Аппиаl ДДН Report 1950-51

COLORADO

Agricultural Experiment Station



Colorado

Agricultural and Mechanical College

Fort Collins



TABLE OF CONTENTS

	cage
Letter of Transmittal	4
Foreword	5
Accomplishments	6
Irrigation and Water Studies.	6
Soils and Fertilizers	$\overline{7}$
Crop Improvement	9
Breeding to Improve Livestock and Poultry Returns	11
Feeding to Increase Livestock and Poultry Returns	12
Increased Range and Pasture Returns	13
Food and Feed Preservation	14
Improving Animal Health.	15
Plant Disease Controls	15
Insect Control	15
Industrial Processing	15
Home Living Problems	16
Weed Control	16
Branch Experiment Stations.	17
Editorial Service	17
Financial Report	23
Personnel Changes	24
Staff	25

Letter of Transmittal

Sixty-Fourth Annual Report

Colorado Agricultural Experiment Station

Honorable Daniel I. J. Thornton Governor of Colorado Denver, Colo.

Sir:

In compliance with the act of Congress, approved March 2, 1887, entitled, "An act to establish Agricultural Experiment Stations, in connection with the colleges established in the several states under the provisions of an act approved July 2, 1862, and under the acts supplementary thereto," I herewith present the Sixty-Fourth Annual Report of the Colorado Agricultural Experiment Station for the fiscal year of July 1, 1950, to June 30, 1951, inclusive.

Homen J. Henney

Homer J. Henney, Director

Fort Collins, Colorado July 1, 1951

64TH Annual Report

Colorado Agricultural Experiment Station

June 30, 1951

Foreword

The Colorado Agricultural Experiment Station, during its 64th fiscal year, was the center of more interest in research results than at any time in the past 10 years.

The Experiment Station is situated at Colorado Agricultural and Mechanical College in Fort Collins. The Station operates horticulture, a g r o n o m y, livestock and range experimental farms in cooperation with the College. From the main Station, activities are directed through Branch Stations in eight agricultural research areas throughout the State. These are near Akron, Greeley, Rocky Ford, Center, Durango, Austin, Craig and Denver.

The 10-year legislative program initiated in 1948 has increased interest in agricultural research and brought it to the front. More people seem conscious of the needs for agricultural research than at any time in the history of the Station.

Insects that decrease the yield of potatoes from 500 sacks an acre to 200, or purple blotch that grades out 50 of each 100 boxes

of onions, or a dead calf in the pasture-these and other costly problems for ranchers and farmers create a demand for the "reasons why." The herbicide, weedicide, fungicide, insecticide and fertilizer fields have all had a phenomenal expansion in Colorado.. Questions on how to stop calves from dying soon after weaning and how to make a higher percentage of turkey eggs hatch are among the special types of requests. "What kind of soil is there on that farm and how much should I pay for it?" are all questions of newcomers in Colorado. There are questions on what new crops will take the place of wheat and potato acreages. New strains of old crops and occasionally new varieties are suggested. "How can I cover more acreage with the irrigation water I have now?" "Will a sprinkler system do it at a cheaper cost in the long run?"

The projects started with the increased state funds two years ago are beginning to bear fruit. The new projects in cooperation with agencies of the U. S. Department of Agriculture, are showing progress. The project which deals with growing more and better hay on irrigated meadows at high altitudes is already showing how to double hay vields. It still has to show how this can be done economically. The soil fertility maintenance and water penetration problems on the upper Colorado river are being studied closely.

Homer J. Henney Homer J. Henney, Director

Accomplishments

Irrigation and Water Studies

Measurements of the water table in 137 observation wells in the South Platte and Arkansas Valleys were made in the spring and fall. Three automatic recorders were operated throughcut the year. There was a general lowering of the groundwater table during the 1950 summer in all pumped areas of the state.

Investigations regarding installation of new sprinkling systems and the performance of old systems continued. Performance data included penetration of water applied, satisfaction, cost of power, etc. Considerable attention was paid to the functioning of screens, a difficult problem.

