked these ideal conditions prevalent in the four fruit counties of western Colo-

rado—Montrose, Delta, Garfield and Mesa—is shown by the tremendous yields and the enormous profit which some of the acres in this favored section have been made to produce.

Net returns to the grower of from $500.00 to even $2,000.00 per acre in a single season have been by no means out of the ordinary and have been fully verified by the records of the various shipping associations, so that there can be no doubt on that score.

It appears to me however that a mistake has been made in using these figures, which while by no means extraordinary, are still not the average—in inducing settlers to buy orchard land on the Western Slope. A better method, in my opinion, would be to take an average production, for even the profits of some of our poorest growers appear unreasonable to the average eastern farmer. On the other hand, every purchaser of orchard land, seeing these records of some of our most successful growers and listening to the glowing tale of the real estate agent, at once get the idea that they can duplicate the records of the best producers and quite naturally are disappointed when they fail to do so.

A fair average of what an acre of fruit land will produce to the grower would be from $300.00 to $500.00 per acre, which is still a return of from twenty to forty per cent. on the first cost of the average bearing orchard on this side of the range.

Some of you perhaps may think that I am casting doubt on the records of returns, which probably more than one man in this meeting can easily substantiate. That is not at all my intention. Colorado has suffered in the past from the mining sharks who sold millions of dollars worth of stock in valueless mines to credulous easterners, on the strength of the assay of some neighborhood producer. Colorado still suffers from the effects of that blight and I do not believe that we should take the same risk in presenting to the eastern homeseeker, the possibilities of orchard land on the Western Slope.

And now that I have given ample warning to keep the newcomer on the Western Slope from feeling disappointed should he be unable to duplicate the records which have been made on this wonderfully productive soil, I will give a few instances of success with this season's crop, which has generally been felt to be below the average standard.

The figures herewith quoted were taken either from the official records of the fruit shipping associations or are substantiated by the affidavit of the grower.

Palisades naturally has the record for the most productive crop of peaches.

J. R. Bradshaw this year harvested 7,496 boxes of Elbertas from six acres—on an average of 1,250 per acre. H. J. Shideler marketed 5,593 boxes from five acres of five-year-old Elbertas—over 1,100 boxes to the acre.

J. C. Crew harvested 1,000 boxes of apricots from forty trees on his Palisades ranch, which netted him $1.00 per box.

T. W. Monnell of Montrose gives a few details of record crops in that district as follows: nine acres of Ben Davis and one-half acre of Jonathans, twelve years old, brought the owner $4,442.00. Twelve acres of Jonathan, Winesap and Grimes' Golden netted the owner $6,012.00. These are both Montrose county crops.

J. F. Jackson of Pomona, near Grand Junction, received from twenty to thirty boxes of Mammoth Black Twig from one row in his young orchard.

A. E. Barrick of Clifton has been netting more than $700.00 from one acre of Winesaps off fifty trees, for the past five years.

H. G. Crissey of Palisades netted $918 from one hundred Kieffer and Bartlett pear trees this season, taking 600 boxes from less than an acre.

The Western Slope has advantages which few other fruit sections claim—in profits to be made from growing crops between the trees of young orchards while waiting for them to come into bearing.

A. E. Johnson of near Grand Junction took 1,070 crates of cantaloupes from five acres planted between the trees, netting more than $250 per acre. Mr. Johnson, on another piece of young orchard eighteen acres in extent, harvested 244,000 pounds of potatoes, from which he received from eighty-five cents to a dollar per hundred. I. B. Smith of Clifton harvested $228.27 worth of melons from three-quarters of an acre planted to apples.

Now here you see the possibilities of both young and old orchards and these cases are not extreme. Many ranchers have done as well, some even better, in other seasons when fruit prices were higher.

But with the enormous production to an acre and to a tree, it is still difficult to realize what the fruit possibilities of the Western Slope really are.

There are still thousands of acres to be set to trees in Garfield, Mesa, Montrose and Delta counties. The two latter are gaining thousands of new acres from the completion of the Gunnison tunnel, while in Mesa county, private enterprise has added 15,000 acres to the fruit area of the county this year, and the High Line canal will develop even greater acreage of land adapted to fruit cultivation.

When we consider the possibilities of a single acre—and there are thousands of acres, each of which produces its car of fruit—the wonderful future of the Western Slope can soon be realized.

For instance, in 1909 the four fruit counties of western Colorado shipped nearly 5,000 cars of fruit—4,789, to be exact.

The total carload shipments, including potatoes, honey and vegetables, were 5,978 cars, divided as follows: Mesa county, 2,690; Delta, 1,777; Montrose, 815, and Garfield, 696 cars.

The figures for this year have as yet not been compiled by the railroad officials, but they will fall short of 1909 because of the unusual weather conditions, which brought frosts when least expected and which caught much of the fruit area unprovided with orchard heaters.

Many of the fruit growers remember the difficulty experienced in getting their apples to market a year ago. There was such a shortage of ventilated cars that it became necessary to utilize box cars for the transfer of apples, taking a desperate chance that they would pass over the range without freezing.

I do not believe any of us realize the fruit possibilities of this Western Slope. I am more familiar with Mesa county than with the other sections of the Western Slope, and I venture to predict that next season, with normal conditions, in the neighborhood of 5,000 cars will be sent out from the Grand Valley alone. Delta, Montrose and Garfield combined ought to be producing as much more, which will mean 10,000 cars to be placed on the market within a very short period of time and from a very limited area.

We apparently are doing nothing to solve the problems which will follow our efforts to market this enormous crop at exactly the right time and in such a way as to least influence the market downward. Of course, we may anticipate somewhat lower prices for our fruit as the total output increases, for the buyers as well as the consumers are governed entirely by the supply and demand.

It appears to me that it is not too early to begin urging the railroads, upon which we depend to get our crops to market, the necessity of providing for the future—and the very immediate future. We need more railroad facilities on the Western Slope, the roads need more equipment—more trackage. There should be an outlet over a double track to Colorado Springs and Pueblo, where the eastern and southern roads can begin to share the burdens we are placing on the Colorado railroads in the shape of profitable and perishable freight. I believe that these problems are already being considered by the railroad managers, but we should not allow them to delay their action too long, or we will some day awaken to a realization of our position when called upon to face a loss of a million or two in dollars and cents.

While Colorado already has a reputation equaled only by Hood River for her fruit, we will be forced to create new markets as our crops increase in volume. The Western Slope fruit growers should be united for a systematic advertising campaign to demonstrate its desirability to the millions of Americans who have never had an opportunity to taste of the delicious Colorado apple, peach or pear.

We should constantly strive to improve the quality and the attractiveness of the fruit we ship from here, for the appearance of an article is a salient selling point.

Canning factories and drying plants, also cider and vinegar mills, should be established in every fruit district in western Colorado, for in that way we not only secure a return for otherwise waste products, but we have an outlet into which we can divert a portion of our crops every year, when we find it necessary because of unstable market conditions or inadequate railroad facilities.

But above all, we must continue to improve the quality of our fruit and keep the culls at home. Then there will be no difficulty in finding a ready market for western Colorado fruit, even after the prediction I have made of 10,000-car crops have been verified, and even that amount is doubled or trebled as the new acreage now being planted and which will be planted under the High Line canal in the Grand Valley and the Gunnison tunnel in Montrose and Delta counties comes into bearing.

ADVANTAGES OFFERED FOR FRUIT RAISING IN THE UPPER ARKANSAS VALLEY.

JAMES TURNBULL, GENERAL MANAGER ROUND CREST CANNING COMPANY, CANON CITY, COLO.

It is rather a delicate matter to have to set forth the advantages of fruit raising in the upper Arkansas Valley when the statements have to be made at Rifle: As advantages are comparative, and comparisons are odious. Were it not for the fact that we all know that the quality of the fruit raised at Rifle was of such exceptional excellence as to overbalance any disadvantage that there may be, I am afraid that I would hardly dare to attempt to set before this meeting in this place the advantages of fruit raising in the upper Arkansas Valley.

At Canon City, the center and hub of the fruit raising industry on the Eastern Slope, we have been terribly behind the times in proclaiming to the world at large the many advantages that we have. We could well afford to take not one leaf, but many leaves out of the book of the Western Slope, who are past masters in the art of setting before the world at large the very great number of advantages that they have to offer, and to hold out to the fruit growers. And, we, most of us, unless we sing our own praises, our praises are never sung; at least not in such a manner as we all think they deserve.

We are therefore going to take a leaf from the book of the Western Slope growers and begin singing the praises that we can do with so much conviction.

Canon City has for many years taken not only some but many of the best prizes offered in not only the local fruit shows but those of International importance. From this fact it would be very evident that in the opinion of judges who are absolutely unbiased we can grow fruit at Canon City of such quality as is second to none any place else in the United States. This fact needs no further endorsement than the above.

I do not know that in quality the Canon City apples are any better or any less good than those raised in other sections of Colorado. I think that on this point there is very little difference; and Colorado apples have a fame that extends from one ocean to the other. So that we can perhaps pass over this point also.

The apples of the Canon City district, however, have keeping qualities, better than those raised in any of the other large commercial growing districts of the State. And it is entirely possible to keep in common storage Canon City apples until May and June. In cold storage they can be kept from a month to six weeks longer in practically perfect condition.

The fundamental question, however, as far as we are all concerned is the commercial advantages offered by any particular section. And Canon City is being favorably located, where we are at the door of the states of Oklahoma and Texas, the great consuming markets for Colorado boxed apples.

We have a lower freight rate than most of the other producing sections. We have not the long haul across the mountains, and therefore are able to get our fruit to market in quicker time and therefore in better condition. We have a considerable advantage in being near the Colorado terminals of the various railroads so that we get refrigerator cars, empty, easier than any other sections more remote from these points than is Canon City.

On small fruits the Canon City district being very close to Pueblo, Colorado Springs and Denver, as well as to the Leadville and Cripple Creek mining districts, which really comprise the populous centers of the State, enables us to get into these markets with our small fruit at a less cost for expressage than any other section. And our returns are, therefore, proportionately greater.

The same arguments that apply on the fresh fruits also apply on the manufactured fruit food products. This is well exemplified in one particular crop—that of the sour varieties of cherries. The growing of this fruit in the Canon City district is perhaps more profitable than any other crop, because there is an almost unlimited market for cherries when properly canned, and a very considerable market can be had in the large markets, such as Chicago, St. Louis, and Kansas City without too great an expenditure of time in transit. For canning purposes, this fruit is worth from three to four cents per pound and in average seasons will net the grower $1.50 per crate

when placed upon the fresh fruit market. These results cannot be obtained in any locality where they have not got the outlet that Canon City has.

One of the greatest advantages in the upper Arkansas Valley is a canning plant at this place. This is a large institution giving employment to from fifty to one hundred persons. During the past year, this plant has used over two carloads of cull apples per day, which otherwise would have been a total loss to the community. Besides this, it affords a splendid market for the surplus small fruits and vegetables at a profit to the grower which is nearly as great as though shipping the same on the green fruit market.

To illustrate further the commercial advantages of fruit growing in the Canon City district, I can give you a few statements as follows. The yield of Black Twigs in the Troutman orchards during the season, 1910:

From 226 acres, 134 trees, averaging 52 trees to the acre, 4,104 boxes of apples, or an average per acre of 1,580 boxes.

Average price per box	$ 1.04
Equals a gross profit of, per acre	1,643.20
Picking, packing and boxing, per box	.25
Liberal estimate of cost for general care, including pruning, heating, spraying and thinning, per box	.05
Total cost per acre	474.00
Net profit per acre	$1,169.20
One-acre yield, 62 trees to the acre, 1,936 boxes	$ 1.04
Gross profit	2,013.44
Total cost per acre	580.80
Net profit	$1,432.64
Record of two-thirds of an acre (.65), 72 trees per acre, 1,438 boxes, which is at the rate of 2,212 boxes per acre, at per box	$ 1.04
Gross profit	2,300.48
Cost per acre	663.60
Net profit per acre	$1,636.89
Heaviest tree yield	54 boxes
Heaviest ten tree yield	483 boxes

This, of course, is not an average. It is a specially selected instance; but it might be made an average because this tract, which is part of the Round Crest Orchards, owned by P. H. Troutman, was heated and thus protected from the late frosts in the spring—was properly pruned, and properly thinned and sprayed, and given careful, scientific attention in every detail. There is no reason why other orchards should not produce an average equally as good as this, and, as a matter of fact, many acres of orchard in the Canon City district this present season have produced returns nearly as good as this just cited.

ORCHARD OF BLACK TWIGS, OWNED BY THE ROUND CREST FRUIT COMPANY,
P. H. Troutman, General Manager, Canon city.
Record of two-thirds of an acre (.65), 72 trees per acre, 1,438 boxes of apples in 1910.

The protection afforded by orchard heating will eliminate the crop failures which have been so serious a menace to the growing of fruit in the Canon City district in the last few years. Two and three years ago this section was very seriously damaged by late frosts. This present season the Western Slope suffered very severely, and it is evident and apparent to all who observed the matter closely, that had orchard heating been generally adopted and followed in a systematic and scientific manner, there would have been no failures in either section either year.

Fruit growing in the Canon City district is, therefore, reduced to almost an exact science. And when intelligently carried out, a net profit of $300 per acre, over and above all expenses of every kind, is assured; and when we say $300 per acre, we are putting it at a very conservative figure.

DISCUSSION.

Mr. Chubbuck—I would like to raise one question. In figures given we were given what were said to be net returns. I would like to ask what is to be understood as net returns. Are they really net returns or simply net returns from the Fruit Exchange? Do they represent total crops?

Mr. Newton—I think they take the returns that are gotten from the association net, after the commission is out; not after the boxes and packing are taken out, but the net return after the fruit is sold and the commission taken out.

Mr. Shaffer—That would be net except the labor; the labor involved would not be deducted?

Mr. Newton—No, sir.

Mr. Shaffer—I would like to ask—the paper suggested a possible over-production of apples as these various acres that are now coming into bearing and the acres to be planted come into bearing—as fast as these come in, as I understand it from this paper, Brother Meyer suggests that there might be such a thing as a surplus. Is it not a fact that there has been a general falling off in the apple crop, Professor Chubbuck, and that the demand is increasing and the supply is decreasing?

Mr. Chubbuck—I am not exactly informed on that point, but my opinion is that so far as the total output of apples for the country at large is concerned, there is really a falling off. I don't think we need be alarmed on the question of overproduction.

Mr. Newton—We are gaining in demand faster than we are producing apples.

Mr. Taylor—In 1896 the total production was 69,000,000 barrels, and either last year or the year before it had dropped by gradual decrease down to 23,000,000 barrels.

Mr. Clough—There is no question but what there has been a great falling off in the production of apples in the United

States, but there is something besides production of a crop. What did we get for that large crop, and what do we get for the small crop? I came from Maine, and before I was twelve years of age I remember we had a small orchard on the place, but a young orchard which did not supply us with enough apples for the year, so I remember going with my father about six or seven miles north of where we lived in an adjoining town and buying apples. Of course, we had to pick them ourselves. Some were on the tree and some on the ground, but we bought those for seven cents a bushel. We couldn't grow fruit today for seven cents a bushel. We produced in 1896 69,000,000 barrels of apples in the United States and only 22,000,000 or 23,000,00 barrels of apples last year. We do not mean that when we produced that great big crop we were making a good profit on growing those apples, which we surely were not. In 1878 the first good export demand for apples came to this country from England. Everything was packed in barrels down in our country, as it is today, and the man who had a good large orchard (and I lived in a good orchard county, Kennebec County, in the State of Maine) went around the country buying up flour barrels, which was the standard apple barrel. It was worth 20 cents. The apple grower bought those barrels; he got 80 cents for his apples and hauled them six or eight or perhaps only two miles to the shipping point. The farmer thought he was doing pretty well when he got $1.00 a barrel for choice apples.

We must consider that while the apple crop of the United States has fallen off, we have a natural increase in the price of our fruits, which makes it more profitable for us to grow 23,000,000 barrels of apples than it formerly did to grow 69,000,000 barrels. I believe the apple crop will increase materially, but we have a foreign demand which is coming on and is going to take large quantities of our fruit, but we must pack so it can stand the passage across the water and can be held a reasonable time on the other side, until it can be consumed.

Mr. Troutman—I want to reply to one remark about the profitableness of our 23,000,000 barrels of apples today. It must be borne in mind that to produce a box of our "fancy" apples in the West it costs easily double and perhaps three times as much as it does the Eastern man to produce that box of apples. I recall an instance last year in Iowa. Last year Mr. S. P. Spencer of Randolph, who had forty acres of apples, Grimes Golden and other good varieties of apples, harvested and sold his apples, I think it was for $11,000.00, and he told me that his windfalls, which he picked up and sold to a cider mill, paid all his boxing expense and that the only expense he was out was for one spraying that cost him about $200. His orchard is seldom pruned or sprayed, never heated, irrigated or cultivated, and therefore his margin of profit is very much greater than our profit is out here, because it easily costs on the average 40 to 50 cents to pick, pack, harvest and grade box

apples. There is one more point in regard to the paper just read that I would like to call attention to. That is the wonderful benefit to a community of a canning factory. I am in that business, but I don't want you to think I am talking just from that line. I would have to go out of many small fruit growing lines I am in if there was not a canning factory at Canon City, because many times we can't dispose profitably of many of those small fruits, and this is especially so when it comes to apples, and it would be true of you people over here who grow peaches. Our cull peaches and apples bring us a very good profit, because we have a place to put them, and it has been a matter of astonishment to me that you haven't had a half dozen canning factories over here before this.

Mr. Newton—What do you pay for cider apples?

Mr. Troutman—We pay for canning apples 35 cents a hundred, and 25 cents a hundred for cider apples. Everything that is two and one-fourth inches in size, 35 cents a hundred. It costs about 10 cents to pick them up and haul them to town.

Mr. Newton—The matter of price of our fruit and the profit we get out of it and the grading price is due, in a large measure, to the fact that we keep it longer. When I was a boy we didn't have apples until May of the next year, but the Government is experimenting and individuals are experimenting so that we keep them about nine months and we have fresh apples, and it is the only fruit that can be kept that way. That is why we pay more for apples than anything else. Apples are the most staple fruit we have.

Mr. Hogg—My old grandfather said he could make money on apples and make them into cider. Now, if we grow vegetables in between rows, as the paper suggested, I think that will pay for the care of the orchard, so we will be on the same basis as the Eastern orchards. Their ground back there will not stand the growing between the rows of vegetables, but ours here will. I have demonstrated the fact, because I have grown carrots in my orchard for five years, and in that part of the orchard I am growing just as fine apples—in fact, finer than in some other part of the orchard. My carrot crop has paid for the care of my orchard and more, too, so my apples have been absolute profit. I think, as the paper suggests, we can do that and then have no fear of having to compete with the Eastern orchards.

Mr. Taylor—Mr. President, one point always comes up as bearing on the decrease in production in spite of the increased planting of orchards. A great many people ask me why it is that in the last ten or fifteen years the production has dropped down to one-third what it was, in spite of the tremendous planting in the Western and Northwestern states and other places. I think we can explain that, perhaps, by the dying of the orchards through the Middle Western States. The state of Missouri boasts of 20,000,000 fruit trees growing there, and I will ven-

ture to say that half of the little valley of the lower Grand River produces more than all of the 20,000,000 of trees in Missouri, and the same thing is true of all those states throughout the Middle West. The trees are dying from neglect and diseases which are not present in our orchards out here, and I think we can explain a great deal of that dropping off in the production from the dying of orchards in the Middle West.

President Parfet—For the benefit of both Canon City and the Western Slope, I want to say that I paid on the Denver market five cents apiece for apples produced in Denver county—at the Madison orchards just outside of Denver county. Delicious apples; they were retailing for two pounds for a quarter; I believe they produced this year about 800 boxes of delicious apples.

SMALL FRUITS.

M. R. KILBURN, PRESIDENT AND MANAGER THE NORTHERN COLORADO NURSERY COMPANY, LOVELAND, COLO.

It is a pleasure to have the privilege of presenting another paper to the members of the Horticultural Convention. My paper of two years ago before this society has brought me many letters of inquiry concerning the growing of small fruits, and for that reason I conclude that some good has been done. The growing of small fruit is not occupying the attention of orchardists that it should, and especially the market gardener and those living near the city markets and on small tracks. One or more acres in small fruits will prove a great benefit to the cherry and apple grower, as it will aid to keep the help employed when labor is not required in the orchards, and also prove quite profitable. If we can have enough work to keep the same help employed throughout the season it will render us better service and we can keep our pickers during the entire season.

The growing of strawberries is very profitable in Colorado. if one has the proper soil and a good water supply. A sandy loam is the best for strawberry culture. The land should be thoroughly enriched and selected for easy irrigation. Strawberries require plenty of water and should be irrigated once each week during the first six or eight weeks from planting; cultivate after each irrigation. Colorado does not produce one-tenth enough strawberries for home consumption and prices are always good, ranging from $2.00 to $4.00 per case for home grown fruit. Senator Dunlap, Aroma, Gandy, Warfield, are all good, and do well in our climate.

One in growing strawberries should plant some new ground each season, in order to keep the beds renewed. This is also

the most economical, as plants are always at hand from the old beds to start new ones.

Irrigate your strawberry beds as late in the fall as you can get water, then mulch with barnyard manure or straw.

Red raspberries make an excellent crop to grow with strawberries, as they begin ripening about the time strawberries are finished up. The red raspberry is one of the most popular of fruits, and people cannot resist the beautiful red berries, even though they come high. The same character of soil and same method of preparation required for strawberries is also necessary for raspberries. After soil has been prepared, mark out rows seven or eight feet apart by plowing a deep furrow, then lay the plants in, two or three to the hill, then plow a furrow onto the plants; later go along and straighten plants up and tramp the dirt solidly around the plant with the foot. This is a fast way to plant and has proven just as good as where they are planted with a shovel and a single plant at a time.

The Marlboro is far superior to any other sort for commercial purposes, being of a bright, attractive color, large berries and an excellent shipper. No other fruit will bring greater returns, and the third year from planting will bring a full crop of fruit; from 300 to 500 crates per acre is considered a good crop, and the average price will range about $1.50 per 24-pint crates. It costs to produce a crate of raspberries, including picking and boxes, about 50 cents per crate.

Most of the work can be done by women and children. The black raspberry is quite as successful in Colorado as the red raspberry, and requires the same methods of treatment. The Kansas and Gregg are both good. Following along the same line I might mention the blackberry and the dewberry. These are all very much neglected in Colorado. Blackberries are very profitable and one never needs have a failure of crop, as the canes should be covered during the winter and early spring, so there is no danger of freezing out. People who are living on small tracts near town, could make a great deal more money with less work if they would grow more small fruits.

The currant and gooseberry are two fruits that should occupy a prominent place in all orchards. The red currant is one of the hardiest of small fruits, as well as being very profitable. The land should be very rich for currants and a coating of barnyard manure will pay. Practice clean cultivation and give plenty of irrigation while the fruit is on the bushes. Currant bushes should also be kept well pruned, allowing no wood to become over three years of age. Plant rows six feet apart and four feet in row. Fay's Prolific and Red Cherry, with good quantity of London Market, for the late fruit. London Market, coming late in the season, always commands a good price.

Gooseberries, while one of the easiest fruits to grow, some years produce wonderful crops. Some growers report a return of $600 per acre for their crops the past year. Being marketed in the green state they will bear shipping a long distance and still reach the market in first class condition. Gooseberries require about the same methods of treatment as the currant, and plant about the same distance apart.

All the large growers of gooseberries are using large hand rakes or scoops for picking the fruit, after which the fruit is run through a fanning mill. The cost of picking is reduced one-half in this way and it leaves the fruit in excellent condition for the market.

The Oregon Champion is one of the most prolific of gooseberries and the bush is an upright grower. The Downing and Pearl are also good standard varieties.

Every fruit grower will find it profitable to grow all the fruits that I have mentioned.

The inclination of the city people to reurn to the soil is becoming more prevalent every day, and every one recognizes the ideal life as being one in which they can own their own little home, surrounded by the fruits and flowers, where they may commune with nature and be free from the nerve-racking noises of the city. This alone is ample inducement for us to plant more fruit and build more country homes.

DISCUSSION.

Mr. Shaffer—I would like to ask if any one has had any experience with the Bederwood.

Mr. Troutman—While it's not a very good shipper, we get more money out of the Bederwood than any other variety of strawberry. It yields enormously, and for some reason the people in Denver would rather pay twenty-five cents a crate more for the Bederwood than any other berry we grow, in spite of the fact that it is important that you have to pick the berry in the morning before it is hot and rush it to Denver, and it has to be sold the next morning or consumed practically within thirty-six hours of the time it is picked. I don't believe it would be good for you over here, on account of the long haul, but it has a flavor that very few berries have.

Mr. Shaffer—Nature has afforded the Western Slope a system of refrigeration that is perhaps greater than any work of man. We load strawberries, red raspberries and all those things here at six o'clock at night. They go over the cold range that night; they get to Canon City—I don't think we sell any of them there—they reach Canon City about two o'clock in the morning, Pueblo about four, Colorado Springs about six, and they are on the market at eight o'clock in the morning.

Mr. Troutman—In that case, then, the Bederwood I would recommend very strongly.

Mr. Newton—They use them at Fruita extensively.

Mr. Troutman—There is another thing in this question. I want to heartily endorse everything that was said by Mr. Kilburn in that article. We have tried the raising of small fruits in our orchards; especially in our small orchards we find it very profitable. We find that we give our orchards better care than if nothing was growing there, and I can bring a young orchard into bearing without a cent's worth of cost, and I will have interest on my money, by the growing of small fruits.

Mr. Miller—Have you had any experience with the Aroma?

Mr. Troutman—We are just trying it this year, and I cannot report on that berry.

Mr. Shaffer—Last year at the Palisade meeting—and I want to withdraw a statement I made there at that time—I was advocating the ten-acre tract idea and told certain things for planting. I have proven everything except in the case of squashes and pumpkins, and you have to have more than ten acres of ground to grow them on your own ground. (Laughter.) Mrs. Shute, would you be kind enough to give me the names of those strawberries.

Senator Dunlap—Aroma, Gandy and Warfield.

Mrs. Shute—I would like to have you try the Brandywine.

Mr. Clough—Mr. President, I would like to ask Mr. Troutman or any one else if they have ever tried the Clark Seedling. It is the great berry on the Pacific Coast. They stand shipping to Chicago from Hood River. I have bought them in Denver and in Minneapolis. They are a large, round, dark red berry, and I thought of trying some of those next year, and if any one here has tried them I should like to know their experience and how they yield here. Probably ninety per cent. of the berries grown out there are the Clark Seedling, and they know how to grow things.

Mr. Garrison—I think we have grown strawberries twenty-five years or more at Denver, have we not, Mrs. Shute?

Mrs. Shute—Yes, sir.

Mr. Garrison—The strawberry raisers of Denver and Jefferson, Adams and Arapahoe counties have made thirty-five per cent. more out of the Jucunda than any other berry. While there is a first class Jucunda on the Denver market, it is impossible to sell any other berry of any kind while that berry is in reach of the people.

Mr. Garrison—The strawberry growers of our country have made thirty-five per cent. more out of the Jucunda than any others, and I make this statement unqualifiedly: that as long as there is anywhere near a first class lot of Jucunda berries in the Denver market, you can't sell any others. That is not only true, but a Jefferson county Jucunda shipped to Omaha or Topeka or Kansas City outsells any other berry that is placed in that market all the way from fifteen to thirty-five per cent.

Mr. Clough—I have two small patches of strawberries upon the hill on my ranch, and nearly all of them are Jucundas, and the berries we brought down to town last year were said to be by every one who brought them (we didn't have many, because we had a small patch) the finest berries that ever came into this town. I want to go a little further. We knew there was a good many berries on that patch, so we kept track of what we picked; and I am not over-estimating, from the number of berries we picked off that patch, which we sold at $3.00 per crate here in Rifle, an acre would have brought us $1,000.00. The patch is two years old.

Mr. Garrison—I had a patch of Jucundas I picked from for eight years. I picked a good crop the eighth year, and I know positively of neighbors who have picked the Jucunda patches ten years. One neighbor picked his Jucunda patch thirteen years. It is readily recognized by every one that a plant that has this endurance is really harder to get a crop the first year. The Dunlap will pick three times as many berries the first year as the Jucunda, or the Dunlap will make five times as many blanks the first year as the Jucunda, and while we pick three times as many crates of berries from the Dunlap the first crop, the third crop you will pick three times as many Jucundas and the Jucundas will last three times as long; that is, the plants will endure that much longer.

Mr. Shaffer—Do you use the matted row system or the hill system?

Mr. Garrison—We use the matted row altogether, and I would state this: that all the evils that grow out of the matted row system do not any of them attach to the Jucundas, but they all attach to the Dunlap and Warfields. You never have any too many plants; you always have just enough.

Mr. Shaffer—Has your experience shown that fall planting was as good as spring planting of strawberries?

Mr. Garrison—Well, I have grown strawberries fifty-five years. I never got any strawberries to grow in Colorado in the fall. In Iowa and Ohio, where I grew strawberries a long time, I succeeded just as well in the fall as in the spring.

Mr. Parfet—On account of scarcity of water?

Mr. Garrison—Yes, on account of scarcity of water—on account of many other things I haven't time to explain. Those we started in the fall never amounted to anything.

Mr. Clough—I would like to ask Mr. Garrison if he considers August fall planting?

Mr. Garrison—Yes, sir. I have planted early in the spring before we had any water, with good success. I have planted in August with no success. I wouldn't advise any one to plant a strawberry plant or any other kind of a plant or any kind of a tree in the fall.

Mr. Clough—We have planted two small patches in August and September. The first patch had a nice lot of strawberries this year. I lost about four plants out of six hundred. No patch of strawberries ever did better than those. That is on the mesa soil here, where we have plenty of water. I would plant in August in preference to any other month, on this side of the range. That is just my own experience. I know men on this side of the range will ask you when is the best time to plant strawberries. They will say, "Any month you have water."

Mr. Garrison—Raspberries will do the same as strawberries. I have a raspberry patch that has only one-sixteenth of an acre in it, and it is on the stiffest, meanest adobe I ever saw, and last year for over two weeks on one-sixteenth of an acre every other day my returns were $25.00, and that land is so hard to plow that I can't plow it at all.

Mr. Chubbuck—I saw in the Denver papers during the latter part of the strawberry season a statement to this effect: that there were not nearly as many strawberries being grown in the vicinity of Denver as formerly. I want to ask if that statement was well based. If it is well based, what is the cause? I would like to get at, if possible, the reason for this.

Mr. Hogg—Mr. President, I was just going to remark that I had a strawberry patch die out one winter there because of the roots burning out on account of lack of water. We never have any late water on the east side, and if you have no water you will lose old beds as well as young beds. Strawberries are short rooted and dry out very quickly, and that is the reason Denver has gone back on strawberries, because, I think, two-thirds of them have been killed out or winter killed.

Mr. Garrison—I think I can answer Brother Chubbuck's question advisedly. A very large proportion of our land that is not planted in orchards has already been planted in strawberries. It is impossible to raise strawberries, the second crop of strawberries, on the same land inside of five or I would be safe in saying ten years. There is no crop in the world that exhausts soil like the strawberry does. Do you know why a strawberry has runners? It has runners only for one reason, and that is the young plant is hunting for soil where the salts it requires have not been exhausted. The salts that are necessary for growing strawberries are all exhausted the third year with any other berry except the Jucunda, and on our lands we are compelled to plant peas and plow the peas in if we expect to raise any strawberries for six years after the land has had strawberries on it. Really the only way we can succeed successfully is to put the land in alfalfa and leave it ten years. That is the reason why, Brother Chubbuck, we have exhausted our lands as far as the strawberries are concerned.

President Parfet—You don't mean to say the second crop; you mean after the vines have played out?

Mr. Garrison—Yes, sir.

CULTURE OF NATIVE OR AMERICAN GRAPES.

M. E. SNOW, CANON CITY, COLO.

While this subject is not of my own choosing, it is nevertheless a worthy one and deserves far better treatment than I shall be able to give it. Knowing, as I do full well, that my talents, whatever they may be, certainly do not run to literary effort, and my only excuse for offering this at all, is a desire to bear my part in helping to build up and maintain these State gatherings. We need more of them, and for my part I should like to see a few summer meetings added to the midwinter one.

It seems to me that right out in the orchard, during the growing season, would be the ideal place to hold a horticultural meeting. Certainly it would give a great chance for practical demonstration in work of spraying, pruning, cultivation, etc.

Then, too, I think this State organization should be supplemented by a good local or county Horticultural Society in every fruit-growing district of our state. In Fremont county, we have such a society, and it is a live one, too. It is recognized by all as one of the leading organizations of the community, and has done at least as much as any other agency to build up and advance the horticultural interests of this section. Our county commissioners recognize its importance by donating a room in the court house for meeting purposes, and here monthly meetings are held throughout the year. During the winter season an annual institute and rally is held lasting two or three days, at which time a special effort is made to get in new members.

A Fruit Show held in connection with the institute has proved very helpful in keeping up the interest and is growing in importance every year. The prizes are donated by our merchants and they have always treated us very liberally. In return for this, our ladies usually serve a dinner during the noon hour, to which all fruit growers, as well as the merchants and others who have contributed, are especially invited, and this, too, has proved a valuable feature with us and has done much to promote a friendly feeling between our business men and the ranchers, as well as affording a splendid opportunity for even the ranchers to get better acquainted.

But, I have forgotten the grape, and it would seem that with two-thirds of the grapes consumed by Colorado people, shipped in from outside her borders, that this branch of fruit growing has not received the attention that it deserves, and while it is not my intention at this time to especially advocate the planting of this fruit on a large scale, yet, I do most emphatically want to plead that it be given a place on every fruit ranch in the State, to the extent of supplying, at least, a liberal amount for home use, for certainly no fruit is better liked by the majority of people than the grape.

It is easily grown, gives quick returns and readily adapts itself to almost any location, yielding abundantly, year after year, the most perfect fruit.

So, that it seems almost a shame that so many of our fruit growers even are doing without this most luscious fruit, that could be so easily supplied.

I do not imagine that the native grape will ever rank commercially in this State with the apple, peach or cherry, but until we grow at least enough for home consumption, planting certainly can be safely extended and in certain portions of our State would no doubt be found quite profitable, even on a commercial scale.

In selecting a site for the vineyard, choose the best that can be spared, for while it is true that the grape will thrive, often, on a rocky, barren knoll, where most fruits would starve, yet the chances are that it might even do better under more favorable conditions, but in any case, especially if planting in an orchard, try and secure as much sun as possible and soil of a sandy nature will generally give you earlier and sweeter fruit, than the heavier soil. Rows should be planted seven to eight feet apart, with vines at least eight feet apart in the row, depending somewhat on the variety. The soil where the row is to stand should be loosened up to a good depth and as a rule, good strong, one year vines will be found fully as satisfactory as the older plants, cost less and are more easily planted.

If planting on a very large scale I should leave a little wider space about every fourth row as a passage way for the spray cart and manure wagon. A three wire trellis with posts twenty-five feet apart, well braced at ends and holes bored in posts for the stringing of the wires, is all that is necessary, and will stand as long as the posts will last.

The grape is naturally a strong, rank grower and on ordinary soil will not require any fertilizer the first two years. But keep the cultivation going, especially during the first part of the season, always striving, by cultivation and watering as needed, to secure a good strong growth early in the season, but later on, say about August first, withhold both, thus checking the growth of the vine and allow the full strength of the plant to go to the maturing fruit. In this way you will get earlier and sweeter fruit and vines will ripen up in much better shape for winter.

After vines are in bearing, a moderate application each winter of barnyard manure will be of benefit, but do not overdo the fertilizing at any time, as you may get a great growth of vine at the expense of the fruit.

The pruning of the grape is probably the most important part of the season's work, but really any system that will reduce the amount of bearing wood and not allow the plant to set more fruit than it can properly carry to maturity, will be found

satisfactory, and as different varieties require different treatment, in this respect, it is hardly advisable to prescribe any set rule to cover all varieties and conditions of growth. However, a little watchfulness on the part of the grower will soon enable him to determine from the maturing crop the amount of bearing wood that his vines will support. If your berries are inclined to run a little small, I should certainly advise heavier pruning the following year. Any of the mild spells during February or early March will be found a good time for this kind of work.

As for insect pests and diseases, of course the grape has its enemies as well as other fruits, but on my own place it has required less doctoring than any other fruit, and as our college bulletins cover this part of the subject far better than I could hope to, I shall cut it out entirely and ask you to refer to the bulletins, which can be freely had for the asking.

As to varieties, there is almost an endless number from which to choose, and every one palate ought to be able to find just the right flavor to suit, as well as the color desired. My own vineyard contains over twenty varieties, and this number will probably be added to, rather than be diminished, as I enjoy watching the growth and noting the different characteristics of each, as they mature, covering a period as they do from August tenth to October first. But for the average grower who grows for market, of course this would be all wrong, as only a very few varieties would be wanted, and as the market seems to prefer a black grape, the planting should be largely of this class, although my own experience has been that a limited amount of the red and white varieties can be marketed locally at an advanced price over the blacks. Where the season is long enough to properly mature it, I doubt if anything has yet been found to beat the Old Concord, but for Colorado planting in general, with our high altitude and comparatively short season, I believe the Worden will be found more satisfactory for the general crop, as it matures ten days earlier, is a sweeter grape and bears just as well. It is, however, a little more tender skinned and so does not ship quite so well. Moore's Early is a very good early Black grape in some localities, but in others does not yield very well. McPike and Campbell's Early are two of the newer introductions that are quite promising, the latter, especially, being very handsome in bunch and berry, but quality only fair. Of the Red varieties the Brighton, Delaware, Salem and Agawam are probably as good as any, and I should rank them about in the order named.

In White we have the Niagara, Moore's Diamond, Green Mountain, etc., which are all good, but for me the Diamond has proved a little more hardy than the Niagara, fully as good in quality and a heavier cropper, showing the past season, which was an off year, probably more fruit than anything in the vineyard.

The Green Mountain is fine for home use, being very early and of superb quality, but rather tender for shipping. All of the red and white varieties are less hardy than the blacks named, and even in the Canon City district will often winter kill to some extent, unless vines are laid down and a light covering of earth given in the fall.

But this is already longer than I intended and I will close by pleading that every fruit ranch, not already well supplied with this fruit, give it a chance in next spring's planting to the extent of twenty-five vines, at least.

FOREIGN GRAPES.

HON. A. C. NEWTON, GRAND JUNCTION, COLO.

The foreign grape is as "old as the hills," apparently, as almost from the earliest history of the human race we read of the wines made from these grapes. Noah, of Bible fame, knew all about the foreign grape, and it has been an article of diet as well as of drink all down the centuries.

The nativity of the grape is hard to determine, but most authorities claim that it is native to the country 'round about the Caspian sea, where the vines are very hardy and grow to the tops of the highest trees. Vines were introduced into France, Germany and other countries of the Old World from 300 to 600 years before Christ, while it was as late as 281 A. D. when the first vines were planted in the Rhine Valley, where the wines have become so famous.

It was not until the middle of the eighteenth century that the grape was introduced into England, where it met with a good deal of success, though it was tried by the Romans much earlier, but failed.

As early as 1620 and 1680 efforts were made to grow foreign grapes in Virginia and Pennsylvania, but the result was a failure, and they have never been successfully grown in any section of the East, and in fact, they have been and now are supposed to be impossible anywhere but in California, and the old-time settlers of that state open their eyes in surprise if we of the Grand Valley show them magnificent clusters of Tokay and Muscat grapes and claim that we raised them in Colorado—they deny that we can do it at all.

It was about 1771 that the cultivation of these grapes was successfully established in California and the result has been attended with flattering results, as we are pushing the old countries hard in the amount of wine manufactured, and the heaviest carload shipments the past season from California, as I note from a report made by John F. Moore, manager of the Grand

Junction Fruit Growers' Association, the past week, was of foreign grapes, and the number of carloads was given at 4,930 cars, while of peaches, apples and pears there were only about 2,000 each. This was astonishing to me and will be to many here, as we always think of California as a peach country, and it must be understood that only a fraction of these grapes are shipped green, the larger portion being used for wines and raisins.

To my mind there is no other fruit that quite takes the place of the foreign grape for the table; it is decidedly healthy and nutritious and can be eaten with impunity, and no orchardist who lives in a section where they can possibly be grown should fail to have at least a few vines for his own table. My friends on the other side of the range in Colorado say that they can grow them to some extent and every section should try it out. The vine is exceedingly hardy but it requires a long season of summer heat for not only the ripening of the fruit but the vine as well and they do not flourish at all in a moist climate.

The greatest drawback to the successful growth of the foreign grape in this country is the difficulty of getting them to market in a perfect state and the government is making experiments in order to determine how best to do this. The Agricultural Year Book of 1908 says that the use of cold storage will keep the grape from 60 to 100 days while the fruit will keep but ten to twenty days when packed and shipped the usual way. It says the effort is being made in order to supersede the imported article, and it may surprise many to know that in 1907 this country used 1,500 carloads from European countries. The use of finely cut cork has also been successful, and it is in this way that they are imported.

The Year Book of 1909 goes farther into detail as to the work of experimenting in shipments and it claims that a good deal of the present loss can be avoided if great care be taken in picking and packing the fruit, as the grape berry is easily cracked or bruised and is to a large per cent. rendered unfit for long distance shipment by being pressed into the packages in great haste. Those most carefully prepared and packed will show less than two per cent. decay at the arrival at New York while those packed in the customary way show nearly six per cent. decay; the first are in a merchantable condition a week after arrival while the last named are almost unsalable and to a point where there was nothing in them to a grower.

I was on Market street in Chicago three years ago late in the fall and witnessed the arrival at the auction room of several cars of Tokays, Emperors, Cornichons and other varieties and they were actually unfit for the table and were sold mostly as job lots to the Italian vendors, who went over them carefully and selected out the best. It disgusted me with the shipping of foreign grapes, and until some more successful

method of handling is used the grape will not be a money maker where it must be shipped any distance.

I very much doubt if the raising of these grapes here to any great extent will prove satisfactory; as the local market will soon be supplied and we will never be able to send them out in car lots with success. Ten years ago I had the handling of six acres of these grapes and made many trials in seeking markets outside of Colorado after fully glutting the market here. I sent twenty crates to Minneapolis where they sold as common Concord black grapes and there was barely enough left to pay for the freight and the crating. I also tried Chicago and other points but without success. Since then the acreage in our section has been cut down and now there is a good market for the limited supply.

I would set out for home use two or three varieties—the Muscat, Purple Damascus or Black Hamburg and possibly the Tokay, but I do not like the latter so well as the others, and they are far more liable to become bruised if you wish to ship them.

When Mrs. Shute asked me to write something on the subject I told her I knew nothing about it, and I did not then know how woefully ignorant I actually was. It is an almost inexhaustible subject. These grapes are raised to an enormous extent and the number of kinds, colors and tastes of wines is legion. Some countries went into the culture so extensively that their rulers had to pass an edict to save some of the ground for breadstuffs. I confess that I am just a little bit "nutty" on the subject of foreign grapes but the distemper has been on the increase since I began to know just a little bit about this marvelous product—the vine. If I were to see some of the bottles of wine made away back in the middle ages I should certainly want to break the total abstinence pledge and take a "wee bit of a drop."

GROWING FOREIGN GRAPES IN THE GRAND VALLEY.

S. H. HANDSHEY, PALISADE, COLO.

First, select ground with sufficient fall to drain the water off nicely. Ground should be leveled thoroughly, then mark off rows every eight feet both ways. This will give you 680 vines to the acre.

The next most important is to procure vines with three joints, or vines that have been started by cuttings of three joints. This will start the crown up far enough so the fruit will not come in contact with the ground and give space to get spray between the fruit and the ground also.

The grapes best adapted for commercial purposes, in my opinion, are the Muscat, Muscatel, Tokay and Cornichon.

In spraying, I use the dust spray manufactured by the Dust Spray Co. Formula: 40 lbs. fresh air slacked lime, 5 lbs. Bardoux in dust formula, and 10 lbs. sulphur, thoroughly mixed together and applied with a hand dust sprayer made by the Dust Spray Co. The first spraying should be done directly after uncovering in the spring just before the bud opens; the next spraying should be done about the 15th of August. This in my opinion is the most important. See that all foliage and all fruit comes in contact with the dust. The last spraying I do about ten days after my last watering. I only water three times in one season; first spraying about ten days before watering.

Pruning grapes. I usually leave two joints in the fall. Summer pruning, I do not cut back anything except Tokays. This variety I watch very close as the growth is very rapid and the wind has a tendency to blow them off. This can be prevented by simply pinching off the top with thumb and finger, or a knife can be used, being careful not to cut too low, as the fruit on this variety must have all the shade possible from its own foliage.

Harvesting grapes. Boxes should be made out of 5 inch peach boxes with wide bottoms and the same for sides, this making a box that will not let the berries through and will also give ventilation. With the cleat nailed on the bottom the same as nailing up a peach box, this will also give ventilation when stacked up in rows. Grapes should be picked and left in the sun from six to eight hours and then left stand in the packing shed or some other place in the shade from 24 to 48 hours before packing. In picking grapes one should have a long pointed knife to pick out the inferior or bad berries or green ones that are in a pod. The pod should be cut off in the same position as it grew and handled in just the same position while extricating bad berrids if any, never turning a pod over. If a pod is turned over from its natural way of growing the berries will all loosen on their stem just coming from the vine and not being shrunk. This is one thing that must be done or your grapes will not stand up in transit.

Packing, the last and most important thing of all, is an honest pack. Do not put anything in a crate that you would not like to buy yourself. I have shipped grapes this year into every state from Colorado to New York with the exception of Indiana, with most gratifying results. A crate of grapes, on honest pack, will weigh gross 31 lbs., and net 28 lbs.

DISCUSSION.

Mr. Shaffer—Don't you believe, Mr. Newton, that it would be possible on the Western Slope to supply the Denver market with the native grapes?

VIEW OF THE VALLEY THREE MILES WEST OF PALISADE, COLORADO.

Courtesy of E. S. Sheriman—The Palisade Tribune.

Mr. Newton—Yes, I think so, although they raise grapes just as well or better than we do on the Eastern Slope, and they tell me they never made a success of shipping native grapes at all.

Mr. Shaffer—Well, I understand they ship in several hundred carloads every year from Niagara.

Mr. Newton—They probably keep them in cold storage just as they do in California. This year has been the biggest success in the shipment of foreign grapes ever known from California, and a good deal of it is due to the fact that they have been careful in packing. I will explain how they pack the foreign grape. They have a four sided tin affair that laps around it, and pack them in bottom side up, just as you face a box of apples. When they are picked and packed by the crate, the pickers and packers do not care much how they get in, and just jam them down in, and the grape cracks, and every time they crack they rot, and they rot in six to ten days. The government is experimenting, and especially the people of California, by being very careful in putting the grapes into packages, they arrive that much better. They have been shipping grapes to Des Moines and other points east and they arrive in splendid condition and keep for ten days or two weeks after. That is possibly why the New York markets supply the market after our local crops are gone. We buy everything in Colorado; we buy it anyway, no matter what the cost.

Mr. Troutman—Mr. President, I can vouch for the grapes Mr. Newton has grown because he is always very kind when he brings them to state fairs to see that he brings plenty of them for the judges and for the growers who may also happen to be there, and it has been my pleasure many times to see and sample those grapes. Capt. B. F. Rockafellow is the only man who ever grew them, to my knowledge, at Canon City. My present foreman, who for many years managed his place, tells me that they did very well. They have to be mulched and buried in the winter, and I presume they have to be on the Western Slope, I don't know. I am going to plant some this next spring myself; a few years from now I will be able to tell you more about them.

Mr. Newton—There was one thing for the benefit of this part of the country for foreign grapes. I took eight or ten crates to Ogden a year ago to the Irrigation Congress, and California had two carloads. I had eight or ten crates; and they were nice ones. They were freshly picked; and I was completely buried in foreign grapes, but I captured more awards than all the two carloads did, and I had almost to make affidavit to the fact that I grew them. They would hardly believe me that we could grow such fine grapes in Colorado. "Why, it isn't possible outside of California," they said, and one woman was there and she said: "If you can grow them there you can beat us out of sight, for I never saw such Tokay grapes." Wherever I have

gone, and I have gone almost every year to the fairs, it is proven that we grow the best foreign grapes that are grown. The flavor is there and the color and size. We beat them in the size of the bunches. I never have seen any bunches the size I took that year. That was an unusual year. I had one that was nearly seven pounds.

Mr. Shute—That was the seven pound bunch of grapes you sent to the Omaha Exposition in 1898, do you remember?

Mr. Newton—I had forgotten that.

Mr. Lanzendorf—Do you think those grapes can be raised here at Rifle?

Mr. Newton—I don't see why they couldn't be raised here. They have tried it in Delta and Montrose counties, and they say they raise them. I don't know why you don't raise them here.

Mr. Miller—They can be raised here and they are raised here. My brother has them and had them here a year ago on exhibition Apple Day, and they were as fine as any ever dared be, from California or anywhere.

Mr. Clough—They were Black Hamburgs. I have Tokays and Cornichons and Muscats upon the ranch. Next year I ought to have some grapes. I cut them back and cover them.

Mr. Taylor—At the National Horticultural Congress, at Council Bluffs, this year, an entry of the largest single bunch of grapes was won by a man living at Clifton, Colorado, and there were some California grapes there in competition.

PREPARATION OF SOIL FOR CHERRY TREES, AND CULTURE OF CHERRIES.

W. J. LUCK, MANAGER MADISON ORCHARDS, WESTMINSTER, COLO.

First plow your ground in the fall, so as to have loose, moist soil after the frosts subside in the springtime.

Check your land off the desired distance, which I would recommend to be 16 feet by 20 feet at the least, after which you can dig your holes 2 feet in diameter by 18 inches deep.

PLANTING OF TREES.

In setting trees you should set the tree a little deeper than the desired position, and a little dirt thrown on to cover the roots; you should then raise the tree so as to let the graft be one to two inches below the surface. When the filling is completed, always use top soil to put around your trees when planting.

It is not a good plan to puddle a cherry tree when planting, though, if the season be dry, after you have planted you may

run a furrow within 18 inches of your tree, so as to sub-irrigate. Do not let the water stand around the trunk of a cherry tree, as they will scald, or the ground be likely to bake, which is very injurious to plant.

We tried dipping our cherry roots in water just before setting, with good results, as it will help to open the pores, which will become dry and hard from long standing.

PRUNING OF CHERRIES.

We do not find it a good plan to cut much of the wood out of a cherry, as it will cause a dry rot oftentimes where the cut is made. Have decided that it is a good plan to leave a stub one to two inches, according to size of branch that you find necessary to remove on account of interference of other branches that are more useful to shape and balance your tree.

We use 10x18-inch wood protectors on our trees, so as to prevent sun scald while the tree is small and foliage light, and find 18 to 20 inches about the right height to head a cherry tree for convenience of picking fruit.

VARIETIES OF PLANT.

I will recommend for a commercial cherry orchard that you select from the following varieties: Montmorency, English Morello and Dyehouse, for an early cherry. While you will make no mistake in planting such as Wragg, or Early Richmond, all of which are good for this locality so far as a sour cherry goes.

CULTIVATION OF CHERRY.

It is very essential that you keep the ground worked well on top, and we find the best thing to do this with is some form of an orchard disk, or "Junior" cultivator.

We cultivate clean and find we have no weeds to sap the moisture from the ground and avoid irrigation to a large extent. Only finding it necessary to irrigate about twice during the season, these times being ten to fifteen days before ripping of fruit and the last of July and August, at which time your fruit buds are setting and tree needs nourishment during those times.

PICKING AND MARKETING OF FRUIT.

We clip all the cherries in small buckets strapped about the waists of the pickers. Do not use large vessels to pick in, as the weight will be too much in the bottom and bruise the fruit; would endeavor to leave stem from ¼ to ½ inch long, so as to help the fruit to hold up for the market. We find a local market for a large amount of our cherries, while we ship by car lots to the Eastern markets.

DISCUSSION.

Mr. Garrison—I think the varieties named in Mr. Luck's paper are certainly in the right order. The Montmorency comes first in almost every respect, not only as a commercial cherry,

but as a table cherry. We used to plant the English Morello almost exclusively, and I was one of the first men to introduce the Montmorency, but I believe now 60 per cent. of the cherries planted in our vicinity are of that variety. The Montmorency will bear any way twice as long as an English Morello, and they bear twice as many crops and from two to three times as many at every crop, so I can't see any advantage in planting the English Morello. If we can make three times as much money on a Montmorency tree I think we are very foolish to plant a Morello.

Mr. Newton—It seems now the paper said they set out Early Richmond and Morellos. If I had one of those trees in my orchard I would cut it down. What is the wisdom of raising a little bit of a cherry that the women have to stone for a week to get a little bit of a can, when you can raise a Duke or a Montmorency?

Mr. Garrison—You can't raise the Duke on the Eastern Slope. That is why the paper doesn't mention the Duke. The Madison orchards were the first ones that planted the Dukes, and they certainly have not succeeded or something would have been said about it.