Comparison of f u r r o w and sprinkler systems of applying irrigation water on the apple crop has not as yet produced any sign i f i c a n t difference, although slightly higher yields were obtained under the sprinkler system. Poorer fruit color resulted on the furrow system. Data has not been completely analyzed because of storage tests.

The need for irrigation was determined by the moisture stress developed in the soil as measured by tensionmeters and gypsum blocks installed in test plots. Experiments have shown that as the moisture level was increased to the most favorable condition, the yields increased. Similarly, as the fertility increased, the yields increased The data indicates that in years of limited moisture, high yields may be obtained with higher levels of fertility, up to a certain point.

Last year it was found that there was a highly significant correlation between low soil moisture and stem-end discoloration, due mainly to methods used of prematurely killing potato vines. Maturity was a lesser factor than soil moisture, since in all cases it was possible to decrease the percentage of discoloration by irrigation to where there was no significant difference between the early and late application of vine killers.

Soils and Fertilizers

Leaf mold, dry grass clippings, cotton seed hulls, manure and Canadian peat are being used in soil mulch trials which the past 2 years have indicated that 1 inch of mulching material greatly reduces frequency of watering.

There is some indication that added colloidal silica is itself taken up in different amounts in different treatments, according to incomplete tests with gravelgrown carnations. This may have some effect on stem stiffness, an important market quality in carnations.

Field and greenhouse experiments were conducted to evaluate the relative effectiveness of phosphate materials and methods of application by using the radioactive tracer technique. An experiment with sugar beets on Las Animas clay in the Arkansas Valley showed that phosphorus in two ammoniated superphosphates (1.4 and 3.3 percent NH₃) to be as available to the plant as was phosphorus in concentrated superphosphate.

The availability of calcium metaphosphate to the plant increased as the particle size of the fertilizer decreased from 10 to 40 to 100 mesh. The 100mesh material was not as available as concentrated superphosphate early in the season but was equally available by the end of the season. Phosphorus added as H_3PO_4 or 11-48-0 in the irrigation water was equally available from the two sources. Phosphate fertilizer applied in the irrigation water at the time of planting was not as available early in the season as phosphorus added in dry form as concentrated superphosphate or 11-48-0. Later in the season the two methods of application proved to be equally effective.

Data indicates t h a t alfalfa plus the original commercial fertilizer application treatments may bring b a c k productivity faster than commercial fertilizer alone on leveled land where 1 foot or more of top soil has been removed.

Studies of the effect of particle size and exchangeable bases on soil structure have indicated that the silt percentage, as well as the exchangeable sodium percentage, may be very important in contributing to poor soil structure in western Colorado soils. The most pronounced results of the fertility studies were an increased yield of corn of about 25 percent, and an increase of about 50 percent in sugar beet yield from nitrogen applications.

Infiltration and permeability studies similar to those m a d e last year at the Dry Land Field Station were m a d e in Yuma county during the latter part of September. The objective this year was to secure information on sloping land under stubble mulch and different tillage practices. A study was made on Colby silt loam on an 8 percent slope both under stubble mulch and on a bare field seeded to wheat. The difference in amount of silt collected from the b a r e seeded field plot and the stubble mulch plot showed that stubble mulch is v e r y effective in reducing sheet and gully erosion on 8 percent slopes.

Native range forage plant clippings were made in July after growth had been attained to determine the residual effect of 18 percent superphosphate applied on October 19, 1948, and 20.8 percent ammonium sulphate applied March 15, 1949. The forage yields indicated by these clippings showed no significant difference between any of the treated plots and the checks, indicating in this case very little. if any, carry-over of the effect of nitrogen or phosphate fertilizer the second year.

Ammonium nitrate fertilizer was applied to native range on May 13 at the rates of 20, 100 and 150 pounds per acre. Clippings made to determine forage production on these plots indicated that ammonium nitrate applied at the rate of 100 pounds to 150 pounds per acre gave a significant increase in forage production. The 50-pound rate of application did not show any significant increase in forage production.