Mr. Newton—I have in an old orchard—I am only a new man in the business—about twenty Montmorency trees, and they are tall as a house. They tell me it isn't a good thing to prune cherries; I don't know why; but it takes an expert like myself to get to the top of those trees. I hate to tell how much I raised one year off those cherries. Dr. Divine knows all about the Dukes. They are a tremendous success in Palisade.

Dr. Divine—I think the Grand Valley is a splendid place for the cultivation of cherries. I have several varieties of the sweet cherries that do very well there, indeed, and as Brother Garrison inquires about the Royal Duke I would say that it does very nicely there. The cherry that is doing best in the Grand Valley is the Royal Duke. It is a very large, fine cherry and very profitable. If I should tell you what the average receipts from the Royal Dukes are in the Grand Valley, I am afraid you would think I was giving you some Munchausen story. It is nothing unusual to receive $1,000.00 gross from one acre of Royal Dukes in full bearing. The Montmorency cherry does remarkably well. I have quite a number of those fourteen years old.

President Parfet—You ship those to Denver?

Dr. Divine—Yes, sir, ship them to Denver. They do very well until our friend gets his cherries at Canon City on the market, and then the market goes to nothing. I don't see how they can stand it. We usually start our Royal Dukes at $3.00 to $4.00 a crate, and then the Montmorencies start in at a good price until Canon City knocks the bottom out of the market. The Royal Duke in the Grand Valley is probably the leading cherry

and the most profitable cherry. In picking the cherries I have the work done by women. They pick them with scissors by clipping the stem. They usually have a five or ten-pound pail they carry suspended from their neck, and they clip them and drop them into the pail.

Mr. Newton—Why would you use the clippers rather than take them off with your thumb and finger?

Dr. Divine—You pick two crops at once when you do that. Where you clip them off with scissors you leave the buds on for next year. A woman with a pair of scissors can pick cherries about twice or three times as fast as she can to pull them off. I have them pack the cherries in the box, settle them down well, and then the tops are all faced up in lines with the stems turned down, and I always have them put them full, about as high as you can pile them on. When these come into market I will have a full quart box lined up nicely.

Mr. Garrison—Are those measured in strawberry boxes?

Dr. Divine—Yes, like strawberry boxes, twenty-four quarts to the crate, but when we ship out the sour cherry and the sweet cherries we put them in the ten pound crate.

Mr. Newton—I have heard it claimed that when you pick cherries with the thumb and finger you pick off the crop for next year, but I can't see it makes any difference.

Dr. Divine—Here is another point in picking them with scissors. You will find quite a cluster of cherries; there may be three or four of those cherries that are ready to come, and one or two that are green. If you tear off that cluster you have one or two green which should not be shipped. I have seen when they tear them there is a little strip of bark taken off down next to the stem. Unless you pack your boxes pretty full, when you see them at the other end of the route they are shaken down and your boxes are about half full, and it makes a bad looking pack. As to cultivating the cherry orchard, I never let a pig weed grow in mine. I cultivate them just as clean as we would our peach orchards.

Mr. Shaffer—Do you find a ready market for the cherries, so much so as any other fruit?

Dr. Divine—Yes, I think so. The one great trouble in growing the cherry is it requires a whole lot of help to get them out. You have to have a big force of women and girls picking, and it is quite a tedious process. If it was not for that I believe I would rather raise cherries than anything else.

Mr. Miller—Another question, and that is in regard to the ripening. Shouldn't they be pretty thoroughly ripened before they are picked?

Dr. Divine—Yes, sir, that is right. A great many in picking cherries pick them as soon as they begin to turn. You want to leave them on the trees until you develop the sugar in the fruit before you pick them. That is why so many fail on the Montmorency. It is said here that it is sour and bitter; that is

from the fact that you don't leave them on the trees long enough. A great many will pull them as soon as they begin to turn, but you leave them on the trees for three or four weeks until the sugar is developed in the trees, and then it is at its best, and that it is not very good, in my opinion. I dug all my English Morellos out long ago.

President Parfet—What do you pay for picking?

Dr. Divine—I pay fifty cents a crate for picking and packing.

Mr. Shaffer—I have seen the statement that the Royal Duke was as good as any of the trees that were used for shade trees, and that by using it for shade trees as they did down in the Grand Valley they combined commercial profit with the shade trees as well.

Dr. Divine—You can plant it along the borders and along the driveway, and it is all right. Put it around the outside of the orchard and it is put out of the way, and it is very good for that purpose, and it would be a very nice shade tree in the yard also. I think we don't cut our trees back as we should, especially this Royal Duke. Where I was brought up in the nursery business in Iowa if we cut back a cherry tree we would expect that tree to be dead in about two years, but in the Grand Valley it seems that in that dry climate you can prune your cherry trees. I have seen English Morellos cut off where they were three or four inches from the stock and new shoots sprang out and they didn't die as in a damp climate.

Mr. Shaffer—Would you advise the planting of a one, two or three-year-old tree?

Dr. Divine—I would prefer a two-year-old tree. They are usually too small otherwise, unless you get strictly fisrt-class trees. I prefer a two-year-old tree to plant.

Mr. Troutman—I want to disagree with Dr. Divine, if I may, about the two-year-old tree. We have been planting the one-year-old tree, and in planting several hundred trees each year for the past four years—I am speaking especially of the Montmorency—we haven't lost 1 per cent. We have planted before that, and also last year, because the nursery—Stark Brothers—of whom we were buying, couldn't furnish us the one-year-old; we bought the two-year-old-trees, and we lost at least 10 or 15 per cent. of what we planted, and the others are not making the growth, and my argument in favor of the one-year-old tree is, you get the benefit of the fibrous roots. You take the one-year-old tree, the stock must be good, first-class; you must always have that kind of stock if you can possibly get it. The roots are very fine and the small roots are all there. You take a two-year-old tree, and those roots have been cut off. You get heavy, coarse, knotty roots, with perhaps only one or two fibrous roots from that. My conviction is, that in planting a cherry orchard, by all means plant one-year-

old trees. Now, if I may reply to Dr. Divine's remark about Canon City, Canon City is blamed for a lot of things. Our shoulders are broad, and we are glad to take all the blame that is coming to us. In regard to prices, I will say this: That for two or three years past I have gotten from $2.50 to $3.00 a crate for all the Montmorency cherries I have had on my place. Last year the price averaged about $2.75. The very cheapest cherries we could get were $2.00 a crate. I tried to get a carload of cherries from Mr. Parfet, as we needed them in our business very badly. We can't afford, in the canning business, to pay over about $1.75 a crate for cherries, and so high were the cherries last year, and the year before, for that matter, that we turned down a business of $50,000 worth of canned cherries, because we didn't get the fruit. I don't believe there is any danger of overproduction of cherries. As. Mr Turnbull said, cherries are profitable when the grower can average $1.50 a crate, and they are very profitable at that; and I have not seen a year since I have been in the fruit business—that is not very long, though—anywhere in the last five or six years, when cherries dropped to $1.50 a crate, except for a day or two at a time. Therefore, I believe there is no crop more profitable.

Mrs. Shute—While you are speaking, I wish you would tell the people about the black cap raspberries you raise in Canon City.

Mr. Troutman—The black cap we prefer in Canon City is the Eureka. I don't know whether it is known on the Western Slope. We prefer it to any other. This berry, the Eureka, I speak of, is one of the largest I have ever seen. They bear very heavily and the bush is healthy, a splendid growth, and they top the market. We usually get from $2.00 to $3.00 a crate for pint crates. Off of an acre I have of them, I average a net profit a year of from $300 to $400.

Mr. Taylor—Mr. President, there is one thing I want to speak of here, before you leave the discussion of cherries. One of the reasons that favors the growing of cherries throughout Colorado is the freedom from curculio damage. I know that clear through to the Atlantic the cherry is very likely to be wormy—the same thing that attacks the peach and the apples back there. So far as I know, we haven't a record of this pest in the state of Colorado, and the cherries we grow and ship out are appreciated for that reason. They are the kind the man says you can eat in the dark.

Mr. Newton—There is one thing I want to speak of in regard to Dr. Divine's cherry. The great mistake with the Montmorency is we don't let them get ripe enough. I never pick mine until they are ready for shipment. You get a better price for them for this reason; because a great many women don't know they want cherries until they are all gone. They are

ready when I ship them, so you can pick the whole bunch off at one time. I usually take them off with my fingers. Mine are just as full as they can stick now, and they have been picked that way for three years. I never tried the scissors, because I thought it would take too long. I never ship a box. I never took less than ten cents a pound in bulk.

Mr. Mann—I would like to ask the representative from Mesa county if he made the statement before election.

Mr. Newton—That is no detriment.

Mr. Shaffer—I would like to suggest, in behalf of Brother Mann and Brother Newton, that this is not a session of the Legislature.

Mr. Hogg—As the gentleman from Canon City suggests, it is hard to get a yearling cherry tree. The nurseryman doesn't usually want to dig them. I agree with him, that it is a great deal better to plant when you can get a strictly first-class yearling cherry, because we all know we get the roots that we don't get in digging a three-year-old cherry. We also have to acknowledge that there is a large number of cherries sold for yearlings that are two years old. They buy the runt two-year-old cherries. I think the gentleman there has had experience, and knows the nurseryman does not want to dig yearling cherries. I know there is only two or three times we have ever dug yearling cherries. It was when they become a marketable size as two years old that we dig them as yearlings. You will find I am pefrectly right in saying it is hard to get a strictly first-class yearling cherry.

Mr. Troutman—I have had that experience; they have tried to pawn off a poor two-year-old yearling, but if anyone has ever seen a good one-year-old cherry, he would never be fooled by any substitute.

Mr. Hogg—A good yearling cherry isn't really a standard catalogue cherry. If I was going to buy a two-year-old, I would buy a large one, not a small one. I wouldn't be fooled by having them make me believe it is a yearling. In the paper, Mr. Luck spoke of not puddling cherries. It has been my experience in planting cherries, we can't use too much water, and if we cultivate right away after, so the ground doesn't bake, then don't water a cherry as often as you would anything else, because a cherry will not stand as much water as any other tree; but I think it is wise to use the water for settling, because the tree takes hold and grows quicker.

TOO MUCH IRRIGATION OF YOUNG ORCHARDS.

A. H. DAVIS, EDITOR FRUIT GROWER, DENVER, COLO.

Irrigation is much more than an affair of ditches and acres. It not only makes civilization possible where men could not live without it, but it shapes that civilization after its own peculiar

design. Its underlying influence is that which makes for democracy and individual independence.

The abuse of artificial means which are brought into use in arid sections can be abused to our great detriment as well as to be used to our very material advantage. The most beneficial thing may be used so as to be the most destructive; without water, heat and chemicals this beautiful country would be a barren waste, and by the injudicious use of them these beautiful garden orchards may be made valueless.

By means of artificial heat Grand Valley alone saved $3,000,000 worth of fruit last year, yet instances are numerous where the heat was placed in too close proximity to the trees and burned the fruit and killed the trees.

The use of chemicals for spraying purposes is indispensable, and there are many instances where trees have been killed by using the spray too heavily and burned the trees. These things our orchardists have learned by the sad lesson of experience. But there seems to be one lesson that many of our orchardists will not heed, and that is the great question of water. We have many orchardists who contend and persist in carrying their ideas into practice—that of watering their orchards late in the fall—and this method has been advocated by some of our professors, while many of our orchardists declare that it is injurious to the trees to go into the winter with the ground saturated with water.

In the humid sections of the East and South, where waste water is allowed to accumulate and stand, forming swamps, under irrigation it forms what we term seep lands, which is practically the same condition; and any land where water is allowed to stand on it for any length of time becomes water-logged and non-productive. The lands which are most easily irrigated by water from our mountain streams, and which are surprisingly productive when first reclaimed from the desert condition, not infrequently become noisome boggs or alkaline waters after a few years of cultivation under copious irrigation. This is true of portions of every valley in the West.

We have it on the authority of the Department of Agriculture of the United States that Utah contains not less than 150,000 acres, Colorado 75,000 acres, California 100,000 acres, Nevada 250,000 acres, Wyoming 50,000 acres, Montana 60,000 acres, and Idaho 40,000 acres of just this kind of lands, all of which have been once cultivated and still having valuable water rights. Secretary Wilson says these are conservative estimates. It shows the gravity of the situation, and when considered from the standpoint of ownership, practically emphasizes the importance of using precaution along this line, and preventatives as well as curative measures in the treatment of saturated lands which are under irrigation.

While the injudicious use of water and faulty distribution system hasten the formation of seeped lands, as it is in ordinary farming practice, there is a waste of water which cannot well be avoided. Where there is not good drainage the surplus water accumulates until evil results appear.

Experiments and examinations have brought out some useful as well as encouraging facts about seeped lands, and the methods of restoring them to productiveness. The changing of productive soils into an alkali waste is a process hidden from view, and, like an insidious disease, is often not discovered until disastrous results are manifest.

The lower lands begin to fill with water at varying depths from the surface, the level raises gradually until it reaches the surface. The movement of the soil water is modified by hardpan, gravel and shale formation, as well as by other less pronounced physical characteristics.

The effects manifest themselves by the utter failure of crops in spots, which enlarges yearly until the field becomes barren, and often so soft that it cannot be crossed by teams. The injury extends from farm to farm until the larger part of an irrigation valley becomes covered with salt grass, alkali weeds, or, in many cases, becomes a barren waste, and necessitates the expensive method of a drainage system.

The old saying that "a stitch in time saves nine" is a good motto for our orchardists to adopt in this particular, and it would be much easier and less expensive to adopt preventative methods in the first instance than to be forced to the more expensive and unnecessary methods of a drainage system.

This subject is one that, while it may not seem of great importance to our fruit raisers, in our opinion it is one of the most essential and complex that confronts fruit raisers in the arid sections.

The subject of preparing the orchard for winter is one of great importance and depends almost entirely upon the conditions of the land, age of the trees and the climatic condition of the section of country. Naturally, the tree requires sufficient moisture to ripen and mature the year's growth for winter, but it should not be kept growing too late in the fall, so that the new twigs and roots will go into the winter in a growing condition. Especially is this true of young trees. They do not require water in the late summer and fall as do bearing trees in order to ripen and size the fruit, hence the young orchard should not be watered as late in the fall as should a full-bearing orchard.

The recommendations of Professor Whipple have been quite generally followed, but we do not agree with him entirely in some particulars. His recommendations are as follows:

"The general practice of discontinuing the watering of the orchard in midsummer, for the purpose of allowing the trees

to mature wood growth and color the fruit, generally calls for a late fall irrigation. This may be applied any time after the middle of October, if the trees have ripened the young wood growth; otherwise the water had best be delayed until the first of November. In the bearing orchard this water is applied after the fruit is picked. In our dry climate care must be exercised to see that the orchards go into the winter with plenty of moisture in the soil. Evaporation from the twigs continues, even through the dormant period, and unless the roots have access to more moisture the tops of the trees may freeze dry during a severe winter.

"The amount of water to be used for this irrigation will depend much upon the character of the soil. No doubt many orchards on heavy soil will not require the fall watering. Still, some of the heavy soils are deceiving, and examination will show a very dry subsoil. A good fall watering is one of the most satisfactory means of watering such soil. Evaporation from the surface is slow, and during the winter the water slowly sinks to the dry subsoil. The soil should be examined and supplied with enough moisture to make it cling together when pressed in the hand, and still crumble when broken up.

"As soon as the leaves have fallen the orchard should be plowed or cultivated to catch the leaves. The leaves will help to improve the soil if plowed under before the late winds sweep them into the fence corners. Some growers still question the wisdom of plowing the orchard, but many growers who have tried it not only pronounce it a success, but a necessary step in the proper cultivation of an orchard. While many growers fear that the destruction of roots in plowing will injure the trees, this is not necessarily true. As a matter of fact, a little root pruning by plowing stimulates root growth and keeps the roots down where they belong. Some of our heavy soils really must be plowed, and the fall of the year is an excellent time to do the work. The plow should run deep enough to break up the hard layer formed by continual shallow cultivation during the growing season.

"A light float or harrow should follow the plow to put the surface in good condition. If left too open there is a tendency to dry out. A good smooth and well-broken surface tends to hold the moisture. It is not an uncommon practice to give one surface cultivation about midwinter, and for this work a disc or Planet Junior cultivator is used. Orchard soils properly cultivated before going into the winter are much more easily tilled the following summer."

There is much wisdom in this advice, but the orchardist must be his own judge as to late fall watering, as the soil and climatic conditions should govern his action in a great measure. There is another very important factor to be taken into consideration in late fall watering. If the ground goes into the

winter very wet and freezes up, when the ground thaws out in the early spring it is in fine condition for agricultural crops and general farming, and the fruit trees begin at once to grow and send out buds, many times in advance of the end of our frost season. While, on the other hand, if the ground was left in a more dry condition, just sufficient to ripen and mature the new wood growth of the year, would it not have a tendency to keep the buds back in the spring and thereby prevent a late spring freeze or frost.

Our observation and experience is that if the crop is off by the first of October, that a late watering is beneficial if you have a dry fall, but in orchards where they have been watered well up to the first of October water should not be put on the ground after that date.

On the western slope of Colorado, where water is in abundance, there are more orchards killed outright by the use of too much water rather than not enough, and the problem really becomes one of how little water to use, rather than how much.

The fruit grower of the irrigated sections can learn much about the handling of water by studying the methods and work of the dry farmers, whose crops must be produced by the scanty rainfall their soils secure.

Bulletin No. 104, from the Utah Experiment Station, on the subject, "Storage of Winter Precipitation of Soils," by Dr. John A. Widstoe, has added valuable information to our knowledge of what becomes of the rainfall and snow of winter.

Every grower of fruit ought to study that bulletin very carefully. Dr. Widstoe summarizes the experiment as related in the bulletin as follows:

"1. The beginning of irrigation wisdom is the conservation of natural precipitation.

"2. Irrigation should be supplementary to the natural precipitation.

"3. The natural precipitation over the larger portion of the Great Salt Basin, if properly conserved by summer fallowing, is sufficient to produce crops without irrigation.

"4. The amount of moisture found in the soil in the fall depends on the crops grown, the total amount of water applied during the season, the summer precipitation, and on an irrigated farm, on the date of the last irrigation.

"5 On irrigated farms as high as 95.17 per cent., and on non-irrigated farms as high as 93.17 per cent., of the total winter precipitation were found in the upper eight feet of soil.

"6. The average of maximum per cent. of winter precipitation found in the upper eight feet for five years on an irrigated farm was 82.13; for three years on a non-irrigated farm just reclaimed from the desert, was 61.85.

"7. The drier the soil is in the fall the more of the winter precipitation is found in the first eight feet of soil.

"8. The water capacity of soils under field conditions is low, usually not above 18 per cent.

"9. In the spring, irrigated soils to a depth of eight feet are fully saturated and on non-irrigated soils are usually so.

"10. A comparative small portion of the winter precipitation is lost from the soil by evaporation.

"11. A considerable portion of the winter precipitation passes down through the soil below the eight foot limit.

"12. In the spring less than 20 inches of precipitation are usually found in the upper eight feet of soil; that is, not more than the precipitation of one and one-half years is stored in the upper eight feet of soil.

"13. To make farming without irrigation successful, a considerable per cent. of moisture must be carried over from year to year.

"14. Fall plowing tends to conserve the natural precipitation.

"15. Fall or winter irrigation is advisable on deep soils with good drainage. It should be practiced with moderation.

"16. Lands may be water-logged even when a small supply of water is applied at each irrigation. The surface moves to considerable depth until an impervious soil layer is reached, where the accumulation of water begins.

"17. Summer fallowing conserves the soil moisture; the longer the fallowing period the higher the per cent. of soil moisture.

"18. The reason why the beneficial effects of summer fallowing and fall plowing are not more evident in the soil moisture content is that the water capacity of moist arid soils is small and during the winter season a large portion of the water moves below the eight foot limit reached by he soil augers."

Professor S. L. Smith, of the State of Washington, says: "More harrowing and less watering, if you would produce the highest quality of fruit, and if you wish your trees to be vigorous and healthy." He illustrates his point by giving an example of an orchard which was cultivated and harrowed nineteen times during the season, at a cost of $8.50 per acre; in another orchard with the same conditions prevailing, they omitted harrowing and cultivation to the amount of the net expense of $1.25 per acre; there was a difference of more than $50 an acre in the value of the fruit crop. Another orchard of the same age, the same varieties, the same soil, and the same conditions prevailing in every particular as in the first orchard mentioned, was disked twice and harrowed twice, and produced only 10 per cent. of marketable fruit.

Bringing the subject closer home and relating the experience of a man behind the plow, we have to but relate the actual experience, brought about by accident, of one of Grand Valley's most prosperous and observing fruit growers:

J. D. Jaynes, living five miles northwest of Grand Junction, Colo., in speaking of the cold winter last year, remarked: "That the weather had not been cold enough to hurt fruit trees of any kind, had they been put into the winter in proper condition." He went on to say that he had some trees that were watered late and that many of them were cracked open from one to eight inches up and down the trunks of the trees. He said that the ground was full of water, and that it kept the sap in the trees and they had no chance to mature and harden the summer's growth for winter, and that when cold weather came the trees were full of sap, which froze in the tree and bursted the same as a barrel or tub would if left full of water and allowed to freeze."

He gave another experience which is most convincing: He said that "two years ago the latter part of October he started to water his three-year-old orchard, and after he had watered three rows, he, for some reason or another, ran out of water, and thought that he was ruined because he could water no more of his orchard that fall; and did not do so. The result was that about two-thirds of the trees in the three rows watered were dead the next spring, winter killed; while the remainder of his orchard which he did not water came through the winter in fine condition and made a splendid growth that year."

Many experiences of this character we could relate, some of which are our own, which to us thoroughly demonstrates that fruit trees, especially young trees, should not be watered later than the last of August, or the first of September, thus giving the young wood growth on the trees a chance to ripen and harden for the winter, as natural conditions provided they should.

For orchards as well as other crops, it is better to use a number of small streams rather than one or two large ones, as there will be less washing of the soil and more even distribution of the water can be secured.

While trees are small a furrow on either side of the tree row will answer, but as the roots spread out, additional furrows, three or four feet apart, should be made, until finally the entire space is irrigated between the tree rows. Too much water and too frequent application are more liable to do harm than too little water. Three or four good waterings is sufficient, the last not later than the first of September, in order to allow the growth to ripen, will usually suffice. While a fair amount of water will increase the size and improve the quality and appearance of the fruit, an excess will lessen the size and injure the quality.

THE ORCHARD KINDERGARTEN.

W. P. CLOUGH, RIFLE, COLO.

Mr. President, Ladies and Gentlemen: Kindergarten in our schools means starting the child before it is old enough or knows enough to go into the first grade. There are two branches to the kindergarten of orchards. One is the man or the person who plants the orchard, and the other is the tree. The great trouble with planting orchards by a majority of the people, and I mean this when I say a majority, is that they haven't passed through the kindergarten stage before they begin planting trees, and the planting of a tree means something permanent, not like growing a crop of grain or planting potatoes, but the planting of a tree if properly done, an apple tree especially, means for a good many years to come; we will say fifty years, probably more than that. So it is necessary, in order to establish a permanent orchard which will stay with us and do for us all that it should, that we know something about the business before we begin planting. Statistics prove to us that not fifty per cent. of the fruit trees planted in the United States ever come to bearing age. This may seem like a very strong statement, but it is a fact. There are orchards or pieces of land in the Rifle section that I will venture to say have been planted five to seven times, and there is not an orchard on the land now. If this was true with all of us we wouldn't have any orchards. The first thing to do in planting an orchard or the beginning of one is to prepare our soil so that it is ready for that crop, the same as it would be for any other. The second thing to do is to mark off our ground, after it has been plowed and properly taken care of, the proper distance for planting our trees, which varies with different people and different varieties in different localities. This is a matter for each one to judge for himself, or to take the advice of others who have demonstrated that certain distances are better than others. After we have marked our ground, which is done in various ways, our holes are dug, and this is another matter on which we have a difference of opinion, some saying it is necessary, regardless of the soil, to dig a very large hole. I noticed this man on the other side of the range in his cherry planting. I think his holes were two feet in diameter and eighteen inches deep. That might be necessary in the soil where those trees were planted. Now in planting an orchard I put a bucket of water in the hole when I plant the tree, and when I do this it means that the tree that I put in the hole I dig, which is about eighteen inches in diameter and about fourteen inches deep—it means that bucket of water thoroughly saturates the soil that is put in around the tree, so that the ground after it settles is very nearly if not quite as solid as the surrounding soil, providing it is a soil that is suitable for the planting of trees. If that is not true at the time we plant or shortly after that time, it is true at the end of one year's time, that the soil around that tree is just as

firm as the soil out two or three feet from the tree. That is true on all soils I have planted trees on, and while I have not been in the business so awfully long, I have seen trees planted in quite a good deal of the United States, say Maine, Washington and Colorado. If this is true, which has been proven by my experience, that the soil around the tree is the same as the soil is a few feet from it, what is the use of digging the hole as large as a good sized wash tub in which to plant the tree, and if you are going to put water around the trees that you plant, which I claim is absolutely necessary so the tree may be puddled in so that that the soil settles around those roots, it would take three or four buckets of water to saturate the soil where the hole is three feet in diameter, where it would take but one bucket where the hole is eighteen inches in diameter. After we have planted our orchard the first thing I do is to go through it—I am talking about planting young trees one year old, which is the tree I prefer to plant; I head them about 18 or 20 inches high. After they have leafed out, there would be a little string of branches coming out from the ground up to the top of the tree, I go over them and rub off all but the few branches I want to leave for the top. I think this is the general practice; it isn't any idea of mine, but something I have learned from experience and working along the lines others have worked. The tree is left in this way until the following year. Some time during the late winter or early spring I go over the orchard and cut back the limbs to the proper length so that we have left the right kind of a head for our trees. I have heard a good many people say this, and one man in particular, in this Rifle section, "I planted my orchard and the first two years I didn't do anything to it, and in planting ten acres I only lost twenty-eight trees." That was an argument along the line of letting the tree take care of itself. I believe that the first three years' care of a young orchard after planting are the three principal years in the care of that orchard. If you have properly taken care of it for the first three years, properly pruned it, your work of pruning from that time on will not be twenty-five per cent. of the work it would be if you let the tree take care of itself for the first two or three years. We used to practice, in a good many sections, flat pruning, or cutting the top of our trees off, keeping the limbs so they would not go up into the air for any great distance, but I believe to a very great extent, even down in the lower valley, they have changed this way of doing, although with a great many trees down there they are probably doing so now. Say we have left four chief branches the first year, and the second year we will leave two branches out from it, which doubles or makes eight branches, and the next year we will probably let one extra branch grow on those, which gives us twelve branches, and we will let those leaders grow and work up into the air. By the cutting back we have given our tree for the first two years—we have built up a trunk system which is able to stand up under the loads of fruit which the

THREE-YEAR-OLD APPLE ORCHARD. OWNER, W. P. CLOUGH, RIFLE, COLORADO.

trees will bear in the future, and by cutting back we have also helped balance up that condition by a root system which we all know was very materially damaged and reduced when the tree was dug in the nursery. We have held back the top so we have let our root system catch up with out top system, so we have a balanced tree, and by doing this and letting those leaders grow I think it has been found by nearly everyone that we have a better shaped and a better conditioned tree to stand up against the winds and the burden of fruit which the tree is to bear in the future. I practice clean cultivation. I won't say that I will continue to practice clean cultivation when my trees are ten or twelve years old, that is, not all the time, but up to the time they are six to seven years old I will practice clean cultivation. I haven't grown anything between my trees in the way of a crop unless I have put on a good coating of barnyard manure. I have not cropped between any of my trees where I have not put back something which would equal what was taken off with the crop produced. I am going to follow that practice. They can crop between their trees all they want to without putting anything back; if they do, the time is going to come when the trees will suffer by this robbing practice. We have to put this back some way. I believe that a cover crop in the way of red clover is a mighty good thing in an orchard after it comes into bearing. It may be all right before that time, but with the way I handle trees I would rather have the ground clean all the time, provided I can keep it so without having too much work to do. There was an article on the program before this one of mine that I am very sorry was not taken up, and that is "Too Much Irrigation of Young Orchards."

President Parfet—That will come up to-morrow.

Mr. Clough—I would like to say just a few words along this line about my own experience. One of the ideas which was advanced when this cover crop proposition first came up was—I am very sure I am right, though I believe the people who advanced this idea have changed it—that by growing a cover crop we shade the ground and lessen the loss of water by evaporation. I don't agree with that at all. I have demonstrated to myself and to a good many others who have seen it, that by cultivation, even with a year as dry as this was from the first of May up to the first of September, that by cultivation I can hold moisture and plenty of it for the good growth of a young tree within three to four inches of the surface. We had a period of very dry weather here; it was all up and down Grand Valley, in fact, all over the Western Slope as well as on the Eastern Slope. The soil conditions are different on the Eastern Slope; your climatic conditions are quite different from ours. In an apple orchard which is three years of age—we got to talking about this cover crop proposition, and about the conservation of moisture by cultivation. I said: "I haven't been over in that orchard for the last forty-five or sixty days to make

any tests on the moisture conditions, but I will venture to say that between those tree rows, and in the middle, where it was never irrigated—that land was sage brush four years ago today—there is a fair amount of moisture after you get down three or four inches." After we dug down that far, we found moisture all the way down. Those conditions would give a tree moisture enough to make a good growth right through the season without any irrigation, because, as I say, that ground was never irrigated. The soil between the trees in the tree row and between the two irrigation furrows, which were about three or three and a half feet apart, was not quite as moist as it was out between the tree rows in the middle. That was rather a surprising thing to me, but it was a fact, just the same. There is a gentleman present who has a ranch down on the lower end of the mesa, across the river. His name is Jones. At our Apple Pie Day, on the 28th of September, Mr. Jones brought in some apples, and I think some pears. I know he had some Flemish Beauty pears at the Interstate Fair. But Mr. Jones brought in a box of Jonathan apples at our Apple Pie Day, which was the finest box that we had there, and the people here know we had some mighty fine fruit on exhibition. Mr. Jones grew those apples in an orchard where there was not one drop of water for irrigation after the 20th day of June. I got this from the water commissioner of that district today. They were good enough to go to the Land Show in Chicago, or anywhere else. They were all grown on land where no water was used for irrigation after the 20th of June, because there was no water in the ditch after that date; but Mr. Jones cultivated that land so there was not a weed in sight; there was a mulch three or four inches deep in the orchard all the time. So it proves to me that cultivation of the soil is one of the very best things that we can do. Now, if I can grow a tree with two irrigations, and the rest of it cultivation, and get the same growth on that tree that I could by four irrigations and less cultivation, I will take the tree with the two irrigations and the greater number of cultivations, every time. I will grow a hardier, better wood on that tree than the man would who uses water to make that growth, and lets the cultivation take care of itself. These things have been proven, gentlemen, by actual tests we have made. A good many of these things have surprised me as much as they have anyone else, because my ideas were along different lines up to a few years ago, that is, on some of these questions, but following out the practice of keeping our ground clean—I don't say it is necessary to plow our orchards five or six inches deep; I don't believe I have cultivated mine four inches deep, and then by going over it with the weeder I have kept it down so there was a fine dust mulch all the time; I have gotten a growth that is all I want on my trees. I have some Winter Banana trees that are two years old that I have watered once this year, and

they all tell me this is the driest year they have ever had on the Western Slope. They grew all I wanted them to—a growth of as much as four feet on a good many limbs. We have cultivated them as many as seven times. I wanted to check the growth of those trees, because last year they made so much and such a late growth that they went into the winter with soft wood, and a good many were winter killed back quite badly. The water I gave them was about the first of June, and all I have done since was to cultivate that land. So we start with a tree from the time we plant it, and the kindergarten period of that tree I believe goes through its whole life with the care we must give it. This Mr. Jones I am telling you about is sitting right back here, and he has done without water since the 20th of June, as well or better than any other man in this section, or any other section with water to irrigate three or four times; he has jumped from the kindergarten period this year to the eighth grade, and in another year he will graduate from the high school. He has learned the things I didn't believe were possible. We have argued this proposition many hours. "There is no trouble to make a tree with a little water, but when you get that tree to a fruitage age you must have water for that tree or you can't get sizable fruit." That box of Jonathans was as fine as this county produced, and I would like to have had them at the Land Show last winter, or had them at the Interstate Fair this fall. I would not have been afraid of the other man taking the blue ribbon. This is proof to me that we can not only grow a tree to bearing age with a small amount of water, but I believe we can grow a better orchard, one that will stay with us longer, with less sogginess in the soil, and with fewer pests than might come if we soured our land with water. The land where Mr. Jones grew those apples has an excellent drainage—a fall of 10 or 15 per cent., probably 10 per cent., so that no one can say that it held the water. You couldn't have the drainage any better; so it was the cultivation that was put on that soil afer the water was shut off in that ditch, which was not later than the 20th of June, which made good fruit, which was as pretty and as fine as was ever seen anywhere. This is a subject which could be talked upon for hours at a time, but the time is short, and if we can have that paper on using too much water for young orchards, I would be very glad to listen to it, because I think it is one of the most important things we have to consider at this time.

Mr. Miller—I think that Brother Clough didn't quite finish up in his kindergarten. He spoke of planting, and explained at great length how he planted his trees, but he didn't say anything about pruning the roots; and the reason I raise that question is, because I have had a little experience along that line—because I have taken up some trees that had been planted for two or three years, and I wanted to save them. They were

green, but had never made much of a growth. I thought I would put them out some other place, and I dug quite a wide hole around them, and could find no roots. I kept going closer and closer. I found a lot of long roots when the tree had been planted, just doubled together and stuck in a hole the size of a post hole. They never had made any growth. They had never grown outside of the hole.

Mr. Clough—That makes me think of something. I started along that line, but I didn't finish. The size of that tree hole—the soil around that tree—should be just as firm one year from the time that tree is planted as the surrounding soil. The reason I would not dig the hole any larger than I do is that I know, after I prune the roots of that tree, the fibres are not going much further than the sides of the hole I have dug, the first year. Someone will say, "You don't know they will do it." I dug up some trees last spring that winter killed. Those trees were three years old this spring. That is, it was three years from the time they were planted up to this year, and there were roots that went half way across a sixteen-foot space. The roots extended back as far as I went—further than the tops. The limbs would be probably this far (illustrating), and that would be a pretty good tree. Another thing about planting trees: When I was a boy, down in Maine, we used to go anywhere we could to find an apple tree that came up in the pasture. We put that out, and a year or two after we would graft. The tree might be three years old, and if the root went out six feet we would go after it. We would lay that tree down, and we would dig a trench out to put those roots in. We didn't gain a thing. We lost by doing it, but we didn't know it. But that is the way we used to plant trees.

Mr. Shaffer—The soil is riotous in production here. We have one ranchman who has not been able to rotate crops as has been laid down by learned authorities in that line. He tells me he grew potatoes for nine years on one certain tract of land. At the end of the nine years he tried to follow the advice of the learned men and planted alfalfa. A volunteer crop of potatoes came up and crowded out the alfalfa. (Laughter and applause.)

Mr. Taylor—In answer to the question as to the method in the Grand Valley regarding cover crops, before I answer that I want to say that the discussion I have just listened to by Mr. Clough is one of the best lectures on starting young orchards I have ever listened to. It is one of the best things I think this State Board has ever had a chance to listen to. The idea as to the cover crop in the Grand Valley, I think we are coming to it more and more. I think our orchards, in the cover crops, the idea is with us the same as with Mr. Clough—clean cultivation while the trees are young. When the trees are older a cover crop is something that will add nutrition to the crops.

Mr. Smith—I am from Montrose county. We have an orchard of forty acres, and is sixteen years old, and we have been adopting, of course, the clean cultivation, but I am thinking that if a man has some money in his pocket and he continues to take out every time and all the time he is going to find the bottom. It seems to me it is the same with our orchards. If we expect to get crops out of the orchards and put nothing back there, we are going to find sometime we have reached the end. I want to ask some of these learned men something about these cover crops. I have been very much interested in the study of this irrigation, and I am more and more of the opinion of the gentlemen here that we can do too much irrigation rather than too little. We are irrigating three times a year, and since we have taken off our fruit this year we are putting on hundreds of tons of manure. I am keeping my teams busy every day hauling that manure, and I am going to until I get 150 or 200 tons on that ground. After I have this on, I am desirous of knowing whether it will be advantageous to me to plant next year a little red clover on my ground—not to plant this year and next year plough it up, but let that stay upon the ground. I think the advantage of our clover—it used to be in Ohio, and that was where we did the clover business—we thought it was not the advantage of our clover there so much that we would plant it to-day and plough it up to-morrow, but that the center would come out of those roots and make it porous and let the air and sunshine down into our ground. I want to know if that will be advantageous to my orchard.

Mr. Newton—This matter of a cover crop was first suggested about two years ago to my knowledge by the Agricultural School over there at Grand Junction, and there are very few who have tried it in the Grand Valley, I don't know of a single crop of clover yet started. I am just beginning to learn orcharding. I want to learn more; that is why I am here.

Mr. Clough—I would say for Mr. Newton's information and the other people in the Grand Valley, Mr. Bomgardner, of Grand Junction, had clover in his orchard fifteen years ago. The first clover I ever saw in this country was over at Whitewater and that was the Shropshire orchard. The owner said: "Why, I grow that clover here is so that when the apples fall off, it is a cushion for the apples to fall on so they will not bruise so much." That was one of the ideas of the Grand Valley fifteen years ago. Mr. John Hickman on this mesa has seeded down about ten acres in the old orchard. The north ten acres he seeded down last year and he has as pretty a stand of red clover as you ever saw, and they tell me it is worth just as much to the land to plough a crop of red clover under after one year as to leave it there, so far as actual benefits to the soil are concerned.

Mr. Younger—One of our growers has red clover in his orchard and I think it has been of great benefit to him. That

piece of ground was in red clover some eight or nine years ago and it has been plowed up. It you would go into the orchard you would think the soil would be very heavy and hard, but I never saw a nicer soil in the Grand Valley than there this summer. I thought it was made earth, but I think it is because of the crop of clover. In July or the last of June the ground was plowed and put it in shape and sowed in clover. There is a fine stand and it will be plowed under next year. I find the best orchards we have below Palisades a few miles are orchards set in alfalfa land. In those orchards you scarcely see a tree missing. You will see a growth in three years that you can't see on land that was grubbed out of brush in six or seven. The finest orchards we have out in that section are orchards planted on alfalfa land.

Mr. Butler—There are very few places where they can't get a stand of alfalfa, but certainly no greater fertilizer ever existed. Why not plant alfalfa instead of red clover?

Mr. Clough—The secret of putting in red clover is you put in a crop, plow up and be done with it. If you put in alfalfa you are fighting for years.

Mr. Chubbuck—It has been practiced in the citrus growing districts of Southern California. They are using cover crops, or they refer to them as green manure crops, very extensively, very systematically, but they are using annual crops rather than the biennials like the red clover or the alfalfa. They are using principally the cow pea and things of that sort, that is, the annual plants of the legume family, and are planting them every year systematically. Now this vetch is planted, the seed of which is all imported from Germany, and they import annually to Southern California hnudreds of tons of the seed of the vetch for sowing in the orange groves there to plow under as a source of plant food for the orange groves and also for its physical effect upon the soil for loosening up and making porous soil. The roots of those plants spring down and then they decay and leave the soil more porous, for the air and the water to get down in. They recognize thoroughly the importance of the cover crops or the green manure crops in Southern California. As I remarked in my paper, the question of supplying the soil with the necessary plant food in order to enable those citrus groves to bear a maximum crop of fruit is a very important one, and they are paying large sums of money for stable manure and for a commercial fertilizer system of dry potash salts and phosphoric acid in some form, and in addition are using systematically and very largely the cover crops, and the orchardists of this part of the country will do well to consider very carefully the advantage there is in the cover crop or green manure crop.

Mr. Butler—So far as the cow peas and the sand vetch, that has been tried in this country. It is hard to get a good stand and doesn't do well. So far as the alfalfa, I think the only harm is in the looks. I think the reason why the people

in Palisade and around that country are practicing clean cultivation is because it makes the orchard look nice to have it nice and clean. I have an orchard which was originally in alfalfa and was plowed up, and the alfalfa was never killed entirely, and has been in there ever since, and has only been plowed once, and those peach trees, twenty-two years old, and all other trees, are in as healthy condition as any other trees you will find anywhere, and the orchard is bringing in good returns every year; and what do I care how she looks, just so I get the returns off it? In this valley Mr. Coulter has had the alfalfa growing around his trees for years and years, and he had a good crop of apples this year, while others with clean cultivation didn't have the apples. Wherever you find an orchard that has alfalfa in it, the trees are in a good, healthy condition —just as good or better than any trees where they have been kept clean.

Mr. Garrison—What I have said with regard to weeds, of course, has to be taken with some degree of allowance. I always cultivate my young orchards, and I have tried all these cover crops. The San Luis Valley pea, which, as Brother Chubbuck says, is an annual, is, so far as my experience has gone, 50 per cent. ahead of anything else, and especially the one they call in the San Luis Valley the Mexican pea. It has about twice as much foilage on it, and vine, as any other variety of pea they grow there. I have used it a number of years, and I buy it very cheaply. I believe I only pay about 2½ cents a pound for it, and it is very satisfactory. Every pea will make a vine, and sometimes I think some of them will make more than one vine. It isn't a question as to whether or not you are going to get a stand. When you sow the peas you know you are going to get a stand. You can get just as much foliage on them as you want, and you can plow them under just whenever you see fit; so I don't always depend on weeds for a cover crop. The vetch is very unsatisfactory on account of the seed. I have never been able to get but about one-fourth of a stand, and after trying everything else, when I want a cover crop I use the San Luis Valley pea. I use the small pea with a black eye.

Mr. Troutman—The gentleman from Montrose asked whether a cover crop should be plowed up every year. In my personal experience I have been using cover crops ever since I have been in the orchard business. I think the very longest a cover crop should ever be left on is two years, but I prefer plowing it, having an annual crop, but if you use clover, allowing it to grow until July or August of the second season, and then plowing it. If you allow a cover crop to remain down for some years, the feed roots of the trees come very close to the surface. When you plow, you are going to cut off the feed roots, and if you don't kill your trees, you will very seriously injure them. Therefore, you want to plow your orchards

often enough so those feed roots do not come too close to the surface.

Mr. Coulter—I can only speak from my own experience in regard to cover crop in the orchard. I have an orchard of two acres which has been in alfalfa for about ten years.

President Parfet—Alfalfa close to the trees?

Mr. Coulter—Alfalfa as tight up as it can get. We plowed that orchard, I think, after it had been in two years. We plow the alfalfa under every two years, and then let it come again. So far as the trees are concerned, I can't see but the trees are just as healthy, just as productive, and this year very much more so than orchards clean cultivated.

President Parfet—How often do you irrigate?

Mr. Coulter—We irrigate about four times. I think it requires a little more water than with clean cultivation. My soil here is nothing but decomposed ground, and there is nothing that replenishes or builds it up like alfalfa—nothing we have out here. I planted some two years ago on alfalfa ground, and was well enough satisfied with my orchard, so that I sowed a part of that orchard to alfalfa, and I expect to plow that next year. Last year I planted another part of it, and next spring I intend to plant the balance of the ten acres to alfalfa between the rows, and plow it under every two years. I got as high as twenty-five boxes of apples from some of the trees, as fine fruit as a man ever saw.

President Parfet—What age were the trees?

Mr. Coulter—I think they are about twelve years in bearing.

President Parfet—About seventeen years old?

Mr. Coulter—Seventeen or eighteen years old. So far as the alfalfa in concerned, I think it is a benefit to the trees, although on different soil it might be different. We have so many different soils and different conditions in Colorado, that what is good in one section may not be good in another.

Mr. Harris—I have a few acres of orchard in alfalfa. On the side hills the ground is very rocky, and it has been almost impossible for me to break it up and get that alfalfa out. I think the trees that are in that locality in the orchard are just as healthy and thrifty as in any other part of the orchard.

President Parfet—Get just as good fruit?

Mr. Harris—I think just as good as in any other part of the orchard. Professor Taylor is a good deal better judge of trees than I, and he might be able to tell you whether the trees are as thrifty as I think they are, or not.

Mr. Taylor—Your trees certainly looked very healthy where the alfalfa was.

Mr. Coulter—I would like to ask Mr. Harris if all orchards which were pretty thoroughly set with alfalfa, yours in par-

ticular, and mine as another, as well as others, were fairly heavily loaded with apples.

Mr. Harris—That is a fact here. I couldn't plow my orchard, and where the alfalfa was I had more apples than in the bottom, but I don't know whether the alfalfa was the cause of it. The ground is a little higher and not so susceptible to frost as down in the bottom further on. But I am satisfied those trees are fully as healthy as any part of my orchard and make a good growth every year.

Mr. Clough—Anyone that lives in Garfield County knows this year gave us one of the most spotted crops you ever saw, and alfalfa had nothing to do with it. Take Mr. Jones' orchard, where he had absolutely clean cultivation, and he had fruit where he hadn't very much water. There is a Missouri Pippin, which had no water after the 20th day of June. That grew in the same orchard where there were Jonathan apples and Flemish Beauty pears. Go right down to the Morrisiana Ranch and they practice clean cultivation. The Morrisiana Ranch produced more fruit than any other orchard in the State of Colorado. It has nothing to do whether there was grass growing in the orchard or not. It was spotted frost conditions that prevailed in our country this year.

Mr. Miller—There are some theories advanced here in regard to frost and the reason why certain orchards bore apples and others clean cultivated and so on did not. I have lived in this county about nineteen years and have studied orcharding quite a good deal, and I have watched very closely lately, and it seems to me that wherever there was a little air stirring this spring when we had those killing frosts, there was fruit, and where it was absolutely still there was nothing. That is how I account for this spotted condition in the way of frost. The frost was just the same I think all over; the temperature, I think, was just the same, and neither the clean cultivation nor the alfalfa or clover I think had anything to do with it. The reason I have come to that conclusion is, right up here above Antlers and above Silt there is an orchard that is immediately in front of the "Gap," and that orchard had so much fruit on it that they had to thin it, and on each side there was hardly any fruit and some of them had no fruit at all, and there always is in that section a draft through the "Gap."

THE TREE, ITS PHYSIOLOGY AND HYGIENE.

A. JAY GARRISON, EDGEWATER, COLO.

The tree and the human race have a co-extensive history.

As ever man found himself an inhabitant of the earth, he at once became intimately associated with this most useful and ornamental product of nature.

In Holy Writ the tree is the emblem of the life that now is and that which is to come, and trees, vines and flowers are employed to portray all the elements and phases of human character. From the beginning, trees have been counted worthy of sacred esteem and careful protection.

In the journey of Israel from Egypt to Canaan, Moses was commanded not to destroy a fruit bearing tree, even if it appeared necessary while besieging a city. Most briefly this significant reason is given, for the tree of the field is the life of man. The cause of this sacred relation between man and the tree is of easy solution.

Have we proffered to erect an abode for selves and supply it with furnishing or fuel to protect us from cold or cook our food, build a barn or house of business, bridge a river or sail across the ocean, span the continent with a railway, found a city, or dedicate a place of communion with the Father above at every step of the world's progress, we have been compelled to acknowledge our dependence upon the tree and levy a tax upon its immeasurable bounty.

Furthermore, all along life's pathway there has arisen before us the image of the fruit bearing tree, as the highest embodiment of the unbounded generosity of the Giver of all good as it beckons us come and and partake without money and without price.

Again, the tree is not far removed from us in kinship in its physiological propensities and hygienic necessities.

Sparta and other ancient peoples reached their highest state of civilization when they entertained their most sacred conceptions of their divine relation to the earth, its trees and flowers.

Like its constant companion and should be friend, the tree is not, as most people suppose, altogether of the earth, earthy. The finer and more essential elements of its being it gets from the light and air and not from the earth.

The leaves are more essential to its hygienic welfare than the roots. The uplifting and outspreading of its branches pushing the leaves to the extremities is but the uplifting of its hands in a fervent plea for the uncontaminated sunlight, pure air and wholesome nourishment. We admire the flowers, never stopping to recognize the leaf as one of the most marvelous specimens of the handiwork of the Creator. It is composed of three layers. The upper one is a network of many little mouths constantly drinking light, heat and carbonic acid; the middle one is a cushion of chlorophyll, which takes up the life-giving forces, digests them and sends them on to perform their ultimate purpose of building up the tree; the lower layer evaporates the surplus and sends it back into the air to be used again. The prime reason why a tree should be cultivated and properly cared

for is that it may be provided with vigorous and healthful leaves.

The leaves of a tree are always a true index of its hygienic condition. A cherry tree deprived of its leaves by slugs, for three successive years, well! to say the least, it has certainly been fatally slugged. A nurseryman who, in early September, defoliates his trees to supply a fall trade should be looked after by the Humane Society.

Much of the vital forces necessary to carry the tree through the winter is supplied by the leaves while in the process of ripening. Colorado's September snows destroy many of our young trees by arresting the work of the leaves before they have completed their task.

In falling upon the earth the leaves perform a useful office in mulching and protecting the root system. Special arrangements should be made to catch and hold the leaves. If no cover crop has been provided weeds should be permitted to grow after midsummer. Do not send your leaves over to the fellow east of you while depending upon your next neighbor west to land his leaves under your trees. A leaf under the bush is worth two in the air.

The primary function of the root system of a tree is essentially a mechanical one. The rootlets are cables by which the tree is safely and securely anchored and prepared to withstand the tidal waves of wind, which beat against its branches.

How unsightly are the trees in many Middle West orchards, leaning to the northeast, with most of the branches on that side. If trees older than yearlings are planted special care should be taken to obviate this defect.

While the roots are insinuating themselves into every crevice and cranny of the earth in order that the tree may be securely grounded, they are all the while drinking in water, absorbing the choicest bits of nitrogen, sulphates and other salts necessary to its development.

As far as possible the roots should be maintained in a perfect hygienic condition. With its roots thoroughly encased with aphis and all manner of insects preying upon its branches, what can be expected of the poor tree?

The marvelous potency displayed by the roots of a tree in their persistent efforts to perform the purpose of their appointed office is seen in the fact that huge rocks are often rent asunder and the sides of mountains are torn away.

The cambium layer is the medium of co-operation between the foliage and root systems. It envelops the entire tree from the tip of the smallest branch to the most tender rootlet. It is in touch with every leaf above and every fibre beneath.

Here the sap is constantly making an equal distribution of the protoplasmic substances while in the process of trans-

formation into solid cell tissues. This is the festal board where the leaves and roots spread the nutritous foods they gather from earth and sky; it is the workshop where they build up year by year, fold upon fold, this wonderful thing we call a tree.

In view of what the tree is and what it has been to the race, it it not high time—are we not sufficiently civilized—to place an estimate upon it commensurate to the elements of its entity, rather than a mere mercenary one?

Our constant familiarity with the tree has dulled our conceptions as to what the tree is, and of the pleasures and blessings it so generously bestows upon us. If the first tree we had ever seen was a Jonathan apple tree, heavily laden with its luscious and incomparable fruit, we would readily accord it the first place in all the products of nature.

Man's inhumanity to the tree is one of his grossest sins.

As we older grow the more readily we recognize the common tie that binds man and the tree to the earth.

While teaching school in Iowa, before orchard planting was common, we urged our patrons to plant fruit trees and assisted them to the extent of our ability.

We now have the happy assurance of knowing that if we made no lasting impression upon the minds and backs of our pupils, we have never been forgotten by the families whom we persuaded to plant orchards.

During forty years' experience as a teacher and minister we found scores of good people easily reached by using a fruit tree or a flower as a medium who could not be approached by creeds or church machinery. How beautifully and pathetically Morris sang of the tree that had been his companion in youth:

"Woodman, spare that tree!
Touch not a single bough!
In youth it sheltered me,
And I'll protect it now.

My heartstrings 'round thee cling
Close as thy bark, old friend.
Here shall the wild birds sing
And still thy branches bend.

Old tree, the storm still brave
And, Woodman, leave this spot.
While I've a hand to save,
The axe shall harm it not."

DISCUSSION.

Mr. Chubbuck—There is in existence an organization in which there are some people present who are members. I refer to the American Breeders' Association. Now that is not, as

most people imagine when they hear the title of that association, an organization interested in the commercial breeding of live stock. It is an association of people who are interested in the science of breeding as applied to plants, animals and even the human race. There are some thirty or forty members of that association here in Colorado. Some of the members are present in this room. Among them is Mr. Garrison and also Mr. Parfet and some members of the college and others. That association of people interested in the science of breeding, in such subjects as this paper that Mr. Garrison has read, the "Hygiene and Physiology of the Tree," matters of that sort, that association will have its annual meeting at Columbus, Ohio, in February. A few of us have been trying to see to it that Mr. Garrison attends that meeting, because we believe that he can present to the scientists some thoughts of interest growing out of his study of trees and other plants, and his study on the subject of the laws of heredity as applied to plant growth. Mr. Garrison is on the program for that meeting and we want him to go for the good he will do. The next annual meeting of the American Breeders' Association may be held in Denver or some point in Colorado, and we hope to have Mr. Garrison commissioned by the Denver Chamber of Commerce and this convention to extend the invitation of Colorado to the convention to hold the next annual meeting in Denver or some Colorado point. I bring this up to you here now on the spur of the moment as called up by this splendid paper of Mr. Garrison's which has proven to you, to us all, that Mr. Garrison would be a worthy representative of Colorado people in that gathering of scientists interested in that line of work.