Sod-bound intermediate

wheatgrass was subjected to four treatments: (1) renovation; (2) 15 pounds nitrogen; (3) 30 pounds nitrogen, and (4) 45 pounds nitrogen per acre. Grazing was allowed on a portion of the area. Clippings indicated that the lower rates of application had little effect on forage production but that renovation and the 45 pounds of nitrogen both showed increases in forage production.

During past years in the San Luis Valley, it was found that 40, 160 and 20 pounds per acre of available nitrogen, phosphate and potash, respectively, produced the most economical notato. There was still some question as to the best method and time of application, but this vear's results, although not considered proven, indicate that the standard method of applying the fertilizer in two bands, 2 inches to the side and 2 inches below the top of the seed piece at planting time was superior.

Large responses in yield of potatoes were obtained from the use of nitrogen at 60 to 70 pounds per acre on the early planted farms. None of the fertilizers used on the late-planted farms produced an increase in yield large enough to be beyond the possibility of a chance effect.

At the Colorado Potato Experiment Station a commercial fertilizer experiment was conducted with two dates of planting. One date of planting was the first of June, the other June

15th, and in every case the early planted plots outyielded the late-planted.

Foliage spray applications of plant nutrients have failed, so far, to produce beneficial results when compared to standard fertilization practices. This was especially so with nitrogen as a plant food. The test materials were applied to apple, peach and cherry foliage.

Crop Improvement

In both the Meeker Baltic and Hardistan alfalfa maternal line selection program, progeny of each of the selected third-genertion plants were

ALFALFA subjected to inoculations of bacterial

wilt and reclassified for wilt resistance. The fourth-generation families displayed a considerable increase in wilt resistance over that of the previous generations. The average wilt resistance of 182 Meeker Baltic families was 52 percent in contrast to 16 percent for the 78 third-generation families from which the selected plants were obtained. The Hardistan lines averaged 59 percent resistance in contrast to 30 percent for the 72 parental lines. This work shows considerable improvement in the selected over the original parent material.

Severe winter conditions eliminated all but 100 lines of the smut resistant, winter hardy cross of Purdue x Trebi. These remaining selections BARLEY are being increased for yield tests to be planted in the fall of 1951. Several thousand inoculations were made with loose smut in various

crosses of smut-resistant and

commercial varieties of barley. Readings will be made to determine the reaction of the progeny in July of 1951.

Corn breeding studies were conducted in 1950 on the Agronomy Farm of the Experiment Station at Fort Collins, as well as on the Arkansas Val-CORN ley Branch Station at Rocky Ford. Two new hybrid varieties, Colorado 120 and Colorado 330, were released in 1951 as a result of these studies.

Results from the dryland hybrid-corn tests at Akron indicate that Colorado 152 and Dekalb 65 yielded high over a 4year period, 1946-50 (1949 omitted). The test at Haxtun indicated that Wilson W 275 was high for the 4-year period, 1947-50.

No difference could be found in chemical composition or quality of Elberta peaches harvested from "short-pruned" trees. On dwarf - apple rootstocks

FRUIT all varieties have produced fruit at an earlier

age with sizes running larger than standard trees. Yield data has not been tabulated as yet. Six sports of the Jonathan apple have been compared with the regular Jonathan in composition and quality. All except the Minjon were found to be as desirable as the Jonathan.

The amino acid picture is altered in potato tubers and sugar beet roots when the plants are treated with 2,4-D. At least one other hormone-like **POTATOES** material produces similar results. The protein picture in potato tubers is also altered.

The development of a cultural treatment of potatoes for the intensification and stabilization of the red-skin color of red varieties of potatoes is already finding widespread application in Colorado.

Continued progress has been made in improving germination of beet seed through the use of furrow forming planter units

sugar BEETS rubber "V" press wheels.

More uniformly improved results have been obtained with the rubber "V" press wheel than any of the other 75 types tested.

A two-row, power-take-offdriven cycloid weeder was built and tested as a weeder for sugar beets. This machine which was built after earlier tests with a single-row model designed at the station proved successful. The two-row machine has shown considerable effectiveness in removing small weeds from beets.