Mr. Bennett—I move that the convention send through our representative, Mr. Garrison, to the Breeders' Association an invitation to hold their next meeting in Colorado.

Mr. Hogg—I second that motion.

President Parfet—It has been moved and seconded that the horticulturists here assembled extend a hearty invitation, through our representative, Mr. Garrison, to the American Breeders' Association to meet in Colorado at their next session

Motion carried.

GRAFTING AND BUDDING OLD PEACH TREES.

DR. J. H. DIVINE, SECRETARY PEACH GROWERS' ASSOCIATION, PALISADE, COLO.

In the early days of peach growing in Palisade many varieties were set out, most of which grew and bore well, and while the State markets were able to consume all the product, which were more or less remunerative, but when our output became so large that distant markets had to be sought it was found that some varieties would not stand up long enough, or from various

reasons were poor payers. A few varieties doing best in our soil and climate and possessing quality, sizez, color and keeping qualities to enable them to be shipped to distant markets and to hold up long enough to be consumed, became our most profitable varieties. Then our problem became how to convert all our peach trees into the desirable varieties. To grub out old trees and replant, or to set trees between the rows and let them grow for two or three years before cutting out the old ones, seldom proved satisfactory. The shade from the old trees caused them to grow up tall and slim, with but few branches, making it difficult, if not impossible, to train them to a low, spreading head.

The first experiment made by our orchardists in budding old trees proved to be a failure; but few of the buds lived and some of the buds that had set were destroyed by twig borers the next spring.

Mr. George Lawrence, now of Farmington, New Mexico, found that they could be made to grow if they were tied in very tight and kept from drying out.

My first experiment was made on one hundred Alexanders. The budding was done in September, just before the bark set, by men who were expert in budding seedlings in the nursery row. The buds were tied in with coarse, tarred hemp string that would hold a knot well and would not slip. A great many of those put in were fruit buds; in the spring they bloomed and some of them bore fruit; some of the peaches, weighing a half pound or more each, appeared to be growing out of a branch where it was four inches in diameter.

The single buds should always be used, as the leaf bud between the fruit buds will seldom grow if put into a large limb.

After following up these trees for a year or two and rebudding where they had failed, I succeeded in getting a fine, well balanced head on them. They are now in full bearing and fully equal to any in that orchard.

Grafting the peach has heretofore generally resulted in failure. To get a fair degree of success great care must be taken; the scion should be selected from thrifty twigs about the size of a lead pencil.

In our semi-arid climate the grafting must be done very early in the spring; the first warm days in March are best; that is point No. 1. The grafting is done by the ordinary cleft method. A wedge must be left in the cleft to prevent the scion from being pinched. That is point No. 2. The wood of the peach is soft, and if it is pinched it will not grow. The wax used is the ordinary grafting wax used in grafting the apple, composed of one-half pound tallow, one pound bees' wax, two pounds resin.

See to it that the stump and the cleft on both sides and the end of the scion are thoroughly covered with wax, then take strips of cloth or old calico, cover the stump and both sides

VIEW OF THE PACKERS AT WORK IN THE PEACH GROWERS' BUILDING AT NIGHT, PALISADE, COLORADO.
Courtesy E. S. Sheriman—The Palisade Tribune.

of the cleft, force it down into the wax. This is done to prevent the wax from being melted by our hot sun during the summer.

Five or more limbs should be grafted on each tree; leave all the rest of the limbs on to carry up the sap. The grafts should be in full bearing in two years and fully equal to a four-year-old tree.

I would now recommend that where we wish to topwork an old peach tree that we first graft it, then where the grafts have failed to grow put in a bud. Do the budding in the fall, just before the bark sets, by selecting a sprout from one-half to one inch in diameter. The budding can be done quite easily, while it is a very difficult job to bud an old tree where the limbs are more than three or four inches in diameter. Care must be taken that the bud and incision in the limb does not dry out, as the weather is usually hot and dry when the budding is done. I now hermetically seal up the incision with a piece of adhesive paper (the kind that is now used in putting up parcels to take the place of twine). Put a little strip across the incision above and below the bud, or lengthwise; make a little hole in the paper, so that the bud protrudes, then wrap with sacking twine, commencing below the incision. Wrap it so that each turn shall touch the one below, omitting only over the point of the bud; carry it well above and bring the end of the string under the last turn and pull it up tight.

In the spring, after the bud has started, cut off the limb about a foot above the bud and let it develop sprouts enough to carry up the sap, but keep them cut back so they will not shade or interfere with the growth of the bud. In my work on old trees I lost a number of them by cutting the limbs too close to the bud and before they were large enough to take care of the sap.

If there are any insect enemies to the peach present in the orchard, as twig borers or aphis, spray the grafts and buds at the same time and with the same poison that is used on the large trees.

My experience is that it pays to topwork peach trees if they be healthy and vigorous, and before they begin to decline from old age.

DISCUSSION.

Mr. Bennett—I would like to ask Dr. Divine if he would think grafting is preferable to budding.

Dr. Divine—Yes, sir, I would say it is better to graft. You can get a peach tree in full bearing in two years from grafting. It would take about three years before you get your bud into bearing—about three years—two years, at best.

Mr. Bennett—Isn't grafting rather easier than budding, too?

Dr. Divine—You will find it a pretty difficult task to graft a peach and make it live.

Mr. Bennett—Budding is not always sure, is it?

Dr. Divine—Budding is a great deal surer.

Mr. Garrison—With regard to grafting, or top grafting, I want to make this suggestion. It appears as though the elements were rather against us last year, so far as our plant life were concerned, at Denver and Jefferson counties, and I noticed a condition which prevailed almost universally when I went to do some top grafting in the spring. The cambium layer was from a very light brown to a dark brown color, and I want to say that it is my judgment that when you go to do any top grafting, if you find this condition prevailing your work will be futile. It would not be advisable when you undertake to do any top grafting. If you open the bark and find the cambium layer is not a bright green color, glossy, and appears to present a mucilaginous condition, you better not do any grafting. I never found that condition prevailing until last year, and I attributed it to two things: that is, as I said in the paper, the September snow and the extreme dry weather in February.

Mr. Bennett—Didn't the cold weather last winter have something to do with that? I had a little experience in 1898 in Michigan. They had a very cold winter; the thermometer went down to thirty-two below zero, I believe. As a result we lost several million trees in the state, and particularly one thing that is important that showed up at that time was that the trees which were in sod came through in pretty good shape; those in clean cultivation nearly all died. It was simply a matter of frost near the roots. Still, we are not recommending that trees be left in sod. Last winter we had a very cold winter, much more so than usual, and I was expecting to see more stock injured last summer than showed up. In Connecticut in 1903 we had a cold winter. The ground was bare at the time. A great many places the next summer the cambium was black, as you suggested, and in many cases the bark loosened up all around, and some of those trees leafed out and lived until June and then died because of starvation, as there was no sap going down, and more died later in the season, some the next year and some the third year. It was the effects of the winter killing. The degree of killing didn't show up entirely until the third year. I think we will find the same thing here. The cold injured the roots. That is more prevalent in this State, perhaps, than back East. I don't believe many of us realize the difference we have here in the moisture and in the wood, and in the drying out, between this country and the East. Now, as in your paper you stated the amount of water that is stored by the trees; this goes on also in the summer as well as in the winter. We find that in the winter the trees are giving off moisture all the time, and we must have moisture in the soil to take the place of that. Professor Bailey, at Cornell, some years ago did some experimenting in that line. He found that when there is con-

tinuous cold weather, so that the roots and body of the tree are frozen solid, the twigs become shriveled.

Mr. Clough—I would like to say a word along this line of dark cambium layer. In February I got about sixteen thousand cuttings for grafts from a nursery below here, and I noticed that more especially in the Staymen Winesap that condition prevailed that Mr. Garrison speaks about, the dark-colored cambium layer. When I came to those I threw them one side, because I said: "Those are no good for a scion; I wouldn't sell them to any one." This was not true with all varieties. Once in a while the Jonathan showed this condition, but very few of them. The Winesap were pretty badly affected. We had the snow on the Western Slope the same as you did on the Eastern Slope, the same as you had last fall. While I didn't know what to attribute this to, I believe it was attributable to this cause; that is one cause for it. Professor Bennett says that in Michigan the young trees or the trees in sod were not affected as much as those where there was clean cultivation. He attributes that to the cold weather freezing the roots where they had no protection from the sod that was on the orchard. At Rifle we had more snow last winter, and it laid on longer, perhaps, than any winter for quite a long time. Our ground was not frozen all winter. So the mulching, cover crop or anything of that kind had nothing to do with it here. That is a point I want to bring out.

Mr. Shaffer—Mr. President, your Committee on Resolutions begs leave to report. If the Convention please, I will read the resolutions one at a time and move their adoption as they are read. In this instance I know that many of the old timers here in horticultural matters will feel sincere and deep sorrow.

RESOLUTIONS.

Whereas, A Divine Providence has seen fit to take from us, since our last annual convention, the beloved President, the Hon. Thurston White, of Canon City, and

Whereas, His strength of character, his eminent fairness, his tireless energy in the upbuilding of the horticultural interests of the State, made his life and his work an inspiration to his friends and associates; therefore, be it

Resolved, That by a standing vote, with bowed heads, we pay our tribute of respect to the memory of this good man and commend his strength of character, integrity and perseverance to those he has left behind; and be it further

Resolved, That these resolutions be made a part of the record of the Colorado State Board of Horticulture and that an engrossed copy, signed by the President and Secretary of the State Board, be forwarded to his bereaved ones.

Mr. Garrison—Mr. President, I believe it would be altogether fitting to ask Brother Mann to lead us in a short prayer.

Mr. Mann—Our Father, we bow before Thee at this time, acknowledging that Thou art the Supreme Ruler. We bow before Thy will. Thou hast given and Thou hast taken away. We ask Thy blessing in a special way to rest upon bereaved ones. And, oh, our Father, may we, those of us upon whose shoulders rest the responsibilities of the life and the day that now is, may we, our Father, emulate the one who has gone from us. Every good thing in his life, may we emulate it, and so, our Father, wilt Thou bless and use us while we live, that we may be of help to one another. Give us wisdom and knowledge from above. Grant unto us Thy blessing, not for any selfish purpose, but as Thou shalt bless us, so may be become a blessing unto others. Help us to know we have no right to breathe this air without contributing something to the common good, so lead and protect us in this year before us in the Master's name. Amen.

Mr. Shaffer—I move the adoption of the resolution.

The motion was duly seconded and carried unanimously.

Mr. Shaffer—Here is a second resolution, and before reading it I want to say that you will all be unanimous in reference to this:

RESOLUTION.

Resolved, That, as a recognition especially deserved, this convention desires to thank Mrs. Martha A. Shute for the work she has accomplished for the horticultural interests of the State and for the active energy she has always manifested in horticultural up-building. As a result of her unswerving devotion to duty Colorado is to-day capturing a majority of prizes offered in competition with all the fruit producing sections of the Union. She has initiated and successfully followed to successful passage many laws of benefit to the horticultural industry, and has, by personal visits to the various counties of the State, succeeded in awakening them to the possibilities of their product.

Ladies and gentlemen, I move the adoption of this resolution by a rising vote.

The motion was duly seconded and adopted unanimously by a rising vote.

Mrs. Shute—I thank you all most sincerely.

Mr. Shaffer—Now here is one that the members of the Resolutions Committee regard as one of the most important of all the resolutions, so far as its instructive nature is concerned, and the resolution will explain itself:

RESOLUTION.

Whereas, It has been demonstrated by actual competition against the representative fruit producing sections of the country that Colorado excels in its product, and the positive and irrefutable proof of this statement is found in the prizes awarded the State against the keenest of competition, and

Whereas, Every possible effort should be exerted to maintain this high standard and secure the confidence of the purchasing public; therefore, be it

Resolved, By the annual convention of the Colorado State Board of Horticulture, that we recommend to the American Apple Congress that it pass resolutions endorsing the enactment of a law that will provide for the marketing of apples under the provisions of the pure food laws and that the provisions extend not only to the producer, or original packer, but to the wholesaler or retailer who may re-pack the product. And, further, that this law shall provide that all packages or parcels shall be labeled "true to name," and that an adequate penalty be provided for a violation of the law; and be it further

Resolved, That the Legislative Committee appointed by this convention be instructed to frame a law incorporating these ideas and that this committee be also directed to act in conjunction with any other committees appointed for a like purpose in securing the passage of such a measure by the next session of the General Assembly of Colorado.

Ladies and gentlemen of the convention, I move the adoption of that resolution.

The motion was duly seconded and carried.

RESOLUTION.

Resolved, By the annual convention of the State Board of Horticulture, That the thanks of this convention be extended to the Denver & Rio Grande, the Colorado Midland, the Atchison, Topeka & Santa Fe and the Colorado & Southern Railroads for the interest manifested by them in promoting the welfare of horticulture in the State by making rates to this convention; and be it further

Resolved, That a copy of this resolution be forwarded to the various roads named herein by the Secretary of the State Board of Horticulture and that these resolutions be made a part of the published report of the proceedings of this session.

I move the adoption of the resolution.

The motion was duly seconded and carried.

RESOLUTIONS.

Resolved, That the thanks of this convention be extended to President Parfet, to Secretary Stotler and to every member of the State Board of Horticulture for favors rendered; and be it further

Resolved, That especial credit is due Mrs. Martha A. Shute, Assistant Secretary, for the active interest she has shown at this convention, and in the many conventions in the past; and be it further

Resolved, That the convention feels especially grateful to Hon. Horace Mann, of Rifle, Colo., for his kindness in permit-

ting the use of the Christian church, which has furnished, indeed, a pleasant and comfortable place for the members of the convention; and be it further

Resolved, That the thanks of the convention be extended to Professor Levi Chubbuck, of the United States Department of Agriculture; to A. Jay Garrison, to Professor E. P. Taylor, of Grand Junction; to Professor Gillette, Professor Bennett, Professor Welden, and those who attended from various parts of the State, and to all those who assisted in making the convention the splendid success it has proven.

Mr. Shaffer—I move the adoption of these resolutions.

The motion was duly seconded and carried.

RESOLUTION.

Resolved, That should the federal government fail to make further appropriation for the maintenance of the Teller Institute, the Indian School at Grand Junction, and the Fort Lewis Indian School at Fort Lewis, and should the movement to include all the non-reservation Indian schools maintained by the federal government in the provisions of the Davis bill, now pending in Congress, fail, that the State Board of Horticulture endorse the movement to convert these Indian schools into arricultural and horticultural schools and experiment stations as secondary schools, under the supervision of the State Board of Agriculture, and favor the necessary appropriations by the Legislature to that end.

Mr. Shaffer—Mr. Chairman, I move the adoption of this resolution.

The motion was duly seconded and carried.

Mr. Shaffer—Here is another resolution.

RESOLUTION.

Whereas, That since the term of office of Mr. George E. Harris, who has been an able and efficient member of the State Board of Horticulture, accomplishing many valuable services for the upbuilding of the horticultural industry of Mesa and Garfield counties (District No. 5), and of the whole State of Colorado, is to terminate in a short time, and since Mr. Harris has, on account of an increasing pressure of duties along live stock and other business lines, refused his name to be used as further appointee upon this board; and

Whereas, That since there is a strong desire by the fruit growers of the lower Grand Valley for a representation upon this board; be it

Resolved, That this convention of Colorado horticulturists heartily endorse the name of Mr. R. E. Turpin, of Grand Junction, for appointment upon the State Board of Horticulture, as the most logical candidate as a representative of this Grand River Valley fruit district.

Mr. Taylor—There is one resolution that will be included that Mr. Shaffer was not given. The signatures on this resolution comprise all the members of the Resolutions Committee except one (Mr. Shaffer.) That one name is not here.

RESOLUTION.

Whereas, In consideration of the valuable personal efforts of a single resident of the town of Rifle, in visiting the meeting of the State Board of Horticulture at Palisade one year ago, and there, by his convincing appeal and cordial welcome became directly responsible for the holding of the present meeting of this convention at the town of Rifle, in the county of Garfield; and

Whereas, In view of the fact that the present meeting has proved one of the most successful and beneficial meetings ever held by this organization; be it

Resolved, That the thanks of this body be accorded Mr. Fred G. Shaffer, of Rifle, for his individual efforts on behalf of this State Annual Horticultural Convention.

I move the adoption of this resolution.

The motion was seconded and unanimously adopted.

Mr. Shaffer—I want to thank the convention. Now, that represents the work of your Comittee on Resolutions, and these resolutions are all signed by F. G. Shaffer, G. E. Harris, E. P. Taylor, J. H. Divine and J. H. Hogg.

PREPARATION OF THE SOIL AND CHOICE OF STOCK IN PLANTING A NEW ORCHARD.

JAMES H. HOGG, NURSERY MANAGER NORTHERN NURSERIES, DENVER, COLORADO.

The preparation of the soil and selection of stock for an orchard is of the greatest importance to the orchard, consequently to the owner. The first thing to consider is: To what kind of fruit is your soil best adapted? For instance, cherries do best on high ground; apples will stand a little lower ground, containing more moisture, and plums will do well on still lower ground; but no fruit will do well in wet, soggy ground. Second: What particular kind of fruit is marketable at a profit in the markets to which you have access? With this settled, you are ready to begin operations.

It is advisable to grow rye on your orchard site the year before planting, as you then have a good stubble to plow under, especially if the rye is cut early and allowed to grow again before plowing. This plowing should be done in the fall, and should be good and deep, as after your ground is set to trees, it will not receive a thorough plowing again. Always bear in mind that your orchard is permanent, and that you have to ir-

rigate it. Your system of irrigation must be planned and your ground graded before you plant a tree, as after the ground is once planted it will be hard to rearrange.

Figure to give your orchard water as evenly as possible. Leave no low places where water will stand, as this is conducive to the breeding of many diseases. It is also desirable to lay out your orchard with the view of its future cultivation, as the cultivation of an orchard is as essential to its growth and productiveness as is tree surgery and spraying. By planting your trees so they row all ways, you can cultivate both ways, and the cultivator will stir up the soil very close to the trees, eliminating any extra hand hoeing, which will greatly reduce the cost of permanent care of your trees, as the cultivation of the soil is very necessary for the destruction of the eggs of numerous insect pests, which are deposited in the ground near the roots of the trees.

With your orchard graded and plowed it would be best to harrow it thoroughly, then roll, as we have good authority that such a process will assist greatly in holding moisture over winter. It is also a good plan to dig a hole in which to plant the tree in the fall or winter, as the freezing and thawing of the ground in the open hole tends to neutralize it. By all means dig the holes large enough. In many cases, in fact, most cases, when selling an order of trees, the salesman is asked: "How large a hole will I have to dig?" The salesman, fearing he may lose the order if he tells the purchaser that he must dig a hole one yard across and two feet deep, tells him to dig the hole just big enough for the roots of the tree. That is large enough for the salesman; but if you want and expect the best possible results, dig a large hole.

In the preparation of soil for an orchard, always bear in mind that you only set an orchard once, and that it is that once that helps largely or hinders greatly the results of your future labors, as an orchard well set out is started right, and with care will come into bearing much earlier than one that is planted in holes just large enough. Of course, in Colorado, it is a known fact in setting an orchard you need water with which to plant the trees. With the large hole you can readily see that, the dirt being softened about the tree, it will absorb more water at the time of planting, and will not need watering again as soon as if it only took two buckets of water to fill the hole. Then, again, we all know that the irrigation of ground keeps it cold, and consequently does not encourage early growth, which is essential to transplanted trees.

It has been the writer's experience that if, for the lack of time, or any other cause, you cannot properly prepare your ground before planting time, and early planting time at that, it is better not to plant at all until the following year, as it is a waste of time and money to start an orchard on which you

must put in years of work, unles you start right. The first cost is small in comparison with future care and expense, which can be greatly reduced by the proper preparation of the ground, as you cannot grade or change your irrigation system or cultivation plan after the trees are once planted.

Having often been asked as to fertilizing, I wish to state that any Colorado soil in which I have planted trees had all the strength necessary for the growth of trees, until they had grown in it for some time. To supply any need that might be felt later for the trees, it is well to fertilize the surface of the soil and by cultivation and watering, the strength of the fertilizer will reach the roots of the trees in good time, and in such a way as to do the most good, and no possible harm. Harm can be done by putting the fertilizer in the hole with, or even below, the roots of the tree, as any of the commonly used fertilizers produce unnatural heat when buried in the ground, which is never a good thing, and often very harmful.

Now, as to the selection of stock for your orchard. What kind of stock does a raiser of horses get to start a breeding farm? Does he look for the cheapest? No. He will not accept a runt or a diseased specimen, nor will the cattle, sheep, hog or poultry man. Then, why should the orchardist? He, above all, should procure the best, as it is longer before he begins to realize profits from his efforts, and the effect of a runt or of diseased stock is permanent, and can only be rectified by digging out and beginning over. Always get the best stock to start with; it will be the cheapest in the long run. Be careful and look into the matter well before you make up your mind as to what varieties or kinds of fruit you want. Then take the same trouble to find who can furnish you with what you want. We all know that young, thrifty stock will give the best results. Small, stunted trees are often sold for yearlings, when in reality they are two, and sometimes even three years old. That class of stock is dear at any price.

If you have been wise in the preparation of your ground, and used good judgment in the selection of stock to be planted, then follow it up by planting right, which includes the cutting off of the ends of all the roots that have been cut off previously, or that have been bruised. Use a sharp knife and make a smooth slanting cut, as a fresh cut root will head and begin to grow much quicker, and a bruised root will decay, which retards the growth and sometimes kills the tree. Use lots of water in setting young trees, but cultivate between irrigations. If you have started right, keep right in caring for your orchard, and you are sure to make a success of fruit raising anywhere, especially in the fruit districts of Colorado.

DISCUSSION.

Dr. Divine—Mr. Chairman, that was a splendid paper. There were a great many good ideas in that paper. There was

one I was glad to see him bring out, and that was on securing first class stock. When I send to a nursery I tell them to send me the very best trees. I never ask the price of a tree. I think even 10, 15 or 20 cents on the first cost of the tree is nothing. In establishing a first class orchard, my habit has been to order more trees than I expect to plant and the very best trees I can possibly get. I go over those trees carefully and throw out all not absolutely perfect, and in that way you can get up a first class orchard. Another point, in preparing the soil for the orchard I think it is a good idea to plow your ground and cross plow it the year before you intend to set it out, and then put on the sub-soiler and run up and down the rows where you intend to have your trees set. In the spring, when you are going to set out your trees, mark out the furrows with a plow and run back so you throw out a good big furrow. Plant your trees in this furrow, but, of course, you plant them so when it is leveled off your soil will come from one to two or three inches above where it stood in the nursery. A good deal of that will depend on your soil. If your soil is clay, don't put them down so deep. If it is soft, put them down two or three inches more than they stood in the nursery. I have run irrigating water in that ditch the whole first year. Sometimes I run it in the first and second watering and then fill up that ditch and run a ditch on either side. Either way is all right. I have raised the finest trees I ever raised when I run the water in the ditch the first year. You have to irrigate the young trees a little oftener than the old. You can run the water at first and then possibly let it run one or two hours and you have wet that furrow thoroughly, and when it comes in again, let a little more water down the furrow.

Mr. Butler—I would like to ask, the third year how close do you run your water to your young trees?

Dr. Divine—I usually put in the irrigating furrows with a shovel on a plow. I use the largest sized shovels and I try to put them down in the ground about twelve inches. That makes a deep furrow and I run them as close to the tree as I can without hitting the end of the extension.

Mr. Butler—The third year?

Dr. Divine—Yes, or any other year. Put a furrow a foot deep if you can. That gets it down pretty close to the roots and out to the sides, and the water will be retained in the soil a great deal longer than with shallow surfacing.

Mr. Clough—Everyone who has planted or is going to plant a young orchard should send to the United States Department for a bulletin, entitled, "Orchard Irrigation," covering irrigation experiments in Montana, Washington, Idaho, Oregon, Wyoming, California, Colorado and other sections, some of them coming very close home to us here, and you would cut down the amount of water you are putting on your orchards

at least 50 per cent. and in some cases 75 per cent. It gave an illustration of irrigating in Wyoming; the number of acres of land that are being irrigated by one second-foot of water is 112 acres. The bulletin goes on to state that in California, where conditions are very different to those in Wyoming—in fact, they are almost reverse on account of the different elevations and the different atmospheric conditions, so those are taken as illustration, and Wyoming, where the maximum amount of irrigation for 112 acres of land was one second-foot of water, 400 acres of land growing practically the same thing out in warm California in a lower elevation has done better service.

ORCHARD MANAGEMENT.

CHARLES E. WHITE, MANAGER IMPROVEMENT DEPARTMENT BEAVER LAND AND IRRIGATION COMPANY, PENROSE, COLO.

While orchard management indirectly constitutes the greater part of our discussions here to-day before the annual convention of the State Board of Horticulture, and is in a way the life work of most of us, I shall say only of the care and maintenance of an orchard in its youth.

To grow a tree is much like the development of a business, and its financial success depends much upon the same treatment. To begin with, the tree must be good. The care of a business must be thorough and careful, so must the care and cultivation of a tree. Fruit trees are the growers' tools and machinery by which he produces fruit. The very best are none too good for the modern fruit grower on our high priced lands, for they represent far more than the cash outlay to buy them. They represent time, care and patience to bring them to a bearing age, which takes a fair slice of a man's active years. Thoroughbred trees; trees of the best blood; able to do the best work and the most of it only are worthy of our consideration. The fruit as well as the tree must be considered, so, "By their fruits ye shall know them." With us Gano, Black Ben, Jonathan, Rome Beauty, and possibly Winesap and White Winter Pearmain bring in the dollars while some of the fancy kinds, such as Stayman Winesap and Delicious, require 15 years of fun to bring in the dollars. It is a singular fact that the dark bodied trees are the hardier.

After making a selection of the best commercial trees we are anxious to get them into the ground usually about the first of April. Good yearling whips arrive from the nursery usually in good condition. Now the secret in procuring a good stand is in the handling, which must be swift and careful, keeping the roots from exposure. Place one or two inches deeper than in the nursery, putting roots in natural position with prevailing roots and tops in the direction from which we receive most

wind. After pruning all broken roots with a slope from the under side, place the tree in position, putting some damp, fine earth around the roots. After partly filling the holes, raise the tree slightly with an upward and downward movement to settle the earth around the roots and give them a downward direction. Follow immediately with irrigation water, afterward dust with fine dry soil to conserve the moisture. Now we must shape our future orchard by cutting back to the desired height. We usually head at eighteen to twenty inches; thus we balance the relation between roots and tops, as the roots are usually rather weak to supply enough nourishment after being removed from the parent field. Our trees should now make a start with very little loss. Constant conservative cultivation and irrigation and possibly a cover crop for green manuring should bring us to the first of August. We may experience some trouble with insects and vermin through the summer, which can usually be destroyed with the proper appliances. The first of August we should have our trees well watered. Then let them go dry to harden for the coming freezing weather. It is natural that there should be drouth at this time of the year and we must obey the dictates of nature. So many of our winter-killed trees are a direct result of late summer irrigation. If our trees need water give it to them after we have had a good killing frost or after the leaves have fallen. It does not injure them, as it is natural in most sections for the ground to freeze to a certain depth.

As cold weather sets in, in most sections of the State we are annual losers from rodents. Blood or lime-sulphur wash will protect the trees from rabbits.

In Colorado the winters are usually mild, and outside of plowing in the fall we should have no more serious worry. Fall plowing conserves the moisture of winter and by spring a downward movement of water has been induced rather than a lateral movement. Each year should see the furrows multiply so as to follow the growth of the roots.

While we may have to plant ("replace") trees we can select a thrifty two-year tree, which preserves uniformity. In large enterprises of fruit growing to-day the question of competent labor confronts us. We cannot make an orchardist in one day and fruit growing is an art cultivated to perfection only through years of experience in a given locality. In smaller enterprises the question of how to make a living while bringing our trees to a bearing age is with us. While in most fruit sections work is plentiful, we find times that put us to our own resources. Many kinds of crops can be grown between trees, but many should be discouraged, as young trees should be of first importance. It would be better to lose a season's work than to stunt the trees by over irrigation. It is a common opinion among fruit growers that the orchard should not be irrigated in early spring, especially in the blooming period. Some think that

withholding water will retard the blooming period, but we find the trees out in leaf and in bloom at a certain time of the year. The orchard that goes into the winter in the proper condition does not need an early irrigation. Excessive irrigation in and after the middle of the summer does not help the development of fruit buds, rapid growth as a result of over irrigation retarding the fruit buds similar to a heavy crop of fruit.

If the orchardist wishes to promote fruitfulness, prune in the summer and do not over irrigate. Avoid letting the ground get too dry for a long period, as it will hasten the ripening of the fruit. Small fruit can be transformed by using plenty of fertilizer in the orchard. The opportunities of the young fruit grower are many. Stock and poultry bring good incomes according to the locality. Apparently the Western people were sleeping upon their opportunities, but they are awakening to a realization of their brightest dreams, but it is a fact that the West must grow the bulk of sun-kissed fruit for the United States and the world.

COMMERCIAL APPLES, PICKING, PACKING AND MARKETING.

A. L. ROBERTS, PRESIDENT NORTH FORK FRUIT GROWERS' ASSOCIATION, PAONIA, COLO.

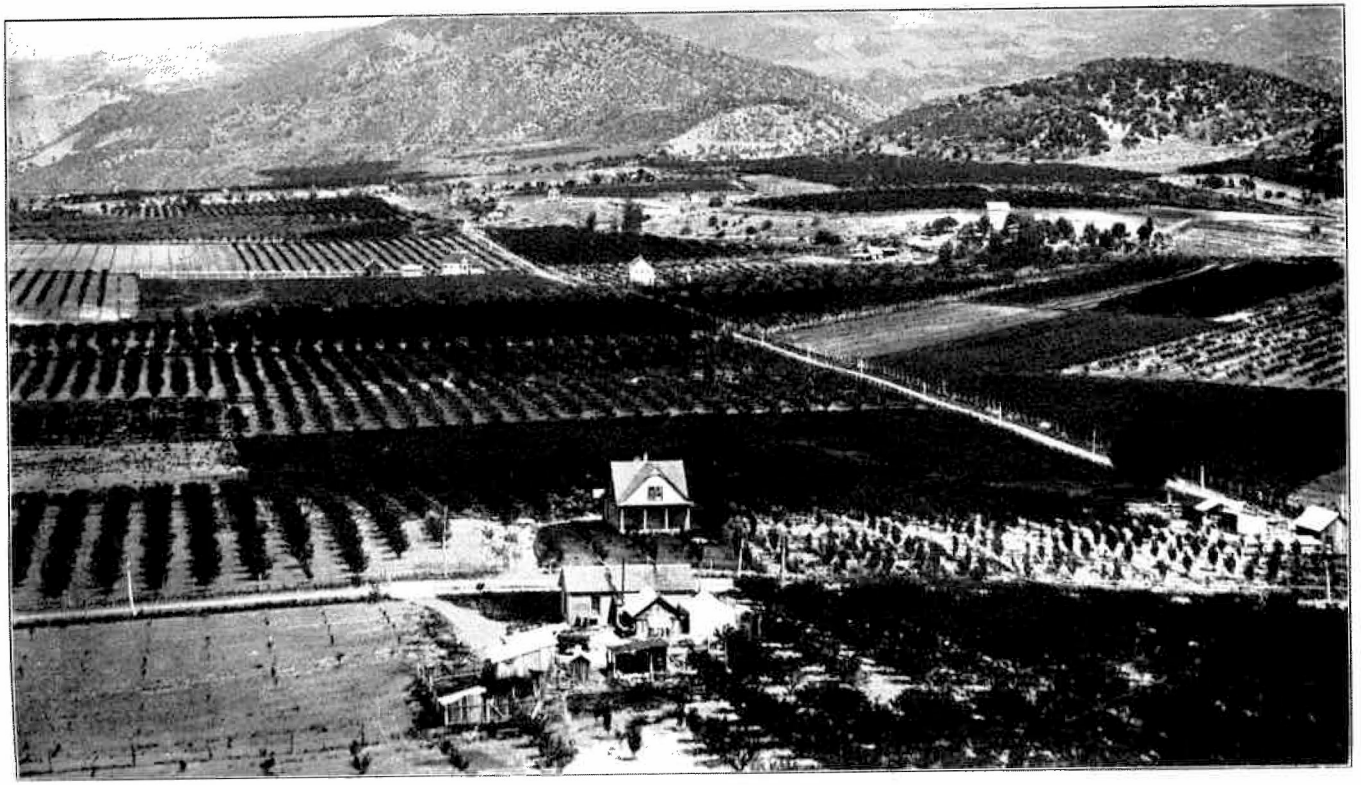
In preparing a paper on this subject, to be read before a meeting of the State Horticultural Convention, I naturally have in mind Colorado conditions and for Colorado people. The growing of commercial apples in Colorado has become a leading State industry. Hundreds of families are supported by it, and no one who has made commercial apple growing in Colorado his business under right conditions has ever failed. Nor need he ever fail in the future where conditions of growing are anything like right and a fair amount of intelligence is used in the work. That is to say, that there will always be a demand for Colorado apples in the markets of the country, and in the valleys of the State suited to the growth of apples a grower should always succeed. There are different grades of success, however, and as the degree of happiness in many homes of fruit growers depends upon the grade of success the grower has, it becomes at once important that the greatest possible success is attained. And as to methods that may be pursued there is a great range of possibilities, almost limitless in extent. Therefore my problem will be to select what I think is the best method to be followed in the light of all the experience I have had.

A commercial apple in Colorado may be said to be almost any variety. In our country the North Fork Fruit Growers' Association, of which I am a member, has some years shipped as many as a hundred different varieties of apples. This year

we shipped fifty-five. Some of these varieties were very good and some were very bad, and yet I do not recall a single year when a single variety has not been sold at a profit. There is a vast difference, however, as to the amount of profit; and, therefore, where it is possible to do so, it is important to grow the best varieties. And I want to say, in this connection, that every apple grower in Colorado, unless he is extremely wealthy to begin with—in fact, has all the money he wants or ever expects to want—should grow apples for money, and for that reason alone. This may seem so self-evident to many that you will wonder why I speak of it. But if it is self-evident that we should grow apples for money, it is also self-evident that many are now failing to make the most of their opportunties. Therefore, the main effort of this paper will be to point out what I believe to be the best way to make money out of growing commercial apples.

I believe I will be advocating nothing new when I say that the Jonathan has proven itself to be the best apple grown in Colorado to-day as a money-maker. Next, the Rome Beauty. Colorado beats the world on Jonathan and Rome Beauty. Next, the Stayman Winesap and the Grimes Golden. Then comes what we might call the second grade, the Gano, the Black Ben Davis, the Pearmains, Geneton, Missouri Pippin, and so forth. If I should plant another orchard for myself I should not go outside of the first four varieties mentioned—Jonathan, Rome Beauty, Stayman Winesap, and Grimes Golden. But if I had grown trees of a number of the varieties that might be called second graders, I should probably not graft them (unless there was some other special reason), because I doubt if it would pay. Money that comes in right now is often worth more than the chance that more might come in in five or ten years. Some varieties, however, when in standard locations and not too old, undoubtedly do pay to graft, as no one wants very poor varieties if stock and location warrant grafting to better sorts. Of the newer vareties, such as Winter Banana or Delicious, I have had no experience. Neither do I know how the Spitzenberg and the Newton Pippin of the Northwest would pay in this country, but I should have to have considerable proof of their adaptability before I would want to try any new variety on a large scale.

My subject includes picking, packing and marketing. I do not consider either picking or packing to be very complicated or very difficult of proper accomplishment for commercial success. Nevertheless, both must be done with great care. For picking, I use the ordinary picking sacks and believe that they are sufficient for the proper success if enough care is taken. I know that many apple growers will not agree with me in this, believing that too many apples are bruised when sacks are used, hence they prefer to use buckets or baskets that are rigid. They are much slower, however, and therefore more expensive



A PORTION OF GERMAN MESA, SHOWING MT. GUNNISON, DELTA, COLORADO.

Courtesy of A. L. Roberts, Paonia.

to use. Also, I have found that any ordinary crew of apple pickers can be induced to be careful in using the sacks if enough pains is used in giving the pickers minute instructions, and dwelling upon the importance of not bruising a single apple. It must be remembered that usually more apples are bruised putting the apples into the sacks than in emptying into the boxes or in hitting the sacks of apples on ladders or limbs. I always insist that my pickers put their hands clear down into the sacks until the apples can be placed carefully upon the other apples already in the sacks. But care must taken in all points, and after your crew is properly instructed it is absolutely necessary to insist that these instructions are carried out to the letter at all times. This can be done, and success can be had in this manner.

I believe in the Colorado box, the one adopted at the Fruit Growers' Convention held in Grand Junction last spring. I believe in the Colorado diamond pack and the three grades "Extra Fancy," "Extra Choice," and "Standard," adopted at the same meeting. We have used them and found them satisfactory, only we are now selling our apples under copyrighted brands. Our Extras are sold as the Columbine brand, our Extra Choice as the Paonia brand, and our Standards as the Robin brand. These brands have proven to be an advantage in selling.

Until this season we have always employed exclusively the usual method of packing from the apples direct as they came from the orchard and were put upon the packing table without the use of sorters. This method is entirely feasible, and a good commercial pack can be secured in this way if care enough is taken with the packers. In fact, in the case of both pickers and packers, patience, pains and vigilant watching are necessary for success. And my experience is that it pays to take pains to explain to help why the rules are made, as well as to insist that they are followed.

This year our manager has been experimenting some in assorting apples before they go to the packing tables. He reports some degree of success and seems to be of the opinion that in a few years the plan may be able to be worked out sufficiently for adoption as part of the regular method of packing used by the association. It is certain it would be less difficult for the packers to pack properly if all the apples were assorted and graded beforehand. It also may be presumed that a sorter having only one thing to perform might be able to do it better than a packer will do having to pack the apples at the same time. But the main question is the expense, and whether it will pay or not, and my experience is not sufficient to answer as yet. I do not believe, however, that it will ever pay us to adopt the complicated system of assorting to sizes used in the Northwest.

This brings me to the most vital subject of my paper—marketing.

There are many important things to be done and left undone to be successful with a commercial orchard. But the most important of all is marketing, or getting the money out of a crop. Also, there are more failures in this than in any other branch of the business.

For the benefit of the fruit industry in Colorado I would urge that as growers we take a broad view of the marketing problem. In the first place, it has been clearly demonstrated, I think, that a fruit grower's business does not cease when the fruit is grown; it only ceases when money for the crop is safely in the bank, and then only to begin again in the preparations for a new crop. And this thing of turning one's crop over to some outside commission house to sell, although sometimes coming up to expectations, has nevertheless so frequently ended in financial disaster to the growers concerned that enlightened communities have long since evolved a better plan—the plan of marketing through associations of growers. By this method a sufficient quantity of fruit is brought together to enable the association to employ its own manager or managers, sales manager or salesmen. These men are interested only in getting as much for the growers as possible. The largest and most notable example of this in the United States, or the world, perhaps, is the California Fruit Growers' Exchange, which has its agents in every large market in the United States and Canada and a representative in Europe. Then there are fruit growers associations in Florida and Texas, in Washington and Oregon, Utah, Idaho and in Colorado.

Now, taking into consideration the returns to the growers from associations the country over and comparing them with the returns from all private shippers the country over, I believe the returns from the associations will be found to be much the best. This is not saying that a few individual shippers may not have an advantageous connection with some market in which they obtain just as good results as associations do, but it is not the rule. Then, too, associations are a great benefit to a community in many other ways than simply selling fruit. A good association will sell any product the growers have to dispose of in any large quantity; it will supply its growers with the best best packing material, the best spray material, the best spraying machinery, and so forth, at reasonable prices, usually lower than private stores will do. It will also be a bureau of information for the growers at all times, and its officers will be constantly watching for knowledge that will be of benefit to its shippers.

Now, there are different plans upon which associations can be run. Some take entire charge of the packing as well as shipping the fruit of their growers and others simply market the packed product as it is delivered to them. I believe, however, that all associations exercise some jurisdiction in formulating rules for grading and packing. The best way, I believe, is to have all fruit packed directly by the associations. Undoubtedly in this manner the greater uniformity in grading and packing can be secured. And this will be found to be a big advantage in marketing, as all buyers desire at all times uniformity in pack and package. Also, most associations prorate their returns. All should do so. In this way each grower receives the same for like grade and variety. And in doing this it can easily be seen that it is much more fair to each grower if the greatest possible uniformity has been attained in grading and packing, and this can only be done when all packing is in direct charge of the association management.

Also, this prorating feature, peculiar only to associations, is a most estimable feature. A grower can hardly afford to be without this provision if he is located near any good association which uses it. It is like an insurance policy on his crop. If a car or two of his fruit is smashed in a wreck or goes wrong in any way he does not have to lose—all fight out a claim for damages with the railroad company. He gets what all his neighbors get and what all the association's shippers get for the same thing. He can hardly afford to take the risk and chance of getting very much less for the chance that he might get just as much.

Our own association, the North Fork Fruit Growers' Association, of Paonia, is, I believe, an example of a successful enterprise, one which has been a tremendous benefit to Paonia growers. Since it has been running our shippers have received a great deal more money for their fruit than they were receiving before and they have been getting their money much quicker. Land values have been advanced and the increase has been maintained largely upon the prices obtained by the association. In this association all fruit is packed under direct charge of the management and all fruit is prorated, with like grade and variety. We have a board of five directors, a manager, and, in season, a foreman for each packing station. We have three regular packing and shipping houses on the railroad, and have packing stations at a number of other places at a distance from the railroad. Also, for the last two years we have maintained boarding and lodging tents for packers and help. In this way a large responsibility in harvesting is removed from the growers and it really makes their troubles very much less. At the same time, a single management can handle the situation more advantageously and more economically than individual growers can do for themselves. Personally, I find it a great deal of comfort to know that all will be taken care of at the packing house, that all I have to do is to deliver my fruit and spend my money.

Nevertheless, it is something of an education to learn to be a good association member, as well as something to learn to know how to run one just right. A number of our growers

who have shipped with our association are not shipping with us to-day. Their reasons for not doing so are, in my opinion, usually trivial. They are not good reasons. They are not such reasons as ought to influence a prudent man to change a convenient and safe system of marketing for something untried and experimental. Personal pique or personal dislike of some official is not a good reason for allowing oneself to lose perhaps several hundred dollars a year. One should be willing to ship with his worst enemy if his returns were made greater thereby. I do not recall a single instance in which a grower has quit shipping with our association and tried some other way and has not lost money by so doing. Usually they have gotten a good deal less money for a like quantity and grade of fruit and have had to wait for a much longer time for what they did get.

Now, I have said in another part of my paper that we should grow fruit for money. We need to make money in our business. The welfare of ourselves and our families requires it, and the development of our country is enhanced by it. And I say it is foolish to let some little, trivial reason stand in the way of our own progress. I believe in the association idea. In an organization of fruit growers for themselves. And then, if a grower has a suspicion that something is not being run right in his association, let him make an honest investigation. It may convince him that he is mistaken. If, on the other hand, he becomes sure that there is a wrong he should be able to convince the majority of the fault and secure their aid in having it righted.

I have spoken freely of our association, the North Fork Fruit Growers' Association, of Paonia, and indeed in any wish to advertise it or to lower any competitor in the estimation of the grower, but because it is the one I have had experience with, and because my experience has led me to believe that this is the best method of marketing fruit. Also, what has been true of our association has and will, I believe, be true of other real associations. And that brings out the point that not all so-called associations are real associations. I would define a real association as one that does not handle fruit except for growers; that is, it does not buy and sell produce for itself, and which prorates its returns.

Also, it is sometimes an advantage for several associations to unite in selling; that is, to have the same sales manager. Mr. W. H. Garvin, of Delta, has been for several years the sales manager for several associations. This last year I believe he was selling for an association in Montezuma, for one in Montrose, three in Delta county (including our own), and, if I mistake not, for one here in Rifle. Also, I believe Mr. Moore, of Grand Junction, was sales manager for a number of associations in Mesa county and Utah. This uniting of associations in selling enables them to offer sufficient quantity to induce the best talent to undertake its sale, and is a point which should not

be lost sight of by the different boards of associations. It also to a large extent prevents our fruit from coming into harmful competition with itself. For this reason, mainly, there has been some talk of attempting to form a mammoth association in Colorado which shall undertake the buying and selling for what would be practically all present associations formed into one. Whether this would not be too large and unwieldy to operate successfully I can hardly form an opinion. There are some ways, of course, in which it might be an advantage. Of this I am certain, however, that the association method of marketing has proven the best, the safest, and the most reliable. It will probably also always be an advantage to any new association which may be formed to make its quantity big enough by uniting with other associations, if necessary, to enable it to take advantage of the best talent in marketing.

ORCHARD HEATING.

P. H. TROUTMAN, GENERAL MANAGER ROUND CREST FRUIT CO., CANON CITY, COLO.

"The number of heaters per acre."

For several years, ever since orchard heating became an acknowledged and important factor in the fruit industry, hundreds of articles have been written on the subject; some, merely theoretical; others showing a sad lack of knowledge of the practical side of frost fighting, while the balance have been of the greatest value to the orchardists, and have accomplished a great deal of good. These articles have proved beyond a doubt not only the success of this method of protection, but the overwhelming need of frost prevention.

Not often, however, have any of these articles discussed the very important subject of "The number of heaters required to the acre;" in fact, this subject has seldom been discussed outside of orchard heating advertisements, and it is so important that I believe it deserves the closest attention of this convention.

The question of the number of heaters per acre is a delicate one to handle, especially for an orchard heater manufacturer, without being accused of viewing the matter from a prejudiced standpoint, and my only excuse for bringing the subject before you is the vital importance of having it discussed, and the fact that I am not only a manufacturer, but a fruit grower, who has the welfare of the industry at heart.

I believe I am in a better position to handle this thesis than any other manufacturer, on account of the fact that we manufacture all sizes of heaters, from the smallest to the largest, and therefore nothing I have to say should be construed as furthering personal interests. Neither do I wish any of my

friends in the same line of business to take anything I say personally, for I do not want to condemn or support any particular heater. What I have to say is in condemnation of large fires and not large heaters.

Orchard heating, in its present form, is only a few years old, but it has been in existence in one form or another for many centuries. It is said that Pliny the Elder, of Rome, recommended the practice of smudging in the first century, and as early as the sixteenth century Olivier de' Serres, the famous French horticulturist, speaks of its wonderful protection. In 1796 one of the southern provinces of Germany enforced a law compelling the orchardists to protect their crops against frost and compelled each man to give his services in case of danger. This law was worked out, on very much the same system that frost fighting in the Grand Valley is to-day. Throughout this long career of frost fighting, there is not a single record showing the use of large fires, which substantiates the theory that there is no need for great heat locally, but there is need of numerous small fires, well distributed.

These old records would have little value however, if it was not for their substantiating the theory that modern science has followed. Every scientific principle of ancient or modern origin supports the theory that to get the best results from a certain amount of heat the same must be thoroughly distributed.

The government in all of its reports on smudging or orchard heating makes a strong point of small fires and warns the growers against the use of large fires (see Farmers' Bulletin No. 104 and Year Book, Department of Agriculture—1909—page 360). Furthermore, the majority of practical orchardists who have tested the various methods for themselves will agree with me that the best results were obtained with small fires.

Large fires have the same effect that old-fashioned hearth fires have—your face is scorched while your back freezes.

When furnaces were most generally used in large houses or buildings, almost invariably two furnaces would be used, as it was found that two furnaces of smaller type would give more heat from a ton of coal than one larger furnace.

Steam heating follows the same principle; numerous small coils are scattered around or throughout the building, church, or auditorium, as such coils heat the building much more evenly, than half the number of coils would double the size.

When it comes to out of door heating this principle becomes all the more important, as the air drafts are stronger.

Heat rises, and when the fires in an orchard are placed too far apart there is not time for the heat waves to meet under the blossoming trees, before the air currents carry the heat into the upper strata.

Years of experience have proved that forty square inches of fire area in one place is as large a fire as should ever be used.

TEN-YEAR-OLD ORCHARD OF ARKANSAS BLACKS. OWNED BY P. H. TROUTMAN, GENERAL MANAGER ROUND CREST FRUIT COMPANY, CANON CITY, COLORADO.

The forty square inch opening has come to be known as the "Standard" opening. Experience has also shown that for each degree of rise in temperature 400 square inches of fire area per acre are necessary on the average. This will vary, of course; high winds will make necessary greater heat, while on very still nights often half this amount will accomplish the same purpose.

At this average it will require four thousand inches of fire area, per acre, to raise the temperature ten degrees.

With the standard opening for each heater, it will require one hundred heaters to accomplish this result. It will take an opening of eighty square inches of fire area, per heater, if only fifty heaters are used. This is my reason for condemning large fires.

Large receptacles are more expensive and the grower very seldom is willing to purchase a large heater, if it is going to cost him double as much, and therefore he compromises by using only half enough of the large heaters. We orchard heater manufacturers are to blame for this, however, for we assure our customers that half as many large heaters are just as efficient, in spite of the enormous number of scientific facts that prove we are wrong. The growers take our word for it and they are the ones who suffer.

My objections to large fires are principally the fact that large fires create a strong draft, which carries the heat far up into the air, and causes the cold drafts to rush in from the sides to take its place. And that large fires do not heat evenly. In one place the heat will be great enough to scorch the trees, while half way between the fires Jack Frost will probably be getting in his work. This is always the case, unless twice as much heat is being produced as is necessary.

Large receptacles are nice and I recommend them for the grower who is willing to use them as a reservoir to save refilling so often. This is the only excuse for the existence of a larger heater, and it should be borne in mind that just as soon as a large receptacle is used for the purpose of creating more heat, a greater quantity of fuel will be consumed, and the heater will have to be refilled just as often as if it were a small heater.

So strongly do I feel upon this subject that I would rather see the growers use a common lard pail, which is patented by no one, using 150 of them to the acre, than have them use only 50 of our No. 3 or some other reservoir heater, for rarely will a season pass without the need for greater heat than can be obtained from fifty heaters with the Standard opening; it would be better to use three times as many little heaters well distributed, lighting them as they are required, than to increase the heat by opening the 50 reservoir heaters to the intermediate or reservoir opening, and the cost of equipment will be less. Some people say that the heaters will be in the way, and that

the fewer used to the acre the better. This is not so! Large fires have to be placed in the open away from the trees, which places them in the way of hauling, spraying, plowing, etcetera, while small fires can be placed in the tree rows and out of the way of any orchard work. I have used both in my orchards and know how they work.

Orchard heating is no longer an experiment, but has become one of the most important branches of orchard work. There are thousands to testify as to its great protection; we all know of the great need for the same in all sections; therefore, these subjects are not so important, but the ways and means of obtaining the best protection with the least cost is of vital importance, and merits a thorough discussion and the closest investigation.

ORCHARD HEATING.

JAMES L. HAMILTON, GRAND JUNCTION, COLO.

This is now the third year that I have been asked to appear on your official program and say something on the subject of "Orchard Heating," and I assure you that it is with a keen sense of pleasure that I review the progress made in this very interesting work during the past three years. I say keen pleasure, because the practical application of orchard heating on commercial lines on an extensive acreage was first made by the writer against the rigorous conditions of our climate. Since a fine crop of fruit was snatched bodily from the frost by the writer, and the fact established that it was a practical operation, the proposition has grown like the proverbial "rolling snowball," until to-day orchard heating has become a household word in the homes of every fruit grower in every fruit growing section of America, as well as foreign countries.

The marvel is that any proposition should spread so like wild fire and reach every nook and corner of the world in so short a period of time and its many advantages become so readily understood and appreciated. It is therefore a great pleasure to the writer to feel that he was the first to "touch the button" that set in motion so ponderous a machine—one that means so much to the fruit and vegetable growers of the world. To appreciate what it means to the growers, we have but to refer to our files so well filled with letters written in many foreign hands, as well as letters by the thousands from every fruit bearing State of the Union, from growers that have heard the good news of crop insurance and are anxiously waiting for the latest news from the front ranks. Added to these are hundreds of letters from growers that have actually met the enemy in their orchards and groves, and, writing, express to me their genuine delight because of the successes they have met, all knowing that at last they have broken the shackles that have bound them for years and from the sad experiences of losses of

their year's expectancy by the frost. From my experiences of three years ago to the present time, orchard heating has grown to the proportions of national and international interest, and the business of supplying the necessary equipments for this work has assumed amazing proportions, and by next spring there will be installed in the orchards and vegetable tracts of America alone several million heaters. In the orange groves, the pineapple tracts and the vegetable gardens of Florida are now close to a half million little stoves ready to belch forth their tiny fires in defense of the crop at the call of the grower. In every State extending from Florida northward to Maine the growers are bestirring themselves and preparing to equip their orchards with heaters. Likewise the Central and Western States that suffered so severely from the frosts last spring are now teeming with interest and scores of carloads of orchard heaters are even now being bought, while westward as far as the Sunset State and northward to Washington orchard heaters are the topic of conversation, and hundreds of thousands are being purchased by the growers. Even in sections of the country that have always been considered practically proof from frost because of favorable topographical conditions, the heater is winning its way, as there is no section upon critical examination but has lost more or less fruit by the ravages of the frost, and the anxious fear of the decline in the prices of realty that would occur if the fact became known to the world that they used orchard heaters has assumed a new phase. The purchasers of fruit tracts are now looking for the sections of the country where all orchard operations have been reduced to the best science, and orchard heating is now the most important item in orchard work. The most famous fruit valleys of the country, including the Grand Valley of Colorado and the valleys of the Northwest, are the sections farthest advanced in the science of orchard heating, and it is a question of but a very short time when every section that strives to keep up with the rapid march of progress will necessarily have to adopt orchard heaters. It is silly to deny that insurance of any description is a good thing, and certainly any grower that has felt the keen loss of his valuable crop of fruit cannot but recognize in the orchard heater a friend that has come to him in the time of need, and I venture the assertion that after a grower has lost his crop two or three years in succession his one hope is for a crop of fruit and his concern is but little about the value of his land. As with all new enterprises, there is a crop of skeptics that say there is nothing in this operation, and this extends even into the departments of our official government at times. So far as orchard heating is concerned, there is no man that has ever investigated the subject with the honest purpose of learning the facts in the case but that becomes an enthusiast on the subject. During the spring of 1910 there were approximately one million heaters in the hands of the growers in many sections of the country, and the testimony of thousands of growers that used the heat-

ers with satisfaction cannot well be disputed by any individual. We know of scores of crops that were saved from ruinous frosts or freezes that have netted the growers all the way from $6 to $12 per heater that cost from 25 to 30 cents per heater for fuel and labor for the season's operations. I say that with testimonies and affidavits from a multitude of growers confirming these figures that no person with reasonably good sense can say there is nothing in it. It is a subject that should be investigated thoroughly by our government officials at Washington and a vast amount of publicity given all the facts, so that every grower may as quickly as possible become acquainted with this very simple operation. As fruit growers and users of orchard heaters we are learning new things about this work every year, and this applies to a better knowledge of temperature conditions as well as equipment. Like all new things, we have to acquire our knowledge largely by experience, by observing very closely every item that enters into and affects the successful manipulation of the equipment and its best adaptability to he work intended. We are learning much about the natural climatic conditions that may be expected to follow a certain condition that actually exists, also what may be expected of the dreaded condition when it arrives. We are learning how best to meet this condition by the bettering of the equipment and the elimination so far as possible of extremely crude features that call for laborious work, all of which make for better protection because of better preparation and the consequent reduction of cost of operation. All are agreed that a sufficient amount of fuel must be consumed to generate a sufficient amount of heat energy to secure the desired results, and this, of course, is true of any system employed. If the temperature shows 10 degrees of frost, it is a fact that 10 degrees of frost must be overcome, and also a fact that a sufficient amount of fuel must be consumed to produce sufficient heat energy, which, combined with other natural conditions, will overcome 10 degrees of frost. We also know that when the thermometer shows 10 degrees of frost in the air that this is the moment that the fires must give sufficient heat energy to overcome the 10 degrees of frost; not two or three hours prior to this critical period, nor two or three hours after the critical period has passed, nor for two or three hours only should this critical period last for four or five hours, but the temperature condition must be faithfully met at the exact time and the artificial temperature maintained constantly so long as the frost condition is in evidence, graduating the fire energy with the increasing or declining of the frost intensity. A large number of different devices and systems have been tried out thoroughly in this valley, all of which have served the purpose of giving us the knowledge of what the conditions are that we have to meet and a better idea of what methods and equipments are best adapted to the work. The process of elimination has relegated a large percentage of this equipment and better devices and equipments are being employed. The great-

est thought and concern is for the equipment, regardless of cost, that affords the best protection to the crop, and, secondly, the elimination of as much of the back-breaking and laborious work during the night hours, and, third, the reduction of the cost to as low a figure as possible, so long as it does not in any manner affect the ultimate result desired—the absolute protection of the crop. There are some individuals that feel they must exert some effort toward saving their crops, but in a half-hearted manner figure what is the cheapest possible system they can secure, acting on the proposition that if they must smudge they will do it just as cheap as they can and trust to luck for results. Altogether too much of this kind of smudging has been done in the valley and elsewhere, with the result that when the extreme weather condition arises they lost their crop, either partially or wholly, and some say they now understand where they made their mistake and are either buying better equipment—the best their money can buy—or are opposed to orchard heating in general because they tried it and failed. I would much rather double my equipment, regardless of cost, and save a full crop than to skimp the equipment and lose half the crop, or possibly all of it. The best sign of the times is the fact that a large number of the best growers in this valley, those that use their brains, are taking just this view of the subject and are adding extra equipment and using extra precaution in preparation. This is wise, as in the event no fire is used the expense will be slight, and in the event an emergency arises they are better prepared to meet it and the grower will thank himself for his forethought. When he walks into his orchard in the summer months and looks at the well filled trees, he will forget all about the little extra expense put on the equipment.

I appreciate the difficulties growers are laboring under in selecting an equipment. The market is to-day flooded with orchard heating devices and all kinds of claims are advanced by each maker, some of which are too ridiculous to notice. I will suggest to the grower that the one thing to keep in mind is the fact that the whole operation is for the purpose of temperature raising, and this means that at times you will have but 2 or 3 degrees of frost to overcome, or any intermediate degree up to possibly 15 degrees, and what you must have, and what will prove to be the best protection, will be a system that meets all the varying conditions that you will experience. A crop of fruit is what you want, and the device that will best guarantee this crop against every possible weather condition will prove the cheapest. All things are dear or cheap by comparison, and the device that you know from the experiences of other growers has proven the best protection and that saved the largest percentage of crops is by far the cheapest. The question of liberating the proper amount of heat is a serious one. It costs money to supply the fuel; therefore it should not be wasted any more than can be avoided. A device that, first of all, gives absolute protection to the crop should be selected, and the next

thought the device best adapted to generate the fire necessary to meet the varying weather conditions. Fuel is only part of the expense. Labor costs money, and it is also possible that with any system that requires a large amount of labor to handle that the necessary amount of hands may not be secured when needed, and the grower would be as bad off as though he had no heaters. To reduce the labor cost to the lowest possible figure a device must be selected that eliminates as far as possible all night work and that is easily recharged the next day after using. This means large fuel capacity as well as simplicity of construction.

Of great importance to the grower also is the materials used in the device. A grower does not expect to have to replace his equipment of heaters every two or three years. If so, it will prove to be an expensive proposition for him. Select a device that represents the best possible mechanical construction as well as of heavy materials. This means the elimination of any features that will cause the device to quickly deteriorate or give out on account of any weak point. It should be made of iron or steel of sufficient weight or thickness that it will not so easily rust out or become affected by the intense heat of the oil fire. All of these items are of importance, and if carefully considered by the grower will help him out of some troubles and will result in his securing the best possible device for his use. It is also important that the equipment should be well cared for at all times, for if abused its life will be shortened. The heaters should be well housed in the summer after the oil has been emptied, and they should be put away well saturated and no rust or deterioration of any kind will result.

I will further suggest that any grower might well follow closely the work of those that have been actively engaged in this work and have been successful in heating orchards, as it will be of great assistance to him, and remember that orchard heating is made up largely of important details, any one of which if overlooked would result in loss, and no one feature controls it. As an example, you might work on the theory that all that is required is the liberating of a vast amount of heat. At first thought this is correct, but of just as great importance is the control of this heat, so that you can secure the greatest amount of this heat when it is needed greatest. It might result by following out the theory you would work on that you would liberate the largest amount of your heat at an early period of the frost and when you needed the very smallest amount of heat, and when the time came that you needed the largest amount and the very best heat you will be reduced to the smallest amount, and as a result lose your crop, because, while you did burn enough oil during the period to save your crop you did not burn it at the right time in its greatest quantity, and therefore might just as well not have burned any. It would be like having a fire so great in your furnace that the temperature

in your house would be 100 early in the evening, when but a small amount of fire was required, and later in the night, when it is zero, you find the furnace has burned out all its fuel and nothing but a small fire can be secured, and as a result your water pipes freeze. Such an arrangement would not be tolerated for a minute. The furnace gave off enough heat during the entire burning period to have comfortably heated your home, but you did not control this heat, and right here lies the keynote of successful orchard heating. The controlled heat is the all important feature. First, plenty of heat, and, secondly, the control of this heat, and soon no equipment will be tolerated in the orchards that does not scientifically meet the requirements. I trust my words will not be misunderstood, as I have endeavored to bring out the practical points in this important work and believe that any grower that has actually heated an orchard against frost conditions will agree with me on every point.

The operations throughout the country are going to be on a very liberal basis this spring, and the results of the work will be watched for with great interest. It is not to be presumed that every user will be successful at first, as so many will not take the pains to thoroughly understand what will be required of them, and others will enter into the work half-heartedly and overlook important details, and the results will be far from satisfactory. Some will enter into the work with a determination to win and with an anxious desire to save the crop and will do the right thing at the right time. These are the men that will write us letters next spring telling us of the great success they had in operating our heaters, and their names will appear in our book of testimonials.

COAL A PRACTICAL FUEL FOR ORCHARD HEATING.

BY F. E. BARNEY, GRAND JUNCTION, COLO.

Coal has been used extensively the past two years in Colorado for the prevention of frost injury. If coal was not effective and satisfactory, or if other fuels had proven to be greatly superior for the purpose, of course growers would rapidly discontinue its use for this purpose.

If it was the heater the coal was burned in that was at fault and not the coal, the heater would be replaced by one that did handle the coal satisfactorily. What is the situation after two years of experimental work? It is as follows: Coal as a fuel has not been abandoned, but is being used by a greater number of growers than ever before.

On account of the splendid and universal results produced by coal burned in every kind of a device very few of these devices have been replaced. A few small utensils that did not clean well and lacked sufficient capacity have been discarded.

In a few instances the users of this class of coal burners have laid the blame on the fuel and have installed oil pots. While a few growers have replaced their small coal pots with oil pots, an equal number have replaced their oil pots with larger coal heaters. As the process of orchard heating required entirely new work, systems for operating the heaters economically had to be worked out. As necessity is the mother of invention, ways and means were soon devised to reduce this labor to the minimum. By having the coal sheds properly constructed and using the correct size coal there is found to be very little more labor with a good equipment of coal heaters than with the oil pots.

All orchard heater tests show that coal will raise the temperature as quickly and as high as oil. The time required to generate gas from oil to burn and raise the temperature is offset by the burning waste kindling and volatile gases of coal firing.

A good heater burning five pounds of coal per hour, will raise the temperature 10 or 12 degrees when used at the rate of fifty per acre.

To raise the temperature this much with oil requires the burning of one quart of oil per hour in eighty pots per acre.

As there are advantages and objections to both fuels, they will balance one against the other in most respects. The main determining factor in the use of either fuel is the cost of fuel. A good rule to go by is: Where oil costs 3 cents or more per gallon and coal costs $5 per ton or less, use coal; and where oil costs 3 cents or less per gallon and coal costs $5 or more per ton, use oil.

Plenty of heaters should be used to produce sufficient heat and to last through the cold period with very little or no refilling.

A coal heater to be practicable must be held off the ground, as the ground will absorb much of the heat where the coal is burned on or very near it. It must have a concentrated bottom draft, which will cause good combustion, thereby releasing all fuel energy possible.

An outdoor heater, where so many are used, must be quick and easy to light and produce heat quickly after lighting. An orchard heater must hold a portion of fuel in reserve, so as to eliminate labor of refilling.

Where frosts are so severe as to require firing all night, it is of great advantage to use a heater of sufficient capacity to burn all night without refilling. A heater should be reasonably self-feeding and self-cleaning, thereby burning with little or no attention.

An outdoor heater should have heat spreading principles so that it will be successful in saving ground fruits and vegetables as well as tree fruits. As a rule, the shorter the danger period the lighter the frost; therefore every other heater should be lightly loaded and fired for the short periods. If the cold

becomes severe early in the night, the heavier loaded heaters are lighted first, and as it becomes colder more heaters are started burning. Coal has been thoroughly proven to be practical for orchard heating and will always be used.

THE RELATION OF THE EXPERIMENT STATION TO THE FRUIT GROWING INTERESTS OF THE STATE.

PROFESSOR C. P. GILLETTE, STATE ENTOMOLOGIST, FORT COLLINS, COLO.

The Agricultural Experiment Station is primarily for the farmer. As the property of the nation has for its basis the products of the soil, the financial success of those who till the soil and harvest its crops is at the foundation of practically all the success in any trade or business in the country. So, while the Hatch and Adams acts passed by the federal government for the support of Agricultural Experiment Stations, appear to be class legislation, they are really for the benefit of the whole people.

The first of these, the Hatch Act, was passed in 1887. From it the experiment station or stations in each state are given $15,000 annually. The Adams Act was passed in 1906 and was "An Act to provide for the increased annual appropriation for agricultural experiment stations." The amount appropriated by this act began at $5,000.00 a year and increased until, this year, for the first time, the amount to be received by each state, has reached the maximum of $15,000.00. So from this time on, until these laws are repealed, the experiment station or stations of each state will receive $30,000.00 a year from the federal government, for the support of their work.

These acts by the general government have stimulated the states to make additional appropriations for this work, several of which set aside sums far exceeding the amount received from the government.

The Sixteenth General Assembly of Colorado appropriated a total of $55,000.00 to be used during 1909 and 1910 by the Agricultural College and Experiment Station for experimental and extension work in the state.

CONDITIONS GOVERNING APPROPRIATIONS.

All of these appropriations are hedged about with certain conditions that must be complied with in the expenditure of the funds.

The Hatch Act has for its object, according to its own words, "To aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiments respecting the principles and applications of agricultural science."

These provisions are capable of a very general and loose interpretation and for several years the government was inclined to allow a good deal of latitude to the stations in the expenditure of this fund. But, as soon as the stations became well established with their corps of scientific workers, the governing station at Washington has been interpreting more strictly each year, the provisions of the act so that now the Hatch money can only be used for such experimental work as is carefully planned and which has for its object the discovery of some new fact or principle, or the testing of old ones under new or untried conditions. The testing of spraying machines, or spray materials, of a crop rotation, of farm or garden seeds, or of certain feeds for the fattening of animals, and like operations having for their purpose a mere demonstration of known facts and principles, would not be allowed under the Hatch fund. This fund does allow the necessary expenses of administration and the expenses of publishing the results of experimental work carried on under either Hatch or Adams acts.

The provisions for the expenditure of the Adams fund are still more stringent. This fund can not be used for the expenses of administration or for the publication of bulletins or other printed matter, and only for such experiments and investigations as are technical in nature and of a high order. Those employed under this fund are necessarily specialists in some line of scientific research.

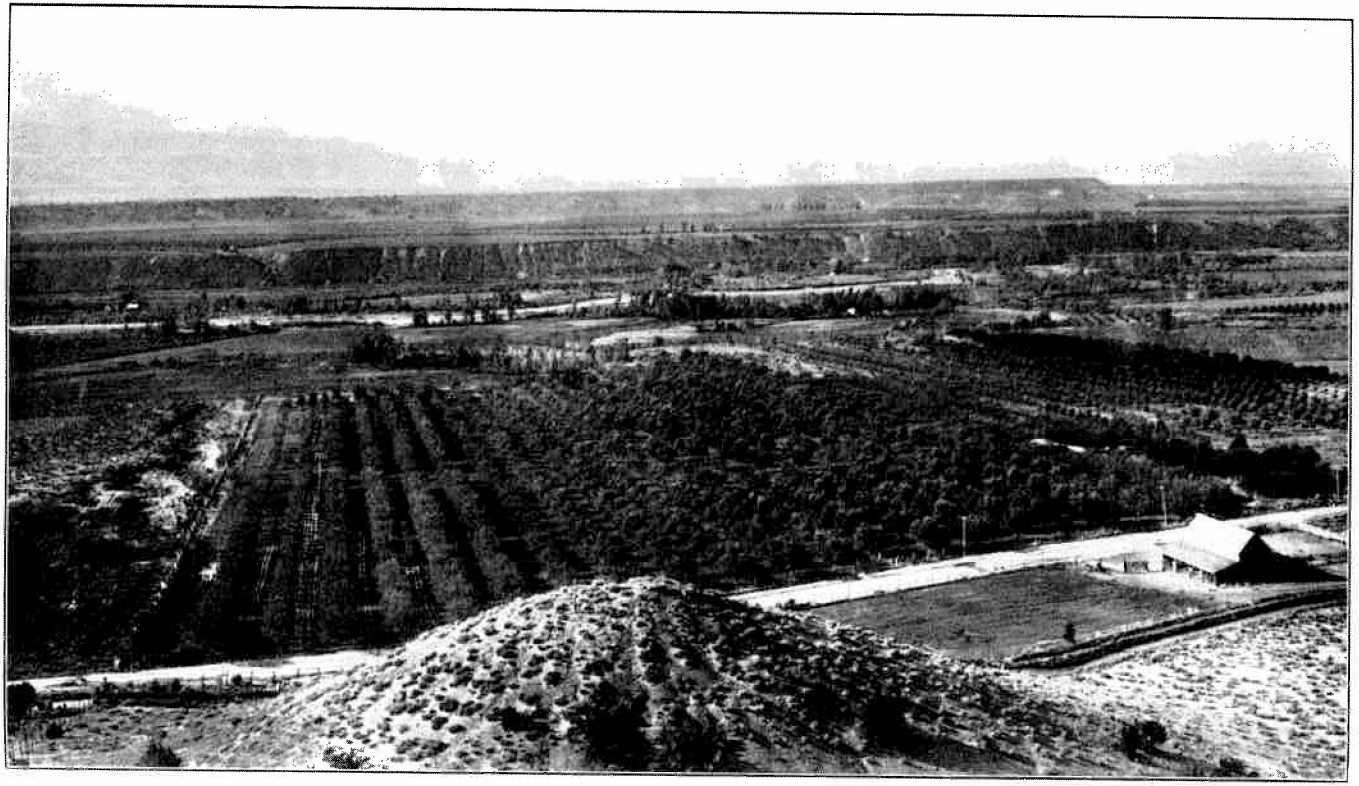
It might also be said of the experiments carried on under the government funds that they are, on the whole, rather elaborate, and expensive, often requiring the careful recording of data for a considerable period of years and the use of expensive instruments, and so are often slow in bringing final results.

The State appropriations are usually for some quite definite line of work that is likely to give quick returns, and for the most part are along some line of demonstration, or extension work. The appropriations made by the Colorado legislature for the experiment station two years ago were apportioned as follows:

Fruit investigations	$10,000.00
Live stock investigations	10,000.00
Potato investigations	10,000.00
Machinery and roads	5,000.00
Plant investigations	8,000.00
Horse investigations	5,000.00
Poultry investigations	5,000.00
Cheyenne county (dry farming)	2,000.00
Total	$55,000.00

RELATIONS TO THE FRUIT GROWER.

So far, my statements in regard to the work of the experiment station have been of a general nature to give a broad



HAWKINS & WOOTTON RANCH, PAONIA, COLORADO.

Courtesy of A. L. Roberts, Paonia.

idea of its scope and plan. In a general way, the station's relations and duties are the same to all farming classes. The special relations between the station and the fruit grower are because of the peculiar problems that the latter has to solve, and for no other reason.

First of all, it might be well for us to consider

SOME THINGS THE STATION CAN NOT PROPERLY DO.

Although the function of the station is the solution of the farmer's problems, it must be evident from what has already been said that there are many of his problems that lie entirely outside the scope of station work that can be paid for out of the government funds (Hatch and Adams).

As examples, analyses of soils, fertilizers, water, fruit, or insecticides; time and expense diagnosing animal diseases and doctoring the affected creatures; the naming of plants and insects; the examination of water, sputum, milk or other substances for the detection of disease organisms, or any other piece of work not in line with some project that is being carried on, cannot be undertaken with these funds. Such work can only be carried on by the college proper, or by State appropriations made for these special purposes.

I call attention to these things because the station has many requests for such work and there are those who seem to think the station is not fulfilling its mission when it fails to respond to such calls on the part of the people of the State.

WHAT THE STATION WANTS OF THE FRUIT GROWER.

If you have troubles that the experiment station cannot immediately take up and answer for you, do not conclude, on that account, that we do not want to hear from you or help you. The relations between the experiment station workers and the fruit growers should be most sympathetic and cordial, and I am confident they will be if we can fully understand one another and work together for the substantial development of the horticultural interests of the State. I wish to invite you all to be very free to communicate with the station in regard to any matters that seem to you to need investigation in the interests of the agricultural development of our State, and then help to get the appropriations from our State Legislature that you think proper and needful for the work of the Agricultural Experiment Station.

WHAT THE STATION HAS BEEN DOING FOR THE FRUIT GROWER.

The horticultural interests have received a liberal share of attention from the station. The projects that have been supported, especially in the interests of the fruit grower, during the past two years are:

Effects of arsenical sprays upon orchard trees.

The source, cause and effect of the so-called "black alkali" spots in our soils. 119

Studies on habits and remedies for our orchard plant lice. 120.

Habits and remedies for the codling moth. 131.

Habits and remedies for red spider and brown mite. 133.

Habits and remedies for the peach twig borer. 136.

Experiments with cement cisterns for vinegar. 139.

Cover crops for the orchard. 140.

Thinning fruit for profit. 141.

Cause and remedy for peach spot. 142.

Handling Jonathan apples to prevent spotting. 147.

Raspberry growing. 152.

The bulletins that the station has published treating of fruit growing in any of its phases are as follows: 155.

6. *Notes on Insects and Insecticides.....James Cassidy 157.
15. *The Codling Moth and Grape Vine Leaf Hopper..... .....C. P. Gillette 160.
17. *A Preliminary Report on the Fruit Interests of the State.....C. S. Crandall 169.
19. *Observations Upon Injurious Insects, 1891..C. P. Gillette 170.
21. *Sugar Beets, Potatoes and Fruit Raising..F. L. Watrous 171.
24. *A Few Common Insect Pests.....C. P. Gillette
29. *Strawberries and Grapes; Notes on Varieties..... .....M. J. Huffington 35.
41. *Blight and Other Plant Diseases.....C. S. Crandall
47. *Colorado's Worst Insect Pests and Their Remedies.. .....C. P. Gillette 42.
50. *Notes on Plum Culture.....C. S. Crandall 43.
53. *Strawberries.....C. S. Crandall and C. H. Potter
60. *Bush Fruits.....C. H. Potter 6.
69. *Plant Diseases of 1901.....W. Paddock 11.
71. *Insects and Insecticides.....C. P. Gillette 20.
80. *Laying Down Peach Trees.....W. Paddock 21.
84. An Apricot Blight.....W. Paddock 30.
86. *Crown Gall .....W. Paddock 31.
94. *Report of Entomologist for 1903.....C. P. Gillette 44.
105. *A New Apple Rot.....W. Paddock
106. *Pruning Fruit Trees.....W. Paddock 48.
107. *Peach Mildew .....O. B. Whipple
114. *Insects and Insecticides..... ..C. P. Gillette
118. *Western Slope Fruit Investigation, Report of Field Horticulturist, 1906 .....O. B. Whipple 3. 4.

*Western Slope Fruit Investigation, Report of Field Entomologist, 1906.....E. P. Taylor
The Howard Scale.....E. P. Taylor
Arsenical Poisoning of Fruit Trees.....W. P. Headden
A Few Orchard Plant Lice..C. P. Gillette and E. P. Taylor
*Dewberry Growing.....O. B. Whipple
*Pruning Mature Fruit Trees.....O. B. Whipple
*Strawberry Growing in Colorado.....B. O. Longyear
Grape Growing.....O. B. Whipple
Tillage, Fertilizers and Shade Crops for Orchards.....W. Paddock
Top-Working Fruit Trees.....O. B. Whipple
Two Common Orchard Mites.....Geo. P. Weldon
Fixation of Nitrogen in Some Colorado Soils.....W. P. Headden
Arsenical Poisoning of Fruit Trees.....W. P. Headden
Nitrates in the Soil.....W. P. Headden
Some Insects Attacking the Peach in Colorado.....C. P. Gillette and Geo. P. Weldon
Thinning Winesap Apples; Winter and Frost Injury to Fruit Trees.....R. S. Herrick
Raspberry Growing.....R. S. Herrick

PRESS BULLETINS.

Wind-Breaks and Shelter Belts for the Plains.....B. O. Longyear
Western Slope Fruit Investigation, Report of Field Entomologist, Season of 1906.....E. P. Taylor
Western Slope Fruit Investigation, Report of Field Horticulturist, Season of 1906.....O. B. Whipple
A So-Called Blight Cure.....C. H. Potter
How to Fight the Codling Moth.....C. P. Gillette
Plant Lice and Their Remedies.....S. A. Johnson
*Spraying for Plant Lice and Codling Moth.C. P. Gillette
The Howard Scale.....E. P. Taylor
The Green Aphis and the Woolly Aphis of the Apple.....C. P. Gillette
Spraying for Codling Moth; Some Important Points to Be Considered.....C. P. Gillette
San Jose Scale.....C. P. Gillette

INFORMATION CIRCULARS.

Orchard Management.
Preparing Land and Trees for Orchard Planting.

One copy each of these bulletins would make a volume of about 800 pages.

Those marked with an asterisk are out of print and can no longer be supplied. The others will be sent to those requesting them so long as the supply lasts.

The East is fast adopting the superior methods of the West in growing, packing and marketing its orchard fruits, and is sure to become our strong competitor in the large Eastern and Southern markets.

While we have advantages of climate and irrigation that the East can not take away, it is necessary for us all to pull together for the best fruit, the best country homes and the best citizenship that it is possible to find anywhere.

To these ends the experiment station desires to labor for you and with you to the best of its ability.

THE PRINCIPAL FRUIT PESTS OF THE WESTERN SLOPE.

PROFESSOR E. P. TAYLOR, HORTICULTURAL INSPECTOR MESA COUNTY, GRAND JUNCTION, COLO.

As to the insect pests of the Western Slope. I have a few samples with me, and I will talk from them, giving you a chance to see what some of them are. Most of you are already familiar with them. To begin with, the principal pest of the Western Slope was codling moth this season. If we were over on the Eastern Slope in an agricultural section, I suppose it would be the grasshopper. The codling moth is all on the Western Slope that the grasshopper is on the Eastern Slope to the farmer. I am going to pass around these scale insects. We might class our pests on the Western Slope as those infesting the trees and those attacking the fruit. The scale insects, the plant lice and the mites and spiders are all pests of the tree itself. After all, we have only one serious pest attacking the fruit itself, and that is the codling moth. Some of the scale insects I have here are the scurfy bark louse. I am going to pass this around, not because it is present on the Western Slope, but so you can have an idea of what the scurfy scale is like. This little twig here shows the oyster shell scale. It is another serious orchard pest in the East, but so far entirely unknown on the Western Slope. In this envelope I have a number of specimens of the San Jose scale, which is probably the most serious of the scale insects infesting the orchards. As a pest on the Western Slope, it is still of minor importance. It has been discovered in a very few of the orchards of the Western Slope. We are doing everything possible to hold it in check. I want you all to become familiar with it. If you should find anything like this on your trees

you should notify either the State Entomologist at Fort Collins or your county horticultural inspector. Neglect of this may cost us a great deal. These specimens are all dead, and there is no danger of spreading them. As soon as the twig dies the insect also dies, so there is no danger of transferring the scale on dead specimens or dead twigs like this.

Query—Would the woolly aphis on young sprouts, cut off and thrown on the ground, die as the sprouts wither?

Mr. Taylor—Generally they will, but sometimes they leave and crawl to other parts of the tree. On these apples you will find little red blotches. The samples I am passing around show San Jose scale on the twigs. This sample on the apples is not the San Jose, but is the Howard scale, which also infests the pear. These blotches look very much like the red blotches from the San Jose scale, which you should note, and if you see these on your fruit at any time during the summer you should make close examination of the tree. The scale marks on fruit are generally most abundant at the calyx and stem ends of the fruit.

As to the treatment and the success of our fruit growers in handling this scale where it has been found—we have found that it seems to be quite as easily, if not more easily, controlled here in Western Colorado than in other sections. The lime and sulphur used on the infested trees while the tree is dormant has been very successful. Trees that were almost encrusted have been reduced to slightly infested, and sometimes after treatment one could hardly find a living scale. It is not going to be a serious pest probably in the Western Slope orchards, if it is taken in hand at once. The aphis proposition is a serious one, or has been for the last few years on the Western Slope, though it has not been so serious this year. In the Grand Valley orchards we have had very little trouble from either the green apple aphis or the woolly aphis. A few years ago there was quite general spraying in several of the Western Slope counties for the woolly aphis, treating both the infested roots and the tops of the trees. That has evidently done a great deal of good. We have also had some natural parasites which feed on these aphids. They have reduced them, so we are not so much concerned over them as before. However, natural conditions might not always be in our favor, and it is well to keep posted on the proper methods for treating them. The green peach aphis infesting the leaves of the trees in the spring and clustering around on the young peaches was very serious in parts of the Western Slope this year. This pest is something we are probably going to have to spray for this spring. In fact, for many of the pests we are going to continue our spraying, and the lime and sulphur spray is something we must not discontinue. The inspection of nursery trees received is important. We are trying to exclude as much as

possible all crown gall. It is not an insect pest, but a disease which causes these knots to grow around the crown of the tree, and in many cases is detrimental. There is no question but trees received from the nursery, almost girdled by these big galls, are not the kind of trees the planter wants. I excluded something like 7,000 trees this year for these various things—not all crown gall, but other things which made them undesirable trees to plant, pests or diseases which might be spread to other trees, perhaps to your neighbors—detrimental fruit pests. I don't believe you want to plant trees with crown gall on them at all.

Query—Why?

Mr. Taylor—They are detrimental to the trees; where they are like that, they might girdle the tree.

Query—I would like to ask if it is possible that aphis on young trees won't make knots like that?

Mr. Taylor—Yes, it will make a knot something like that, but not the same thing. The aphis makes rough knots like the sample I passed first. The aphis has no connection with crown gall.

Query—Crown gall is caused by woolly aphis?

Mr. Taylor—No, I don't think so.

Query—I have a few trees with some such a knot on, but it is smooth here. I thought perhaps it was the aphis.

Mr. Taylor—Perhaps it is; you will find an enlargement sometimes due to the aphis. The samples I have here show the nest of the brown-tailed moth. You have heard a great deal about the brown-tail moth and the gypsy moth, and we are trying to keep these out of this section. These are not present on the Western Slope. These brown-tail moth nests came into this country on imported nursery seedlings. When they came, if we had torn them open, we would have found them teeming with little worms. In importing seedlings we have to be careful to exclude all these things, and if they are found, they are destroyed immediately. The introduction of these pests into our orchards and onto the shade trees in our cities would do us great damage. I got these samples while I was making some inspections for the government of imported nursery stock. These came from near Angers, France; they are all dead. This sample here shows some little cases on seedlings, which are the cases of the apple leaf crumpler. It is not a pest on the Western Slope, but I know it is present on the Eastern Slope, though not as a serious pest.

Query—Got anything on blight?

Mr. Taylor—The blight has not been a serious pest with us this year in the lower Grand Valley in Mesa county. We have had a little of it, but it has not been a serious pest, and we practice the thorough cutting out of the blight there when-

ever it shows up. So far as we know, that is the only thing we can do. I have some illustrations here, some photographs of different orchard pests. I might mention the mites and spiders, including the red spider, the brown mite, the pear leaf blister mite and the pear vagabond mite. The red spider infests peaches, pears, plums, apples and cherries, etc.; the brown mite also infests these varieties and some others. The pear leaf blister mite causes a little blister on the leaves of pears, and the pear vagabond mite causes the leaves of the pear to turn black and curl. It is principally on the young trees that you find this pear vagabond mite. Of the less important insects, we have the cutter bees, which cut little round holes out of the margins of our rose and pear leaves. Most of you have seen these and wondered what they were. The bits of leaf tissue are cut away by these bees and carried to their homes for lining their nests. We have the peach tree borer attacking the peach tree around the crown of the tree, and the peach twig borer attacking the twigs of the peach, and later in the summer entering the fruit itself, causing the drops of gum which we sometimes find on the peaches. We have, of course, the slugs on the cherry and pear, although I don't think we had the slugs as bad on the Western Slope this year as they have been in some previous years. We have a few leaf-rollers on the Western Slope, although this year we had very little damage from them.

The scab of the apple causes great loss to fruit growers all through the Eastern States, and in some places in the Northwest, where the atmosphere is more humid. So far we have never found a trace of apple scab on the Western Slope, and I think the same statement may be made for the whole of Colorado. We have no peach scab so far as I know on the Western Slope. We have none of the brown rot which occurs on peaches and plums in the East and South. The peach growers in the Mississippi valley suffer great loss from brown rot. This gives our peaches great advantage over those grown in sections where brown rot is present. We have no bitter rot, and, as I said, no oyster shell scale and no scurfy scale. We have no tar rot or phyllosticta. We have no peach or plum curculio, which stings apples, peaches, plums and cherries so badly in the East.

Mr. Butler—Could you explain what that looks like?

Mr. Taylor—The curculio is a little grey beetle, about one-sixth of an inch long. On its wing covers are four elevations. It belongs to the snout-beetle family. Upon jarring the trees the beetles will fall to the ground and "play 'possum." The beetle comes out along about the time the leaves come out on the tree in the spring, and they feed a little on the leaves and blossoms, and when the fruit is the size of a pea or larger, the beetle feeds on it, making little punctures. They also make

punctures as they lay their eggs in the fruit. They make a half-moon-shaped mark, and the egg is laid within that crescent mark. We have these two kinds of punctures from the curculio. The fruit later on, if it is a peach or cherry, will become wormy. In the apple the egg hatches, and in most cases the fruit falls to the ground, increasing the June drop and the amount of windfalls to an enormous extent.

Mr. Butler—I would like to say I think I have some of that very thing in my cherries.

Mr. Taylor—I have noticed a little of the plum gouger in some sections of the state, which is closely related to this, and perhaps that is what you refer to. We had a few wormy cherries and plums in the Grand Valley this year from the codling moth, too.

Mr. Butler—This was brown or reddish like; I didn't think it was the codling moth.

Mr. Taylor—It may have been the twig borer of the peach. It would be well next spring for you to collect some and get them to Prof. Gillette for a determination of them. I have given you a few pests—I think all of the important ones of the Western Slope. I shall leave the discussion of the codling moth until after the paper of Professor Weldon, who follows me.

VALUE OF FRUIT EXHIBITIONS AT FAIRS AND EXPOSITIONS AS MEANS OF ADVERTISING AND EDUCATING.

PROFESSOR E. P. TAYLOR, HORTICULTURAL INSPECTOR MESA COUNTY, GRAND JUNCTION, COLO.

Exhibitions of fruit began this fall with our county fairs. Many of these were at dates permitting the exhibition of the earlier and more perishable sorts, such as early apples, as well as peaches, plums, cherries and small fruits. A representative fruit exhibit was shown at the Interstate Fair at Denver in September, and a very creditable display was made by most of the fruit counties at the State Fair at Pueblo, and at the National Irrigation Congress, held at that place. Following that exhibition the Arkansas valley fruit districts, and others, made exhibits of fruits along with their general agricultural displays at the Land Congress at Pittsburg. Following this was held the National Horticultural Congress at Council Bluffs, Iowa, and after that the National Land and Apple Show at the Coliseum in Chicago.

It was the writer's privilege to visit three of these county fairs, including the Colorado-New Mexico Fair at Durango, and the exhibitions at Pueblo, Council Bluffs and Chicago, and while in attendance a few observations were made on the ad-

THE COLORADO FRUIT EXHIBIT AT NATIONAL HORTICULTURAL CONGRESS AT COUNCIL BLUFFS, IOWA, NOVEMBER 16-19, 1910, WITH TROPHY CUPS WON THERE, AND AT NATIONAL APPLE SHOW AT DENVER, 1909.


COLORADO
DELTA.MONTROSE & MONTEZ A COUNTIES
COLORADO

vantages of these events as educators and advertisers. For the most part, these fairs come when the grower can spare a day or two to look over the fruits grown in other orchards of his section or other more or less remote fruit districts. Without these events the growers might not see their own fruit in comparison with others. If upon comparison he finds his own fruit superior, it gives enthusiasm and incentive to attain even greater perfection, and, perhaps, encourage competition in wider fields. If he finds his fruits inferior to that of his neighbors, its usual and desired result is his inquiry as to cause of the imperfections and the correction of them. Fruit growers have been known to class as unfair the criticisms of their fruits by buyers or association inspectors who later, by comparison at competitive exhibits, have been forced to realize that a difference did really exist.

Even county fairs bring out in an educational way differences in adaptability of certain varieties for one section and other varieties for other locations. Spectators are able to note at a glance that the higher localities excel in some sorts which do poorly, or are only mediocre in the lower elevations. These differences are apparent sometimes between closely adjacent orchards on account of the great difference in elevations of orchards in most of our mountain valley and mesa fruit counties. A study of these adaptations at the fairs is made easily possible and most interesting.

In the scoring of plate entries it is well understood that size, color, shape and trueness to type, freedom from insect or other blemishes and uniformity are points considered by judges in making awards. There are good reasons for making these scoring points. A plate of fruit is pushed aside by the judge on account of its small size, and a well-grown normal plate of specimens receives the award. The grower of the undersized fruit by inquiry discovers that his competitor has won by practicing a more careful system of thinning or more vigorous pruning, or, perhaps, by better watering or the use of cover crops or barnyard manure.

Two plates of Winesap stand on the table before the judge One plate has a beautiful dark wine color, red to the very bottom of both calyx cavity and stem basin. The other plate is equal in every respect to the first, except that it is of a pale red color, with green patches near the stem and upon the sides where other apples or heavy foliage have crowded and shaded them from the sun. Of course, the well-colored plate wins. This is as it should be, for who would not prefer in buying a red apple to select the apple that is red all over? The lesson taught to the grower of the losing plate in this case will probably result in better thinning and pruning by him the following year, or to avoid picking the fruit before it has attained proper color.

The barring from all awards whatsoever, even where there is no competition, of fruit sent to fairs with insect worm holes is a commendable procedure. If wormy fruit can be taken to our fairs and receive awards, the grower may make the mistake of presuming that such fruit will be received upon the market at high prices. If the state of Utah can enforce the law preventing the shipping from the state of wormy fruit, surely there should be no wormy or worm-specked fruit permitted at the fair or exposition. By promptly disqualifying all fruit of this class, growers can be stimulated to more intelligent, more thorough and, if the season demands, repeated sprayings, and a more critical inspection and sorting for these defects while packing their crops. One plate of five apples with four smooth, even-shaped specimens, and one very small or very large one, loses to the plate bearing five medium-sized, but absolutely uniform, specimens. This is a very important scoring point since it encourages more careful grading of fruit, one of the lines along which our growers should make much improvement. Plates of fruit selected with such uniformity that the different specimens "look just as much alike as so many peas," are the kind that win the premiums in close competition, selecting as a standard from which to work the true type for the variety.

The points of excellence upon which box exhibits of fruit are scored usually places 70 points upon the fruit and 30 points upon the pack and package, out of a possible 100. The 30 points are divided upon the box, the box lining, the wrapping paper about each fruit, the cardboard between each layer of fruit, the label and attractiveness of the package, the firmness of the pack, the alignment of rows, the bulge and the height of the apples at the ends where the cover is to be nailed. Every one of these conditions have a direct bearing upon the actual price received for the fruit on the market. In the sale of our fancy fruit we cannot afford to overlook these details, for we have been, and are yet, deplorably weak upon these points.

Fair and exposition managements should establish and print for distribution to all exhibitors a definite scoring card by which the fruits should be judged. The points of excellence should be properly and proportionally placed. From an educational standpoint competitive fruit exhibits are invaluable in encouraging the growth and sale of horticultural products of the highest quality. We are all idealists and admirers of the perfect. The selection of our very best from our crop for exhibition purposes and its comparison with others fixes in our minds the ideals of perfection, and gives us incentive to elevate the entire crop of the orchard toward this standard of perfection.

In speaking of the advantages gained by fruit exhibits from advertising standpoints, I shall be brief, for the benefits are too apparent to need recounting. Fruit growers with good fruit

or fruit land to sell must of necessity inform possible purchasers of the quality of their wares, and the fair or exposition is an effective and legitimate channel to that end. No one can doubt the advertising value in the winning by Otero county of the beautiful Hearst Trophy cup for agricultural and horticultural products at the National Irrigation Congress at Pueblo this year, the winning of the county prize for fruits by Fremont county this fall, Interstate Fair and at the State Fair, or the prestige given Delta and Mesa counties this year by the winning against twelve other States from Washington to Maine, as a Western Slope district the silver trophy cup offered at Council Bluffs for the best fruit display from any district in the United States, Canada or Mexico.

FRUIT GROWING INDUSTRY OF COLORADO.

PROFESSOR E. R. BENNETT, COLORADO EXPERIMENT STATION, FORT COLLINS, COLO.

Fruit growing as a commercial business has been largely developed within the past one hundred years. America, that is, the United States and Canada, leads the world in its output of fruit, particularly fruits of the temperate zone. The apple, though a native of the Old World, reaches its highest development and greatest production in North America. In the colonial days the apple was grown and used extensively in the eastern part of the United States, but the varieties were for the most part inferior seedlings and the apple was utilized largely in the making of cider and other alcoholic products. This probably accounts for the lack of interest taken in the early history of apple growing in the United States in developing better varieties of fruit.

Another factor that may have been somewhat responsible for the conditions that existed was the fact that apples, and in fact all kinds of fruits, were produced one hundred years ago without any particular care. The apples of New England may be said to have grown wild, and after they were first planted by the settlers the squirrels carried seed into the stone walls that soon produced trees, and even now a large part of the apple production in parts of New England comes from these seedling trees that are growing along walls and fence rows of the New England farms.

The many diseases and insect pests that have to be contended with at the present time were largely unknown in those days, and good apples of their kind were to be had from any of the farms from New England to the frontier.

A half century ago apple growing was more or less profitable in connection with the general farming of the Central States and the apple orchard was one of the features of every Michigan, New York or Illinois farm. A few years later the

diseases and insect pests became so prevalent that it was difficult to grow apples that were at all salable or even fairly edible. Up to this time apple growing, or, in fact, fruit growing of any kind, can hardly be said to have been an industry. When the diseases and insect pests made apple growing as a side issue unprofitable, the opportunity for apple growing as an industry became possible. In fact, from this date, that is, twenty-five to forty years ago, may be traced the rise of fruit growing as an important industry in the United States. The experiment stations became active in working out remedies for the various troubles that beset the fruit grower and individuals began seeking for varieties that were better adapted for culinary uses and as dessert fruits.

The old farm orchard of the East has become largely a matter of history or sentiment and has to a great extent passed away, as practically none of them have in the past fifteen or twenty years produced fruit enough to make the orchard worth leaving on the land. Even in the past ten or fifteen years the fruit growing principles and practices have very materially changed.

PRESENT STATUS.

Fruit growing is an intensive business and the cost of production is necessarily high, whether the returns are large or small. As a result, only those places will succeed in commercial fruit growing that have all conditions uniformly favorable.

Of the different factors that are essential in the business, we mention, first, the location. This must be where the soil and climate are at least fairly congenial to the wants of the particular fruit to be grown. The next factor that must be considered is that of distance from and availability of markets. There are many districts that are too inaccessible to make it commercially profitable to grow fruit. Another factor that must be considered in fruit growing is the comparative immunity from diseases and insect pests. No place is entirely free from all diseases and pests, but some places are more subject to certain diseases than others because of climatic conditions or geographical location.

Different species of fruit, and even different varieties of the same species, need different conditions under which to reach their best development. Most of our fruits, however, are cosmopolitan in their wants and may be grown fairly successfully on a great variety of soils and under many different conditions. The apple in particular, although it demands a fairly rigid climate to reach its highest quality, is grown from far north in Canada to the Southern States.

At present fruit growing in the United States and Canada, particularly apple growing, is divided into five great areas or districts. Each of these has its peculiar advantages of location and climatic conditions. Each of these districts is also competing with the others in the markets of the world. The first

and oldest of these districts is that extending from Nova Scotia through northern New England to the Great Lakes. This area is characterized by a short season with an abundance of moisture. Because of these conditions the quality of the fruit in this district is uniformly high. On the other hand, the humid climate makes favorable conditions for the development of all the fungous diseases that trouble fruit growing, and because of the age of the industry in this district all of the insects that are known to fruit growers have to be combatted. As a result this area produces the maximum of high quality but imperfect fruits.

The next district is that of the Appalachian mountain States, running from New York to Virginia and Kentucky. This district is characterized by a longer season but with a maximum of rainfall. The fruit produced in these districts is not uniformly as high quality as that in the North and the fungous diseases and insect pests are practically the same as in the first district mentioned.

The third great fruit growing area is that known as the Ozark district, embracing part of Kansas, Nebraska, Missouri, Arkansas and adjacent States. This area is characterized by a long season with a fair amount of moisture. Insect pests and fungous diseases are practically the same as that of the previously mentioned districts, and the long season tends to produce an excess of tough woody tissue in the fruit. In this region such varieties as Ben Davis, Gano, Missouri Pippin and Arkansas Black are largely grown.

The next important fruit growing section is that of the Rocky Mountain district, embracing Colorado, New Mexico, Utah, Montana and Wyoming.

The fifth important division is that of the Pacific Coast, including California, Oregon and Washington. This district, because of its semi-arid climate, is comparatively free from fungous troubles and because of its comparative newness is also largely free from the many insect pests of the East. As a result the fruit is characterized by freeness from the fungous diseases, but owing to the long season it is not so good in flavor and texture as that of the North or the Nova Scotia district.

The Rocky mountain district has some characteristics that make it different from any of the other four areas. Some of the principles in horticulture are involved that are worth while for our fruit growers to keep in mind. First, our high altitude gives us a short season that corresponds with that of the Canadian districts. The result of this is to make a fine or delicate tissued fruit. This fruit will not stand handling as well as that of the Ozark district, but so far as tissue goes, no better quality can be grown anywhere. The most important feature to keep in mind, however, is the principle that high altitude reduces flavor. At first this might be thought to be a disadvantage to our fruit growers. If recognized and properly taken into ac-

count, it does not need to be a drawback, and in many cases is an advantage. The principle is well illustrated from the celery and cauliflower growing of this State. These vegetables in lower altitudes tend toward a stringy, tough tissue with a strong flavor. In the high altitudes of Colorado neither of these characteristics are noticeable. The celery is crisp, with very little of the stringiness so common in the East and none of the rank, strong flavor so common there. Other illustrations might be given, but these are sufficient to demonstrate the principle.

In applying this principle to our fruit growing we can readily see that it is necessary for us to grow those varieties of fruit that will stand cutting down in flavor and still leave the quality good. This is best illustrated by the Jonathan apple. In New York and New England the Jonathan apple is a decidedly acid fruit. With us the Jonathan is a mild sub-acid fruit. The toning down of the high altitudes is just what the Jonathan needs to give it the delicate flavor that is desired to make it a valuable dessert fruit. The Baldwin, which is grown more than any other apple in New York and New England, is a mild sub-acid fruit in that district. Here the Baldwin is so deficient in flavor as to be practically valueless as a Colorado apple. For this reason the varieties adapted to Colorado are those that are strong, or, as you might say, heavy flavored in lower altitudes. Many thousands of dollars have been thrown away in Colorado because this principle was not recognized and acted upon in the earlier days of fruit growing in the state. Even now our old orchards are largely made up of such varieties as Ben Davis, Whitney Crab, and other varieties even more worthless. It is probable that these are present in the orchards largely because of a prevailing notion that the better varieties were not sufficiently hardy for our climate. We now know that the best varieties that are obtainable are sufficiently hardy to withstand the climate of Colorado even as high as 7,000 feet in some parts of the State.

In looking over the situation of apple growing in the United States it would seem to us that our great advantage is in the fact that we can produce as good a tissued apple as the best districts of America; we have almost no fungous diseases to contend with; comparatively few serious insect pests; and by selecting the proper varieties may grow a quality of fruit that is unsurpassed. We must recognize, however, that other districts have woke up to the fact that the troubles that seemed twenty years ago to be hopeless may be controlled and not only may be handled but are being handled in many of the other districts of the United States. The whole fruit growing industry has undergone, not a revolution, but an evolution, in the past few years, and while the old farm orchard of the East is a thing of the past, many of those places are now making orcharding a business and through better cultural methods and better care of the trees in the way of pruning, spraying, thinning, etc., are

producing fruit that will make a close competitor to the best of our western fruits. Our growers have sufficient advantages that should enable us to hold the enviable position in the markets of the East that has been secured. It will be necessary, however, for us to use the very best methods that are known to horticultural science from the time the root graft is made till the apples are placed in the consumers' hands.

Mrs. Shute—Mr. President, your Committee on Legislation is ready to report. Mr. Shaffer, the Secretary, will read the report, for the convention to act upon.

Mr. Shaffer—The first resolution is as follows:

RESOLUTIONS.

"Whereas, There has been evidenced a determined effort on the part of the fruit growers and horticulturists of the State to have laws passed which will prevent and prohibit the shipment of wormy and unsalable apples out of the State; therefore, be it

"Resolved, That it is the sense of the State Annual Horticultural Convention, in session at Rifle, Colorado, that the Legislature should make a thorough investigation of laws of a similar character pending or in force in other states, and that laws having this for their purpose be passed by the Legislature at its next session; and, be it further

"Resolved, That copies of this resolution be presented to the forthcoming session of the American Apple Congress at Denver, Colorado, and also to the members of the next General Assembly of Colorado for their consideration."

Ladies and gentlemen, I move the adoption of that resolution.

The motion was duly seconded.

Mr. Craig—Is this the time for discussion on this resolution?

President Parfet—I think so.

Mr. Craig—I just want to offer, if you please, a word of caution on passing such a resolution so hastily. I think if you had a little more time you might possibly arrive at a different conclusion on this question of shipping wormy apples. We are laboring under different conditions from those which exist in the Northwest. The Northwest has had a different motive altogether for passing such a law as this, and we in Colorado, particularly those of us on the Western Slope, are not in a position to undertake the absolute prohibition of shipping wormy fruit. I stand as a shipper of apples for a fruit growers' association; therefore, I stand as one who wants to see the grower get absolutely every cent out of his fruit he may. Far be it from me to ascribe anything of a personal motive to the men who have drafted this resolution. I would not for a moment think anything of that kind would exist. My regard

for Mr. Troutman and other members of the committee is too great and I value them too highly to let it interfere with anything of this kind. At the same time, I want to say that, while Mr. Troutman and you people on the Eastern Slope are in better position to pass such a law as this, we are not. You people here at Rifle can't sympathize with us over in the North Fork Valley, possibly, quite as well as the people at Fruita can. You have two outlets; we have one. Our part of the country is owned by the Rio Grande railroad. Four or five years ago I tried to see if we could not establish some kind of a plant in Paonia for the consumption of this low grade fruit, as we felt the sale of this wormy fruit was affecting the sale of our good stuff. Now, I believe that the explanation of the Oregon, Washington, Idaho, California and other territories having laws of this kind is pretty easy. In the first place, they are a great deal nearer to the best market than we are, and I wish to see which of two causes was the greater: whether it was because those markets around Portland and the markets around Seattle were getting so much of this fruit they were getting absolutely sick of it, and disgusted with growers who were selling all their fruit East and leaving them to consume the "riff-raff," or, having two or three lines of transportation to the East, they were in better position to secure freight rates for by-products. With us, we are not able to do that. In the Northwest it is very easily observed that there are four or five states, each with a similar logical reason for such a law. In the first place, there is Montana on the east, Oregon on the west, and Washington on the west. Now, it is almost absurd to mention Idaho as an example of that, because she is crowded between those three states, and couldn't help herself. California has such a law simply because the horticultural industry of California occupies a far more important position than the horticultural industry of Colorado does to-day; that is, in proportion to its other industries, and particularly because the insect pests preying upon the citrus trees have demanded a much more rigid system of inspection than those up in the deciduous belt. That belt is just barely beginning to come into its own in this respect. California, being on the Pacific Coast, naturally has the advantage in exportation of by-products as well as low-grade or high-class fruit.

I don't care to inflict myself upon this convention, but I certainly do urge caution in the passage of any such legislation, and I think this part of the resolution should be carefully studied over by this body. I am simply a shipper and the agent of the growers in the North Fork Valley. I would like to have Mr. Roberts give you a few points on this resolution.