A four-row sugar beet leaf stripper was designed and built to remove the broad, leafy part of the sugar beet top in large enough quantities for commercial dehydration. Both stripped sugar beet leaves and entire tops with crowns were chopped fine and successfully dehydrated in a commercial Heil alfalfa dehydrator. A high-quality livestock feed was produced at a cost about 50 percent greater than for the same dry weight of dehydrated alfalfa.

Sorghum variety experiments were conducted under dryland conditions at the Dry Land Field Station and under irrigation at the Arkansas Valley SORGHUM Branch Station. Several selections from a Coes x Norkan cross offer promise as grain sorghum types suitable for combine harvesting. Some third generation selections from the cross (Extra Early Pink x Early Kalo) x Midland, also showed promise in 1950.

A total of 200 first-generation hybrid onions were tested in 1950. Plots were located at Rocky Ford, Olathe, and Fort Collins. Several Sweet **ONIONS** Spanish crosses tested at Rocky Ford were superior to the commercial checks in storage quality, but inferior in yield. At least three Globe-type hybrids were superior in yield and at least equal in storage quality to Mountain Danvers when tested at Olathe.

Selection and inbreeding was continued within the Sweet Spanish and Globe-type varieties. Considerable resistance to field and storage diseases was found in five Sweet Spanish inbreds.

Systematic combinations of inbred carnation parents are being made to produce outstanding varieties for Colorado conditions.

By progeny test-**CARNATIONS** ing, outstanding parents are being obtained and preserved for our use. Foundation stock is being distributed to propagators for commercial testing this year. Colors are medium pink, gold, crimson and deep pink. The inheritance of flower size is under study.

In the winter wheat studies. new crosses were made using spring wheat parent material with superior leaf and stem rust resistance. Selections

WHEAT were made in secondgeneration and more advanced generation material. Several advanced lines were included in yield tests at Fort Collins and at the Dry Land Field station. Several selections have been entered in U.S. Department of Agriculture uniform tests for Hessian fly resistance, winterhardiness, and uniform bunt resistance. The Station is also taking part in the cooperative program to determine if any of the existing materials used in breeding programs in the United States are resistant to race 15B of stem rust.

The serious losses caused by dwarf bunt in the northwestern part of the state have made necessary the inclusion of the program of work to develop good milling quality wheat having Selecdwarf bunt resistance. tions of resistant material of this type are being tested in the northwest part of the state because of the danger of transporting those races of bunt to the eastern slope.

Breeding to Improve Livestock and Poultry Returns

Conventional type steers were about 20 percent heavier than comprest when started on feed as calves, when slaughtered

CONVENTIONAL carcass. VS. COMPREST HEREFORDS

and in the Both steer types were fed to a con-

stant finish of high good to low Rate of gain was 16 choice. percent greater for conventional

type steers. Efficiency of converting feed into gain was practically identical for the two types. In other words, feed costs per pound of gain were the same for both types.

In the beef breeding research. 15 different inbred strains of Hereford cattle are being developed in order to check the feasibility of attempting to adapt hybrid corn breeding methods to commercial beef production. In

BEEF

individually feeding yearling beef BREEDING bulls from these different lines in

1950, the most efficient progeny group required 14 percent less feed than the least efficient group. This indicates that there is a great opportunity to develop even greater beef producing efficiency from Hereford cattle.

The results of 11 incubation trials, involving about 4,500 pedigreed eggs, support previous work at this Station that 23.5

Feeding to Increase Livestock and Poultry Returns

Range breeding cows fed a winter ration of sorghum fodder. soybean meal and minerals supplemented with 1/2 pound alfalfa hay after two calf **RATIONS** crops show a trend in FED better calving per-CATTLE formance and heavier weaning weights than animals fed no supplemental source of vitamin A.