Mr. Roberts—I wouldn't wish you people to think that the growers at Paonia have any more wormy apples than anybody else. I don't believe we do. I think we are quite as able to take care of the codling moth as the rest of them. I believe

we can stand that part of it, but I do believe if we had a law prohibiting absolutely any wormy apples from being shipped, the growers of Colorado would lose thousands of dollars. It is an advantage for us to have as few worms as possible always. That ought to be an object, it seems to me, to any grower to do his best to keep the worms down. He knows he is not going to receive nearly as much for wormy apples as for apples that are perfectly free from worms (altogether), and I think that is incentive enough in itself. I don't believe that we want a legislative enactment prohibiting that kind of fruit, if by shipping it he can get a good many dollars out of it he could not get otherwise. That is my position entirely in the matter. There is one more point I think ought to be taken into consideration, and that is that we don't any of us ship wormy apples in the extra choice grade or our second grade, although we do put in some stings. I presume that is not meant to be prohibited, but in the lowest grade, or what we have named in our Grand Junction meeting of last spring the standard grade, we do ship one small worm hole; an apple with three or four holes is not admitted. (We do ship one small worm hole.) You cut out of that standard grade all of the big, fine, nice looking apples that have no small worm hole and you will have left in that grade some misshapen, very mean-looking apples which are hardly salable at all. Those fine, big, large apples with one small worm hole actually help sell that grade. I have seen letters from men who buy apples in large quantities. (I saw one letter.) The purchaser said: "We don't mind your wormy apples, but we don't want your small apples." That is another thing, the size. You cut out the big, fine, nice looking apples with one small worm hole, and put in just your small misshapen and perfectly green, and you have nothing left in the whole thing. In fact, you have to throw away how much? How much would you have to cast aside? How much in the Grand Valley? How much at Rifle? I imagine if you had to throw away that whole third grade that in most years you would be throwing away almost one-third of your crop. I say that quantity is too big and the amount of money we receive for it is too large for us to think of throwing it away without thinking of this matter seriously.

Mr. Troutman—In reply to the gentleman, and especially to my friend, Mr. Craig, who has just spoken, my main idea in suggesting this resolution is to get the opinion of the Western Slope growers upon this very important subject. I know what the Eastern Slope people feel as a whole, and as I expect to attend the Congress in Denver at the end of this week, and as there will be a very warm discussion, probably, on this subject, I was anxious to have it discussed here first. I am very heartily in favor of the non-shipping of wormy apples. From our own orchard we have not shipped wormy apples for three years; we have disposed of them at twenty-five cents a hundred. My

friend, Mr. Craig, said it would be a much greater hardship for them not to ship wormy apples from the Western Slope, and especially from Paonia, than it would for us not to ship them out of the state, for the reason that we had a cider mill at our place, and that also he might have gone on to say that the people in Otero county shipped their apples to Denver for cider this year and got $5.00 a ton for them. Let us just figure for a moment. The cider plants pay $5.00 a ton, or twenty-five cents a hundred pounds, for the apples. It costs ten cents a hundred, or about $2.00 a ton to pick them up, but acknowledging, perhaps, that you would have to pick up your apples anyhow and cart them away, because it would be much better for your orchards, let us figure that the growers at Canon City get $5.00 a ton for wormy apples which they don't pack—$5.00 a ton, forty boxes. You would have forty boxes of wormy apples, and understand I am speaking of wormy apples now, not the wind-falls; ten per cent. of your pack apples is certainly a large estimate for wormy apples, because figuring your wind-falls—you know the wormy apples are the ones that usually fall, which means only twenty per cent. of your crop that is wormy; I don't mean worm stings, because that makes a splendid second grade apple, but of the wormy apples themselves. Therefore, figure that you would have one ton of wormy apples per acre; you are just $5.00 an acre worse off than we people are on the Eastern Slope who send them to the canning factories. A word about shipping, and speaking of freight, which is very high, it is possible if you people could grind your apples to ship your juice, as we do, to some large manufacturer and allow them to make the vinegar it would cost you nothing, because the manufacturer buys the juice f. o. b. Now for some other reasons why I believe the wormy apples should be taken off of the market. I do not know what your marketing conditions on the Western Slope are, but I do know that wormy apples are a great detriment to our markets on the Eastern Slope. We ship principally to Texas and Oklahoma. We quote our apples "extra choice," we will say, or "choice." Our specifications are "free from worm holes; worm stings and other hard blemishes allowed." We quote these apples out at so much per hundred or so much per box. Word comes back to us, "Such and such a man is shipping choice apples; we can get them from him for so much." Those few wormy apples that are being sold drag down the entire market. The retailer will buy the cheapest apple on the market that he can, not because the consumer will not pay more, but because he has to meet competition. Competition forces the retailer to buy the cheapest apple he can, and that is the wormy apple; if that wormy apple comes from Colorado, every poor box of apples that leaves the State of Colorado is a detriment to our good name. One other reason for the non-shipping of wormy apples is that a wormy apple or bruised apple, or an apple simply cut with the stem of another apple,

known as a soft blemish, will not keep in storage. Hundreds of carloads of apples are shipped out of Colorado in October and November. They are expected to keep for the spring trade. These people who buy them put them in storage. They pay us good money for what they get. Spring comes, April, and they find that the center of the box has shrunken. They investigate and they find a great many rotten apples in that box, and I venture to say that without exception every one of those rotten apples will be found to have either been a wormy apple or an apple with a soft bruise or blemish. I had some experience with this in cold storage a few years ago when I used to pack wormy apples. Last year I kept about three carloads of choice apples; that is to say, they were worm stings, off-colored apples and other blemishes that would not go in the fancy trade. I took them out the 15th of May. They consisted of Ben Davis, Winesap and Jonathan. I repacked them and there was only a shrinkage of the choice of two and one-half per cent., and I had a shrinkage in the fancy of one per cent., which is a very remarkable cold storage record. Another reason for my supporting a law for the non-shipment of wormy apples is the fact that our neighbors of the Northwest, our strongest competitors, do not ship them, and those may say they have their reasons for not doing so, but the fact remains that we must compete with the Northwest for our markets. The time is coming when Colorado, as some gentleman said yesterday, will have to fight for her market. The first year that we have a full fruit crop in the United States the Colorado growers will find that they have to fight for their position, and everything we can do to improve our pack is going to help us. Another reason for such a law is this: I know that Mr. Craig, Mr. Roberts and myself and many others are going to put out a good grade for our own protection, but there are growers on the Western Slope, and a great many of them on the Eastern Slope, who are going to put into their boxes every kind of an apple they can—they are allowed to put in—thinking that they are benefiting themselves by doing so. It is a very mistaken idea, but they will do it, and unless you have a law absolutely forbidding the boxing and the shipping out of the State of a wormy apple, these growers are not going to stop at one small worm hole. It is going to be first one medium worm hole, and then one large worm hole, and finally they will get a dozen large worm holes, and pack in such a way they will not be discovered until the consumer gets into the very center of that box. We enforced very rigid inspection rules this year, and I know of the way some of the growers pack. We didn't ship a single wormy apple, as far as we knew. I know a great many slipped by us we never knew were there, but we didn't ship wormy apples knowingly, and at least four other fruit growers' associations and fruit companies at Canon City, the Fremont County Association, the Royal Gorge Association, didn't intend to ship wormy apples.

Mr. Roberts—No, I don't believe they would, but I don't believe you can ever get this down so you won't have one wormy apple in a box. Therefore, any law that was passed would have to have a small percentage of leeway to protect the grower if it was intended to make it absolutely criminal to find one wormy apple in a box. You take the very best judges of fruit and sometimes, in spite of the fact they are going over a dozen plates of apples with a microscope (almost), it will be found they will overlook a wormy apple and give the prize to an apple that had a worm in it. Therefore you can't make it absolutely ironclad. I certainly hope some of my friends here who feel differently than I do will be heard upon this floor, and also others in support of this law, because I believe the more we can discuss it the better.

Mr. Clough—I don't believe that a good apple grower will have, the average year, more than 5 per cent. of wormy apples. If he is a good apple grower he will not have more than 5 per cent. I am in favor of a law that will be very strict, and will be enforced against the shipper of wormy apples. If we can't get it, we can organize or have an association here which will have a number of inspectors who will look after our fruit, as they probably have at Paonia—I believe they have something of that kind over there; I know they have in other sections of the country—so that our packers won't have the say whether they pack those apples or not, then we might be in shape so we could handle a certain per cent. of wormy apples from Rifle; but without that, I favor a strict law against the shipment of wormy apples. In Mr. Roberts' paper I think he said one of their members left the association, or a former member left the association, for the reason that he could not have the say about packing his own fruit. We have got right back to the proposition. If we have a member in an association that insists upon packing his own fruit or leaving the association, we must insist upon his leaving the association, because, when a man takes that stand, he surely wants to do something different from what is good for the community in which he lives.

Mr. Shaffer—I am a member of this committee, and moved the adoption of that resolution. I am not a fruit grower, but a consumer of fruit, and I have been listening to this discussion, and it occurs to me that it is the consumer of the fruit that is in favor of this thing, and the producer who must be against it. I can see, personally, no logical or reasonable reason, my friends, from a moral point of view, from a point of view of building up a community, or from any point of view in which you may look at it, and in saying this I say nothing with reference to what the gentleman has said, because, like him, I have the friendliest feeling for him; but the rule of the country is, the greatest good to the greatest number. Now, my friends, the producers of apples on the Western Slope are not the

greatest number. They ship those out into Texas, Oklahoma, Iowa and all the East, and they pride themselves upon their market, but they have three names, as I understand: "Fancy," "choice," "standard." Now, I want to be corrected if I am wrong. "Fancy," "extra fancy," "extra choice" and "standard," either one of those names—that is the highest ideal. So far as the Eastern purchaser of fruit is concerned, when you say "standard," he thinks that is true, and when you say "fancy," he doesn't think it is any better than the "choice." I can't see but one argument in favor of shipping wormy apples, and that is to get the worms out of the state. We, on the Western Slope, as has been stated here—we must do this; we must prepare ourselves with our fruit associations, with our producers and with our consumers. We must labor as a community of interest to sustain the reputation that we have earned for producing the best apples on earth. Now, my friends, we have gone to Pittsburg, Pennsylvania; we have gone to Chicago; we have gone to Council Bluffs. We have scattered our resources, in the way of fine fruit, all over the East and all over the West. We have said to the people there: "This is the kind of apple grown in the State of Colorado." They believe us; they have taken our word for it, and we have taken them into our confidence. What are we going to do? Are we going to send them a hot pot of worms, green apples, and everything else, and tell them: "This is what we took for our exhibit, and this is what we are sending you today?" (Applause.) Now, as I say, I am speaking from the point of view of a grower and not a producer. I have a little orchard growing; some day I expect to produce, and perhaps when it begins to produce I might ship a box of apples with a worm in it. I couldn't say as to that; but I do know this: that from the point of view of advertising our resources, from the point of view of keeping faith with the people, from the point of view of doing the greatest good to the greatest number, my friends, there is no argument against some law that will compel us to feed the public just what we represent we are feeding. Now, here is a nurseryman—two or three nurserymen we have in this gathering. You, as buyers of fruit, have no objection to a rigid inspection of every fruit tree that goes out, have you? Then as a consumer of the fruit that grows on that tree, why is there any more logical reason that there should be complaint against the inspection of the fruit? Perhaps I am prejudiced, but I will be frank, and say I can't see but one side to the question. Perhaps this resolution will not pass. It is right, and the time will come when it will pass, and the people of the Western Slope, and the people of the Grand Valley of Colorado will be shipping a better quality of apples out of the Grand Valley than they are at the present time.

Mr. Roberts—I would like to say a few more words on this subject. I think, perhaps, the subject is being a little misun-

derstood. I see that my friend, Mr. Shaffer, believes absolutely in excluding the worms, but it seems to me that the nut of the whole situation is contained in one thing, and that is, that the grades ought to be as represented. I am not against that, at all. We do not care, as growers, if you make a law requiring the extra grade to be according to proper specifications. That is all right. We don't care if you make a law requiring the fancy grade to be the same; that is all right. We don't care if you make a law compelling the standard grade to come up to certain requirements, and make it be as represented; that is all right. I am in favor of that, absolutely. Then no one can be fooled about it when they know the terms. They must learn the terms. We have got to have some names for these things, but I would not care, my friends, if you print the specifications of your grade right on the box. I am not caring about that; but to say that we should not ship something that is absolutely salable, something people absolutely want, and are willing to buy and pay money for, something they would rather have than something your specifications, as the discussion brings out, would leave in, I think it is really wrong. They don't object to wormy apples—nice, big wormy apples, with one small worm hole in; they don't object to those. There is a class of people who can't afford to buy anything else at the price we would want for the others, and we would be excluding a certain class of people from buying apples; they can't buy apples at $2.00 or $3.00 a box. What would you think of a law that said cattle men could not ship a carload of cattle unless those cattle all came up to a certain standard of perfection—so fat, and like that? Cattle go into the market as third-graders, but they sell, and there is a legitimate demand for that class of cattle, just as there is a demand for that class of fruit. Mr. Troutman says that you could not keep those apples. None of our people expect to store "standard" apples for cold storage; nobody expects to do that. We store "fancies," but we never store "standards." Those are shipped for immediate consumption to people who want them for immediate consumption. There is a legitimate demand for them. If there was not, we could not ship them. A law that would designate each brand or each grade, at absolutely what it was represented to be, I am absolutely in favor of; but I don't see any use of excluding one class of our fruit, which has possibly the name wormy apples to it, any more than to discard the green ones, or the misshapen ones. You might let these specifications so read that you could not ship anything but absolutely perfect apples, but I do not believe the apple growers of Colorado would find their business very profitable if you did.

Mr. Troutman—Mr. Roberts, if the consuming public wants wormy apples, why are there so many hundreds—maybe that is a little large—I will say dozens of rejections yearly on choice stock because of worms? That I get from the Produce Reporter Company, of Chicago, and by referring to their records you will find that in sections where wormy apples are shipped there are more rejections on this one reason than all the others put together.

Mr. Roberts—My dear sir, that is something that is very easily understood. When you put wormy apples in the "extra" grade, naturally you should expect that car will be rejected; but I don't see any objection to having specifications that are right, and then requiring the orchardists to live up to the specifications. I don't see any use in excluding something that is going to make the third-grade more valuable, and leaving the green ones in there, you could not sell, unless you had some bright-colored wormy apples in that grade there to help sell them.

Mr. Bennett—I think it is profitable discussion—much more profitable than our papers. It seems to me here that we come down to the point of the human equation. I will guarantee that if there is a law passed in this state to ship no wormy apples out of the state, there will not be a grower in this state who will not be liable to prosecution next fall. It can't be possible. I believe the truth of this matter stands between the two extremes. I don't think any one in the state gets any madder, or liable to say worse things than I do, when I get hold of a box of fancy apples and find them wormy. A short time ago a man who recently came from Cleveland, Ohio, showed me some apples he bought in Fort Collins, that came from Idaho, and said they were the best he could get, marked "choice," and he was disgusted with Western apples in general. They were supposed to be Idaho apples, and he thought because they were "choice," they were good apples. The thing of it is, that we buy "fancy" apples in Fort Collins, and will find the top layers very nice, the second layer not so good, and the middle is awful. The men who pack those apples should be liable to prosecution; but it seems to me, on the other hand, that we should have a right to ship wormy apples to certain classes of trade. There is a demand for cheap apples in the Southern states, and I believe they should be allowed to be shipped out. I would hate to see a law that would allow wormy apples to be shipped in the state and not shipped out, because we would get nothing else in Fort Collins. The thing we need now, I think, is a law that shall designate that a box shall be marked what is in it. If they are wormy apples, all right; if they are clean apples, and so marked, all right. I believe that a law prohibiting the shipping out of wormy apples in this state would be an injustice to our growers. On the other hand, as it is now, I believe we are getting a black eye, because we are shipping apples that are not truthfully named.

Mr. Butler—I would like to say just a word. I am a Prohibitionist, but not exactly a prohibitionist on this question of shipping wormy apples, on account of the fact that everybody knows wormy apples will get in occasionally. I think the law

that we are needing worst is the one that will make it more stringent on people to spray, and do away with the codling moth.

Mr. Shaffer—Professor Gillette suggested in the committee room, as I understood him, that he believed the old-style "firsts," "seconds" and "thirds," the plainest and best, so far as the consumer is concerned.

Mr. Gillette—I would understand these terms better than those now in use.

Mr. Shaffer—And the probability is that if there is any legislation enacted at this next session of the Legislature, it will be along the lines of compelling the people to put up the stuff that will be true to the names. If they are labeled Jonathan "firsts," they will be the best of Jonathans; "seconds," a lower grade, and "thirds," a still lower grade.

Mr. Craig—I think the only thing necessary is for the house to vote on the resolution.

Resolution again read. A standing vote was taken; the motion was lost.

Mr. Shaffer—Here is one I don't imagine there will be any complaint on at all.

RESOLUTION.

Whereas, Reports in the daily press indicate that the American Apple Congress, in Denver, will consider the question of the adoption of the Oregon or Northwestern box; and

Whereas, The horticulturists of Colorado are desirous of keeping in line with other sections in matters of contemplating any improvement; therefore, be it

Resolved, That a committee of three, consisting of P. H. Troutman, Horace Mann and A. Jay Garrison, be appointed by the State Board of Horticulture, to act in conjunction with a like committee of three from the American Apple Congress, to thoroughly investigate the proposition in every detail, and report their findings back to said congress, and that a copy of this resolution be forwarded to the secretary of the American Apple Congress, at Denver, Colorado.

The motion was duly seconded and carried.

Mr. Clough—I think the question of the size and shape of the apple box will be one of the principal things that will come up at the American Apple Congress in Denver his week. I was fortunate enough to be at the National Land Show, in Chicago, last year. In making the rounds of the building, I came to a Chicago commission man who was making a show of his wares there, in order, of course, to draw trade, and he had about twenty boxes of either Washington or Oregon packed apples. It doesn't make any difference which state they came from, the pack is the same. They tier-pack in that country, and it is a good pack. They were boxes of Jonathans. The box was

about—not less than three-fourths of an inch narrower than our standard box, and as the end-piece was square, the box was consequently that much narrower. The box was longer than our box—long enough to make up for the extra width taken out in the side—and I will say that the weight was practically the same as a Colorado box. He said: "I bought these apples, really not knowing what I was going to get; they were sold to me for the "fancy" Jonathan apple that is grown in that country, and this is what I got." We measured the box and got the difference in the size. A standard tier-pack of apples of the Jonathan size, and the other apples that go along with that size, is four apples across the bottom, seven tiers long; in our box we have four tiers deep, as it is a side pack. We had Jonathan apples at the show which were packed in the standard box; four apples across in the row and seven long filled the boxes completely. If four of our apples which were called "fancy"—and it would require a "fancy" apple of that size so that four would fill across that box—is a Colorado standard size for that class of apples, four tiers across with three-fourths of an inch less space across that box would be a standard size for the Northwest. They pack apples in that country in various sizes, and they are sold by sizes, as Mr. Roberts said, running all the way, I guess, from forty-eights up, I believe, to close to two hundred. And those apples, in order to fill the box completely, have to be, as they are packed in that country, various sizes of boxes. They tell me it is almost impossible for a man, say buying the output of an orchard, and taking the various sizes of the different kinds of apples grown—it would be almost impossible to load a car so it would ride properly. If you have a carload of hundred and twelves, they would load all right; but if you have a mixed lot, apples of all the various sizes you were going to have, you are going to have a lot of trouble in loading out. This proposition of a box to be used as a universal box, or to cover the Northwestern states, and public favor classes Colorado in those Northwestern states, it is going to change the size of our box which we are used to, and which we know holds a certain amount of apples, and it is going to make it so we can do something we never have done before, and that is to sell an undersized apple, when the people of the Northwest will try to make you believe the apples grown in Colorado are smaller than those grown in the Northwest, when, as a matter of fact, the box they use is proof that such is not the case. I believe one of the most important things coming up at the convention is the size of the box, and I think the Colorado box should stand as a unit. It is adapted to our use, and it has been adopted as the Colorado standard box. (Applause.)

Mr. Bennett—One remark along the line of the appointment of this committee of three. It seems to me, in appointing your committee, you should have representatives of commercial fruit

growers on that committee. I would like to amend that by the addition of three members representing fruit growers' associations, at least some of them, on the Western Slope.

The motion to adopt the resolution as amended was put to vote and carried.

President Parfet—I will appoint J. F. Moore, H. H. Younger, of Grand Junction. and A. L. Craig, as the additional members of the committee.

Mr. Shaffer—Here is a resolution that the State Annual Horticultural Convention favor allowing the State Agricultural College the appropriation asked for.

Mr. Garrison—I move you, Mr. President, that it is the sense of this convention that the Legislature should be informed that we are in favor of this appropriation for the State Agricultural College and. most urgently beg of them that it shall be granted.

Mr. Shaffer read the following and moved the adoption of the resolution:

Whereas, There is a movement in the State to supplement the horticultural inspection law by a pest district act, and

Whereas, This movement has taken form in a State meeting at Greeley for January 6, to discuss the proposed law, primarily for the control of grasshoppers by inspection areas or districts formed on petition, and

Whereas, Such an act would be a most useful resource in combatting the codling moth should it ever become so serious that spraying alone is not sufficient for its control, therefore be it

Resolved, By the State Board of Horticulture in annual session at Rifle, December 13, 1910, that we approve of the proposed plan and urge the press and the people, as well as the legislators of our fruit districts, to give this movement their earnest consideration and support.

The resolution unanimously carried.

Mr. Shaffer—The Legislative Committee have no more to offer at this convention. I thank you.

DEDUCTIONS FROM THREE YEARS' EXPERIMENTAL WORK WITH CODLING MOTH IN WESTERN COLORADO.

PROFESSOR G. P. WELDON, FIELD ENTOMOLOGIST OF COLORADO AGRICULTURAL EXPERIMENT STATION, GRAND JUNCTION, COLO.

A meeting of fruit growers for the discussion of problems relating to their business would scarcely be complete without a discussion of the codling moth. While this is one of the oldest pests of our orchards, and one that nearly every entomologist

who has worked in orchards has experimented upon, it still is one of the most serious. One season the apple grower meets with success in combating it, and prides himself of the fact that he has solved all the problems relating to its control; the next season he sprays in exactly the same manner, as far as it is possible for him to tell, as he did when he met with success, but finds that something is wrong some place, and he has failed in that which he felt so sure would bring the required results.

Experimental work is of little value unless the same experiments are conducted for a number of seasons, for there are too many factors that influence the result of an experiment, that may be operative in one season and not in another, to place much dependence upon the work of a single season. Without advancing any ideas that are entirely new or startling, it is the writer's purpose to submit data in this article, gathered from the past three years of experimental work on the Western Slope of Colorado, which will go toward proving three propositions, which are: 1. The one-spray method can only be successful in controlling codling moth in orchards where there is a natural scarcity of the pest throughout the season. 2. The specking of fruit cannot be prevented during a season of severe codling moth attack, no matter how much arsenate of lead is applied. 3. Thoroughness in applying the spray is a much more important factor than the quantity of arsenate of lead used per given volume of water.

Taking up the first proposition: By the one-spray method is meant one thorough spraying after the petals have dropped from the blossoms and before the calyx lobes have folded in, thus doing away with the so-called calyx cup into which the first spray should be driven. Considerable has been written of recent years about the one-spray method, and while some experimenters have concluded that only one spray is necessary, and have failed to make any allowances for different seasons or different sections, the more conservative of them have realized that such a method could not hold good in every locality and in every season. If this is true, how, then, can we lay down any rules in regard to the number of times an orchard should be sprayed in a season, that will hold good at any time and in any place, no matter what the existing conditions may be? From the past three years' experimental work on the Western Slope, and from observations made in a great many orchards, it seems apparent that no rule in regard to the number of sprays that should be applied in any one season can be laid down that will not be subject to seasonal variations. To illustrate this point a comparison of results attained in last year's experiment is made with results attained in this year's experiment.

It will be remembered by many of you who are here to-day that last year it was possible to control codling moth very effectively, in many localities of the Western Slope, with only one

spray. This year it has been found necessary in those same localities to spray three or more times, and in most cases with poorer success than last season. A striking example of this was noted in the locality where our experimental work was done last year. In that particular locality no one, to my knowledge, sprayed more than once, and practically every one was so successful that from 90 to 99 per cent. of their fruit was free from worms or worm specks. The experimental trees were sprayed only once, but very thoroughly, and an average, estimated from actual count of all apples from nine trees, of 95½ per cent. of the fruit free from worms or worm specks was attained. With an average such as this, any further spraying during the season would have been a waste of time and money. The fact that so large a percentage of the fruit was good could not be attributed to the spraying, had there been no comparison of the sprayed with unsprayed trees. In this block there were thirteen unsprayed trees, all Ben Davis, the same variety as those sprayed, and the average percentage of sound fruit, determined by actual count of all apples from a number of trees, was 52, so there was no doubting the fact that only one spray had resulted in a saving of 43 per cent. of the fruit. It is well to note here that the wormy fruit of the check trees, while it was spoiled for the first grade pack, was not excessively wormy, as it would have been in a season of severe codling moth attack, most of the apples having only one worm hole in them. The experimental orchard, along with practically all others in that section of the country, were much more wormy this season with from two to five sprayings instead of one, due partly, no doubt, to the light crop of apples, but due principally to the great abundance of worms, which seemed to find everything favorable for their development.

This year's experiment was conducted in a locality where there was an average crop of fruit and an abundance of worms. It was found to be absolutely impossible to keep down the worms in the particular orchard chosen, with only one spraying, and where last year 95½ per cent. of the fruit was saved with one spray, this year 22½ per cent. of the fruit from one Ben Davis tree was free from worms, and much of it was also worm-specked. In this orchard one Ben Davis tree, left unsprayed, had 17.4 per cent. of its fruit worm-free. Thus the benefit of the one spray was only 5 1-10 per cent., in all probability because of the fact that the percentage of the worms which enter the side of the fruit, usually estimated at about 25, was an exceedingly large number, and there was nothing to keep them from going in. There was no doubt but that the arsenate of lead was good, and the calyx spray effective, for out of 2,362 apples from the once-sprayed Ben Davis tree only 17 were wormy in the calyx, while out of a total number of 1,366 apples from the unsprayed tree 679 were wormy in the calyx. The best results were at-

tained in this orchard with the use of four sprays, 83 per cent. of the fruit being worm-free. Much of it was, however, specked.

This brings us to the second proposition: "The specking of fruit cannot be prevented during a season of severe codling moth attack, no matter how much arsenate of lead is applied." The general complaint throughout the fruit sections the past season was that even though the worms failed to gain an entrance for any distance into the fruit, they succeeded in eating enough to leave specks. The specking of fruit is caused almost entirely by worms that have been killed by the poison, but which fed for some little time after taking the fatal dose. For my part, I cannot see how specked fruit can be prevented during a season when codling moth is abundant. The larvae cannot be killed unless they get some of the poison into their system, and in order to get some of the poison they must feed upon a portion of the apple covered with the poison, or on the poison itself with none of the apple. It is possible that some worms are killed by eating poison from the skin of the apple before the skin is pierced, but as arsenate of lead is a somewhat slow-acting poison, and does not kill immediately upon taken into the body of the insect, in most cases a worm will feed for some time underneath the skin of the apple, after taking the fatal dose, and as a consequence we have an apple that is specked, is not strictly fancy, and cannot be packed with our best grade of fruit. Sprays applied late in the season, while they may keep the worms from getting in and totally destroying the fruit, bear a direct relation to the number of worm-specks upon the fruit. This point was nicely illustrated, in this season's experiment, by two Ben Davis trees, one sprayed only once, and the other four times. The tree that was sprayed only once yielded a total of 2,362 apples, 144 of which were specked and 1,813 wormy. The tree that was sprayed four times yielded a total of 1,282 apples, 618 of which were specked and 219 wormy. Examples of this kind could be multiplied, but it is not necessary to do so in this paper.

The fruit grower realizes that the specking of fruit is unavoidable during certain seasons, and has tried to overcome the difficulty by the use of a very strong spray of arsenate of lead. While it would seem that such a method might result in some good, careful experimental work, and careful investigations in many orchards, failed to indicate that a strong spray is a solution of the difficulty, and that in the words of the third proposition laid down, "Thoroughness in applying the spray is a much more important factor than the quantity of arsenate of lead per given volume of water." It matters not how great an amount of arsenate of lead is used in 100 gallons of water, if it is not put in the right place the best results cannot be expected from it. If only three-fourths of the calyx cups are filled during the time of the first spray, it makes no difference how strong the arsenate of lead was used, the re-

maining one-fourth will probably allow the entrance of enough worms to undo practically all the good that was accomplished by the first spray. It is true, also, in applying the later sprays, that often not nearly all of the apples on a tree will be touched with the liquid, and of many of those that are touched, there will be only a small portion of them coated with the spray. It is true that the orchardist meets with a serious difficulty when he endeavors to coat any good sized apple with any spray. Especially is this true of certain varieties, such as Ben Davis, Gano and Jonathan, but the better he succeeds in doing this the better are his chances for success, and there is no excuse in applying these sprays, for not exercising the greatest possible care, so that the greatest good will result.

It has been abundantly proven that the excessive use of arsenical sprays endangers the lives of our orchard trees, so that certain precautions should be taken for their protection. As it is absolutely necessary to use a large amount of liquid to do thorough spraying, precautionary measures should consist principally in the use of the least possible amount of arsenate of lead per given volume of water, that will do effective work, and in guarding against needless spraying of the trunks and larger limbs. Two pounds of arsenate of lead, mixed with 100 gallons of water, has been used with perfect success in many cases, and while it is probable that any of the standard brands will successfully control codling moth when used at that strength; in order to be on the safe side not less than three pounds was advised last season, and the majority of the orchardists used it stronger. Wherever only three pounds was used, and thoroughly applied, it proved to be in every way as effective as where the higher strengths were used.

The fact that later sprays must be applied in a season when codling moth is abundant, and their use can only result in keeping the worms from entering the apples, and not in preventing worm specks, makes it urgent that all methods at the orchardist's disposal be brought into use in the fight against this pest. The question resolves itself into one of decreasing the present abundance of worms, so that less spraying will be necessary. At present we may have to spray often and very carefully; but along with that spraying should go other things which will aid materially in the work.

From the time when apples are picked in the fall, until the time when the first moths begin to appear in the spring, little attention is given to the matter of codling moth control by he average apple grower. It is of course true that codling moth could not be decreased by any method that might be used during this period, to such an extent that spraying would not be necessary, but it is also true that work of such a helpful nature can be done that codling moth can be much more effectively controlled than by spraying alone. The work during this season, which should not be neglected by any orchard-

ist having codling moth, consists in killing all larvae that can be found wintering on the trees or thereabout. In order to do this, it is necessary to scrape from the trunks of trees with a trowel, knife or other instrument, all the loose bark which always serves as a hiding place for multitudes of larvae. The larger crotches, cracks or any places affording shelter, are always favorite places for hibernation; all these should be carefully searched, and the larval contents destroyed. The practice of banding trees with burlap before the larvae begin to leave the apples early in the summer, and destroying every ten days, those which gather beneath for pupation, is a valuable one, and particularly so when the trunks of trees have been made smooth by the scraping off of all loose bark. Bands for this purpose do not need to be made from burlap, but most any kind of cloth with a good nap will answer the purpose. They should be at least five inches wide, and folded so as to make two or three thicknesses of the cloth. The darker it is beneath a band the more liable are the larvae to stay there.

Besides the use of these two methods, whereby great good can be accomplished, there is a third one, which is always valuable, and that is the picking off and destruction of wormy apples as they appear early in the season. This can be accomplished along with the thinning operation, which most orchardists practice, and which is no doubt of great practical value.

While these three methods are only aids in fighting this pest, and the use of one or all of them should not be expected to take the place of spraying, they are too important to neglect with the present abundance of codling moth. It is safe to say that if every orchardist would cease depending absolutely upon spraying, and would pay careful attention to these other methods also, that the present abundance of wormy apples could be reduced to a minimum.

DISCUSSION.

Mr. Tomlin—The gentleman, Mr. Weldon, visited my orchard this summer, and I gained from him some little knowledge as to the egg, and I would just like to ask, in speaking of the habits of the moth, I understand that the egg laid by the moth is no more than a membrane, which is about the size of the head of a pin. Now if that be a fact, isn't it a fact that the arsenate of lead has to be on that apple before the egg is deposited? I have understood from other sources that the insect hatches and doesn't emerge from under this membrane; that it very often, at least, goes right into the apple without coming out. I would like to know if this be a fact, for the reason that it makes quite a difference in determining the time we should spray. We should spray before the egg is deposited if that be a fact. If not, it would not materially interfere with the time. And, in speaking of the worms entering the

apple, in my case my experience has been that nine-tenths of the apples that were wormy, the worms entered the side of the apple.

Mr. Weldon—In answering your question about the hatching of the eggs, I would say that the little worm leaves the egg from the upper side, and always travels some distance from the egg before trying to get at the apple. The only thing is to get the spray on before the eggs are hatched at all, so you will be sure to get the first worms that hatch. In regard to the calyx spray, of course you spray your orchard when the calyx is open. If you want to determine that accurately, leave a tree without spraying and see how many you will find on it. Seventy-five per cent. of them will probably be wormy in the calyx end.

Mr. Tomlin—You must bear in mind that nine-tenths of the apples which fall from the tree, the windfalls, are those where worms had entered the calyx.

Mr. Siprelle—What does that indicate?

Mr. Weldon—It indicates that the spray was poor or that the spraying was not thoroughly done. You ought to have a very small percentage wormy at the calyx at the end of the season if your spraying was thoroughly done.

Mr. Butler—A few years ago Professor Gillette recommended fumigating your packing houses, or house you keep any fruit in. The worms were liable to collect there during the winter, and he recommended fumigating to kill them there.

Mr. Weldon—If the packing house could be effectively fumigated it would be a great thing. The packing house question is one I have thought about a great deal. There is no question but there is a tremendous lot of worms in our packing houses. Many of those are cellars, dark and cool, and tend to hold the worms back in the spring. That is really an important problem. Just how to get at it I don't know. It is possible to fumigate a tight packing house. Of course, if you should undertake to fumigate one which was not tight, you could not do very much good.

Mr. Taylor—By way of discussion of this paper, I think this problem is the most important problem we have considered since this convention was called together. This comes right down to dollars and cents of what it costs and what the fruit grower finally gets as the result of his labors. The experience of the practical growers of the lower Grand Valley this year has been to call their attention to the natural conditions, after all. Some of the natural conditions come in to make so much difference that we are inclined to think our own efforts are without any benefit at all. This is not correct, because we do accomplish a great deal of good, and we have accomplished much with our sprays, this season, against the codling moth. A simple comparison of the orchards that were sprayed and

those not sprayed will show you that we have accomplished great good. As Mr. Weldon says, however, the conclusions we must form, and the rules we lay down, must be based upon certain conditions. We cannot, as has the man from the extreme Northwest, say that one spraying will always control the codling moth, though ever so thorough. The number of sprays necessary for controlling the codling moth may depend upon a number of conditions, some of which are the season, the temperature of the season, the variety of the fruit involved, etc. We know that a Winesap is not usually as wormy as a Ben Davis, and we know the long, hot, dry season is more conducive to the development and multiplication of the codling moth than the season that is not long, hot and dry. We know that the season following a winter in which the hibernating larvae are not destroyed is liable to be more wormy than when a high percentage are destroyed during the winter. We know the number of sprays required will depend upon the proximity of your orchard, which might be sprayed well to begin with, to the orchard next to you which is neglected. This point should be emphasized: that universal, thorough spraying is to be desired for the best results in fighting the codling moth. Another condition: The number of sprays necessary for controlling the codling moth will depend upon the thoroughness of the first spray. That was brought out by Mr. Weldon very well, and needs to be clinched and impressed upon everyone using the codling moth spray: that if you are going to have good results with your season's spraying, you must do that first spraying, at the dropping of the petals—well, you must do thorough work. It is not safe to say that the single spraying, no matter matter if it was put on thoroughly, was sufficient to carry it through the season. Some seasons it will, and some seasons it will not; and it requires close observation by the fruit growers, and by the people supposed to make these observations for you, to keep pace with the development of the codling moth. It is well, also, in my opinion, for us to assume that our season's crop of worms is going to be severe, so that we begin the season's spraying right, putting on, perhaps, one or two extra sprays—rather be in the excess than the defect in number of sprays. I would rather put on three or four sprays for the first brood of codling moth, or before the first of July, than to assume it is going to be an easy year, and put on only one or two for the first brood, and depend on the later sprays providing the worms get abundant late in the season. It will be too late to save many of the apples you would have saved had you assumed at the outset you were going to have a considerable number of worms; that it was going to be a wormy year. Therefore, my recommendations, after observations in the lower Grand Valley, will be that we must have more than the spray to fill the calyx cups, but we must keep the apple coated with poison as it grows. The worms do not all go in at the calyx,

and the fruit growers here from the North Fork, and from the Gunnison, will all agree with me that we must not lose sight of the worms that affect the sides of the apples. I am going to assume next year that we are to have a wormy year, and I am going to advise fruit growers to put on not only that first spray thoroughly, just as though that would be the only spray, but I am going to have them, as nearly as possible, put to another spray at the time of the beginning of the laying of the eggs, which time must be kept track of by the closest kind of observation, and again a short time after that, as the apple is apt to grow away from the poison and leave space on the sides of the apple that the little worms might get through. We must keep those apples covered, destroying as many as possible of the first brood, and if we have to put on three or four sprays for the first brood, I am in favor of doing it. We have allowed far too many worms this season to develop, on the supposition that perhaps we were not going to have as wormy a year as we really did have. We are going to bear down on the matter of thorough spraying. We are going to bear down on the matter of providing more spray pumps in our fruit sections. We haven't half the number of gasoline power spray outfits in our principal fruit sections need. We need outfits that will put the spray on with the proper pressure, and before the calyx cups are closed, and before the eggs have hatched and the worms gain entrance. These are the things. If we observe them there will not be so much discussion on what are we going to do with the wormy apples. Let us strike at the root of it. This is the all-important point for the discussion of fruit growers in the State of Colorado, I am sure.

I hope we will not have the worms next year that we had this year, and I have to strengthen my hopes the observation that a large number, late in the season this year, were destroyed by a tiny egg parasite which attacked the second brood of eggs and destroyed many of them. A tiny bee, a mere speck; you can hardly see it with the naked eye, but this little bee, nevertheless, deposited its eggs in the eggs of the codling moth, and many of the latter never hatched at all. The codling moth eggs instead of turning to the red color, and then to the dark, turned inky black, and a little hole was eaten in the shell of the egg, and the bee emerged, and these little bees simply went on their search for more eggs. A large number of generations of these were known to develop this year. The development of this parasite came at an earlier date this year than previous years, and if by any artificial means we can protect these parasitic bees, we may be helping out in this codling moth question. The protection of the leaves in the fall would be a step in that direction, since it is probable, and practically proven, that this parasitic bee winters within the last eggs hatched, which are on the leaves of the trees, and if they are plowed under, those little bees do not have the chance to get out and attack the

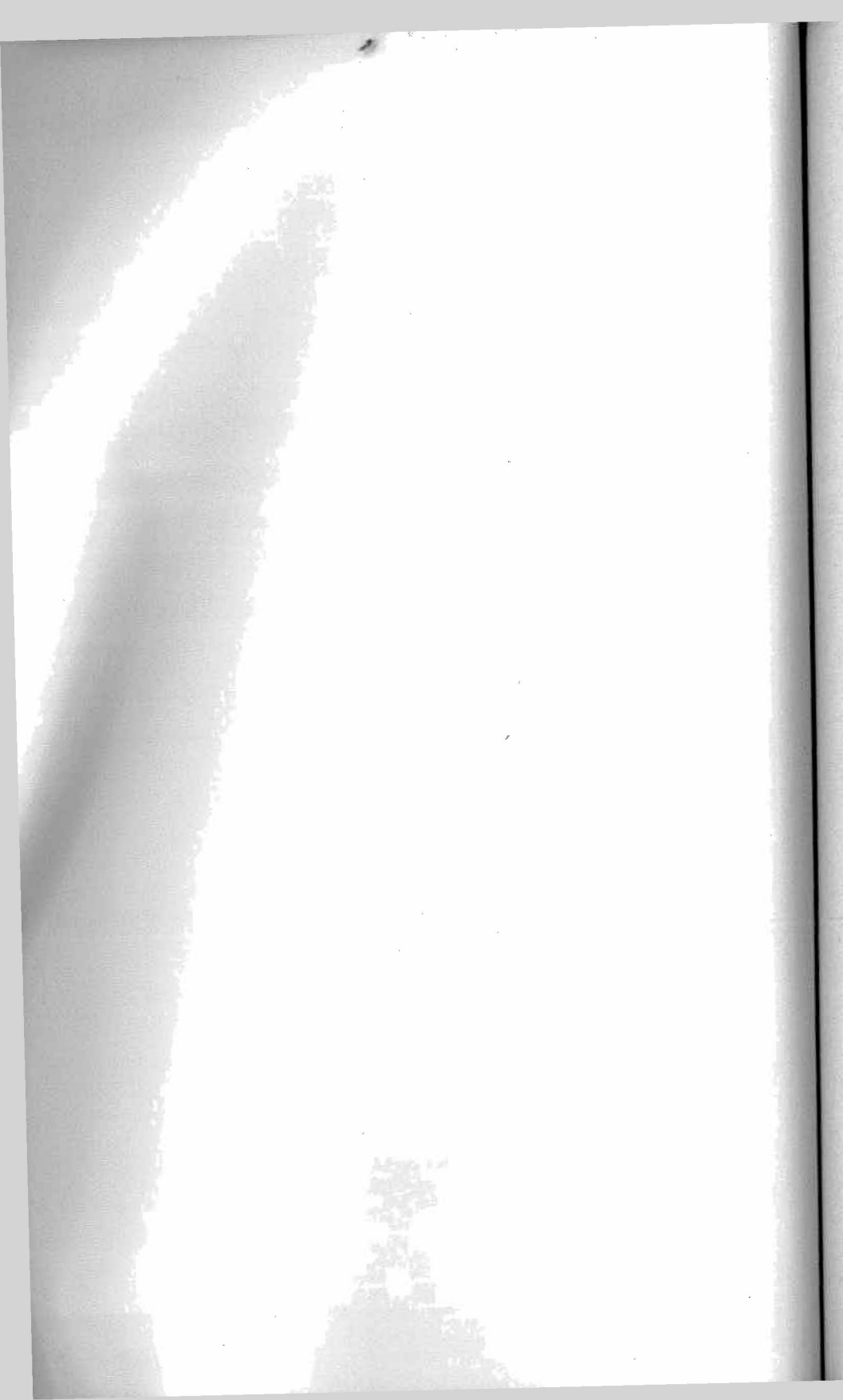
codling moth eggs the next season. The collection and saving of these leaves bearing the parasites in the codling moth eggs might do us some good. I add this, simply as a matter of observation, and a matter which might mean much to the fruit growers of Colorado, just as the lacewing larva has done much in controlling the woolly aphis. By suggesting this little parasite, however, I would not leave the impression with you that we are going to depend upon this little bee for controlling the codling moth. We are going to start in next year, I hope, with a more thorough method, a more intelligent method of spraying, than we have ever had before, adding to that spraying method suggested by Mr. Weldon, the destruction of the worms on the bark of the tree, destroying all those you can, and perhaps pick off the wormy apples in the spring. The spraying should prevent those, and we hope to do better next year than we have this.

President Parfet—If there is nothing further to come before the meeting, we will adjourn.

Mr. Mann—The Good Book says the first shall be last, and I want to be last. I wish to personally say that I am very glad indeed you have held your convention here; glad you listened to our call for the meeting, and came into our midst. We have enjoyed it very much, indeed. The name of our town, Rifle, would naturally strike terror into your hearts, but I hope you have found us a very jolly bunch. I trust we may meet again; but, if not, I hope we may meet in the harvest home beyond.

Thereupon the meeting adjourned.

IRRIGATING STRAWBERRIES ON I. H. MORSE FRUIT FARM, NEAR LONGMONT, COLO.
Photo by Chas. Boynton.



REPORTS
OF
County Horticultural Inspectors

BOULDER COUNTY.

T. B. HOLMAN, HORTICULTURAL INSPECTOR BOULDER COUNTY, BOULDER, COLORADO.

Acres in orchards bearing fruit 750, acres in orchards not bearing fruit, 75; acres in orchards bearing apples 675. Average price per box apples $1.25; average price per crate cherries $2.50; average price plums, per crate, $1.00. Average yield per acre apples, 300 boxes.

The varieties of apples that indicated a full crop were the Ben Davis, Gano, Northwest Greening, Utter's Red, Wealthy, Yellow Transparent. Those that were a partial crop, Rome Beauty, Northern Spy, Geniton, Walbridge and many others.

The codling moth is causing 90 per cent. of the damage done in this county at present; some green aphis and woolly aphis in orchards.

Spraying was very poorly done and with very unsatisfactory results. We never had so large a per cent. of wormy apples and never saw apples rot as this fall.

As in my report of one year ago, I think the arsenate of lead was not up to grade and our spraying has not been satisfactory, and with our present way of spraying we need more than one spray. Some parties who have sprayed have had good results. Very few are making a specialty of growing fruit, but are engaged in other business. We can grow the apple here, but our method of care is poor. In many places the heaters would have been of great benefit the last spring, but near the city of Boulder we did not need them, and our crops were good.

CHAFFEE COUNTY.

MRS. SARAH M. BURNETT, PONCHA SPRINGS, COLO.

In Chaffee County we have 150 or more acres in orchards bearing fruit, and not bearing possibly 20 acres. Most of our fruit area is planted to apples. The average price per box of apples this year from $1.50 to $2.00; cherries about $2.80 per box. The plums sold for about 30 cents for three-pound box.

The varieties of apples that had a full crop were Wealthy, Duchess, Yellow Transparent, Benona, McMahon, Pewaukee, and many others. Average with other fruit sections of the State last year was almost a failure here.

The White Winter Pearmain, the Gano, Red Astrachan and the Alexander are not always a full crop, but never an entire failure.

Thus far we have had no injurious insects nor pests more than the sap-suckers (birds), which remain with us, and occasionally make their nest among fruit trees, laying eggs and raising the young, which are quite tame, as we do not destroy them.

Spraying has not yet been a necessity in this county, and our fruit, more especially apples, are attracting the attention of buyers and dealers outside of our county, owing to their fine quality and excellent flavor. This valley is coming to the front as a producer of perfect and first quality of apples and many other fruits.

Now is the time for improving the soil of the orchard by spreading plenty of manure from the barnyard two or three feet from the trees, pruning and clean cultivation and thorough irrigation twice a month from the first of May until the first of August. The sap sucker can be driven from working on trees by smearing the parts where they have worked with soft clay or mud and thus save and keep the beautiful little birds with us.

The orchards in this county are generally in good condition, the fruit buds are well set and prospects are good for a large crop in the year 1911. The past year the wood growth has been unusually strong. The acreage in trees is being extended rapidly. The apple as a money crop is growing in favor each year.

FREMONT COUNTY.

A. S. TAYLOR, HORTICULTURAL INSPECTOR FREMONT COUNTY, CANON CITY, COLO.

In Fremont County there are 3,500 acres in orchards bearing fruit, and 4,000 acres in orchards not bearing fruit. Acres in orchards bearing apples, 3,200. Average price per box apples "Fancy," $1.20; "Choice," 75 cents. Average price per crate pears, $1.60; cherries, $2.10; peaches, $1.00; plums, 75 cents. Average yield per acre apples 200 boxes.

The varieties of apples that gave a full crop, Winesap, Rome Beauty, Colorado Orange, Paragon, Arkansas Black, Jonathan, Wealthy, Transparent, Grimes Golden, Black Ben Davis, Missouri Pippin and several other varieties.

While the Genitons were a partial failure, we had no varieties that were a total failure.

IRRIGATING AN APPLE ORCHARD IN THE ANIMAS VALLEY, OWNED BY T. A. KERR, DURANGO, COLORADO.
Courtesy of the Denver & Rio Grande Railroad. Photograph by George L. Beam.

The injurious insects which have been most prevalent in this county are the woolly aphis, green aphis and codling moth, with a good deal of crown gall on nursery stock received last spring.

The spraying has been generally and thoroughly done, but some few of our growers do not spray at right time to do sufficient work—seem to think that any time will do, just so it's done between blossoming and picking time. But they are learning.

The improved method of packing and grading fruit is giving better satisfaction in the market, as there has been but very little complaint from buyers this season. Growers are doing better pruning and more thinning, as they find they must do this thoroughly to raise the grade of apples.

Growers are planning to use several carloads of lime sulphur for winter spraying, as former experiments have proven that it is very effective for destruction of aphis and other insect pests.

GARFIELD COUNTY.

FRED G. SHAFFER, RIFLE, COLO.

Acres in orchards bearing fruit, 2,524; acres in orchards not bearing fruit, 3,970; acres in orchards bearing apples, 1,609. Average price per box apples, $1.20; average price per crate pears, $1.50; average price per crate cherries, $2.25; average price per crate peaches, 65 cents; average price per crate plums, 40 cents. Average yield per acre apples, 225 boxes.

All varieties of apples indicated a full crop except in frosted sections. No varieties were a total failure.

The injurious insects which have been most prevalent in this county are woolly aphis, green aphis and codling moth.

Spraying has been generally and thoroughly done.

There will be planted, according to estimates given, in the spring of 1911, about 2,300 acres. This will represent apples principally, with a small portion devoted to cherries, peaches, pears and other fruits.

LA PLATA COUNTY.

P. S. TAYLOR, HORTICULTURAL INSPECTOR LA PLATA COUNTY, DURANGO, COLO.

Acres in orchards bearing fruit, 700; acres in orchards not bearing fruit, 1,500; acres in orchards bearing apples, 600. Average price per box apples, $1.85; average price per crate pears, $2.50; average price cherries, $3.00; average price plums, $1.50. Average yield per acre apples, 175 boxes.

The varieties of apples that have yielded 75 per cent. of a full crop: Stayman Winesap, York Imperial, Wagner, Wealthy, Gano, Northwest Greening, Duchess, Maiden Blush, Yellow Transparent, and varieties 20 per cent. crop, Ben Davis, White Winter Pearmain, Grimes Golden, Jonathan, Rome Beauty, Walbridge and Snow.

The injurious insects most prevalent in this county are the codling moth, green aphis, brown mite, woolly aphis.

Only a comparatively few orchardists have done thorough spraying.

Soil, sunshine, and water have done wonders in Colorado. Add to this brains, and success must be the result in the orchards.

MESA COUNTY.

E. P. TAYLOR, HORTICULTURAL INSPECTOR MESA COUNTY, GRAND JUNCTION, COLO.

In the county of Mesa there are at the present time 10,003 acres in orchards bearing fruit, and 13,757 acres in orchards not bearing fruit. Acres in orchards bearing apples, 6,502. Average price per box apples, "Fancy," $1.25 to $2.00 per box; "Choice," 85 cents to $1.25. Average price per crate pears, "Fancy," $1.60 to $2.00; cherries, $2.50 to $4.00; Elberta peaches "Extra," 56 cents; "Fancy," 49 cents; "Choice," 34 cents; plums, $1.00 to $1.50.

Elberta peaches in Palisade district full crop. Of the apple yield, the Arkansas Black, Winesap, Mammoth Black Twig, and Geniton, almost full crop in most parts of valley. Pears were half crop.

Light crop of Jonathan, Grimes, White Winter Pearmain, Gano, Ben Davis and Rome Beauty.

The codling moth has been particularly prevalent. The plant lice have been less abundant than usual this year except the green peach aphis, which was particularly serious early in the spring. Brown mites and red spiders have increased in severity, especially the latter. Scale insects have caused but very little trouble. Peach twig borer has been less abundant than usual. Peach tree borer has been destructive only in some parts of the county, and this not the principal peach district.

Spraying with the lime sulphur spray was quite general this spring with good results. The spraying through the season for codling moth was as thorough as usual, but the great abundance of worms this season made the number of sprayings given this year, for the most part, too few to hold the pest down to as low a percentage as would have been desirable. A light crop made the worms too numerous to control

by three or four sprays. Six and seven sprays with lead arsenate gave better results.

The year in Mesa County orchards has been below the average, both in amount of fruit and quality. Orchard heating was general in the spring, but all were not equally successful, perhaps from faulty methods or too low temperatures in certain spots. After all frosts, about 50 per cent. of a crop seemed to be in prospect. Deficiency in apples and pears was made up by a full crop of peaches in the Palisade district. A long, hot, dry season prevailed, which apparently made codling moth injury much greater and the expected crop of apples and pears was greatly reduced. Some few instances of wormy crops might have been due to poor arsenate of lead, but for the most part seemed to be up to the desired standard. Many growers assumed that too few a number of sprays would suffice and failed. Some growers from fear of poisoning the trees used too little spray or too weak a spray to accomplish the results they would have liked. The season has demonstrated that to make sure of winning against codling moth in seasons of great abundance one, two, or even three sprays, are not enough, no matter how thorough.

The improved layered pack of apples was used to advantage and the wrapping of the "Extra Fancy" grade and varieties was followed with success. The year was an unfavorable one for the employment of the improved pack. Greater improvement with pack is desired.

A vinegar plant was installed at Grand Junction. More fruit bi-product establishments are needed.

The number of gasoline spray machines in the district is still inadequate to do thorough spraying at the proper time upon the acreage to be sprayed.

MONTROSE COUNTY.