Two pounds of 18 percent safflower meal had slightly over half the value of 1 pound of soybean meal as a protein supplement when fed to steers. Safmeal with 25 to 28 percent protein had about 80 percent the value of soybean meal as a protein supplement. Eighteen percent safmeal fed as $\frac{1}{3}$ of the concentrates had about $\frac{2}{3}$ the fattening and protein value of a mixture of five parts corn and one part soybean meal fed in percent oxygen at 0.8 percent carbon dioxide is POULTRY near to optimum hatchability at an

altitude of 5,000 feet. Individual hens from the families which gave the best hatchability at optimum conditions also gave the best hatchability at low (19 percent) and high (26 percent) oxygen levels. The data suggested a possible advantage of selecting breeding stock under extreme conditions of incubation for improvement in hatchabili. ty. Individual families have best hatchability at different levels of oxygen.

the same manner.

Varying amounts of concentrates to roughages in cattle fattening ration in the ratios of 3:1, 2:1, 1:1, and 1:2 were tested. The 3:1 ration produced the slowest but the most economical gains. If sold at 112 days after being placed on the ration the steers on the 3:1 ratio would have shown the most profit, followed in order by those on the ratios 1:1, 1:2, and 2:1. This experiment is still in progress. Another experiment showed that all four types of dried molasses beet pulps tested were good feeds with three of them — comparatively new types—equal to or slightly superior to the type in use the past several years.

Best methods of fattening heavy, medium, and lightweight lambs at desired market

weights were studied. Three rations were fed with

FED SHEEP

RATIONS the purpose of rapid. medium and delayed fattening. The three rations were used for

each weight group. The lambs weighing 70 pounds have given to date the largest and cheapest gains for each of the rations fed. The lambs weighing 80 pounds have given the poorest gains and at the highest costs.

Several experiments with chicks fed a supplement including B12 resulted in lower blood amino acid levels. A basal diet built around solvent POULTRY process soybean oil meal did not agree with other basal diets supplemented with B_{12} .

An antibiotic containing animal protein factor supplement stimulated growth when used in chick diets and increased feed efficiency. Certain utilization other supplements supposedly free of antibiotics gave as favorable results.

A striking effect of fasting

chicks, then returning them to feed, has been observed. Blood levels of arginine, methionine, tryptophan and histidine were lowered, while that of lysine was very markedly increased.

Two clips were sampled for shrinkage in 1950. Core tests were also run on the two clips in conjunction with the Denver

Wool lab-

WOOL oratory of **INVESTIGATIONS** the Production

and Marketing Association. The hand samples and the core samples vielded shrinkage percentages within 2 percent in all cases. This project may be expanded next year, especially if the new 34 inch core tube proves This new tube is successful. 35 inches long, has a ⁸ .- inch diameter and is forced into the wool bag without use of a machine. A clip can be sampled in less than a half hour using this technique and bags can be sampled from the ends, making it unnecessary to remove sacks from original piles.

Increased Range and Pasture Returns

Forage yields of several grass species planted at the Great Divide Branch Station following a removal of big sagebrush by burning indicates **RESEEDED** that reseeded AREAS areas produce between eight and nine times as much forage as unimproved sagebrush ranges.

Seeded forage comprises twothirds of this production. Reseeded areas produce two times as much forage as burned sagebrush lands which are not seeded.

Results of 1949 tests show that the butyl ester form of 2,4-D is more effective in controlling sagebrush than the amine or sodi-SAGEBRUSH um salt forms:

SAGEBRUSH um salt forms; CONTROL that a commercial mixture of

2,4-D and 2,4,5-T was most effective May 16, while the 2,4-D was most effective June 14. Spraying done July 1 was not very effective. Sagebrush kill from all treatments varied from 20 percent for the ineffective to 74 percent for the most effective. A wetting agent was a valuable addition to the water sprays.

A factorial experiment to study effects of fertilizer, irrigation methods, time of cutting, and introduced plant species on

an established welldrained meadow YIELDS showed the first year that increased hay

yield of approximately 100 per-

cent resulted from nitrogen application. A correspondingly high increase in protein content was noted.