ARTHUR A. MOORE, HORTICULTURAL INSPECTOR MONTROSE COUNTY, MONTROSE, COLO.

In Montrose County we have 4,847 acres in orchards bearing fruit. Acres in orchards not bearing fruit, 750; acres in orchards bearing apples, 2,100. Average price per box apples, $1.00. Average price per crate pears, $2.25; cherries, $2.00; peaches, 50 cents per box. Average yield per acre apples, 210 boxes.

York Imperial, Ben Davis and Missouri Pippin indicated a full crop of apples.

The Jonathan, Winesap and Grimes Golden were a partial crop, due to local conditions of frost in spring.

The injurious insects, which have been most prevalent in this county, are the woolly aphis, green aphis, codling moth, crown gall, and there has been some blight in the orchards.

Spraying has been generally and thoroughly done.

MONTEZUMA COUNTY.

C. H. TAYLOR, HORTICULTURAL INSPECTOR MONTEZUMA COUNTY, DOLORES, COLO.

Acres in orchards bearing fruit, 900. Acres in orchards not bearing fruit, 2,000. Acres in orchards bearing apples, 850. Average price per box apples, $1.50. Average price per crate pears, $2.25; cherries, $3.00; peaches, $1.50; plums, $2.00. Average yield per acre apples, 300 boxes.

All varieties of apples yielded well in a list of 132.

We have the codling moth in but eleven of our orchards, woolly aphis in four; all others are free from insect pests.

Spraying has been generally and thoroughly done.

No artificial heating has been employed in this county. A larger acreage will be planted the coming year than in any previous year. Our nearly entire freedom from insect pests and tree diseases, together with comparative freedom from late spring frost, encourages a rapid development of the fruit industry in this county.

PUEBLO COUNTY.

J. N. BARTELS, HORTICULTURAL INSPECTOR PUEBLO COUNTY, PUEBLO, COLO.

Acres in orchards bearing fruit, 2,300. Acres in orchards not bearing fruit, 2,500. Acres in orchards bearing apples, 1,500. Average price per box apples, $1.25. Average price per crate cherries, $1.75.

Jonathan, Ben Davis, Missouri Pippin, Yellow Transparent Winesap yielded good crop.

We have the leaf roller, codling moth, crown borer, woolly aphis, but little blight or crown gall.

Spraying has not been generally and thoroughly done, although more has been done than in former years in some localities and less in others. Has not been as general as it should nave been.

But little attention is given to packing fruit, and but very little grading is done. Some of the best cared for orchards had nothing on them, while others not cared for at all gave some returns. Some smudging has been done in some localities by approved methods, and perhaps more benefits will result from it in the future than has in the past.

CULTIVATING ORCHARD OF W. T. BOZMAN, IN THE MONTEZUMA VALLEY.
Courtesy of Denver & Rio Grande Railroad. Photograph by George L. Beam, Denver.

WELD COUNTY.

GEORGE J. SPEAR, GREELEY, COLO.

Acres in orchards bearing fruit about 600; acres in orchards not bearing fruit, about 1,500; acres in orchards bearing apples, about 450. Average price per box apples, $2.00; average price per crate pears, $1.50; cherries, $2.00; plums, $1.00 per crate, or 5 cents per pound.

The grasshoppers have done most of the damage to the orchards, but we hope for some legislation that will be of benefit to us in exterminating this pest.

Spraying is not generally done here, but some of the orchardists are giving attention to it with good results. It would be well for a county horticultural inspector to be appointed in order that the orchards might be inspected. There is no question but what we have the land here in Weld County to raise apples that are of fine quality and are of especial merit as good keepers, and when it comes to growing plums, cherries and small fruits, there is no section of the State that excels Weld County for the growing of these fruits of the best grades.

It appears to be the prevailing opinion of those not acquainted with the natural resources of this section of the northern district, that we are more of an agricultural than a horticultural district. That is true, but those interested in orcharding are taking more interest and there will be a larger acreage planted to fruit this coming spring.

MONTROSE FRUIT GROWING.

T. W. MONELL, COUNTY CLERK AND RECORDER, MONTROSE COUNTY, COLO.

When one considers that Montrose county is larger than some states in the Union, that it is divided into valleys and mountains, one can begin to have an idea of the magnitude of a county which has attracted the attention of the largest buyers of fruit in the United States and at Liverpool, England. The average altitude of the fruit growing section is from 5,500 to 6,000 feet, the soil is such that it is only necessary to plant your orchard on a piece of ground that has a slope to give it natural drainage.

In the early days the people planted everything that was to be found in the catalogue, and a few that they had heard their grandfathers speak of. To-day they plant what the market demands, and they have taken the old Ben Davis apple, so much in disrepute, through the eastern and middle states, and made it one of the large commercial apples of this section. I freely predict that the time is not far distant when Colorado Ben Davis apples, grown at an altitude of 5,500 feet, will be in as great de-

mand as are Winesaps at the present day. There is no better apple grown for storage purposes, and, beginning with the month of February, after they have gone through the sweat, they make a splendid baking or cooking apple, and in March are the equal of any for eating.

The chief varieties grown here are the Jonathan, Winesap, Grimes Golden and the Ben Davis, both the ordinary Ben Davis and the Black Ben Davis, while a few orchardists go heavy to Rome Beauty, Arkansas Black and Red Aiken. These constitute the principal commercial shipping apples, with a scattering amount of other varieties. Of summer apples we produce the finest Maiden Blush in the world. The firm, hard apple, the beautiful yellow tinge and the bronze cheek. Under ice these apples are generally shipped to New Orleans, although some have gone to Chicago and Boston. The Wolf River is another splendid seller, while for the early fall apple the old reliable Wealthy and the Strawberry are the two apples in this line.

For peaches, we might say they do well in every section of the county tried. The principal shipping varieties are Yellow Crawfords and Elberta, the latter predominating.

Prunes seem adapted to this country and are enormous bearers and good money makers, the Italian and German Silver being the varieties for green shipments, while the French Sugar and Imperial Epeneuse are the great drying prune, the latter being a prune which cuts into the date market to a large extent, being very large and meaty when dried.

The favorite pear is the Bartlett and the Winter Nelis, while the Cycle and Sweet Mary fill the local demand for pickling and syrup pears.

Cherries are abundant yielders, and after a certain age readily bring $15.00 a tree. All varieties do well with the exception of the sweet cherries, which seem to be alternate bearers, although the Royal Ann has never been a complete failure.

Nature has favored the county in the position of the valleys in such a manner that there has never been a complete fruit crop failure in any of the valleys of Montrose county since trees were planted, although twice in the twenty-three years that the fruit trees have been bearing we have had partial failures, owing to frost coming at an unusual time. Many thousands of acres of new orchard have been planted and many more are expected to be planted this coming year. It is a recognized fact that irrigated fruit grown in the mountains is the best fruit, for export or for storage.

The completion of the Gunnison tunnel, the greatest of all irrigation projects undertaken by the United States government, insures to the Uncompahgre valley the only essential heretofore lacking to make it the greatest fruit growing country in the world, and that has been the ability to have the water for irrigation when you wanted it, and the amount needed. This tunnel

DRYING PEACHES AND PRUNES IN THE ASHENFELTER ORCHARD NEAR MONTROSE, COLO.
Courtesy of the Denver & Rio Grande Railroad. Photograph by George L. Beam, Denver.

has given to the county the best and most perfect water supply yet known to man, and the coming year will see hundreds of acres of new orchard planted in the fertile Uncompahgre valley. In the Paradox valley the reservoir system to irrigate has so far proven such a grand success that enlargement of these reservoirs has already begun. This is one of nature's favorite spots, and will in a short time be the greatest peach valley anywhere in this western country.

On the San Miguel river thrifty and enterprising fruit men have slowly but surely, the last few years, been planting the hillsides to orchard.

The Wrights, Mesa county, are about to complete several systems of irrigation works, and with the advent of Bulkeley Wells' ditch there will be had 60,000 to 70,000 acres of rich and fertile lands capable of producing splendid apples.

The Muddy country has never been looked upon as a fruit country until the last couple of years, but the few hardy pioneers who brought the ever-ready apple seed into the new country, when it came to grafting these seedlings, selected from only the best commercial varieties, until now they have several promising orchards in a section of country heretofore known chiefly for its production of cattle.

Some people look upon fruit growing as an expensive thing. It is true that it takes something to properly prepare the ground for an orchard and to carefully plant the trees, besides the cost of the trees. To handle the ground, you may plant it to sugar beets or to potatoes and it will pay a good price for your work in attending to these crops, while at the same time you are attending to your trees. Some people go farther and plant onions between the tree rows, and where this is done the first two years before the trees get large enough to shade the ground much the onion can be as successfully grown between the tree rows as by itself. You can continue raising crops profitably and without damage to the trees, between the tree rows, for at least four years. I would suggest that the trees then be left to themselves. If apples, they will pay you a fair return on your investment. One of the nice things about fruit growing is the fact that each year your trees produce a little more and the fact that the markets for Montrose county apples are already established, and it is not a question of hunting the markets, but a question of packing, sorting and loading for a price already agreed upon between you and the dealer.

(Address before the first American Apple Congress, Denver, Colo., December 15, 1910.)

APPLES AS AN ASSET.

HON. ALVA ADAMS, PUEBLO, COLO.

Stock Show good thing. Pie Day appeals to memory of youth. Melon Day stands first in black man's eye, and only second to Pie Day in mind of American boy. Strawberry Day is a sort of an aristocratic celebration. Potato Day is too necessary and common to win enthusiasm; but Apple Days and Apple Conventions have a personal interest for all the children of Adam.

I join in the universal love of the apple, and I believe in it as an agent of health, diet, beauty and commerce; these must be the reasons why I am placed on your executive committee and given an honored place on the program. I am an eater and buyer of apples. I do not raise or sell them. My entire orchard consists of a dozen apple trees, and of the taste of their fruit the boys are more familiar than I. I squeeze into the association as I do into the cattle growers' society, which permits me to pay dues and qualify as a stockman, upon my inventory of three lame horses and one cripple bicycle. Scant as may be my production, I challenge even the fruit man who markets his fruit by the thousand boxes to be more interested than am I in the development of the orchard industry in Colorado. I appreciate, to their full, the potential influence of our mines, when I assert that the future happiness and destiny of our people depend more upon our orchards than upon our mines of gold.

The apple is an asset financially, morally and politically. It is a mortgage payer, a character builder, a conservator of home, and a patriotic incentive. Apple orchards mean intense cultivation of small tracts of land. It means a maximum of production and a minimum of waste. It is a business in which every member of the household can take an intelligent and useful interest. It centralizes the family, and creates a home in which all may have a part. In an orchard land, fireside altars are everywhere reared and everywhere sacred. Small holdings, devoted to high-value crops, develop ideal communities. There results better roads, easier and cheaper transportation, more convenient schools, churches and markets, the telephone and daily mail, good and near neighbors, better society, a higher standard of citizenship. It gives most of the advantages of the city, without taking away the virtues of rural life. It is the happiest possible compromise between town and country. Individual ownership of large areas of land is not the best condition where the welfare of millions are to be considered. The strongest desire in man is to own land. There is no greater thrill of satisfaction than is found in walking or riding over wide stretches of soil that is your very own, from the center of

the globe to the stars. Large holdings of land by one owner is waste, and waste will not be tolerated in the ideal civilization that is to come. The crowding future will confine individual possession to the amount of land that he can cultivate and use. The country would advantage if the limit of a farm in humid sections was 160 acres, and in irrigated regions not to exceed eighty acres. The thousand-acre farm is seldom the seat of a model home; family life in its most perfect sense is not found where the nearest congenial neighbor is distant a day's ride. The steam gang plow is not an agent of civilization. The great field, where a single furrow is a day's plowing, and whose far side is fenced by the horizon, is a part of the primitive frontier. It suggests monopoly and capitalism in land, and is out of place in the requirements of to-day.

"A little land and a living" is the slogan of the hour. In Colorado, a home of your own and a living is more sure when your little land is planted with apple trees than will result from any other crop. Last week the Agricultural Department, at Washington, reported nine billion dollars as the soil product of the United States in 1910. It is a staggering total. One year's crop of American farms enough to buy half a dozen European kingdoms! To this tremendous aggregate the apple orchards of Colorado contributed more dollars than any like number of acres in the United States. Surely, the product that yields the greatest comparative value in our country is a commercial asset of worth. The "Apple is King," and its dominion will spread until the world is familiar with its virtues.

The apple is the aristocracy of foods and the best medicine. The climate and conditions that are best for apples are also best for man. An orchard land is the cradle of manhood and womanhood; where vines twine and trees bear their fruit, homes grow. Our flag has no anchorage as firm as the family hearthstone. The debt-free home is the guarantee of this republic. The aim of free government should be to have every citizen hold in fee simple a piece of land upon which to build a home. The man with an acre and a liking for honest work never shouts revolution. Insurrection makes no recruits among home owners. The taxpayer is the patriot. Anarchy never plowed its own field or gathered fruit from its own apple trees.

The man in the orchard is always a good citizen; he has no time for strategy and treason. The seed of revolt and shame find genial soil in the city tenements; loyalty and patriotism germinate in the orchard home. Apple orchards are better nurseries of citizenship than decks of battleships or military camps.

The men who work with their hands, who care for the orchards and fields; are important moral assets in the struggle for liberty. Prophets and world movers have always been outdoor men. Christ selected no office or professional men to be

His messengers. They were fishermen, herdsmen, dwellers in tents. Not bigger cities, but a thicker settled country, is what makes a state great. Not more rich, but more prosperous.

Apple raising is not a holiday entertainment. Poetry and romance have woven their charm around the apple, but those who cultivate their orchards in dreamland, and irrigate them from the springs of their imagination, will find their fruit to be apples of Sodom. Horticulture is a science, not a guess or a makeshift, and should not be a side issue. It was the business of the first pair in Eden, and will be the pursuit of the angels in Paradise. It is not a trade for those afflicted with the hookworm. Eternal vigilance is the price. Industry and sense are imperative. The apple that grows of itself and falls into the open mouth of the loafer under the tree is always a wormy windfall. No business requires higher qualities than apple raising. Anybody can raise some sort of apples, but to raise the kind the market wants is not the work of common talents. It takes sense to select the soil and place; sense to select the kind to plant, to fertilize and spray and prune, to irrigate and to gather, to pack and sell. Here expert information pays. Knowledge is power here as everywhere. Only pilfering boys shake the trees and use a club to knock off the apples. Picking fruit is now an art; it must be handled as gently as eggs. Apple raising is a trade, as packing, selecting and marketing is a profession.

The apple orchard is no place for the man who believes that the god of luck rules human destiny. Good fruit is not a chance. Luck may sometimes win a prize in a lottery; a bobtail flush and nerve may sometimes win a good pot in a poker game, but no prize box of apples was ever raised without work and brains. To grow the apples the world is willing to pay for, demands the same prosaic traits that bring profit in the cabbage patch and the potato field. It is the worker and the reader —the man who studies his business—that does the best. The farmer who takes the agricultural papers, who knows the literature of the farm, who follows the experiments of the agricultural college, will always find his land the most productive. The man on the farm who thinks that book horticulture and book farming are nonsense will always have trouble in paying the mortgage. The threadbare story of Greeley's buttermilk that cost the same as his champagne is the refuge and defense of the shiftless farmer. It is a good story, but it is not true. It is eternally true that system, study and brains are masters in every vocation.

An observing man can travel through a farming and orchard country and by the appearance of field, improvements and orchards, can make a list of the farmers who read, attend fairs and institutes, and can tell whose notes are good.

Hood River, Oregon, has a benevolent apple trust. The association packs, sells, and guarantees the fruit. No poor or

bad fruit is sent out. The culls and the wormy go into the mill. Cider tells no secrets. The fruit that carries their brand is reliable. Their association name is a certificate of character, and that character is worth an additional 50 cents or $1 a box. A good name is an asset in fruit selling. Colorado has a wide growing reputation. Every fruit stand, from San Diego to Boston, places a Colorado label on their best fruit and charges a double price. A box of Colorado apples retails in the East at the price a barrel of ordinary Eastern apples sells for. That is a prize for excellence. Apples are still the consolation of New England winters, but she buys more Western apples than she raises; her orchards can produce more rods of stone fence than bushels of apples. She also recognizes the supremacy of Colorado and other mountain states for apple culture. Everywhere in the East the business of apple raising is in decadence. Aside from a few states there has been a very serious decline. In 1896, 69,000,000 barrels of apples were raised in the United States. This was a barrel for each of our 69,000,000 people. In 1901, the production dropped to 27,000,000 barrels. In 1909, but 23,000,000 barrels were raised. The taste for apples is growing and the crops are decreasing. This is the field and opportunity for Colorado. To the sun-drenched orchards of these semi-arid lands, the world will look for the perfect apple. It is a business to which nature has given us a practical monopoly. Emerson said that the world will beat a pathway to the shop of the man who makes a better shoe or a better mousetrap. So the apple lover will make wide the way that leads to Colorado orchards. Climate, altitude, soil, irrigation, sunshine are all ingredients that help make perfect fruit. The apple tree is soon to be a greater asset than our mines. Its harvests are perennial, while gold and silver have but one crop. Civilization depends upon reproduction. Soon mining will be but a memory—its monument the scarred and desolate mountainside—while the orchards will be a permanent zone of bloom and beauty and fruit, whose fragrance and glory will tell of an Eden that has gone and foretell a Paradise that is to come. For fifty years Colorado has led in precious metals. Gold and silver have been our crown; the mine has been the prince in the house of our prosperity. Today a new throne is being built; a new dynasty is coming. Pomona is to be queen, and her reign will be more beneficent and longer than the 600 years of the Hapsburgs.

The twentieth century is to be the age of the apple and Colorado is to be the center of its empire. The coming fatherhood of this mountain land can look upon a noble progeny and with pride can say with Solomon, "I raised thee up under the apple tree; there thy mother brought thee forth."

Every box of perfect apples we send out of the State becomes a missionary that spreads the gospel of irrigation and carries the message of Colorado fertility. We do not wish to

brag, only little folks do that; the strong and great do not boast and strut, but to show what we can do and let the observer draw conclusions is the part of wisdom. To have a talent and hide it under a bushel is folly. This Apple Congress, every fair and exposition where we show our product, is an object lesson—our way of telling the truth. Rhetoric may deceive, statistics may be questioned, but the fruit itself does not lie. These are not children of the imagination, but real apples of gold that are convertible into cash, bank credit and prosperity.

The profit yield of the apple tree has been a revelation to our own people as well as a shock to the skeptic from afar. We knew that apples could be raised, but even some home orchardists, when the crop was sold, have counted their money twice to be sure it was real and not counterfeit. Not only has fruit culture paid the best, but the orchard is nearer the home than the field, and home building is the best and should be the first business of our country.

To put people upon the soil is a work of humanity as well as of national prudence and safety. If the nation would for awhile close the gates of Castle Garden and plant the surplus man of the city upon the land it would raise the standard of citizenship and strengthen the republic. To swing wide the doors to the restless and the poor of all nations and then to withdraw from settlement vast empires of the public domain seems to be a paradoxical statesmanship. In Colorado one-third of the State is now a reserve upon which it is trespass for a citizen to set his foot. I believe in conservation, but there is a line of excess where conservation becomes economic lunacy, and it is not certain that we are not now in the crazy zone.

Intense cultivation results from apple culture. It makes more room for the crowding millions. In time the limitation of area that an individual may control must become a national policy. Horticulture not only relieves the pressure for land, but contributes to health, morals, happiness and prosperity. There is physical well being in apples. The child that eats apples never gets yellow; the apple barrel is nature's medicine chest; biliousness and dyspepsia are unknown in families who indulge freely in an apple diet. Boys crave apples, especially if on a neighbor's tree. This hunger can be turned into legitimate channels.

Let them be plenty and free of access in the household and the boy will not range the neighborhod in the dark of the moon. Apples are a splendid substitute for cake and candy. Health is now a branch of public school instruction. The text book on health should be revised and the first chapter teach of the apple and relieve it of the odium placed upon it in the first book in the history of the race.

PRUNING TREES IN THE JAMES F. KYLE ORCHARD, AT MONTROSE, COLO.
Courtesy of the Denver & Rio Grande Railroad.
Photograph by George L. Beam, Denver.

The apple should be the emblem of salvation and not of sin, as it has the virtue and power that brings redemption to the physical and financial man. Diet has much to do with character. Apples would have made a better world. Had there been apple orchards along the brook Kidron, Elijah the terrible could have dropped his meat diet of locusts and lived on apples and honey; had he done so he would have been less fierce; he would have preached tolerance, rather than judgment and fire baptism to a generation of vipers. Had Napoleon dieted on apples a week before Waterloo he might have died a king in Versailles. I would rather trust a judge that loves apples than one that hankers after bear meat. Apples help the liver, the digestion and the disposition. With these in good working order man needs neither police, courts nor jails. As a matter of public economy the State could afford to supply a daily ration of apples to all of its male citizens; it would save more than the cost in demeanor and character. Apples are an antidote for drink and tobacco. When thirsty eat an apple, when nervous for want of a smoke, eat an apple. It is also more cleanly, wholesome and respectable. Barrels of apples should stand at the doorway of every legislative hall. The statesmen who lunch on apples are generally safe. President Taft lunches on apples. The well loved Senator Cockrell for thirty years lunched on apples; his disposition never soured and his integrity was granite firm. Last week Congressman Taylor gave Speaker Cannon some Colorado Winesaps and Jonathans. He now knows good as well as evil, and we may now expect better temper and better legislation from the stalwart old hero.

Apples are a natural food and carry the pure food stamp of the Great Physician. They hold more nourishment than the predigested artificial foods, now universal at the American breakfast table. Apples supply the elements that most systems crave. As body builders they rival meat. As a diet they give as much force as the preparations which promise to make the lean fat and the fat lean, and a Sunny Jim out of the most depressed and gloomy. I am not a vegetarian. I belong to the Cattle Growers' Association; then, I was raised on pork and beef and do not like to go back on my raising, but I do know that less meat and more fruit is an antidote for many ills; it saves calomel and keeps doctor bills at a minimum.

Three-quarters of the menu at most homes and all hotels could be eliminated to advantage of body and purse. The French bill of fare has forced itself upon the public cookery of the world. With French cooks its decoctions may be wholesome, but when in amateur hands the pure food law should insist that the skull and cross-bones be stamped upon the menu as upon other poisons.

The craze of the culinary art is to invent new mixtures, new dishes, new extravagances. In living, simplicity has a hundred virtues where luxury has one. A sensible view of diet and

eating will do more than a new tariff for our country. Our social life and entertainment seems pervaded by a sort of delirium. Rivalry and competition eclipses our judgment. We forget that in all save love common sense is a safer motor than hysteria. On the Palace Hotel, San Francisco, dinner menu I counted 183 dishes. Some Denver bill of fares have nearly as many. This is barbaric and not civilized. A Denver hotel that would present a simple bill of fare, every article pure and well cooked, could make a fortune. A meal that offered one or two plates of meat, one soup, two vegetables, fresh eggs, good bread, butter, milk and coffee, each meal to be opened with a baked or raw apple and closed with apple pie, all absolutely pure and fresh and cooked as mother used to cook, would take the patronage of 75 per cent. of the traveling public.

Nearly all patrons condemn the present system of hotel and restaurant cooking. They tolerate it, for they can get no other, as no proprietor has the courage to present a pure, wholesome, simple bill of fare. The road that leads to the orchard is the pathway to a simple, prosperous and a happy life. Let us travel it.

(Address before the first American Apple Congress, Denver, Colo., December 15, 1910.)

ALL THE YEAR'S MANAGEMENT OF AN APPLE ORCHARD

BY B. F. ROCKAFELLOW.

Mr. President, Ladies and Gentlemen—It seems to me that a proper and sufficient response to this subject would be to refer to a practical demonstration in about 999 orchards in Colorado, which, as Eugene Grubb would say, "Are the best in America! and all the world!"* I infer that this title means good management of good varieties, and trees properly set out good distances apart, and with no fillers, in order to have sunlight all around, and that when large they can be sprayed to advantage; planted in a location with good drainage and soil suited to their growth, and only for quality. Much damage, to the permanent industry is done by fairs and expositions in awarding premiums to so many overgrown, for the variety, large apples, as destitute of flavor as the Frenchman's "Apple of the Earth." Superior flavor should be the first consideration of perfect fruit, and the average apples of all varieties, such as furnished to the trade, be entitled to premium and not those of abnormal growth, selected only to show. The big sugar beets get no prizes. It is the medium sized, with high sugar contents. So it should be as regards richness of the apple. The foreign trade, which we must soon look largely to demand varieties of pronounced rich flavor, whatever the color.

Alternate in setting out each two or more rows with other varieties of different growth, in height and shape, but the same blooming time, thus securing perfect fertilization. Young trees should be washed with lye—not drugs—and the Agricultural College professors advise adding lime, and they will have smooth bodies and no borers. Forest shade trees, in all their majestic growth, should grace the borders of every orchard; should never be headed back; not so with the fruit bearing apple trees in Colorado soil. About the eighth year they get high enough and should be headed back and opened out to the sunlight by cutting to a limb going in the direction needed, otherwise some varieties will attain high, sturdy growth, almost like the elm. Cross limbs, water sprouts and suckers must be cut out. If the knife is spared the tree will spoil itself. Its proper use is the cheapest way to thin fruit. Generous irrigation of each individual tree, where we have but twelve to fifteen inches annual rainfall, is a necessity. Our people have fine success in planting berry bushes, roots and vines between the rows to the sixth year; then seeding to red clover, and plowing it under about every fourth year, then clean cultivation and manuring for two years, and seeding the third spring. By the advice of the professors of the Colorado Experiment Station, we are now using alfalfa, its roots gathering more nitrogen, and when plowed under in the fall, many more tons of needed fertilizer in their roots. In orchards showing any signs of fungus, scale or black rot troubles, use Bordeaux mixture or lime-sulphur spray before the buds swell in the spring. Then if heating pots are used, they should be placed and filled ready for the campaign against Jack Frost. The boys call them "jack-pots." Of course none of you know what that means.

Soon as the petals from the blossoms fall comes the critical time—the first thorough spraying. Remember the place to put it is in the calyx of the blossoms of the upper limbs. It then can scarcely be kept from the blossoms in the lower limbs, as the calyx cup then opens upward and will get sufficient insecticide. The operator persistently dashing the spray from underneath the limbs outward or toward the body of the tree should be at once relieved from duty. If the work is done properly and at the right time, and followed the middle of July with a light spray, there will not be any danger of filling the soil about the trunk with destructive doses, as, to our knowledge, was done at the time of spraying six or seven times a season. Remember, however, that the thoroughness with which you spray determines the grade of your apples, and even whether many of them stick to the trees until ripe. In June, in full bearing orchards, the trees should be relieved again of suckers and water sprouts, which will then be easily removed without aid of the knife. In July go after the woolly

aphis, if any appears. As gathering of ripening varieties follows then in quick succession, it is well to remember the lessons of our experience as well as information gained at short courses and Institute work—among other things, as to necessity of gathering without bruising and packing properly. Then sell soon as possible. If you have no established wholesale trade for your product, give your fruit association and the middle man a chance, providing they keep in touch with the markets that demand such stock as you have to sell. Your apples off and disposed of, then clean up the orchard of all fruit that fell in picking, the canning and cider stock. Draw in your ladders, empty packages, then give your orchard the most thorough soaking. It needs such a drink to go into winter quarters, and to be in good condition in the spring before ditches generally are ready to be drawn from.

In striving to excel in the management of orchards and having fair success in fighting orchard pests, we believe we are doing yeoman's service to the race. For the good your horticulturists have done the present and future generations, in planting trees, and encouraging the noble pursuit of beautifying home life on the farm and suburban homes, we certainly believe the good Lord will excuse us from fighting fire in the next existence.

In practicing the foregoing my apple trees, twenty-five to thirty-five years old, are as vigorous and productive as when ten years old, and they seem to give me a friendly welcome as I pass through the rows admiring their smiling, fragrant bloom, and, later, beautifully colored fruitage.

Let us "smile and boost" our product.

Here is to the memory of Mother Eve, who gave to the first doctor—Adam—a specific for all our digestive ills—the apple—if enjoyed every morning, baked, which will insure our internal organs being always kept in tune.

STATEMENTS AND FACTS.

(SHUTE.)

APPLE GRADER.

"For many years there has been a demand for a practical apple grading machine, and now Mr. J. L. Hamilton, of Grand Junction, has one which has done good work during the past season, and for which great things are expected. It grades the apples as to size and does not bruise them in any way. The machine is simple and greatly lessens the work of packing.

"The development of this machine was the result of necessity—'necessity is the mother of invention.' Last spring the Grand Junction Fruit Growers' Association, of which Mr. Hamilton is a member, announced that the tier pack would

be adopted for packing the 1910 crop of apples. Heretofore Colorado growers have used the 'jumble' pack, in which the first two layers of apples are faced and then the apples are placed in the box loose. When this style of pack is used great latitude is allowed as to the sizes of apples placed in the box; all apples graded as 'Fancy' must be at least two and a half inches in diameter, but there is nothing in the requirements to prevent some apples two and a half inches in diameter and others four inches in diameter being placed in the same box. This makes a bad pack, and Colorado growers decided to adopt the tier pack of the Northwest.

"Now, when the apples are packed in tiers they must be graded carefully as to size; if the apples are placed in layers, they must of necessity be approximately the same size, if the box is to be firmly packed. Colorado growers were greatly uneasy about using this pack, for they had never tried to pack apples in that way, and were afraid the work would be too slow. Instead of protesting against the improved pack, Mr. Hamilton began to work on a machine to facilitate the work, and his new machine is the result."

PREVENTING PEAR BLIGHT.

DR. J. H. DIVINE, PALISADE, COLO.

"To prevent blight, pear trees should be cultivated and irrigated in such a way as to make a slow, hard growth, and irrigation must stop early in the season, and the trees allowed to ripen thoroughly before cold weather. Remove all water sprouts and sappy growths.

"If blight should supervene, cut off at once all limbs from twelve to eighteen inches below the blight, and if occuring on the body or fruit spurs, cut out and scrape to sound bark, then apply the bi-chloride of mercury, or what is commonly called corrosive sublime, in the strength of one part dissolved in 1,000 parts of water, to the wound on body and severed limbs. The saw or knife must be disinfected after each cut. Most authorities will direct to place them in the bi-chloride solution, but the bi-chloride solution will corrode all metal tools. A better preparation for that purpose would be formalin. Procure from your druggist an ounce of the 40 per cent. solution called formaldehyde; put it in two or three quarts of water and use to disinfect the tools, using the bi-chloride to apply to the cut surfaces, it being cheaper.

"Pears should be sprayed with the same preparation and at the same time as the apple, viz: Arsenate of lead, three or four pounds to 100 gallons of water applied thoroughly as soon as the petals have fallen, using a coarse spray, filling up all the calyx. For subsequent spraying use five or six pounds in the same amount of water, in a fine mist cover all parts of the

young pear as thoroughly as possible, just short of dripping off. Spraying the pear promptly on the falling of the petals is not quite as essential as in the apple, as the calyxes do not close as promptly or as perfectly, and some do not close at all." —(From the Orange Judd Farmer, February 4, 1911.)

THE WORLD'S COLUMBIAN EXPOSITION, 1893. STATE OF COLORADO.

AWARDS.

Exhibit. (Mammoth) Clover.
Exhibit. Forty-six varieties of soil.
Exhibit. Jellies, Jams and Canned Goods.
Exhibit. Pomaceous and Stone Fruits.
Exhibit. Collection of Grapes.

THE WORLD'S COLUMBIAN EXPOSITION, 1893. STATE OF COLORADO.

AWARDS IN HORTICULTURAL DEPARTMENT.

30 Gold Medals.
370 Silver Medals.
60 Diplomas.

LOUISIANA PURCHASE EXPOSITION, ST. LOUIS, 1904. STATE OF COLORADO.

AWARDS.

Grand Prize. Collective exhibit of Colorado Vegetables, Grains, Grasses and Forage Plants.
Grand Prize. Fruit.
Gold Medal. Honey.

LOUISIANA PURCHASE EXPOSITION, ST. LOUIS, 1904. STATE OF COLORADO.

AWARDS IN HORTICULTURAL DEPARTMENT.

19 Gold Medals.
139 Silver Medals.
93 Bronze Medals.
233 Diplomas.

TRANS-MISSISSIPPI EXPOSITION, 1898.
STATE OF COLORADO.

AWARDS IN HORTICULTURAL DEPARTMENT.

30 Gold Medals.
20 Silver Medals.
70 Diplomas.

TOTAL.

79 Gold Medals.
529 Silver Medals.
93 Bronze Medals.
363 Diplomas.

Dr. J. H. Divine, of Palisade, says of quince culture:

"The quince usually grows where the pear does well; it requires about the same kind of soil. A small admixture of clay is best. It is subject to blight, the same as the pear. If the pear will not grow there, it is probable that the quince will not. The Rea, Mammoth, Orange and Van Deman are about as hardy as the pear. I would not advise the extensive planting of the quince in a locality until it has been tried out in a small way."

STATISTICS.

The figures herewith quoted are taken either from the official records of fruit growers' associations, or substantiated by the affidavits of the growers.

Palisade has the record for the most productive crop of peaches.

J. R. Bradshaw this year harvested 7,496 boxes of Elbertas from six acres—on an average of 1,250 per acre. H. J. Shideler marketed 5,593 boxes from five acres of five-year-old Elbertas—over 1,100 boxes to the acre.

J. C. Crew harvested 1,000 boxes of apricots from forty trees on his Palisade ranch, which netted his $1 per box.

H. G. Crissey, of Palisade, netted $918 from 100 Kieffer and Bartlett pear trees this season, taking 600 boxes from less than an acre.

In Mesa county, from the Palisade district, in September, in less than one week, there were 373 cars of Elberta peaches shipped out.

"Austin, Colo., January 19, 1910.

"I have a neighbor who bought a forty-acre tract of land in 1905, for $2,700; put it to trees in 1906 and 1907; also put a wire fence around it; sold property in March, 1908, for $10,000, without any further improvements. It sold again, in December, 1909, for $20,000.

"I have a fourteen-year-old apple orchard. In 1909 I sold over $2,000 worth of Grimes Golden apples, from 120 trees, or less than two acres. I sold thirty-three boxes from one tree for $1.25 per box (Ben Davis apples), or $41.25. At the same time I sold eighty-one boxes of Ganos, from four trees, at $1.50 per box, or $121.50.

(Signed) "HENRY HAWKER."

Delta Independent.

E. F. Hubbard, who owns a fruit ranch near Cory, says of his 1909 crop:

"Off of 194 Jonathan trees I sold $2,110 worth of apples. Off of 1,296 trees I cleared, above all expenses, $6,100."

On the thirty-four-acre orchard of A. L. Roberts, of Paonia, production and returns for 1909 were as follows, verified by his books and those of the fruit dealers:

"Twenty-six acres apples, $600 per acre, $15,600.

"Eight acres peaches, $325 per acre, $2,600.

'Total, $18,200.

The $18,200 represents his returns after commission for selling.

John Markley, whose ranch lies eight miles southwest of Delta, on California mesa, says:

"From 65 Rome Beauty trees, fifteen years old, in 1909 I sold apples to the value of $1,306. My trees are set eighty to the acre, therefore, I had less than an acre of trees."

Delta Independent.

J. F. Jackson, of Pomona, near Grand Junction, received from twenty to thirty boxes of Mammoth Black Twig from one row in his young orchard.

T. W. Monell, of Montrose, gives a few details of record crops in that district, as follows:

Nine acres of Ben Davis and one-half acre of Jonathans, twelve years old, brought the owner $4,442. Twelve acres of Jonathan, Winesap and Grimes Golden netted the owner $6,012. These are both Montrose county crops.

M. V. Quinn, of Lincoln Park, Fremont county, sold the product of forty apple trees, of the Colorado Orange variety, for $796.

In Fremont county, in the month of October, beginning with the week of the 6th, there was from $10,000 to $15,000 coming into Canon City every day from the sale of fruit, and 15,000 people engaged in picking apples in that vicinity.

The culture of small fruits in the Northern District is carried on to a large extent, and the acreage is increasing each year in the planting of all small fruits, especially cherries. The report of Shipping Agent W. O. Fletcher, of Loveland, reads as follows: 1,470 crates of cherries were shipped, at the average

ONE HUNDRED AND TWENTY ACRE ORCHARD OF FRAZIER, HILL & FRAZIER, SPRING CREEK MESA, MONTROSE, COLORADO.

price of $2.30 per crate; 61 of gooseberries, at $2.10; 141 currants, at $2.20; 1,665 red raspberries, at $2.35; 36 black raspberries, at $2.66; 3 of blackberries, at $2.50.

A remarkable record of a small, six-acre tract for truck gardening is reported from the Grand Valley, near Grand Junction. It is owned and worked by an Italian, with eleven members in his family, and this year his net profit was $1,000.

Some doubt has been expressed regarding the use of cull apples for vinegar. It is stated by good authority that three gallons of cider can be obtained from one box of apples—that is $1.20 for the cider, or $1.20 for the cull box of apples, and the expense is not very great in the production of the cider.

From advices received from the Santa Fe Railroad, it appears that there has been sent out from Manzanola, approximately, between 600 and 700 cars of fruit. The large number of young orchards coming into bearing in this vicinity has increased the yield of the apple crop, and the use of smudge pots to protect the crops from the killing frosts in the early spring caused a record-breaker in that part of Otero county.

PRICES OF FRUIT

Were good and will average, in the various fruit-growing sections, as follows: Apples, "fancy," $1.25 to $2 per box; "choice," 35 cents to $1.25 per box. Pears, "fancy," $1.60 to $2 per crate. Cherries, $2.50 to $4 per crate. Elberta Peaches, "extra," 56 cents; "fancy," 49 cents; "choice," 34 cents per box. Plums, $1 to $1.50.

THE INTERSTATE FAIR

Held in Denver, September 3-17, 1910, was a great success. The management were fortunate in securing the services of the government expert, Hon. George B. Brackett, United States Pomologist, of Washington, D. C., and he says:

"The Interstate Fair, in its fruit exhibit, was a great success, and pleased me greatly, and I appreciate the courtesies of your State's people."

THE COLORADO STATE FAIR

Held in Pueblo, September 19-24, 1910, was well sustained, and the fruit display was a very creditable one. The officials and exhibitors were all satisfied with results. The premiums in both of the above-named fairs were paid in full, which is very gratifying to all concerned.

George Sykes, a Palisade, Colorado, man, has a set of tables which he has placed on the market which he claims is a good system for packing and sorting fruit and vegetables. He says "that there never will be a mechanical device made that will sort out the culls from the good fruit, therefore you can pack and sort by hand cheaper than you can by machinery. If you have to sort by hand to get your culls and poor fruit out, and divide the fancy

from the choice, you might just as well put your fruit where it belongs, instead of running it over a machine."

He claims "you can sort to size, to color, and get your culls out with the one handling; that the packer can pack more from his tables because they are made to accommodate all size boxes, be they either cantaloupe, peach, apple or prune crates or boxes, and that it shortens the arm movements of the packer."

These tables are made of iron except the bins, and they are made of canvas. The fruit in the bins comes in contact with nothing but canvas.

SAMPLES OF THE GREAT SURFACE CREEK PRODUCTION.

I moved on a wild forty acres northeast of Cedaredge—health poor and only a few hundred dollars. In 1902, which was my first record, I made from three-fourths of an acre of berries $272.89. I have added constantly to this, and in 1907 I had one and one-half acres of strawberries, dewberries and red and black raspberries and only half of this acreage in full bearing. I netted clear of all expenses $890.

Eleven-fortieths of an acre of red raspberries yielded $338; nine-fortieths of an acre of blackberries netted me $177.

(Signed) G. H. WEBB.

I have one-fourth acre in grapes. This crop in 1906 weighed 4,000 pounds and netted me 3 cents per pound, or $120. From 150 currant bushes I sold 30 crates and netted $60. I sold in 1906 from 70 apple trees, ten years old, 518 boxes and cleared net, deducting all labor and expenses, $1 per box. In 1908 I had ten to fifteen boxes to the tree, and a full crop of everything. Am fifteen years in Cedaredge.

(Signed) JOHN G. WETTERICH.

I came from Iowa to Cedaredge three years ago and I wish to state that I have, from one of my six-year-old orchards, sold Elberta peaches at the rate of $18 a tree. I raise five kinds of grapes, some of the bunches weighing as high as 9½ pounds and measuring 18 inches in circumference. From six acres I cut seven tons per acre of alfalfa. I have raised cabbage that weighed 18 pounds per head, and all vegetables do exceptionally fine here.

(Signed) T. W. ODEM.

(Delta Independent, December 16, 1910.)

SECOND REPORT

OF THE

State Entomologist

C. P. GILLETTE

UPON THE

Horticultural Inspection Work

For the Year 1910

SECOND REPORT

OF THE

State Entomologist

C. P. GILLETTE

Upon the Horticultural Inspection Work
for the Year 1910

The past year has been the banner one for the setting of fruit trees in Colorado. The reports from the inspectors of the twelve chief fruit growing counties of the State indicate that 1,302,698 apple trees were received and inspected, and 1,271,292 were planted.

Of pear trees 108,855 were received and 107,890 planted.

Of peach, prune, plum and apricot trees, 194,899 were received and 191,975 planted.

Of cherry trees, 302,990 were received and 302,715 planted.

By summing up we get 1,909,442 as the total number of fruit trees inspected in these counties the past year, and 1,873,870 as the total number planted. The difference, 35,572, is the number of trees that have been condemned by the inspectors for one trouble or another.

If the apple trees were set at an average of 80 and the other trees at an average of 120 to the acre, the number of acres set to fruit trees in Colorado the past spring was approximately as follows:

	Acres.
Apple	16,000
Pear	900
Peach, prune, plum and apricot	1,600
Cherry	2,500
Total	21,000

A comparison of this report with the report of last year indicates that the area planted to fruit trees has been increased about 30 per cent. in 1910 over the acreage planted in 1909. I am inclined to think, however, that there may have been more trees planted in 1909 that escaped the attention of the inspectors in some of the counties than has been the case in 1910.

The total of fruit trees condemned for all causes during the past year has been 35,572, or 1.9 per cent. of the total numbe inspected. In 1909 there were 38,919 trees, or 4 per cent.

of the total trees shipped, that were condemned. So that while the shipments were increased nearly 30 per cent. during 1910, the per cent. of nursery stock condemned has fallen off about 50 per cent. The largest saving has been in the great reduction in the number of the crown gall trees that have been received. The reason for this marked reduction is undoubtedly found in the fact that crown gall trees were rigidly culled out and destroyed in 1909.

IMPORTANCE OF THE WORK.

The splendid success that Colorado has met in the growing of orchard fruits has been due quite largely to the fact that we do not have to contend with some of the worst insect pests and plant diseases that occur in other portions of the country. It is evident to my mind that the future success of our orchardists will depend quite largely upon our ability to keep free from these pests and diseases, and it is to that end that the nursery and orchard inspection work is being carried on.

Some of the counties are supporting the work strongly, and here we should mention especially the counties of Mesa and Delta, but there are many others that still restrict the work unduly by appropriating small sums for its support. In fact, all counties in the State could quite largely increase their support of the work of their county inspectors with great profit to their fruit growing interests.

During the biennium just closing the State Entomologist has been allowed to use but a small portion of the total appropriation made for the work. It is strongly hoped that the entire amount of $8,000.00 may be available for the work during the years 1911 and 1912.

COUNTIES SUPPORTING THE WORK.

The counties that have supported the inspection work to a greater or less extent during the past year, with the names of their inspectors, are as follows:

Boulder county, T. B. Holman.
Delta county, H. A. Richardson.
Denver county, F. L. Rounsevell.
Fremont county, A. S. Taylor.
Garfield county, J. F. Myser.
La Plata county, P. S. Taylor.
Larimer county, F. Y. Moseley and L. F. Paull.
Mesa county, E. P. Taylor.
Montezuma county, C. H. Taylor.
Montrose county, Arthur A. Moore.
Otero county, C. S. Lane.
Pueblo county, J. N. Bartels.

SPRAYING IN NORTHERN SPY FIFTEEN-YEAR-OLD ORCHARD OF GEORGE D. BEGOLE, WESTMINSTER, ADAMS COUNTY.
These apples took first prize at Interstate Fair and Exposition and State Fair, 1910.

DEPUTIES.

Most of the nursery inspection work during the past year has been done by deputies from the State Entomologist's office. Those who have served in this capacity are Mr. E. P. Taylor, Mr. George P. Weldon, Mr. L. F. Paull and Mr. O. G. Babcock.

COLORADO NURSERIES.

The nurseries inspected and given certificates the past year are thirty-one in number. Their names and addresses are as follows:

Bardell, J. T., Larkspur.
Boulder County Nurseries, Boulder.
Braun, Geo. J., Denver.
Brim, Ed., Loveland.
Chase & Carr Nursery Company, Delta.
Coffman, C. W., Loveland.
Colorado Nature Nursery, Boulder.
Colorado Nursery Company, Loveland.
Denver Park Nurseries, Denver.
Dillon, J. W., Greeley.
Dillon, A. W., Lebanon.
Donnell, A. L., Rifle.
Downer Bros. (Fruita Nurseries), Fruita.
Espelin & Warren, Fort Collins.
Gutheil Park Nurseries, Gutheil Park, Adams county.
Hall, Jasper D., Dolores.
Hunt, F. H. (Broadview Fruit Farm), Denver.
International Nursery Company, Denver.
Kenley, William, Canon City.
Mathews, E. J., Paonia.
Milton, W. E., Durango.
Northern Colorado Nursery Company, Loveland.
Northern Nursery Company, Denver.
Park Floral Company, Denver.
Redding, L. J., Flagler.
Rockmont Nursery, Boulder.
Russell Bros., Palisade.
Tichenor, Dr. W. W., Rifle.
Turney, A. N., Loveland.
Vanderbeck, J. C., Paonia.
Wallace Creek Nurseries, DeBeque.

Some of these are dealers only, and many others grow but very little stock within the State.

The following table, extending over several pages, gives important information as to the amount of nursery stock of different kinds that was shipped into the different counties of the State the past year, together with the nurseries from which the stock was received. The table also gives the number of fruit trees condemned from each of these nurseries, and by each county inspector:

NURSERY STOCK RECEIVED AND TREES CONDEMNED IN THE VARIOUS COUNTIES OF COLORADO DURING 1910.

BOULDER COUNTY.

NURSERIES	Apple	Pear	Peach	Plum, Apricot and Prune	Cherry	Shade and Miscellaneous	Grape	Currant and Gooseberry	Raspberry, Blackberry and Dewberry	Ornamental Shrubs	Total Fruit Trees	Fruit Trees Condemned
Billman Nursery Co	....	....	....	....	....	400	....	....	....	100	....	....
Boulder County Nursery	18	....	....	11	8	10	13	13	....	20	37	....
Colorado Nature Nursery	....	....	....	....	....	45	....	....	....	100	....	....
Colorado Nursery	2,629	....	108	428	1,006	307	281	168	1,500	63	4,171	119
Ellwanger & Barry	15	....	....	15	10	100	15	....	....	260	40	....
Fairbury Nursery Co	30	....	....	4	10	....	....	....	....	....	44	1
Galbraith Nursery	200	....	....	....	30	....	....	52	....	12	230	42
Gardner Nursery Co	35	....	25	25	25	....	....	32	....	10	110	5
German Nursery	143	....	6	16	78	4	200	225	....	32	243	32
Green's Nursery	3	....	3	....	13	7	....	45	....	....	19	....
Hobbs, C. M.	40	....	....	110	100	50	255	....	....	....	250	15
Hubbard, F. S.	....	....	....	....	....	....	2,000	....	....	....	....	....
International Nursery Co	77	....	....	85	105	50	12	....	....	140	267	1
Maywood Nursery Co	....	....	6	....	....	....	50	....	....	100	6	2
Meehan, Thos.	....	....	....	....	....	10	....	36	....	385	....	....
Meneray Nursery Co	89	....	....	1	32	....	....	....	....	1,022	122	81
Milton Nursery Co	539	....	268	69	46	....	68	239	....	8	922	91
Northern Nursery Co	174	1	3	61	112	63	5	56	....	109	351	28
Ohio Nursery	....	....	....	....	150	300	....	....	....	650	150	....
Perry Nursery Co	38	....	9	20	65	57	....	45	....	141	132	12
Reed, W. C.	90	....	25	....	650	20	....	....	....	....	765	17
Rochester Nursery Co	22,000	....	....	....	....	....	....	....	....	....	22,000	280
Rockmont Nursery	....	....	....	....	....	732	....	....	....	100	....	....
Schroeder-Sons	35	....	....	10	24	....	....	....	....	200	69	2
Shenandoah Nursery	1,460	160	275	200	580	262	160	600	....	1,675	2,675	142
Skinner, J. H.	....	....	....	....	....	95	....	....	....	305	....	5
Stannard, F. H.	....	....	....	....	....	500	....	....	....	200	....	....
Stark Bros.	8,651	16	63	110	1,419	61	14	177	12	87	10,259	245
Storrs-Harrison	45	150	....	610	50	252	600	200	3,100	750	855	22
Taylor, L. R.	70	....	....	....	10	....	....	....	....	....	80	....
Watrous Nursery Co	100	12	....	30	200	500	....	....	100	....	342	30
Welch, E. S.	....	....	....	....	....	68	....	....	....	1,015	....	....
Winfield Nursery Co	2,575	....	....	....	....	10	....	....	....	....	2,575	....
Foreign shipments	....	....	....	....	....	175	....	....	....	7,000	....	....
Other nurseries (14)	25	....	....	....	....	....	....	12	500	659	25	....
Totals	39,081	339	791	1,805	4,723	4,448	3,703	1,899	5,212	15,143	46,739	1,172

NURSERY STOCK RECEIVED AND TREES CONDEMNED IN THE VARIOUS COUNTIES OF COLORADO DURING 1910.—Continued.

DELTA COUNTY.

NURSERIES	Apple	Pear	Peach	Plum, Apricot and Prune	Cherry	Shade and Miscellaneous	Grape	Currant and Gooseberry	Raspberry, Blackberry and Dewberry	Ornamental Shrubs	Total Fruit Trees	Fruit Trees Condemned
Alabama Nursery Co	159,272	10,395	31,467	1,903	5,494	4,020	9,700	1,600	9,268	450	208,531	3,745
Bertram, B.	3,466	....	....	....	....	....	....	....	....	....	3,466	142
Bloomington Nursery	250	....	250	....	....	....	....	....	....	....	500	7
Brown Bros.	100	....	....	....	....	....	....	....	....	....	100	9
Cedarhill Nursery	2,000	....	....	....	....	....	....	....	....	....	2,000	29
Colorado Nursery Co	21,569	1,695	2,354	172	673	1,290	1,249	328	6,130	21	26,463	240
Davis County Nursery	61,673	439	4,248	1,070	4,004	28	1,667	49	1,200	37	71,434	1,090
Fairbury Nursery	200	....	200	....	....	....	....	....	....	....	400	9
Fruita Nursery	250	....	....	....	....	....	....	....	....	....	250	2
Galbraith Nursery	3,550	....	1,007	9	540	....	....	....	20	....	5,106	737
Gardner Nursery	602	47	4	15	2	16	10	30	360	....	670	135
German Nursery	4,450	235	531	272	123	9	110	220	520	26	5,611	1,154
Gutheil Park Nursery	5	....	60	....	2	....	....	....	....	....	67	1
Halsinger	....	....	....	....	....	....	....	....	1,500	....	....	....
Hill, D.	....	....	....	....	....	....	....	....	....	....	....	....
Hubbard, T. S. & Co	....	....	....	....	....	....	500	....	....	....	....	....
Huntsville Wholesale Nursery	....	500	....	....	....	....	....	....	....	....	500	14
Illinois Nursery	....	....	....	....	....	....	....	....	....	....	....	....
International Nursery, Denver	770	10	850	10	10	....	....	....	....	....	1,650	72
International Nursery, Utah	1,000	....	....	....	....	....	....	....	....	....	1,000	20
Mt. Arbor Nursery	200	....	....	....	....	1,000	....	....	....	....	200	14
National Nursery, Lawrence, Kan.	1,000	....	....	....	....	....	....	....	....	....	6,000	....
National Nursery, Ottawa, Kan.	6,000	....	....	....	....	....	....	....	....	....	1,000	112
New Haven Nursery	100	....	300	....	....	....	....	....	....	....	400	14
Oregon Nursery	955	225	....	....	50	....	....	....	....	....	1,230	33
Richland Nursery	670	2	10	....	20	....	....	....	....	....	702	17
Shenandoah Nursery	....	....	....	....	....	....	....	....	....	....	....	....
Sherman Nursery Co	450	25	125	....	....	....	....	....	....	....	600	3
Stark Bros.	28,701	600	2,840	644	859	50	470	264	430	128	33,644	1,242
Utah Nursery	22,539	63	3,930	102	527	10	992	62	1,300	27	27,161	133
Washington Nursery	2,916	....	....	....	....	....	....	....	....	....	2,916	81
Winfield Nursery	7,268	100	3,405	22	50	....	....	....	....	....	10,845	606
Miscellaneous nurseries	74,804	80	....	....	....	440	800	50	1,400	500	4,884	46
Totals	404,760	17,416	51,581	4,219	12,354	6,863	15,498	2,603	22,128	1,189	490,330	9,707

NURSERY STOCK RECEIVED AND TREES CONDEMNED IN THE VARIOUS COUNTIES OF COLORADO DURING 1910.—Continued.

*DENVER COUNTY.

NURSERIES	Apple	Pear	Peach	Plum, Apricot and Prune	Cherry	Shade and Miscellaneous	Grape	Currant and Gooseberry	Raspberry, Blackberry and Dewberry	Ornamental Shrubs	Total Fruit Trees	Fruit Trees Condemned
Bent, J. A.	....	....	....	....	75	....	....	....	....	....	75	....
Butterfield, J. C.	....	....	....	....	....	903	....	....	....	....	....	3
Conard & Jones	....	....	....	....	....	....	....	....	....	36	....	....
Dinge & Conrad	....	...	....	....	....	....	....	....	....	18	....	....
German Nursery	....	....	....	....	....	2	. ..	....	....	25	....	....
Jackson & Perkins	....	....	....	....	....	....	....	....	....	1,031	....	10
Kelsey Nurseries	2,480	290	1,100	2,170	4,955	830	....	....	2,000	505	10,995	280
Parsoner, C. J.	....	....	....	....	....	....	....	....	....	25	....	....
Knox Nurseries	....	....	....	....	75	....	....	....	....	....	75	....
McHutchinson	....	....	....	....	....	....	....	....	....	1 carload	....	....
Mt. Arbor Nursery	25	....	....	....	....	200	....	....	....	....	25	....
Northern Colorado Nursery	54	1	....	272	62	146	54	28	18	310	389	....
Reed, W. C.	....	....	....	....	6,500	....	....	....	....	....	6,500	....
Stark Bros.	7	....	....	....	1,900	....	.. .	....	....	....	1,907	1
Storrs & Harrison	....	....	....	....	....	....	.. .	....	....	....	....	....
Tennessee Wholesale Nursery	....	....	....	....	18	....	.. .	....	....	....	18	....
Welsh, E. S.	1,460	....	100	560	....	2,865	....	....	3,000	5,670	2,120	5
Younger & Co.	3,610	280	....	3,610	....	2,100	3,100	11,200	....	....	7,500	10
Miscellaneous	200,000	100	300	22,000	196,500	$5,000	....	....	....	5,000	425,400	....
Totals	204,636	671	1,500	28,612	210,085	42,046	3 54	11,228	5,018	12,620	445,504	309

*Includes much stock received in Denver to be planted in Jefferson, Adams and Arapahoe counties.

FREMONT COUNTY.

Allen Wood Nursery	....	....	....	....	20	....	25	....	75	....	20	....
Berrydale Garden	....	....	....	....	....	....	....	100	1,000	....	....	....
Colorado Nursery Co.	2,585	25	25	20	450	200	300	100	....	....	3,105	35
Cumberland Nursery	75	....	25	....	100	....	....	....	....	....	200	8
Fairbury Nursery	443	....	....	....	153	....	50	25	....	....	596	107
Foster & Griffith	....	....	....	....	170	....	2,500	....	....	....	170	....
Galbraith Nursery Co.	582	....	....	40	90	....	235	....	....	12	712	19
German Nursery	1,644	2	14	5	298	....	165	650	885	25	1,963	224
Griesa Nurseries	570	....	....	....	....	....	....	....	....	....	570	27
T. S. Hubbard	....	....	....	....	....	....	1,100	....	....	....	....	....
Knox Nursery	480	....	....	....	....	....	....	....	....	....	480	4
La France Fruit and Poultry Farm	....	....	....	....	....	....	....	....	150	....	....	....
Lee's Summit Star Nursery	630	5	21	10	120	....	500	200	2,500	....	786	23
Northern Nursery Co.	50	....	....	....	5	5	....	....	....	20	55	1
New Haven Nursery	200	....	....	....	....	....	....	....	....	....	200	15
Perry Nursery Co.	215	70	75	1	98	....	125	....	....	37	459	20
Plumfield Nursery	9,915	....	....	60	2,704	....	1,350	4,500	6,250	....	12,679	242

NURSERY STOCK RECEIVED AND TREES CONDEMNED IN THE VARIOUS COUNTIES OF COLORADO DURING 1910.—Continued.

FREMONT COUNTY—Concluded.

NURSERIES	Apple	Pear	Peach	Plum, Apricot and Prune	Cherry	Shade and Miscellaneous	Grape	Currant and Gooseberry	Raspberry, Blackberry and Dewberry	Ornamental Shrubs	Total Fruit Trees	Fruit Trees Condemned
Schroeder-Son Nursery	112	....	....	....	20	....	....	....	200	....	132	3
Sherwin's Nursery	503	6	6	....	617	....	210	....	175	....	1,132	34
Shenandoah Nursery	13,000	600	500	1,980	5,505	1,150	29,200	9,300	15,000	....	21,585	202
Stark Bros.	21,522	103	193	185	4,918	790	4,750	1,685	1,510	585	26,921	363
Topeka Nursery	550	....	....	....	90	....	....	....	....	....	640	....
Wallace Creek Nursery	5	5	5	....	2	....	....	....	....	....	17	1
Weston, A. K.	....	....	....	....	....	....	3,000	....	4,000	....	....	....
Willis Nursery Co.	1,715	101	106	130	2,605	242	2,300	....	....	6	4,657	53
York Nursery	....	....	....	20	120	....	300	100	....	....	140	....
Other nurseries (13)	7,765	301	125	56	60	55	....	....	....	....	1,007	117
Totals	62,561	1,218	1,095	2,507	18,154	2,542	46,110	16,660	31,745	893	85,526	1,498

GARFIELD COUNTY.

Cedarhill Nursery and Orchard Co.	49,610	668	5,227	377	2,378	46	1,116	12	1,180	....	58,260	312
Chase Nursery	5	....	....	....	20	....	....	....	1,010	....	25	....
Colorado Nursery Co.	....	....	....	....	250	....	....	....	....	....	250	....
Crescent Nursery Co.	....	....	....	....	100	....	....	....	....	....	100	....
Davis County Nursery	37,097	546	6,387	786	2,088	459	2,610	212	2,496	....	46,904	216
Fairbury Nursery	100	....	10	....	....	....	25	5	....	....	110	2
Galbraith Nursery	241	10	40	10	10	....	....	....	....	....	311	34
Gardner Nursery Co.	20	....	6	15	18	....	10	....	....	....	59	3
German Nursery	1,181	14	16	....	10	....	12	....	....	....	1,221	60
Grand Junction F. Growers' Ass'n.	228	....	....	....	....	....	....	....	....	....	228	10
Mt. Arbor Nursery	150	100	50	....	....	....	....	....	....	....	300	2
Northern Nursery Co.	200	....	....	....	....	....	....	....	....	....	200	12
Sedgwick Nursery	30	15	....	13	46	7	79	....	50	....	104	1
Stark Bros.	11,855	117	1,504	176	1,108	39	966	....	....	....	14,760	70
Winfield Nursery	700	....	....	....	....	....	....	....	....	....	700	400
Other nurseries (1)	25	....	....	....	....	....	....	....	....	....	25	....
Totals	101,442	1,470	13,240	1,377	6,028	550	4,818	229	4,737	....	123,557	1,122

NURSERY STOCK RECEIVED AND TREES CONDEMNED IN THE VARIOUS COUNTIES OF COLORADO DURING 1910.—Continued.

LA PLATA COUNTY.

NURSERIES	Apple	Pear	Peach	Plum, Apricot and Prune	Cherry	Shade and Miscellaneous	Grape	Currant and Gooseberry	Raspberry, Blackberry and Dewberry	Ornamental Shrubs	Total Fruit Trees	Fruit Trees Condemned
Alabama Nursery Co	50	....	....	....	....	....	....	....	....	....	50	....
Barry Company Nursery	2,450	....	....	....	....	....	....	....	....	....	2,450	248
Davis Company Nursery	26,477	2,499	461	975	2,209	274	336	275	13,265	151	32,621	898
Fairbury Nursery	200	25	....	....	....	....	....	....	....	....	225	26
Galbraith Nursery	100	10	....	....	2	....	10	....	....	....	112	5
German Nursery	75	25	....	....	....	....	....	....	....	....	100	7
Green's Nursery	1,000	50	10	50	50	5	....	....	....	....	1,160	20
Griesa Nurseries	450	20	....	15	25	....	....	25	200	....	510	25
Henderson, Peter	....	....	....	....	....	....	....	....	....	25	....	....
Knight, I. & Son	....	....	....	....	....	....	....	....	600	....	....	....
May & Newnap	200	25	....	....	25	....	....	....	....	25	250	10
New Haven Nursery	250	100	100	....	100	....	....	....	....	....	550	26
Salzer	....	20	....	20	....	5	....	....	....	37	40	....
Skinner, J. H.	250	50	....	....	....	1,160	200	100	....	80	300	19
Stark Bros.	5,485	152	30	60	4,380	52	120	....	100	155	10,107	110
Wild Bros.	900	35	75	....	....	....	....	....	....	....	1,010	78
Younger Bros.	250	50	....	30	....	500	....	70	200	100	330	11
Other nurseries (9)	3	....	....	....	3	55	2	25	250	97	6	3
Totals	38,140	3,061	676	1,150	6,794	2,051	668	495	14,715	670	49,821	1,486

LARIMER COUNTY.

Boulder County Nursery Co	60	....	....	36	250	110	50	150	....	20	346	4
Brown Bros.' Co	147	....	12	6	6	....	50	150	....	100	171	25
Colorado Nature Nursery	2	....	....	2	11	66	....	....	....	962	15	....
Crete Nurseries	12	....	....	12	12	....	....	....	....	100	36	1
Fairbury Nursery	75	....	....	....	100	25	12	24	....	....	175	4
German Nursery	280	16	92	26	81	16	12	224	....	25	495	46
Green's Nursery Company	12	....	6	40	15	12	....	....	....	....	73	....
Griesa Nurseries	1,398	....	138	248	990	....	50	700	....	....	2,774	19
Hubbard, T. S. & Co	....	....	....	....	....	....	1,000	10,000	....	....	....	....
Maloney Bros. & Wells	120	....	....	20	1,000	....	....	....	....	....	1,140	21
Mt. Arbor Nursery	165	20	....	....	210	....	....	250	100	....	395	4
Northern Nursery Co	60	....	10	25	100	30	....	200	125	100	195	1
Ottawa Star Nursery	600	50	71	100	507	3	....	25	....	3	1,328	69
Perry Nursery	3	....	....	....	3	10	....	....	....	100	6	....
Shenandoah Nursery	4,418	200	250	1,100	9,070	10,000	6,000	16,400	....	2,500	15,038	820
Sherwin's Nursery	1,860	....	....	240	1,875	....	....	....	3,000	....	3,975	154
Stark Bros.	1,228	47	9	181	708	125	....	212	....	150	2,173	169
Storrs-Harrison	75	....	....	50	200	....	....	150	....	50	325	....
Willis Nursery	6	....	....	30	50	200	....	100	....	....	86	....
Other nurseries (5)	114	....	6	50	27	....	6	....	30	....	197	10
Totals	6,695	133	394	1,166	9,165	607	180	2,585	3,255	1,610	14,853	1,347

NURSERY STOCK RECEIVED AND TREES CONDEMNED IN THE VARIOUS COUNTIES OF COLORADO DURING 1910.—Continued.

MESA COUNTY.

NURSERIES	Apple	Pear	Peach	Plum, Apricot and Prune	Cherry	Shade and Miscellaneous	Grape	Currant and Gooseberry	Raspberry, Blackberry and Dewberry	Ornamental Shrubs	Total Fruit Trees	Fruit Trees Condemned
Alabama Nursery	29,033	9,260	10,500	600	800	....	500	....	....	....	50,193	1,283
Cedarhill Nursery	36,142	5,696	6,119	493	873	50	824	10	6,535	260	49,323	575
Chase Bros., Rochester	168	35	10	41	79	5	30	51	75	....	333	3
Colorado Nursery Co	2,063	715	90	14	15	177	69	....	550	100	2,897	17
Crete Nurseries	12	....	....	....	100	....	....	....	50	87	112	2
Davis Company Nurseries	116,576	8,064	10,897	1,760	3,856	826	3,069	737	5,266	1,544	141,153	1,924
Ellwanger & Barry	....	....	....	....	....	....	....	....	....	1,615	....	....
Fairbury Nursery	99	....	360	15	29	4	8	....	5	....	503	21
Fancher Creek Nursery	....	....	....	....	....	....	1,000	....	....	....	....	....
Farmers' Nursery Co	....	....	....	....	....	....	....	1,250	150	5,200	....	....
Fremont Nursery, The	125	112	40	....	....	....	....	....	....	....	277	....
Galbraith Nursery	500	....	....	....	....	....	25	....	....	....	500	14
Gardner Nursery	30	12	3	15	....	66	10	14	10	23	60	17
German Nursery	1,830	350	472	179	63	1	281	89	266	10	2,894	220
Huntsville Wholesale Nursery	....	4,686	200	40	20	18	....	....	....	57	4,946	101
International Nursery Company	2,101	200	185	....	....	....	....	....	....	....	2,486	3
Meneray, F. W.	430	663	....	....	3	....	....	20	....	500	1,096	12
Mt. Arbor Nursery	1,444	740	125	109	250	....	279	....	1,000	....	2,668	37
Russell Bros.	....	2,500	11,000	....	....	....	....	....	....	....	13,500	....
Shenandoah Nursery	1,385	20	120	....	....	....	....	....	....	....	1,525	19
Stark Bros.	12,340	1,462	1,038	298	522	499	739	200	646	499	15,660	297
Storrs-Harrison	2	....	....	....	....	....	....	50	85	100	2	....
Utah Nursery Co	11,868	5,405	6,889	143	678	167	943	509	628	40	24,983	89
Wallace Creek	127	12	56	....	112	....	....	....	....	....	307	....
Wild Bros.	526	....	....	....	4	....	....	....	....	....	530	19
Willis Nursery	1,950	1,265	50	174	300	100	509	....	....	....	3,739	20
Winfield Nursery	39,655	8,121	18,909	1,155	2,419	240	1,892	143	3,325	18	70,259	2,251
Wragg Nursery Co	20	6	2	....	15	....	10	....	....	....	43	4
Younger & Co	135	50	25	12	....	....	....	....	. ..	....	222	....
Other nurseries	1,439	2,052	790	....	1	270	1,000	3	33	265	4,282	41
Totals	271,314	53,246	67,880	5,948	10,139	2,423	11,170	3,067	18,624	10,318	394,493	6,969

NURSERY STOCK RECEIVED AND TREES CONDEMNED IN THE VARIOUS COUNTIES OF COLORADO DURING 1910.—Continued.

MONTEZUMA COUNTY.

NURSERIES	Apple	Pear	Peach	Plum, Apricot and Prune	Cherry	Shade and Miscellaneous	Grape	Currant and Gooseberry	Raspberry, Blackberry and Dewberry	Ornamental Shrubs	Total Fruit Trees	Fruit Trees Condemned
Alabama Nursery Co	2,234	142	60	124	172	100	300	300	300	25	2,732	335
Benton County Nurseries	1,120	....	....	....	150	....	....	....	....	....	1,270	65
Chase Bros.	2,234	142	60	124	172	100	300	300	300	25	2,732	335
Davis County Nurseries	22,907	1,608	2,200	755	1,470	207	1,800	650	100	600	28,940	265
Fairbury Nursery	110	2	....	....	4	....	10	....	....	....	116	44
Galbraith Nursery Co	2,011	50	200	25	50	....	300	50	....	....	2,336	1,898
Gardner Nursery Co	1,450	110	8	20	114	16	....	....	....	25	1,702	360
German Nursery	1,889	334	665	20	105	59	150	50	....	135	3,013	830
Griesa Nurseries	1,280	50	120	....	260	....	....	....	....	....	1,710	344
J. D. Hall	7,529	159	....	....	8	....	....	....	....	....	7,696	140
Harrison Nursery Co	650	....	....	....	4	....	25	....	....	....	654	160
Mt. Arbor Nursery	300	10	10	15	5	....	....	....	....	75	340	58
New Haven Nursery	1,100	30	2,020	....	80	....	20	....	....	....	3,230	151
Stannard, F. H.	....	20	....	100	....	....	....	....	....	....	120	12
Stark Bros.	8,345	463	1,000	101	880	48	242	186	245	277	10,789	390
Taylor, F., Nursery	553	....	....	....	....	....	....	....	....	....	553	35
Winfield Nursery	1,000	2	4	2	....	....	....	....	....	....	1,008	231
Other nurseries (3)	....	....	....	....	....	....	....	....	500	25	....	....
	54,712	3,122	6,347	1,286	3,474	530	3,147	1,536	1,445	1,187	68,941	5,653

MONTROSE COUNTY.

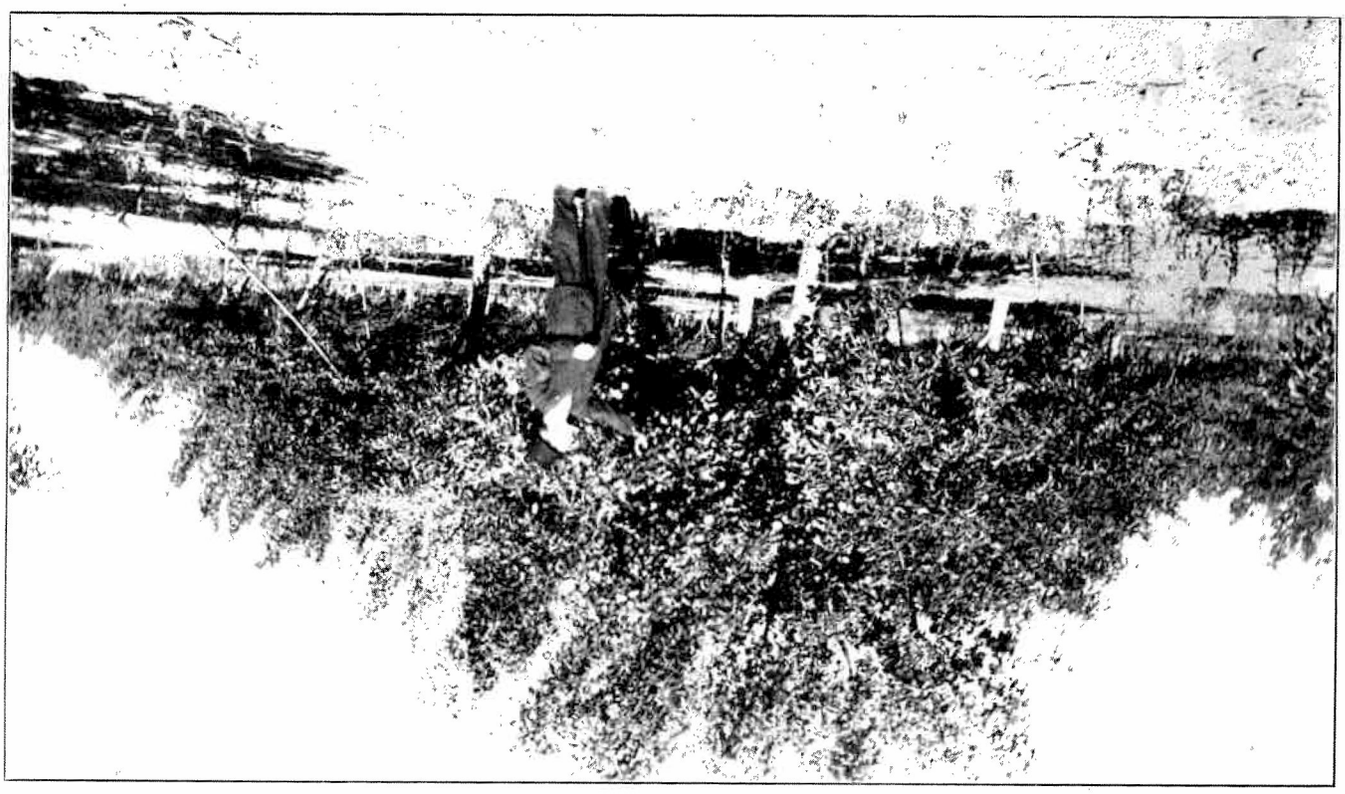
Carter, H. C.	200	....	....	....	....	....	....	....	....	....	200	....
Chase Bros.	33,500	350	2,000	....	586	....	....	....	....	....	36,436	....
Chase Bros.' Company	1,400	54	1,995	....	109	....	....	....	....	....	3,558	....
Colorado Nursery	1,367	33	638	....	20	....	....	....	....	....	2,058	....
Davis Company Nursery	1,229	....	19	....	16	....	....	....	....	....	1,264	....
Fairbury Nursery	125	....	380	....	20	....	....	....	....	....	525	....
Galbraith Nursery Company	1,745	10	10	....	7	....	....	....	....	....	1,772	....
German Nursery	2,161	....	636	....	24	....	....	....	....	....	2,821	....
Meldrum, Jas. M.	510	....	....	....	....	....	....	....	....	....	510	....
New Haven Nursery	1,251	25	200	....	20	....	....	....	....	....	1,496	....
Stark Bros.	670	19	333	....	27	....	....	....	....	....	1,049	....
Utah Nursery	60,667	7,630	9,160	....	3,048	....	....	....	....	....	80,505	....
Winfield Nursery Company	6,585	8	9	....	12	....	....	....	....	....	6,614	....
Totals	111,410	8,129	15,380	....	3,889	....	....	....	....	....	138,808	3,763

NURSERY STOCK RECEIVED AND TREES CONDEMNED IN THE VARIOUS COUNTIES OF COLORADO DURING 1910.—Concluded.

OTERO COUNTY.

NURSERIES	Apple	Pear	Peach	Plum, Apricot and Prune	Cherry	Shade and Miscellaneous	Grape	Currant and Gooseberry	Raspberry, Blackberry and Dewberry	Ornamental Shrubs	Total Fruit Trees	Fruit Trees Condemned
Beatrice Nursery	20	....	2	22	342	1,106	....	....	....	....	386	....
Colorado Nursery Company	110	....	....	....	5	20	....	....	....	....	115	....
Dansville Nursery	....	....	....	....	1,200	....	....	....	....	....	1,200	....
Fairbury Nursery	37	....	5	4	105	35	25	30	....	....	151	....
Gardner Nursery	26	7	4	10	14	....	10	20	100	....	61	....
Hall, E. G.	250	....	50	250	1,000	....	....	....	....	....	1,550	....
Harrison, J. H., & Son	....	....	....	....	3,000	....	....	....	....	....	3,000	....
Mt. Arbor Nursery	150	....	100	110	706	1,000	....	....	....	....	1,066	8
Ottawa Star Nursery	180	20	39	167	1,356	2,267	1,398	378	50	....	1,762	2
Sedgwick Nursery	59	....	45	86	66	7	79	....	....	5	256	2
Stark Bros.	401	....	15	33	5,606	137	466	165	....	10	6,055	....
Watrous, E. L.	1,212	....	30	....	26	6	....	....	....	100	1,268	43
Willis Nursery	175	3	19	4	257	16	861	....	....	50	458	....
Wragg, W. J.	60	....	....	....	3,605	....	80	49	25	....	3,665	....
Other Nurseries (14)	117	....	5	11	410	671	90	10,000	....	31	543	....
Totals	2,797	30	314	697	17,698	5,265	3,009	10,642	175	196	21,536	55

SHOWING FIFTEEN-YEAR-OLD GANO TREES IN WESTMINSTER ORCHARD. GEORGE D. BEGOLE, OWNER.
Three miles north of Denver, in Adams County. One mile of props used to support trees in 1910.



PUEBLO COUNTY.

Fairbury Nursery	150	....	....	....	....	....	....	....	....	....	150	....
Gardner Nursery	100	....	....	....	....	....	....	....	....	....	100	....
German Nursery	150	10	....	....	150	1,000	....	....	....	100	310	....
Moulten, Geo	100	....	....	....	....	....	....	....	....	....	100	....
Mt. Arbor Nursery	800	....	....	100	1,200	2,350	1,550	200	500	100	2,100	2
Northern Nursery Company	....	....	....	....	....	1,500	....	....	....	....	....	....
Schroeder Sons	500	....	....	....	....	....	....	....	....	....	500	10
Shenandoah Nursery	....	....	....	....	....	....	....	....	....	2,000	....	....
Stark Bros.	2,525	....	235	35	300	1,800	3,050	200	1,275	200	3,095	8
Stannard, F. H., & Co	100	....	....	400	100	....	....	....	....	....	600	34
Storrs-Harrison	....	....	....	....	....	100	....	....	....	1,000	...	....
Willis Nursery	200	....	....	....	....	....	....	....	....	....	200	12
Other Nurseries (8)	525	10	50	....	150	....	400	....	. ..	....	735	4
Totals	5,150	20	285	535	1,900	5,750	5,000	400	1,775	3,400	7,890	70

TREES RECEIVED AND CONDEMNED FOR DIFFERENT MALADIES.

APPLE.

Counties.	Inspected.	Condemned for Crown Gall.	Aphis.	Blight.	Borers.	Miscellaneous	Totals Condemned
Boulder	39,081	1,031	0	14	0	14	1,059
Denver	204,636	280	15	0	3	10	308
Delta	404,760	8,223	232	811	17	0	9,283
Fremont	62,561	1,285	46	0	0	0	1,631
Garfield	101,442	1,026	50	0	0	0	1,076
La Plata	38,140	915	326	47	0	0	1,288
Larimer	6,695	1,277	19	0	0	0	1,296
Mesa	271,314	4,426	257	18	1	1,510	6,212
Montezuma	54,712	5,051	506	69	0	0	5,626
Montrose	111,410	0	0	0	0	*3,520	3,520
Otero	2,797	55	0	0	0	0	55
Pueblo	515	52	0	0	0	0	52
Totals	1,302,698	23,621	1,451	959	21	5,054	31,406

*Not classified in inspector's report.

PEAR.

Counties.	Inspected.	Condemned for Crown Gall.	Others.	Scale.	Blight.	Borers.	Total Condemn'd.
Boulder	339	1	..	..	...	4	5
Delta	17,416	27	..	..	202	..	229
Denver	671	...	..	..	...	..	...
Fremont	1,218	9	..	..	...	3	36
Garfield	1,470	5	..	..	...	..	5
La Plata	3,061	31	14	..	16	..	61
Larimer	133	...	..	..	...	..	...
Mesa	53,246	279	20	18	217	2	536
Montezuma	3,122	51	..	..	9	..	60
Montrose	8,129	...	27	..	...	..	27
Otero	30	...	..	..	...	..	...
Pueblo	20	...	..	..	...	6	6
Totals	108,855	403	61	18	471	15	965

TREES RECEIVED AND CONDEMNED FOR DIFFERENT MALADIES—Concluded.

PEACH, PLUM AND APRICOT.

Counties.	Inspected.	Condemned for					Total Condemn'd.
		Crown Gall.	Borer.	Black Knot.	Others.	Aphis.	
Boulder	2,596	14	33	2	...	..	49
Delta	52,812	331	775	..	...	..	1,106
Denver	33,112	...	...	..	...	..	.....
Fremont	3,546	13	58	..	...	..	189
Garfield	14,617	28	10	..	...	..	38
La Plata	1,826	14	64	..	...	7	85
Larimer	1,560	1	50	..	...	..	51
Mesa	73,828	133	787	..	200	38	1,158
Montezuma	7,633	19	...	3	...	..	22
Montrose	2,235	...	...	..	211	..	211
Otero	849	...	...	..	..	..	...
Pueblo	285	9	6	..	...	..	15
Totals	194,899	562	1,783	5	411	45	2,924

CHERRY.

Counties	Inspected.	Condemned for					Total Condemn'd.
		Borers.	Scale.	Black Knot.	Crown Gall.	Others.	
Boulder	4,723	10	..	28	1	..	39
Delta	12,354	1	..	..	33	..	34
Denver	210,085	..	..	..	...	..	...
Fremont	18,145	64	..	..	18	..	128
Garfield	6,028	..	..	..	2	..	2
La Plata	6,794	..	..	..	11	1	12
Larimer	9,163	..	..	..	..	..	..
Mesa	8,737	5	..	..	44	..	49
Montezuma	3,474	..	..	3	...	3	6
Montrose	3,889	..	..	..	5	..	5
Otero	17,698	..	..	..	...	..	...
Pueblo	1,900	2	..	..	...	..	2
Totals	302,990	82	..	31	114	4	277

The following points of interest are extracted from the four preceding tables:

Delta County has led strongly in the planting of apple trees, and Mesa County in the planting of the pit fruits—peach, prune, plum and apricot. Mesa is the only county planting

largely of pears, setting about as many trees the past year as all the other counties together. Cherries are planted mostly on the eastern side of the mountains. The large number of trees given for Denver County includes many trees shipped to Denver, but distributed to the counties of Arapahoe, Adams and Jefferson.

NURSERY INSPECTION.

During last fall Prof. E. P. Taylor and Prof. L. F. Paull, acting as deputies, inspected the nurseries of the State, so far as they could locate them, and from the data gathered in this work I am able to give the following information in regard to the nursery stock being grown in the State. All stock, buds or grafts, one year old or more, are classed as nursery stock in the fable, and new buds and seedlings are classed separately.

TOTAL FRUIT TREE NURSERY STOCK FOUND GROWING IN THE NURSERIES OF THE STATE IN THE FALL OF 1910.

	Apple	Pear	Peach	Plum	Apricot	Cherry	Totals
Nursery stock	378,922	9,065	14,971	28,570	2,064	42,812	476,404
Seedlings	636,300	.....	2,000	.....	.....	800	639,100
Buds	324,600	50,000	146,600	21,950	10,000	54,800	607,950

It will be seen from this table that the total trees that could possibly be sold from these nurseries for planting in the spring of 1911 would hardly be more than one-fifth of the trees sold for planting in the State in 1910.

SOME IMPORTANT PESTS AND DISEASES THAT WE DO NOT WELCOME.

We object to receiving trees infested with almost any serious insect pest or disease, but there are a few that we specially desire to exclude.

Scale Insects—All trees infested with scale insects of any kind are condemned. To the present time we have been fortunate in receiving but very few trees infected with San Jose scale. All trees that are found infested with scale insects of any kind are promptly destroyed, unless the owner wishes to send the stock promptly outside the State.

Woolly Aphis—This insect continues to be shipped into the State in small numbers, and almost entirely by a few nurseries who do not ship largely into Colorado, and who have not learned that we will not receive apple trees infested by this insect in any of the counties of the State having horticultural inspectors. It is a very simple and inexpensive matter to eradicate this insect through the use of the ordinary potassium cyanide fumigation, or by a very thorough and forceful spraying of all parts of the trees with one of the nicotine preparations, or with a coal oil emulsion.

Black Peach Aphis—We also reject all trees infested with this insect until they have been thoroughly disinfected. The remedies are the same as for the woolly aphis.

Borers—The borer which makes us most trouble in the inspection of nursery stock is the peach crown borer, *Sannanoidea critiosa.* We find it occurring to a greater or less extent in all of the pit fruits, more especially the peach. Any method of spraying or fumigating seems to be ineffectual in the destruction of these borers, so that infested trees are usually destroyed. Borers in other fruit trees are of only occasional occurrence.

The Locust Borer, *Cylene robiniae,* is becoming a serious pest in and about Denver and all who are purchasing locust trees from the nurseries should take special precaution to obtain them where there is the least likelihood of borer infestation. All locust trees should receive the hydrocyanic acid gas fumigation, and before setting in the ground they should be thoroughly sprayed with a kerosene emulsion that is not less than 20 per cent. oil.

Brown-tail and Gipsy Moths—These two most destructive European insects, that have become so injurious to almost all kinds of trees and shrubs in the New England states, are carefully looked for upon all nursery stock coming into the State, and especially upon imported seedlings. On two occasions the nests of the brown-tail moth have been apprehended by our inspectors, but in neither case were any of the living larvae found. The office of the State Entomologist should be informed at once if any one receives what he suspects to be either of these pests. If either should obtain a foothold in any of the fruit growing sections of the State, or in our city parks, it is very likely that it would cost Colorado hundreds of thousands if not millions of dollars of expense to keep in in control.

Crown Gall—While there seems to be some question as to just how injurious this disease is to the various fruit and shade trees, we have deemed it best to demand that only healthy trees be shipped into Colorado, as we believe that our fruit growers would rather pay whatever increased price is necessary in order to get perfectly healthy stock. The loss of an occasional tree from the orchard just at the time when it should come into bearing means a loss of many dollars to the owner of such orchard. So all nurserymen are warned to exclude crown gall completely from nursery stock shipped to this state.

Pear Blight—Occasionally pear and apple trees are shipped into the State with their limbs and even the trunks diseased and dead from the attacks of pear blight. Such trees are condemned and burned by our inspectors whenever they feel certain that this trouble is present.

Peach Mildew—This fungus disease has caused considerable loss in some of the peach orchards in the state, and all nursery stock found to be attacked by this fungus is promptly destroyed or returned to the sender.

Black Knot—Whenever plum or other pit fruits are received that have this disease developed so as to be evident to an inspector the trees are condemned and burned. An examination of the table given below in this report will indicate that very few trees are received diseased with black knot.

ORCHARD INSPECTION.

Very few of the counties appropriate money enough for the inspection work to enable the inspectors to visit all of the orchards of the county during the year. The Horticultural Inspection law plainly requires each county to provide for the inspection of all of its orchards annually. The great importance of this work is to apprehend any insect pest or plant disease that may be present in an orchard or in a community before it has become so widespread that it is impossible to keep it in control; and also to spread information from orchard to orchard as to the best methods of controlling insect pests and plant diseases. The inspector is able to tell the farmers who have had little experience in orchard work of the methods used by their more successful neighbors, and in this way the whole orchard work of the county is made more successful and is carried on with a greater degree of average intelligence than could otherwise be possible.

One new case of an orchard infested with San Jose scale has been discovered during the past year. Only three or four infested trees could be found, however, and we expect by prompt action to be able to stamp out this slight infestation and so save to the community the large expense that would be necessary in the years immediately ahead to keep this insect in check if it were permitted to become generally distributed in the orchards of that section. The infested area reported last year has been greatly reduced; in fact, almost no seriously infested trees could be found in the area during the past summer or fall. All of the infested orchards as well as nearly all of the orchards immediately surrounding them were thoroughly sprayed with lime-sulphur mixture just before the trees leaved out last spring.

INSECTICIDE INSPECTION.

Considerable attention has been given during the year to get insecticide dealers to conform strictly to Section 10 of the Hoyt Bill which has to do with the sale of adulterated or misbranded insecticides in the State. This section is very important one in our law and reads as follows:

"It shall be deemed a violation of this act for any one to sell in Colorado insecticide poisons, such as Paris green, London purple, white arsenic, arsenate of lead, arsenate of soda, arsenite

of lead, arsenite of soda, acetate of lead, cyanide of potassium, hellebore, pyrethrum powder, and the like, that are diluted or mixed with other substances unless the kind and amount of the adulterants or mixtures are conspicuously printed in plain English upon each and every package sold. Upon each and every package of white arsenic, arsenate of soda, arsenite of soda, acetate of lead and cyanide of potassium sold in this state the percentage of guaranteed purity must be plainly marked, and on all packages of arsenate or arsenite of lead the amount of water must be guaranteed.

FINANCIAL STATEMENT.

Because of a question as to the legality of the horticultural inspection bill no money was allowed to be paid from the State Entomologist fund in 1909 except the item of $250.00 on salary.

There is no source of income, so this report is of disbursements only.

DISBURSEMENTS.

Salary of State Entomologist, 1909	$ 250.00
Salary of State Entomologist, 1910	499.92
Traveling expenses, State Entomologist, 1910	38.69
Stenographic and clerical help	60.00
Per diem and expenses of deputies, 1910	437.91
Office expenses, 1910	102,78
Oce expenses, 1910	102.78
Printing Circular 1	58.26
	$1,627.71

PROCEEDINGS

OF THE

Thirty-First Annual Convention

OF THE

Colorado State Bee-Keepers' Association

Held in Denver, January 20-21, 1911, at the Albany Hotel Convention Hall.

MORNING SESSION, JANUARY 20.

PRESIDENT COLLINS' ADDRESS.

I have little that is new to say to you, brother bee-keepers. The same plea that I made in my address last year and the previous years is still applicable. The word that I would give would be closer relations between the bee-keepers—less of competition, more of united effort to gain our own. We note that such organization among men of all classes is the signal of greatest progress. If we bee-keepers want to be our own masters we must work together to hold back the tide of such a company as was recently established in Boston. This company has as its aim the monopoly of honey production and distribution in the U. S. Some predict failure for this company but I predict that it will be a success. It behooves you to think whether you wish your children to be simply hired servants of a great corporation or whether they are to be assured the independence which you possess.

THE RETAIL PRICE OF HONEY.

Mr. Adams not being present to handle this subject assigned to him, a discussion of it was led by Mr. Wesley C. Foster. We will take first the question of extracted honey as shipped from producer to dealer. The bulk of western honey goes to the larger cities of the West. The producer receives from six to eight cents per pound, and the consumers in this territory where the honey is sold say from 15 cents to 20 cents per pound. I think we may take it as a fair average that the producer of extracted honey gets from thirty-five to forty-five per cent. of the consumer's dollar where he sells to wholesale dealers. With comb honey I think the case is somewhat different, the bee-keeper

getting from fifty to sixty per cent. of the consumer's dollar. I think it is foolish policy for bee-keepers to sell their extracted honey at six and eight cents per pound when by co-operation they could get from ten to fifteen cents.

Pres. Collins—I heard recently of some honey bought at retail at about twice what the bee-keeper got. The bee-keepers get their percentages cut down much more than many other businesses. They do not go on the principle of "buying at the cost of production and selling for all the traffic will bear."

Mr. Rhodes—I wish to speak of one feature of this question: Our own honey was all used. We wrote to Denver for prices, which were prohibitive according to the statement of our home merchants.

They have refused to handle any at the price asked.

THE INFLUENCE OF LOYALTY.

Mr. Gill—This question affects every one in every profession. If I had traded my locality for one in Idaho, I would have been better off.

Pres. Collins—There is lots of territory in the U. S. that has no bees that would support many. If we could move bees as cheaply as live stock the question of locality would be much easier of solution.

Mr. Gill—On that question the bee-keepers have themselves to blame. The bee-keepers of Texas have a better rate on bees into Colorado than is charged from Colorado to Texas, so the question of railroad rates is also one of locality.

Mr. Wesley C. Foster—Is alfalfa making as luxuriant a growth and yielding nectar as abundantly as it did fifteen years ago?

Mr. Devinney—Alfalfa is said not to exhaust the soil but it does. I used to have alfalfa five feet tall and with ten times the bloom that I have seen in the last few years. There has been a gradual decline and I am fortunate if my alfalfa gets two feet high now.

Mr. Wesley C. Foster—Alfalfa fixes nitrogen in the soil through the means of the nitrogen fixing bacteria, seen on the roots of the alfalfa in little nodules. Farmers have labored under the idea that alfalfa builds up the soil in fertility while the only thing which alfalfa furnishes the soil is nitrogen. For every ton of hay hauled off the land some of its fertility is taken away. Alfalfa like all other plants needs a balanced ration, and to provide this we shall have to use commercial fertilizers and manure with intelligence, knowing what elements are in the soil and what elements we are supplying. A crop of alfalfa needs feed just as carefully prepared as to its elements as a dairy cow does to produce milk, if the alfalfa is to make a good growth and yield abundant nectar.

Mr. Rhodes—What do you know about the development of a new and better kind of alfalfa?

Mr. Wesley C. Foster—The Colorado Experiment Station located in the Arkansas valley has developed a new and better kind of alfalfa without doubt. It covers the ground more thickly, making a heavier tonnage per acre and stools below the surface of the ground, making it less subject to injury or destruction through cattle feeding on it during the fall, winter and spring. It also is not so subject to winter killing. This alfalfa is sure to be planted by more farmers every year, and the better stands of alfalfa the farmers have the more nectar there will be in the fields for the bees to gather.

Mr. Gill—I can see how soil could become worn out, sick, clover sick as we call it in the east, but as I look at it, the virgin soil ought certainly to be the same in fertility that the fields were years ago when alfalfa grew more luxuriantly. There are other conditions that affect the growth of alfalfa and the secretion of nectar. These conditions are moisture, atmosphere, electric conditions and grasshoppers and drouth. I could take a head of alfalfa this year and shake out scores of little mites. Then there is a fungus growth that injures the alfalfa and a drouthy condition prevents the blossom from heading right. I still believe that Colorado will come into her own, and that these are only temporary conditions.

Mr. Rhodes—In sugar beets there was much more saccharine matter this year than usual; water reduces the saccharine content.

Mr. Wesley C. Foster—The Agricultural College reported that those little mites in the alfalfa head of which Mr. Gill spoke are thrips. There are many species of these, and one can hardly look at a single blossom anywhere without finding from one to several score of them. Thrips are very fond of pollen and the softer parts of the flower. It is not known whether they eat the nectar or not, but they are very fond of tender vegetable matter and tissues. It is quite common for them to become so numerous in the flower that no seed is produced. It is evidently possible for them to destroy the nectar secretive blossoms of the flower. They are much more numerous during dry years, and when grasshoppers and other insect pests abound.

Mr. Devinney—I have often thought that since ditches were built and the alfalfa watered a great deal that this causes an imperfect growth of the plant. The early cutting of alfalfa weakens the plant, because the stalk and leaves are but the lungs, and when you take away the breathing organs of a plant you have destroyed a great deal of its vitality.

Question—Can we hope for a crop next year?

Mr. Gill—Conditions certainly are not very favorable. It is very dry at this time, but I have seen it the same during

thirty years experience; it is not the amount of bloom but what is in it. It may take us until July to get our bees strong, but in 1896 we got most of our honey in August.

AFTERNOON, JANUARY 20.

FEEDING BEES.

M. A. GILL.

Mr. Gill said in part—Feeding bees has been more important to some of us than handling our product. During my first years in Colorado I had no interest in feeding, but in the last few years, with grasshoppers and drouth, feeding has become all too important. I invested all the surplus I intended to feed my family on in bee food. I have fed my bees 17,000 pounds of syrup; if my bees didn't get it, my neighbors did. For inside feeding I have used Root's feeders and paper trays. The robber gets in when set beneath. Nothing is better for a feeder than a pan with excelsior set on the frames in a Longmont super on top which fits on the hive absolutely tight.

One of my helpers nearly ruined outside feeding by not properly covering the trough; if they get badly daubed it tells on them, they wear themselves out. Feeding is of more importance than ever before. If nature is abundant we will get enough. A great many started feeding too early and have to continue too long.

Mr. Rhodes—What would you feed now to bees?

Mr. Gill—I'd feed a good, rich syrup, weighing ten pounds to the gallon, or better. If right now the little weak colonies were fed right by the brood nest, hundreds of colonies would be saved.

What is the relative value of a pound of honey and a pound of sugar for feeding?

Mr. Lehman—The pound of sugar far exceeds the pound of honey, and can be fed easier.

Mr. Collins—I am greatly in favor of the pound of sugar; sugar is cheaper, unless I feed cheap honey. Feed the best sugar to be had. You avoid the danger of foul brood by feeding sugar.

Mr. A. F. Foster—We have fed about 5,000 pounds of sugar this fall, and found the cheapest and most convenient method to be the use of cans holding from two or four quarts. Excelsior, wild hay, etc., were used to allow the bees access to the syrup. Nine out of ten took the syrup without any bees drowning.

Mr. Devinney—Mr. Porter uses a force pump to fill the combs with syrup, and these combs are then put right beside the cluster of bees and they can take the feed from the cells in the natural way.

Mr. McCoombs—I have used the Miller feeder, holding two gallons; by the next day twenty-five pounds would be taken. By other methods it would have taken weeks.

Mr. Collins—What do the Miller feeders cost?

Mr. McCoombs—Thirty or forty cents.

Question—What variety of bees has proven best in Colorado?

Oliver Foster—Out of 125 Caucasian colonies they all came out alive and in good shape; out of fifty Italian colonies seven were dead and others in poor condition.

Mr. Gill—I am an admirer of the dark Italian. I feel that it is hardy and better than the lighter colored Italians.

Question—Is the Mark W. Moe tool for transferring larvae a success?

H. Rauchfuss—I have found that a toothpick, softened by placing in the mouth, works very satisfactorily.

WINTERING BEES.

OLIVER FOSTER.

In preparing bees for winter, shall we provide for their protection from extremes of cold and heat by packing the hives, or shall we leave them unprotected? This question should be considered with referenece to several other conditions which must be taken into account.

Mr. A. carries his bees into the cellar, where he scrupulously maintains a uniform temperature of from 43 to 45 degrees. He has found that a much lower temperature than 43 degrees will result in a loss of many colonies and poor results generally, but he succeeds well with the higher temperature, and his experience is in harmony with all who winter in cellars.

Mr. B. maintains, on the other hand, that cold does not hurt the bees in the least. He leaves his colonies right out of doors, in ordinary single-walled, unprotected hives, with the full summer entrance wide open and with perhaps an additional large opening at the top of the hive, right over the bees, which opens into a space between an inner and an outer cover, this space having free communication with all outdoors through spaces under the upper cover at ends or sides.

His bees winter well, even though the mercury falls to zero or far below and though the snowy blizzards often rage throughout the winter. And Mr. B.'s testimony agrees with that of many others who have no use for winter packing and whose bees generally come through the winter and spring in good condition.

Why this difference of opinion and practice? How is it that A. and B. both succeed, each with his favorite method so different from that of the other, while various compromises be-

tween these two extremes do not as a rule give good results. I think we must look for the answer to this question in the fact that other important factors are figuring in the problem.

A. lives in a lower altitude, where the atmosphere is heavy and comparatively damp, and where cold weather continues for several months at a time in winter, with no warm days to enable the bees to fly and renovate their conditions. B. lives in Colorado's rare and dry atmosphere, where every two weeks or oftener throughout the winter the bright sunshine warms his unpacked hives and all outdoors as well, arousing the bees from their hibernating stupor, affording them the opportunity to take a cleansing flight, and to gather into their winter nest and into their now empty honey sac a fresh supply of stores from the outer combs and to reduce it to its proper consistency as to moisture for immediate use.

After this renovating spell they can crawl into the empty cells within the cluster or take their position with those that are delegated to form the outer protecting crust of the cluster. These crust-forming bees assume a state of almost perfect hibernation, in which condition almost any degree of cold is harmless to them for a limited time or until their honey sacs need replenishing, when another warming-up spell and a change of shift is necessary.

Mr. A.'s bees in the cellar have no such natural season of warming up; consequently, the bees of each individual colony must, of their own accord, and at such times as their necessities require, work themselves up to the necessary degree of heat and activity for a similar renovation, although the cleansing flight is denied them until the spring setting-out time arrives. However, if all other conditions are perfect under the protection system, the flying spell seems to be unnecessary for long seasons.

A uniform temperature of much below 43 degrees is probably unfavorable to the other and more necessary renovating operations, hence the advantage of a warm hive during long, protracted cold. Moreover, the air in Mr. A.'s cellar becomes unavoidably foul, and much damper than the air that sweeps through Mr. B.'s apiary and hives. For this reason, heat is necessary to enable the bees to force out these very injurious elements from their quarters.

As I see it, the first essential condition for good wintering is a good quality of stores, gathered or stored from feeders after part of the brood is hatched, so that it is deposited within easy access to the contracted cluster of bees. The next important requisite is thorough elimination from the cluster of bees of the impurities and surplus moisture which are constantly emanating in greater or less amount from their bodies as waste material.

This is accomplished in either one of two ways: The one by the expulsive power of heat; the other by means of a free circulation of cold, fresh air. The one under the warm protection system; the other under the open-air, unprotected system.

The principles involved are quite different, but the end accomplished is the same—a dry winter nest. There are two methods of drying clothes on a cold winter day. One way is to hang them by a hot stove, where the heat turns the moisture into vapor and, expanding the steam, expels it from the fabric. The other way is to hang the clothes out of doors, where they instantly freeze stiff, but where the freely circulating, cold, dry air soon absorbs the very ice and carries it away as frozen vapor. These two principles employed in drying clothes illustrate the two systems under which bees in winter quarters are kept dry and free from impure air. The one we might call the warm protected system; the other the cold free-air system.

According to my experience and observation, a weak or unpopulous colony needs warm protection. Especially is this true if their stores are not of good quality, or if they are short in quantity and scattered throughout the hive with much empty comb near the contracted cluster of bees. Again, some kind of protection is necessary in localities where cold weather is long continued, in a cold, damp climate, or in a low altitude. It seems that a weak and unprotected colony requires too great a proportion of their bees to form that protecting crust I have mentioned, so that there is not a sufficient number of bees remaining to form what should be the main body of the cluster within this outer crust, where a little more heat should be maintained, the bees remaining less dormant and slightly active, and so able to minister to the needs of the colony as to heat and nourishment. When all, or nearly all, the bees are required for the more dormant crust, the colony perishes.

The best method of packing I have found, and I have tried about every form, is to set the hives together in bunches or piles so that all their adjoining sides touch each other. To this end there must be no projections on these adjoining sides either on the bottom boards, bodies or covers. They should be placed four abreast facing south or southeast and the front end should be left exposed to the sun. The top and the northeast and west sides of the bunch may be packed with straw or chaff if desired and the packing held in place with boards and rocks or with burlap and bailing wire. I think it is a good plan in case of weak colonies to place a second tier of four or five hives on top of the first, with covers and bottoms removed from between the two tiers and these replaced by single sheets of tin or sheet iron. To form temporary bottom boards of these metal sheets a bee space is formed on their upper sides by tacking strips on the sides and back.

To avoid confusion the entrances are contracted and separated as far as practicable, with here and there a sheet of tin shoved in between the hives. The removed bottoms and covers are used to retain the packing or to protect the bunch of hives from storms. No mixing of bees need be feared when separating the hives in spring upon their summer stands, since the appearance of the whole yard is entirely changed at once. This should be done when few bees are flying and all locations will be marked by the bees on their first flight.

DISCUSSION.

Mr. Devinney—My experience has been that bees do better to winter on their summer stands. There is too much sweat and moisture inside a close cellar.

Pres. Collins—The experiment a few years ago of wintering bees in a cold storage warehouse at about forty degrees worked fairly well. The bees came through without consuming more than ten pounds of their stores. After being set out in the spring they dwindled some, but did better later on. The bees were placed in the hall leading to the cold storage room so the bees would not be too cold.

Mr. Gill—I'll take my chances on a nice, even, warm temperature rather than extreme cold.

Mr. Wesley Foster—I have an observatory hive in my dining room window; the temperature ranges from sixty to seventy and the consumption of stores is very small; from December 24 till January 19 the bees consumed just seven ounces of honey.

Pres. Collins—You can keep bees as warm as you wish, they will not brood while winter conditions prevail outside.

O. Foster—It is not usual for brood to be found in the hive this time of year.

LOCAL SHIPMENTS OF COMB HONEY.

Owing to an almost entire honey crop failure in Northern Colorado during the past season, local shipments of comb honey from other sections of the State became necessary.

Some of these shipments were made by express, but most of them by freight, as our experience in former years with express companies has been that it is simply a matter of paying higher charges for a poor service.

Having received many local shipments during the past fall, ranging in lots of 12 cases to several hundred cases and in distance of shipment from 75 to 450 miles, we have had plenty of opportunity to experiment as to what is needed to make the shipping of small lots of comb honey during cool or cold weather a success and will herewith give you some of our observations.

While warm weather prevailed shipments came through in fairly good condition.

THIS HONEY WON FIRST PRIZE AT THE INTERSTATE FAIR AND EXPOSITION, DENVER, 1909.

FOUR COLONIES OF BEES, THE INCREASE OF ONE HIVE IN ONE SEASON.

It shows what may be done in a favorable year with intelligent care.

When cold nights came on, no shipment arrived in good condition when cases were shipped singly (glass always protected by thin boards), whether packed in single or double tier cases.

Honey in double tier cases came through with much less breakage than that in single tier cases.

Honey produced without bottom starters in sections broke down more than that with the bottom starters.

Single tier cases and also double tier cases crated together with lath (four in a crate) came through in very bad condition; however, in explanation it may be stated that these came the longest distance and were transferred twice in transit and the damage most likely was done in the transferring by tumbling the crates around, as they have no projecting handles.

Single tier cases with the new and much praised sliding covers have proven a dismal failure; cases had to be tied with string in transit to keep them from falling apart.

Large printed cards with lengthy instructions to freight handlers proved of little or no value; evidently they were too long to be read.

The only lots that came through during cold weather without damage were those that were shipped in 8-case carriers with straw or hay beneath the cases and projecting handles at the ends. While these handles are of little value to carry the crates, they seem to prevent the placing of the crates on end in the cars and to prevent their being tumbled about.

Altogether the damage in these local shipments not packed in carriers has been so frequent that we have come to the conclusion to notify our members, that after this we shall not receive any local shipments of comb honey unless packed in carriers. Another advantage of the carriers is that the cases are protected and arrive in clean condition.

The present rulings of the Western Classification do not make any distinction between comb honey shipped in single cases, glass protected, and comb honey shipped in 8-case carriers, which is manifestly a hardship for the producers and the cause why the use of these carriers for shipments is not more general. I am, therefore, trying to enlist the support of large jobbers and shippers of comb honey within the territory of the Western Classification to urge the Western Classification Committee to rule that comb honey in carriers with straw or hay beneath the cases shall go as second-class freight, for the reason that it will take less time to handle them and the danger of damage is reduced to a minimum, thereby saving the railroads many damage claims, and hope that this move will find the support of this Association at its present session.

FRANK RAUCHFUSS.

UNIFORM SHIPPING CASES.

Uniformity of grading and uniformity of packages of all commodities produced in rural districts and afterwards brought together to be shipped in straight carload lots to distant markets is now being recognized by all shippers, whether individuals or associations, as a matter of prime importance.

In fact, the business in some of these commodities could not possibly have assumed the gigantic proportions that it has, without proper standards of grading and packing that are generally understood by the trade throughout the country. Oranges and lemons are packed in standard size boxes with grade and size indicated on the end of the box. Apples, cantaloupes, dried fruits, nuts, etc., are all packed in uniform packages, if coming from localities where their production is a matter of some consequence.

It is now only in localities where these commodities are produced in a small way as a side line to farming and considered of little or no consequence that the matter of grading and packing does not receive the attention that it should.

Bee culture in Colorado has developed to such a stage that the bulk of the comb honey crop is now marketed in a fairly satisfactory manner; there is still room for improvement in many quarters as regards to proper grading; however, this is a subject outside of the scope of this paper and we shall confine ourselves to the matter of packages.

Comb honey is an article that sells much on its appearance, no matter how fine it may be in flavor and body; if stored in poorly made or discolored sections and packed in unattractive cases, it will not bring near as good a price as an article of inferior quality but properly handled and packed.

Most of our crop must find an outlet in the States east of us and can only be marketed to advantage in carload lots.

In my capacity as manager of a co-operative association of bee-keepers for the past twelve years I have had unusual opportunities to study the marketing question from all sides and have come to the conclusion that the policy of manufacturers of bee supplies in catering to the whims of individuals for new styles of sections and special cases for same is ill advised, and works a hardship on the carload shipper at the point of production as well as on the jobber and retailer at its final destination.

What the carload buyer of comb honey is interested in principally, is to secure stock that is carefully and conscientiously graded and packed in attractive cases of uniform size.

Any buyer of experience will gladly pay a little more for such, than to take goods of like quality but packed in a number of different sizes of sections and shipping cases. The reason for this is that it requires less time in loading the car (if bought

f. o. b. shipping point), less risk of damage while in transit, less time to unload at destination, less room occupied in warehouse and last, but not least, less trouble in making sales and better satisfaction to his trade.

A car of comb honey packed in cases of exactly the same outside dimensions (not necessarily of the same manufacture) can be loaded in less than half the time of a car composed of different sizes of cases. If honey is brought in from the apiaries and first stored in a warehouse before being loaded in the car then the trouble will be aggravated as different styles of cases must be placed in separate piles.

In order to see if the manufacturers of bee supplies would be willing to recognize these difficulties, I wrote last fall to several of the largest firms and am glad to report that they all have shown a desire to come together on a standard outside dimension for 24-section double tier shipping cases for 4¼x4¼x 1⅞ sections, as well as for 24-section single tier cases. It is hoped that cases for the coming season's crop will be of uniform outside dimensions.

The following measurements were suggested:

SPECIFICATIONS FOR DOUBLE TIER CASES.

Outside dimension for standard double tier cases for 24-4¼x4¼x1⅞ beeway sections.

Thirteen and seven-eighths long, 9½ high, 8⅛ wide.

Full half-inch lumber for ends.

Full quarter-inch lumber for tops, bottoms and backs.

Full ⅜-inch lumber for grooved cleats.

Three sheets corrugated pasteboard for each case.

Two sheets plain paper for drip pans.

Plain 2d fine wire nails for nailing covers.

Cement coated wire nails for balance of case.

Covers printed, "Glass! This Side Up!"

Packed in reshipping crates.

SPECIFICATIONS FOR SINGLE TIER CASES.

Outside dimension for standard single tier cases for 24-4¼x4¼x1⅞ beeway sections.

Eighteen and one-fourth long, 12 wide, 5⅛ deep.

Full half-inch lumber for ends.

Full quarter-inch lumber for top, bottom and back.

Full ⅜-inch lumber for grooved cleats.

Two sheets corrugated pasteboard for each case.

One sheet plain paper for drip pan.

Plain 2d fine wire nails for nailing covers.

Cement coated wire nails for balance of case.

Covers printed, "Glass! This Side Up!"

Packed in reshipping cases.

If a discussion on the above standards could be arranged for this convention it might be the means of bringing out some valuable information.

FRANK RAUCHFUSS.

EVENING SESSION—FRIDAY.

The evening session Friday was spent in reminiscent experiences of the beekeeper, which were inspired in charmed manner by A. F. Foster's "Fifty Years of Beekeeping," and a closer acquaintance with the mistress of the situation herself, Miss Honeybee, as presented by President Collins, and that most intimate of associates of the members of the insect kingdom, Prof. C. P. Gillette, of the State Department of Entomology.

For fifteen minutes we forgot the hard problems of the honey producer, and reveled with Mr. Foster in "Being a Boy" again, with a boy's joy in getting a taste of bread and honey, and butter and bread and honey, and then honey some more, at "Darby" Andrews' table. We prayed with him the prayer, "If my pa only had bees I could have some honey," and followed his boyish enthusiasm which, at last, caught the coveted prize and gave impulse and energy to the search which gave Edwin France the willingness to explain the advantage of the movable comb, and show a queen to a boy who fairly quivered with eager interest. We read with him the borrowed copies of the old American Bee Journal, in which Elisha Gallup and "Novice" (A. I. Root) gave their growing plans for improvements, and almost forgot that we lived in a new day, when we had learned a better method of finding our harvest than plugging our hives as you would a watermelon to test its ripeness. The paper read stirred many dormant memories, and, with Messrs. Porter and Gill as star leaders, anecdote and experience fairly leaped to expression.

Over one hundred slides, illustrating the anatomy and history of the bee and honey-producing plants, were then shown, President Collins adding to the interest of the pictures with clear-cut information and racy anecdote. The gradual development from the old straw hive and the crude ideas in frames, to the standard modern expression of that prince of bee missionaries, L. L. Langstroth, in our own country, with a glimpse of foreign lands, which in regular order illustrate the progressive system of beekeeping for more than a thousand years, was of especial interest.

Professor Gillette entered closely into the life history of the bee, treating it so familiarly and clearly that it seemed no less important than its human keeper. The wax-secreting or-

gans, the pollen basket, the brush and comb for the dainty toilet, the sting for its defense, its socialistic commonwealth, which loses all for the common good—given these few glimpses of the perfect plan, and we begin to realize something of the wonders of the minute worlds and workers which surround our paths, and only those who have proven their right to enter into such close fellowship as has Professor Gillette can open our eyes to the wonder of all creation.

Mr. Fred Lawrence, of the Western Soda Fountain Supply Company, favored the audience with two highly appreciated vocal solos, and Mr. William Martin, of the Interstate Bank, played a pleasing piano number.

MORNING SESSION, JANUARY 21.

ARTIFICIAL BEE PASTURAGE.

W. L. PORTER.

It is the nature of the busy bee to secure all the honey that is within its reach. Thus it commences early in the morning, and never lets up on its busy search for honey until the sun lowers behind the mountains, and darkness drives it from its toil. To make a success in the bee business, it is first necessary to have a large amount of bees; second, they must be located where there are plants growing that have honey-producing flowers. The man that decides to make honey producing his business, usually locates where the greatest number of honey-producing flowers grow in a natural way.

But when we look at the best conditions that exist in any locality, we find that the period of time in which any one species of plants are in bloom is short, and in the best of locations there are only a few varieties of plants that secrete honey in abundance.

While these honey-producing plants are in bloom, the bees are having a great harvest; we call it the honey flow. In most localities there are only a few plants that yield honey in a commercial way. In Colorado we have the alfalfa and clover; in the East, white clover and basswood, and in some localities buckwheat; in California, sage and orange. While these plants are in their prime of bloom, the bees are having a bountiful harvest, and are filling the hive with the delicious nectar; but as soon as the blooming time is over, the bees are taking a rest—business is suspended; not much honey coming in, the bees are consuming what honey they have on hand, and waiting for the next species of plants to begin to bloom, when the bees take hold again and have another period of honey gathering.

To make beekeeping as profitable as it should be, we should have a succession of honey-producing flowers that would last

from spring to fall, and if the beekeeper goes into beekeeping with the intensity he should, he may be able to produce this succession of bloom. In the bee business, we depend too much on nature to produce the flowers. If the farmer waited for nature to raise him a crop of corn or other grain, would he receive a crop? We all answer, "No." He must first till the soil and plant the seed and assist nature. The beekeeper is in the same kind of business; he is a producer, and must also assist nature. He has it in his power, and should see to it that there is a continuous bloom of honey-producing plants flowering from early spring to fall, so that bees are rearing brood and hatching more and more honey gatherers, and are continuously adding to the stores of the hive.

I will now mention a few of the plants that we should see are growing. We will commence with soft maple. This sometimes blooms as early as February 22, is a good yielder, and also has an abundance of pollen, and the bark may be punctured so that the sap will run down the tree, making a place where the bees can gather water and also sweet. The elm comes a few days later, and is also a honey producer. Next comes the plum, the cherry, apple and other fruit blooms; the dandelion is coming on very fast, and is a good honey producer. Then the rape and mustard, and a great variety of the crucifferous order of plants. Then the yellow sweet clover and the raspberry, followed by the alfalfa, and a little later the sweet clover. Then comes the basswood, blooming about the first of July. About this time the cleome commences to bloom and keeps up a continuous bloom until checked by frosts. The Simpson honey plant, which grows along the water's edge, is a fine honey plant. There are a number of species of the mint family that come in from June to August 1; the wild horse mint, catmint, and hoarhound. Then come the fall blooms: the asters, goldenrods, and many others of the composotie family.

I have now outlined what nature has done for us; yet there is not a beekeeper has a locality so good that he does not wish it were better, and it is now my aim to show how it may be made better. The soft maple is very easily produced from seed; all that is necessary is to secure the seed, plant them in good loam soil, and the next spring they will come up in abundance. They are large enough at four years old to plant for shade trees or for forestry. They bloom at a time of the year when the bees so much need the honey and pollen to stimulate brood rearing. The black locust is also easily raised from seed; the timber is valuable for posts; it blooms in May, and is a great honey yielder; it should be planted for shade, and also for forestry.

The basswood has been wonderfully neglected. It is as hardy and is as rapid a grower as the cottonwood. It has no enemies in the way of borers or worms to feed on the leaves;

the lumber and wood is valuable, and will always be in demand and at the time of blooming you will always find the trees heavy with the busy bees. It is so profuse in secreting honey that you can see the drops of honey at the base of the petals. I had a hive in Wisconsin that gave me forty-five pounds in three days, and seventy pounds in six days. I thought that a good yield, but Brother Gill has one that very much surpassed that. When living in Greeley I sent East and procured a pound of basswood seed. I put the seeds in wet sand and buried them where they would be frozen through the winter. In the spring I planted them in rows and mulched with leaves. I had nearly all the seed germinate, and it was a pleasure to see those trees grow. This summer, when I was in Greeley, I found the trees thirty to forty feet high and loaded with bloom. There are a few trees in Denver—some on the North Side, some in the City Park, and some on Wheat Ridge—and every year they are full of bloom and covered with the busy workers. Wherever these trees are seen they are always the same—free from worms and borers, no aphids or insects on the foliage. The branches are tough and pliable, and do not break with early and late snows, as do many of our shade trees. There should be thousands of this timber planted each year.

The locust and maple are covered with the disgusting cottony aphid; the box elder and willow with the green aphid; but the old basswood stands out clean and beautiful, free of all pests and hardier than the cottonwood. There should be thousands of them planted in towns and cities, also in the forestry. Let the young beekeeper wake up and look to his future! When I lived in Greeley there was a general complaint against a gardener who sent East and got a package of dandelion seed, that he might have some for greens. I am also fond of greens, and ten years ago, if I wanted a mess of greens, I only knew of one place they grew—one mile east of Westminster. Now the country is covered with them, and we note that bees get through the spring much better than they did in the early beekeeping of Colorado.

The trouble with Colorado is, that there is a long time from March 1 to June 15, when alfalfa blooms, that is without flowers. I have had bees do so well on apple blossoms that they built queen cells and were planning to swarm when the apple bloom matured and fell. The bees find themselves without nectar, tear down the queen cells, destroy the brood, and have less bees the first of June than they did the first of May. We want bloom to fill in this space, so as to have the bees in prime condition to store surplus when alfalfa comes in bloom.

The yellow sweet clover comes two weeks earlier than alfalfa; it grows in all kinds of soil; is a good forage for stock. If the seed was scattered throughout the country, we would soon have it in abundance—a blessing to the farmer and to the

beekeeper. The alsike clover blooms at about the same time; is a wonderful honey plant and a great hay plant. When in Michigan a few years ago, I secured twenty-five pounds of the alsike seed. I found a farmer out near Lakewood who was going to seed a field of alfalfa. I induced him to mix in his alfalfa seed two pounds of alsike to the acre. Last season it bloomed. At first it looked as though nearly all alsike, but later on the alfalfa filled in and made a beautiful hay crop. The farmer told me he was offered $12 per ton for the hay, when he was getting but $8 for the straight alfalfa. It has been a poor season to make experiments, as we had a blighting freeze the 20th day of May, but it has gone far enough to prove to me there is much value in it, to the famer as well as to the beekeeper.

In driving from Denver to Boulder, a few miles south of Louisville I discovered, growing on the plains, an acre or more of horehound. This is a great honey plant. A few seeds got there by chance, and have increased, until now the horehound covers several acres of dry clay and gravel soil. There are hundreds of thousands of acres like this soil which might be in horehound instead of cactus and other worthless plants. When living near Rocky Mountain Lake, I saved a quantity of cleome seed. In the spring I drilled it in the ground. It came up beautifully and made a wonderful growth. There are thousands of acres where cleome would grow, where the ground is growing nothing. The seeds could be buried or drilled in in early spring.

Let every beekeeper study his locality, and let him see to it that there is a continuous bloom from spring to fall. I remember, when I first moved to Denver, I noticed, when driving back and forth to my bees, ten miles northwest of Denver, down by the foot of a small lake, a bunch of sweet clover growing. I would stop my team, get down from my wagon, and observe the bees gathering honey. That was the only sweet clover in that part of the country. Today it is very common, yet there is not as much as there might be. Can we not all aid the honey-growing plants to get a foothold? It is better to see yellow and white sweet clover growing than Russian thistle and horseweed. By sowing the clovers, we make feed for the cattle and honey for the bees, and thus we aid to bring the time when the land will flow with milk and honey.

DISCUSSION.

Mr. V. Devinney—Horses will eat sweet clover, but they do not like to. One year, when I was short for hay, I taught my horses to eat it by starving them to it. It has been my experience that stock do not relish sweet clover.

Mr. Rhodes—I have been accused of sowing the first sweet clover which appeared in the state. Whether true or not, I am going to defend sweet clover until stockmen and farmers find

out what it is worth. One stockman told me sweet clover was the best winter stuffing he knew of.

Wesley C. Foster—One can hardly pick up an agricultural paper without finding articles by farmers, extolling sweet clover as a feed for cattle. Professor Morton, of the Agricultural College, fed sweet clover to sheep, and found it equal in value with alfalfa, while the tonnage per acre is much greater than from alfalfa.

Mr. Devinney—Alkali is a natural fertilizer for sweet clover. Sweet clover will grow where nothing else will, and grow rankest in waste land.

Mr. Collins—I agree with Mr. Porter's statement in regard to basswood. It is a beautiful shade tree, and profuse yielder of nectar. If all the roadsides in Colorado where irrigating ditches run were planted with basswood trees, in a few years the value from timber cut would total millions of dollars every year, besides the large amounts of honey secured, and the advantage of having our roadsides lined with beautiful shade trees. And now I want to add about sweet clover, that it will grow where nothing else will, when it has once gained a foothold. It is now growing on some of the steep, rocky mesas about Boulder, where nothing but Buffalo grass and cactus ever grew before.

Mr. Devinney—I could not grow basswood on clay soil, for basswood grows only on sandy, porous soil.

Mr. Collins—I have seen it on clay bottoms in Wisconsin, four feet in diameter.

Mr. Porter—Basswood will grow on the heaviest clay soils. Mr. Devinney can see it growing on the edge of Manhattan Beach.

Mr. Garhart—In Ohio it grows on very clayey soil.

THE HONEY FLORA OF COLORADO.

S. FRANCIS.

In writing on this subject I will mention briefly the honey flora of northern Colorado, as I have observed it, which, I think, will include the principal honey and pollen-producing plants of the state. I will give them in their order as to the time they yield honey or pollen.

As early as February 25, often the bees are observed working on the soft maple and box elder, principally for pollen, and sometimes a little honey. There are other trees of like nature in other localities that yield pollen or honey at this time of year.

Next comes the cottonwood, in April, which yields pollen abundantly, enabling the bees to begin to brood rearing. A

little later the willow yields pollen and some honey. These two, with numerous spring flowers, in a good season, enable the bees to fill their hives with brood up to the time of fruit bloom, which begins about May 5, when the bees can secure their first surplus honey above the needs of brood rearing, if conditions are favorable for the secretion of nectar in the fruit blooms.

First in importance of the spring flowers are the dandelion and wild parsley, both yielding pollen and honey; and a little later two varieties of cactus, which also hold the same treasures for the bee.

About the first of June, in some localities, the yellow sweet clover begins to bloom, and keeps the bees rearing brood at a lively rate until the alfalfa commences to bloom, about June 15 to 25. From this time on, until as late as October 15, the bees have had a continuous honey flow in good seasons.

The first of July the white sweet clover arrives on the stage of nectar production. This plant, with alfalfa, are the chief nectar-producing plants of Colorado. In some localities there is considerable white clover, also. During the month of August, which is one of our best honey months, the cleome, or Rocky Mountain bee plant, yields considerable honey on cool mornings. I have seen bees working on corn, sunflower and numerous garden and field plants and several varieties of weeds for pollen and honey.

In September the rosin or rubber weed, a desert plant, yields honey, but of poor quality; fortunately it yields after our best surplus honey has been gathered. The fruit bloom mentioned in this paper includes all large and small fruit trees and shrubs, and in the mountainous districts other plants are found which are quite important.

BEE DISEASES—EUROPEAN FOUL BROOD.

H. Rauchfuss—The European foul brood has been in our country for over twenty years. Sometimes it is called black brood or pickled brood. It differs from the American foul brood, in that the dead larvae preserves its shape, while in the more common American foul brood it breaks down and becomes ropy. The European variety is easier to clean out than the American, but is more serious, in that it spreads more rapidly. It comes just before the honey flow, and is called the May disease in Europe.

Mr. Rhodes—What is the difference in the appearance of the comb?

Mr. Rauchfuss—Hardly any. It can be tested with a toothpick or straw, which will indicate that the form of the bee is intact, or nearly so. It is more of a slate color. Dr. Howe calls it black brood. American foul brood is brown. Foul brood has been a good thing for the beekeeper. It flourishes best

THE ROSIN WEED.

A plant growing on the plains and mesas close to the foothills, with yellow, sunflower-like bloom. The honey is amber and of very poor quality and soon granulates. It blooms during August and September, and when mixed with alfalfa honey spoils the quality of the latter. Many beekeepers now extract this rosin weed honey, as the bees winter very poorly on it.

where there are abundant honey crops, and dies down when several seasons have been poor. If it had not been for foul brood the country would have been overrun with bees, and there would have been no profit in the business for any of us.

Mr. Collins—It has been commonly believed, here in Colorado, that the Eastern wax moth will not reproduce itself. But this year I saw a roomful of combs infested with the moth, that were brought here the spring of 1909. If the climatic conditions are favorable, the Eastern wax moth will undoubtedly reproduce in this state.

Mr. Porter—I knew of some wax moths that were brought here in combs from Wisconsin, but they disappeared soon, and have never been seen again.

Mr. H. Rauchfuss spoke on Extensive Beekeeping With Intensive Culture, and said you could succeed with a large number of colonies, give them careful individual attention and get a honey crop, but it needed a good system of management to do it; in fact, several systems would be well to know, so if one did not work under certain conditions, another could be tried.

Intensive culture, with large numbers of colonies, has not yet been very successful, because the plans made have not been carried out. We do not put our ideas into practice. Swarming is the main difficulty, because bees are inclined to swarm just when we don't want them to, and they break into our plans.

Two-story hives of bees are preferable, even if two hives have to be put into one in the fall. They are always stronger in the spring than two would be, and there is nothing lost. You can take off a hive with the old queen, cutting all queen cells, and putting in a new location. Leave combs of sealed brood on the old stand, and you can run in a virgin queen—you do not even need a cage. This will cure European foul brood, or, as most call it, pickled brood, for the bees clean out the cells ready for the young virgin to begin laying. In the fall you kill the old queen and set the old hive back again on the hive with the young queen, with a sheet of paper between.

STAKES FOR HIVE STANDS.

Mr. H. Rauchfuss—I use stakes—four for each hive. Two men can drive enough for 150 colonies in a day. We use a frame to get the stakes in the right place. Boil the stakes in creosote for ten minutes, so that the creosote penetrates clear through. This is the way the railroad ties are treated. They seem to last forever, and do not rot. The stakes are much better than bricks.

THE BEST QUEENS FOR THE LEAST MONEY.

H. RAUCHFUSS.

Which is the best strain of bees? This depends upon the person handling them. I am satisfied they are all good bees, with proper handling. There are locations where they will not have any other than the common black bee, as in Holland, where the heather is a common honey plant. In Switzerland the brown bee is the prevailing variety. This brown bee is not as cross as the Italian. You can work within fifteen or twenty feet of the hive and not get stung. Italian bees tantalize one continually by buzzing about the head and following one about the yard. The Italian bee is also a great propolis gatherer, daubing the sections and combs with the sticky mass, painting everything red. In handling the Italian bee to advantage, one should use a shallow brood chamber hive, as the Italian does not readily enter the super, but begins at the top of the frames and stores the honey downward, crowding the brood chamber.

Now, in raising queens, I take it for granted you are raising them for your own use. When you buy queens at a distance, or introduce queens taken from another hive entirely strange, a very large percentage of them turn out to be inferior. This is a point that has not been sufficiently emphasized. Keep the queen among the bees with which she was raised.

When a colony builds up early in the spring, and prepares to swarm, if we want young queens, take the old queen out. Nine days from the removal of the queen you watch for capped queen cells. If the cells are capped, break up the colony and make as many nuclei as you have queens. Stop up the entrance to each nucleus, so no bees can fly until enough have hatched to care for the brood. Now, if you want to break up the swarming fever among your other hives, shake off all the bees from the combs of brood and put full sheets of foundation in their place. Take this brood and build up your nuclei. The hives containing the old queens in the fall may be set back on top of the hives containing the young queens, with a sheet of paper between. The old queen must be killed when this operation is done. Two colonies of bees united this way come through stronger in the spring than would two individual hives. With two colonies united this way, there is an abundance of pollen and honey in the hive for spring breeding, and bees fail to build up in the spring for a lack of pollen more than for any other reason. With a large hive and a plenty of honey, the bees try to raise enough bees to protect the combs.

Question—When you shake bees, do you shake on full sheets of foundation?

H. Rauchfuss—Starters are better; never shake them into an empty hive. If you do, they will be uneasy, and will go

from one hive to another, inoculating each hive with the swarming fever. If you have a frame of brood in the hive, all this will be prevented.

THE EVOLUTION OF THE BEE.

PROFESSOR THEODORE D. A. COCKERELL.

Professor Cockerell said that if we had been around about ten million years ago, we might have seen little creatures about that were getting ready to become honey bees, and gather the delicious nectar we love so well. And, also, if we had looked farther, we might have seen creatures that later were to develop and become members of the State Beekeepers' Association. But the bee got there first by several million years, and it is sad to think of all the sweetness that was going to waste because man had not yet arrived to set the honey bees to work storing honey for him. The bee, as a honey gatherer, developed into the creature we now know probably several million years before man arrived at the stage we now see him acting upon.

It is practically certain that the bee developed from some kind of wasp, though the wasp that was father of the bee is extinct. Bees all have plumed hairs, while wasps do not. These hairs are used by the bees in catching and carrying pollen. Wasps feed on various insects, while bees feed on pollen and nectar only. It would be hard to say whether bees preceded flowers, or flowers bees. They most probably developed simultaneously, and took their march together, as we see them going now—absolutely dependent one on the other.

The wild bees of one species work generally on but one flower, while the honey bee is more promiscuous, and works all through the season.

The oldest bees known of are preserved in amber, probably three million years old; none of these are honey bees. No fossil honey bees are found in America, and honey bees did not exist here until they were brought from the old world. Honey bees have been found in fossil remains in rocks in Russia. All the honey bees, not over a dozen species, have been developed in the old world.

The social bees are found in little towns or communities, with their burrows close together, but living separately. The bees were beginning to find out the advantages of a socialistic organization. With a compact organization they found that unfavorable conditions, enemies, etc., could be met much more easily.

In central Colorado, the fossil of the grandfather of the bumblebee was discovered along with those of thirty other species of bees. Wild bees are much more numerous in dry regions, and so Colorado has a large number of them.

Beekeepers should be cautious about bringing in the Indian bees, as they might displace our desirable races and make honey production unprofitable. The large Indian honey bee does not have a longer tongue than our Italians, and probably is far inferior as a honey gatherer.

The wild bees are much more numerous than the honey bee. There are 500 species of wild bees in New Mexico alone, and almost as many in Colorado. The wild bee does not have wax-secreting organs, such as our honey bee has, but uses different substances to make its shelter and cells from.

AFTERNOON SESSION, JANUARY 21.

RAILROAD RATES ON BEE AND HONEY SHIPMENTS.

Mr. F. Rauchfuss—The rate question must be taken up in the right way by the right people. There is no question but what there is great injustice in the rates charged for bee and honey shipments. The people in the Arkansas Valley are getting rates, as they have only one system of railroad to deal with. In order to get any general relief in rates, we shall have to get every association in the West shipping honey to demand of the railroad they do business with, a hearing before the Western Classification meeting. If our Western associations apply to all the railroads which will bring sufficient pressure to bear, the Western Classification Committee will docket it for a hearing. Each road has representatives at this classification meeting. There is no doubt but that there is much injustice in comb honey shipments.

UNIFORM SHIPPING CASES.

The association unanimously voted its endorsement of the specifications for shipping cases, as given in the paper by Mr. Frank Rauchfuss.

Note.—These specifications may be found in the paper by Mr. F. Rauchfuss, on another page of these proceedings.

STATE AID FOR THE BEEKEEPING INDUSTRY.

Many members of the association have felt for some time that much could be accomplished for the advancement of bee culture in Colorado, if honey-bearing plants from other parts of the world were introduced into Colorado. Profuse honey-yielding plants that will thrive in the arid West are needed. So far nothing of this kind has been done, and if Colorado is to hold the front place in honey production among the arid states, she will have to go to work at this problem. It was brought out that alfalfa could doubtless be developed that would be more generous in the supply of nectar, and still be as valuable for hay. Beekeepers in the East find it profitable to

furnish the neighboring farmers with alsike clover seed free, for the bees get enough honey to pay for the cost. If we had an alfalfa that was profuse in the secretion of nectar, the bee men could well afford to furnish the farmers with the seed free, and both the beekeeper and the farmer would profit. At present all our honey plants are so subject to climatic conditions that none of them will secrete nectar except under the most favorable or "high-life" conditions. We need, and that badly, hardy, drought-resisting honey plants, such as we have drought-resisting wheat and grains.

The value of honey, beeswax and bee products runs into the hundreds of thousands of dollars yearly in Colorado, and this is but a small percentage of what can be done when all our resources are developed. We deserve to have a division of apiary investigation established at the Agricultural College. Such a department, with a competent man at the head, could conduct valuable experiments and spread invaluable information to the beekeepers of the state.

Our foul brood law is also faulty, and needs revision and changing. Perhaps if a division of apiary investigation was established at the Agricultural College, the head of this division could oversee the inspection of bees for disease, also.

These points being the sense of the convention, the following committee was appointed to secure the needed legislation for the establishment and carrying forward of this work: Frank Rauchfuss, Wesley Foster, V. Devinney.

ELECTION OF OFFICERS.

The following officers were elected for the year 1911:
W. P. Collins, Boulder, President.
W. L. Porter, Denver, Vice-President.
Wesley Foster, Boulder, Secretary.
Mrs. R. H. Rhodes, Platteville, Treasurer.
Frank Rauchfuss, Denver, Member Executive Committee.

THE COLORADO LAWS

GOVERNING

Horticultural Inspection

Also Regulations and Formulas Adopted by
The State Board of Horticulture

Regulations established by the Colorado State Board of Horticulture, for the purpose of preventing the spread of contagious diseases among fruit and fruit trees, and for the prevention, treatment, cure and extirpation of fruit tree pests and diseases of fruit and fruit trees, shade trees, etc., in compliance with chapter XII of an enactment by the Eleventh General Assembly of the State of Colorado, entitled "An act to create a State Board of Horticulture; define its duties and compensation; to protect and promote the horticultural interests of the State," etc., approved April 15, 1897:

Article I. It shall be the duty of every owner, possessor or occupier of an orchard, or land where trees are grown within this State, to disinfect all trees, bushes or vines grown on such lands infested with any insect or insects, or the germs thereof, or infested with any contagious disease known to be injurious to fruits, trees, vines or bushes, in accordance with the provisions of the laws, the regulations of the State Board of Horticulture, and the directions of the county horticultural inspectors.

Article II. The owner or owners of any nursery or nurseries shall disinfect all their nursery stock of insects or diseases injurious to fruit or trees before the removal of the same from their premises for sale, gift, distribution or transportation.

Article III. Fruit boxes which have been used for shipping fruit to any destination are hereby required to be disinfected previous to their being used for any purpose. All boxes returned to any orchard, storeroom, salesroom, or any place used or to be used for storage, shipping or any other purpose, must be disinfected within three days after their return. All packages known as free packages must be destroyed or disinfected before being used again.

Article IV. All orchards, nurseries, trees or places infested by any insect or insects, their germs, larvæ or pupæ, or infected

by any disease known to be injurious to orchards, nurseries, trees or places, and liable to spread contagion, must be cleaned or disinfected on or before the first day of May of each year. All owners or occupants of land shall comply with the provisions of this section. All fruit packages, trees, vines, plants, cuttings, grafts, and scions that shall not be disinfected within forty-eight hours after notice by the county horticultural inspector shall be liable to be proceeded against as a public nuisance.

Article V. It shall be the duty of the county horticultural inspector in each county to see that the provisions of these regulations are put into force and effect within his jurisdiction, and all offenders punished according to law.

Article VI. Disinfection, as provided by these regulations, shall be to the satisfaction of the county horticultural inspector and the member of the State Horticultural Board having jurisdiction.

By order of

STATE BOARD OF HORTICULTURE,
C. E. PARFET, President.

D. R. STOTLER, Secretary.
MARTHA A. SHUTE, Assistant Secretary.

INSECTS CLASSIFIED.

Insects with biting mouths always gnaw into and devour the tissues of the part of the plant on which they feed. Such insects would include all the caterpillars, commonly known as worms, whether hairy or naked; all of the so-called slugs, grasshoppers, locusts, crickets, potato beetles, larvæ of the leaf-rollers, the codling moth, etc. Insects with sucking mouths always cause the leaves to turn pale or brown in color, and include plant lice, scale lice, aphids, thrips, leaf-hoppers, squash bugs, etc.

As a rule, the biting insects may be killed through the use of food poisons, such as Paris green, London purple, arsenite of lime, arsenate of lead, paragrene and hellebore. For the sucking insects the above poisons are useless, and in their stead contact insecticides or surface irritants and poisonous gases are used. These substances may also be used against biting insects when it is not practicable to poison their food.

REMEDIES—FOOD POISONS.

No 1—Paris Green or London Purple (Arsenicals).

Paris green or London purple	1 pound
Water	100 gallons
Lime	2 pounds

First make a paste of the poison, in a small amount of water. Then dilute to the proper proportions. By adding the fresh lime, slaked and strained, injury to the leaves will be prevented.

For codling moth apply in a fine, forceful spray as soon as blossoms have fallen, and again in 30 days. If weather or other conditions interfere with a very thorough first treatment, repeat it within a week.

No. 2—Arsenite of Lime.

To be used for the same purpose as No. 1.

White arsenic	¼ pound
Sal soda	1 pound
Lump lime	4 pounds
Water	50 gallons

First dissolve the arsenic and sal soda together in one quart of hot water, and boil fifteen minutes. When ready for use, slake four pounds of fresh lime and add to each barrel (fifty gallons) of water, straining through a fine wire screen to prevent clogging the nozzle of the sprayer. For codling moth, spray first time as soon as the bloom has fallen; second time, 30 days later. In ordinary years these two treatments will secure fruit very clear from worms if thoroughly applied. If a third treatment is thought advisable, make it about the last week in July or the first week in August. Meantime, go through the orchard with a little hook made of wire, attached to the end of a pole, and pull off all the apples that have worm holes in them. Destroy the apples, unless you have sheep or hogs to eat them as fast as they drop. It is of the greatest importance to spray thoroughly and at the correct time. No. 3 is probably the best poison to use against this insect.

No. 3—Arsenate of Lead.

Arsenate of lead	3 to 6 pounds
Water	100 gallons

Apply as a spray for all leaf-eating insects. This is one of the most effectual remedies to be used against the codling moth and for leaf-eating insects on cherry, peach and plum trees. It never injures foliage and it sticks to the leaves better than the other arsenical mixtures. For codling moth use about 3 pounds to each 100 gallons of water.

No. 4—Arsenic Bran Mash for Grasshoppers.

Arsenic (or Paris green)	1 pound
Sugar (not important)	1 pound
Bran	30 pounds

Add the ingredients to water sufficient to make the mixture moist, and scatter the poisoned bran in places where the grasshoppers are the thickest. The mash may be placed in orchards, vineyards and other places, where hopper pans can not be used. Much care must be exercised to prevent domestic animals or fowls from having access to the poison.

No. 5—White Hellebore.

Is valuable in destroying the currant worm, pear tree slug, rose slug, raspberry slug, and the larvæ of other saw flies.

White hellebore.....1 ounce
Water .....3 gallons

Apply as a spray late in the day, or dust lightly over the foliage from a cheesecloth sack. Air-slaked lime or fine road dust may be used effectually in some cases.

CONTACT INSECTICIDES.

No. 6—Kerosene Emulsion.

Is especially useful in destroying sucking insects, including plant bugs, plant lice, scale lice, thrips and some plant-feeding mites.

Kerosene .....2 gallons
Whale oil or hard soap.....1 pound
Soft water.....27 gallons

Dissolve the soap in one gallon of boiling water. If the water is hard, break with lye; heat the solution to boiling, and, away from the fire, add two gallons of kerosene. Agitate violently for a few minutes by pumping the liquid back upon itself with a force pump, until the mixture assumes the consistency of cream. Dilute with twenty-seven gallons of water, and the emulsion is ready for use.

No. 7—Whale Oil Soap.

This substance stands close to kerosene emulsion in importance as a destroyer of soft-bodied insects. It may be used to spray the roots of nursery stock where infested with lice.

Whale oil soap.....1 pound
Water .....6 to 8 gallons

As a winter wash it is sometimes used as strong as two pounds in a gallon of water for the destruction of San Jose, Putnam and other scales. A pound to two gallons destroys the eggs of most plant lice or of the brown mite.

No. 8—Formula for Fish Oil Soap.

Concentrated lye.....3½ pounds
Water .....8 gallons
Fish oil.....1 gallon

First dissolve the lye in boiling water and then add the oil and boil for two and one-half hours longer.

This is an effective remedy for scale insects, plant lice, and generally for sucking insects, which can be killed by contact insecticides, and may be used as a substitute for whale oil soap.

No. 9—Winter Resin Wash.

Resin .....30 pounds
Caustic soda (75 per cent.) .....9 pounds
Fish oil .....4½ pints
Water to make 100 gallons.

Boil the resin, soda and oil until thoroughly dissolved. Then boil for three hours, during which time hot water should be added slowly, so as not to stop the boiling, until the whole is diluted to fifty gallons. The other fifty gallons may then be added cold. The resin wash is valuable in destroying scale insects in dry season.

No. 10—Lime, Sulphur, Winter Wash.

Lump lime .....20 pounds
Sulphur .....15 pounds
Water .....50 gallons

Boil all together for 45 minutes to one hour, and then apply warm. A good way is to steam-boil in barrels. Strain out lumps and apply with rather coarse nozzle. Use to destroy scale insects, brown mite and red spider.

No. 11—Bordeaux Mixture.

Is used for many fungous diseases.
Sulphate of copper .....6 pounds
Quicklime .....4 pounds
Water .....22 gallons

Dissolve the copper sulphate in a gallon of hot water, slake the lime in another gallon of water, and then add the milk of lime slowly to the copper sulphate solution, while the latter is being constantly stirred. Then add twenty gallons of water. Apply as a spray.

APPLE TREE ENEMIES.

For Codling Moth (Apple Worm). Use remedy No. 1, No. 2 or No. 3—preferably No. 3. The larvæ may be trapped by applying bands to the trees. (See bands on trees.)

For Leaf-Roller. Use remedy No. 1, No. 2 or No. 3, applying the spray as soon as first leaves appear, and repeat in a week if necessary.

The Apple Flea Beetle. A small metallic-green beetle, about one-eighth of an inch in length, that eats holes in the leaves, and jumps or takes wing quickly when disturbed. Use remedy No. 1, No. 2 or No. 3.

Tent Caterpillar. One of the tent caterpillars is a native of Colorado. The eggs appear in dark brown rings around the twigs and limbs of the trees. They hatch out about the time the leaves appear in the spring, and form little webs in forks of the limbs.

Cut out egg masses on twigs in winter. Also cut out tents and burn them during spring and early summer. If very bad spray with No. 1, No. 2 or No. 3.

The Fall Web-Worm. A yellowish or brownish caterpillar, with a black head, that forms a loose web or tent in a great variety of trees, appearing about the first of July and continuing through the summer. The larvæ are rather sparsely covered with long hairs, that are whitish or yellowish in color, with occasional black ones. When the webs are small, cut out and burn. If the web has become large, inclosing many branches of the tree, burn the worms with a torch, or use remedies No. 1, No. 2 or No. 3.

The Apple Plant Louse. During the winter and early spring there are small, shining black specks in rough places on the bark and about the buds, or distributed promiscuously over the surface of the small limbs, usually abundant where there are numerous fine plant hairs, making a felty covering, to which the eggs are easily attached. The best time for treatment is while the trees are dormant just before the buds open, using whale oil soap in the proportion of one pound to one gallon of water, or black leaf extract, 1 gallon in 30 gallons of water. After the leaves are out, use No. 6 or No. 7 or black leaf extract, 1 gallon to 70 gallons of water.

For Flat-headed Borer. First protect the trees from sun scald and other injuries. In winter or spring the borers can be grubbed out with a sharp knife and destroyed.

The Scurvy Bark Louse. The presence of this insect is indicated by very small white scales upon the trunks or limbs of the trees, sometimes entirely covering the bark, and appearing like a covering of scurf or dandruff—hence the common name. The use of No. 9 or No. 10, while the trees are dormant, will probably kill the scales. After the leaves are out, if the lice appear, use No. 6 or No. 7 the last of May, and again about the 10th of June. The same remedies may be applied to eradicate the oyster-shell bark louse and the Putnam scale.

The Apple-Twig Borer. A cylindrical, mahogany-colored beetle, about one-third of an inch in length, boring holes in twigs of apple, pear, cherry, osage orange and other trees, also grape vines, the burrow starting just above a bud and extending downwards. Remedy—Cut out the infested stems and burn them.

FLAT-HEADED BORER.

W. S. Coburn, ex-president of the State Board of Horticulture, says: "Flat-headed borers attack fruit trees when first planted. If trees are allowed to dry out, or do not receive sufficient irrigation when planted, it has a tendency to dry the roots. Before the tree can make any growth after applying the water, it is necessary for them to keep plump, so as to furnish sap. During this time there is sufficient sap in the stock or trunk of

ASHENFELTER ORCHARD AT MONTROSE, 300 ACRES OF APPLE TREES IN BLOOM. THE PROFUSION OF BLOOMS SHOWS THAT THE ORCHARD WILL YIELD ONE OF HEAVIEST CROPS IN YEARS.

Courtesy of the Denver & Rio Grande Railroad. Photograph by George L. Beam, Denver.

the tree to support life, but it makes no flow, having no supply from the roots. During the months of June and July the eggs hatch, and the borers go under the bark and girdle the tree, and in August you will find the tree entirely girdled right at the base of the ground. I would recommend that trees be planted before they start at all, before the buds even begin to swell. Never let them suffer, before they are planted; apply the water at once, and get an early growth on the trees. Sometimes they are short of water after the middle of July. I would recommend not to water such trees when they have already matured the terminal buds of the first growth."

For Woolly Aphis. As soon as the lice appear on the trunks of the trees in the spring, before they get into the branches, apply kerosene oil with a brush or swab. By repeating the operation a few times they may be kept largely from the tops of the trees. This insect is found on the roots of the trees, where it produces wartlike swellings, and also on the trunk and limbs. It is usually densely covered with a woolly secretion. One remedy for the root form is tobacco dust worked into the ground to the amount of three to six pounds about the crown of the tree and then wet with water. In the hands of one who has had experience, carbon bisulphide may be used effectually by injecting it into the ground about the crown of the tree. If the lice spread over the tops of the trees they may be treated with remedy Nos. 6 or 7 or with black leaf extract, 1 part to 70 parts of water. It is necessary to apply with a great deal of force, so as to wet through the "wool," which protects the lice from any light spray. Where the lice are found on the roots of nursery stock, it is advisable to spray the roots in Nos. 6 or 7, or with black leaf extract, 1 part to 70 parts of water, or to fumigate with hydrocyanic-acid gas.

Bands on Trees for Codling Moth. Wrap around the trunk, one or more feet from the ground, three thicknesses of burlap six inches wide. Put in one tack where the burlap joins. The bands should be in place by June 10 and examined every 10 days to destroy the worms until the apples are gathered. It requires considerable time to get over a large orchard, and there is danger of overlooking some of the insects. The operation must be continuously attended to, and removed as often as once in ten days, or the results will be worse than if the bands were not used, as they afford favorable hiding places for the worms to escape birds and other natural enemies. Some orchardists have adopted the plan of removing the bands, killing the insects on the bark and replacing a new piece of burlap. The old bands are gathered in a wagon, on which is placed a tight wagon sheet, and tight buckets are used to carry the bands in, to a place where they can be thoroughly disinfected by running through a wringer or by using hot water or chemicals. Folds of burlap in the crotches of trees catch many worms.

PEAR TREE ENEMIES.

Red Spider or Brown Mite. To kill the eggs while the trees are dormant in winter use remedy No. 6. For spraying after the leaves are out use flowers of sulphur, 1 pound to 5 gallons of water.

Pear Tree Slugs. Use remedy No. 1, No. 2, No. 3 or No. 5. Plum and cherry trees are also infested by these slugs.

Pear Leaf Blister. This disease is indicated by small black spots appearing upon pear leaves, sometimes so numerous as to run together and involve a great portion of the leaf. Before turning black the spots are green, like the rest of the leaf. The parasites spend the winter under bud scales upon the trees, and may be killed during winter or early spring, when the trees are dormant, by a spray of kerosene emulsion in which the kerosene is one-fifth of the mixture, or with No. 10.

PLUM TREE ENEMIES.

For Green Aphis on Plum Trees. Apply as for green apple aphis.

For Plum Gougers. Many of these insects can be caught by jarring the trees as soon as they are in bloom, placing a sheet under the trees to catch the insects. Collect and destroy all stung fruit before the plums ripen.

The Plum-Leaf Nail-Gall. The leaves of the American varieties of the plum are sometimes injured by the production of a large number of slender tubular projections standing out from their upper surfaces. Inside each gall is a large number of very small spider-like insects or mites. Nothing can be done of much value while the leaves are on the trees. Fallen leaves should be destroyed as far as possible by fire and the trees should be sprayed during the winter with No. 9 or No. 10.

The Plum Curculio. Jarring as for the plum gouger is the best remedy for this insect. Some benefit can be derived from the use of arsenical sprays.

PEACH TREE ENEMIES.

The Peach Borer. A yellowish-white larva, or borer, working beneath the bark at the crown of the tree and down on the roots, causing the exudation of a gummy substance. The eggs are laid about the crown of the tree by a small moth with narrow steel-blue wings that flies in the bright sunshine and resembles a wasp in appearance. Cut out the borer with a knife. This should be done early every spring, without fail, and, if thoroughly attended to, will keep the insect in check. A little dirt should be brushed away from the crown of the tree to discover any burrows that may not be apparent at the surface. Many preventatives have been recommended to keep the female moth from depositing her eggs upon the trees. Other insects that may

be found attacking the peach are the plum curculio, San Jose scale, red spider, brown mite, plant lice and twig borer.

PEACH TWIG-BORER.

Formula No. 10 is the best remedy so far tried, just before the buds begin to open in the spring. After the trees have bloomed and the peaches formed, apply bands to the trees the same as you would for the codling moth. Another remedy recommended by Farmers' Bulletin No. 80, U. S. Department of Agriculture at Washington, is kerosene emulsion and clipping the affected limbs off and burning them.

INSECT ENEMIES OF SMALL FRUIT.

The Western Currant and Gooseberry Span-Worms. For the destruction of these worms use remedies No. 1, No. 2, No. 3, No. 6, or insect powder.

For Grape Leaf-Hopper. Spray with solution No. 6 before sunrise. Apply with force, so as to knock the insects from the vines, and wet the ground to destroy the hoppers. Avoid spraying while the vines are in bloom. The grape leaf-hopper also appears on currant and gooseberry bushes and on Virginia creeper.

Strawberry Leaf-Roller. After the berries are picked mow the vines and mulch with a light covering of straw or other rubbish that will burn quickly, then burn when there is a brisk wind. When the rubbish is burned off, irrigate immediately. If worms appear later, spray with No. 1, No. 2 or No. 3.

The Imported Currant Borer. The moths begin to fly in June and are easily caught in a net at egg-laying time and destroyed, and much can be done in this way to lessen the number of eggs to be laid, and hence the number of larvæ to bore in the currant stems. By cutting out and burning all the infested stems, in the spring, the injuries for the following year will be lessened.

SHADE TREE ENEMIES.

Cottonwood Borer. This insect is also known as the oak carpenter worm, but in Colorado it is known almost exclusively as the cottonwood borer. The larva, when fully grown, is nearly three inches in length, with a shining black head. It cuts large holes in the trunks of the trees. The castings of the borers are pushed out on the surface and the trees bleed as a result of the wounds made to the surface. The sap runs down on the trunk and sours, making a breeding place for maggots of certain flies. With a stout wire many of the larvæ or pupæ can be killed in their burrows. Avoid scarring the tree as much as possible, as the borers usually enter at such places. The cottonwood is also attacked by plant lice, fall web worms and the white willow scale.

The Box-Elder Leaf-Roller. This insect is a close relative of the fruit tree leaf-roller, and it seems to confine its attacks exclusively to the box-elder in this State. The eggs are laid in the

crevices of rough bark and are covered with the scales from the under side of the abdomen of the female, which are placed like shingles upon a roof. Use remedy No. 1, No. 2 or No. 3.

The Ash Gall Louse. Greenish plant lice, curling the leaves of the white ash. The lice usually accumulate on the leaves at the end of the limb. The leaves curl and become so swollen and loaded with lice that the limb will often be bent down with the weight. As soon as the leaves at the end of the limb begin to curl, cut the limb off far enough back to include all the infested leaves, and burn.

The Elm Leaf-cluster Louse. Trim out all the clusters and burn, as soon as they appear.

The Cottony Maple Scale. A yellowish or brownish oval scale on the twigs of soft maple. During the fall, winter and early spring the scales are quite flat, but during May are convex, and, finally, a mass of white, cottony threads appear at one end, raising that end of the scale from the limb to an angle of about forty degrees, or even more. In this cottony mass an enormous number of minute yellowish eggs are deposited, often as many as 2,000 to the single scale. A thorough spraying with No. 6 or No. 7 will kill the young lice when they hatch.

The Pine Leaf Scale. White elongated scales appear on leaves of pine and spruce trees, and beneath the scales, in the spring, will be found a mass of purple eggs, sometimes very abundant, causing the leaves to fall. Use one pound of whale oil soap to six gallons of water, after the young lice have hatched, which will be about the first of June.

THE SYRINGA BORER IN TREES.

Podosesia Syringa. It would be well to thrust a stiff wire into the burrows before plugging them, in hopes of killing the borers by that means. After the larvæ pupate, which they begin to do about the last of April, it is probable that much benefit may be gained by spraying the trunks of the trees with strong kerosene emulsion once a week until June 20 for the purpose of killing any eggs that are being deposited upon them. Sprays, for the purpose of repelling the insect from the trunk of the trees, can hardly be of much value, as the borers work freely upon the upper portion of the stem and branches.

ROSE BUSH ENEMIES.

For Aphis on Rose Bushes. Same as for green apple aphis.

For Rose Slugs. Apply remedy No. 1, No. 2, No. 3 or No. 5. If solution is used, spray with force on the under side of the leaves.

INSECTS INJURIOUS TO FARM AND GARDEN CROPS.

The Squash Bug. There are two broods, the adults of the second brood living over winter under rubbish. By examining

the vines each morning the bugs can be rapidly crushed or collected and destroyed. A little later the eggs, which are deposited on the under side of the leaves in loose clusters, can be quite rapidly destroyed by hand collecting. When the young hatch, take a basin, with a little water in the bottom and a spoonful of kerosene on top, and quickly brush the bugs into it.

The Striped Cucumber Beetle. The beetles appear soon after the cucumber, melon and squash vines are up, and eat holes in the leaves, until the plants wither and die. Eggs are also laid about the stems of the plants and the grubs hatching from these burrow down into the roots of the plants, causing their death. Dust the leaves freely with lime, plaster or ashes, or insect powder, late in the evening, or early morning, while the dew is on.

The Bean Beetle. The beetles deposit their yellow eggs in patches on the under side of the bean leaves. The insect, in all stages, feeds upon the leaves and green pods of the cultivated beans, and particularly wax beans. Lima beans are seldom eaten by them. Brush from leaves on hot ground in middle of hottest days.

For Cut-Worms. Place poisoned green clover or any green bait upon the ground where the worm appears, late in the evening. Do not hoe the garden too clean of weeds while cultivated plants are small, as the cut-worms like the weeds as well as anything for food. If the latter are all cut down there is nothing but cultivated plants for them to feed upon. This may seem to be questionable advice, but it will work well if the weeds are not neglected too long so as to choke the other plants.

For Grasshoppers. Poisoned bait or arsenic bran mash No. 4; catching with hopper dozers; ditching, burning, rolling, harrowing and plowing under of eggs.

To Prevent Rabbits from Girdling Trees. The best plan is to use tree protectors, or rub tallow or a piece of liver on the trunks. Never use axle grease.

Grafting Wax. One pound of raw linseed oil, two pounds of beeswax, three pounds of resin. Mix, heat to boiling, stirring continually, and then dump into a tub of cold water. Then work it like taffy. While using grafting wax, place in the sun to melt to the right consistency.

CAUTIONS REGARDING BLIGHT.

The orchard should be examined in the fall or early winter, cutting every branch showing any signs of hold-over blight, the germs of which remain during winter in partly dormant condition. In cutting out blighted portions there is one precaution that should always be observed, and that is the sterilization of the knife. All branches cut off must be burned.

Composition for Wounds Made in Pruning. Take a quart of alcohol, and dissolve in it as much gum shellac as will make a

liquid of the consistency of paint. Apply this to the wound with a common brush, always paring the wound smoothly first with a knife. The liquid becomes hard and excludes the air, and is not affected by any change of weather. If the white color is objectionable, use a little lamp black.

We acknowledge courtesy of Prof. C. P. Gillette, State Entomologist, for many of the formulas herein printed.

SMUDGING.

It is advisable for orchardists to prepare for smudging or orchard heating.

IRRIGATION.

Irrigate fruit trees *only* when absolutely necessary, as many orchards in Colorado are being injured by over-irrigation.

INDEX

TO THE

Annual Report

OF THE

State Board of Horticulture

1910

INDEX

A

B

C

D

E

F

G

H

I

J

L

M

N

O

P

Q

R

S

T

U

V

W

INDEX

TO THE

Annual Report

OF THE

Colorado State Bee-Keepers' Association

1910

INDEX

A

B

C

D

E

F

G

H

I

K

L

M

N

O

P

R

S

T

U

V

W

Y