While continuous vs. rotation. al grazing on irrigated pasture with dairy cows has not gone far enough to measure true re. sults, there is a ten. GRAZING dency for the contin. uous to show less vield in both mixtures. Studies show that vitamin A deficiency is not common in Colorado for. ages except in the dryland region of the eastern part of the state. Mountain meadow have when cut early compare favor. ably with alfalfa hay in vitamin A value.

Alfalfa hay has proved more valuable as a source of vitamin A than the equivalent of high potency vitamin A oil according to blood analyses.

Food and Feed Preservation

The carotene utilization factors in alfalfa have been traced to the non-saponifiable fraction of the acetone extract. The factor or factors is heat stable.

Boron-sprayed Starking Delicious apples were found to be higher in total acidity than unsprayed fruit. Such spray applications may have value in overcoming lack of flavor in certain apple varieties. A processing method for the production of dehydrated potatoes has been developed which permits the control of non-enzymatic browning. This process is being adapted for large-scale application.

Great interest has been shown in the uncooked frozen apple pulp developed at the Station as a base for fresh apple sherbet and ices.

Improving Animal Health

Work was started to compare the incidence of liver abscesses in feedlot cattle with the incidence of liver abscesses in pastured cattle. Forty-six beef cattle were examined in slaughter houses. These cattle had histories of pasture feeding through the summer months, followed by one month of heavy concentrate feeding in feedlots prior to slaughter. Over-all liver a b s c e s s incidence in this area is about 16 percent of all cattle slaughtered. The incidence of liver abscesses occurring in the 46 pastured cattle was lower than the over-all incidence.

Plant Disease Controls

There is some evidence that methods of inspection and destruction of diseased trees heavily infested with green peach aphids may have a bearing on the dissemination and spread of the peach mosaic virus.

Insect Control

Entomologists have found that DDT in five combinations and parathion reduced potato aphid population to almost zero during the season. Methoxychlor and untreated checks had very high populations of this aphid.

Parathion and methoxychlor continued to give the best results in reducing the numbers of cherry fruitworms in sour cherries.

The appearance of the Red-Banded leaf roller in Delta and Mesa counties in 1949 has been responsible for a series of observations on this insect during 1950. It has been found causing 15 percent damage to apples in one orchard near Cedaredge.

Industrial Processing

It was shown that betaine hydrochloride, concentrated Steffans filtrate and a liquid betaine filtrate could function as transmethylators in the chick as effectively as methionine.

A large collection of dried

pregnant cow manure as well as various extractives therefrom have been assayed for androgenic hormone content. The extracts are being further treated and characterized as to their hormonal content by the laboratory sponsoring this project.

Home Living Problems

Consumers at Milwaukee were willing to pay up to four cents per pound more for **PEACHES** ripe peaches than the firm ripe peaches, and likewise for firm ripe as compared to firm peaches.

Basic proportions for two home-type mixes, an all-purpose mix and a cake mix, were adapted for use at high altitudes.

These mixes provide a BASIC short cut for the prep-BAKING aration of a wide vamiXES riety of baked foods. The list includes bis-

cuits, muffins, pancakes, waffles, breads, quick rolls, pastries, cakes, and cookies. Recipes for these foods with many variations were standardized and tested at an altitude of 5,000 feet. Thereafter, recipes for the same foods were standardized for altitudes equivalent to 7,500 and 10,000 feet. Bakings for the latter tests were conducted in the altitude chamber. Work is now in progress to standardize this mix for the three altitudes and develop large quantity recipes for hospitals, school lunch rooms, cafeterias, hotels, restaurants, summer camps and lodges. Studies are also in progress to develop recipes for differing high altitudes.

Weed Control

The State Assembly of 1949 transferred the function of Seed Inspection and Seed Law Enforcement to the State Department of Agriculture. The Labor-SEED **INSPECTION** atory trained several of the state men for inspection service, but means for raising funds for carrying on the inspection service were not provided and the State Department has done no inspection. With the discontinuance of the Seed Inspection we may expect an increased disregard for the provisions of the State

Seed Law, a decrease in the

number of seed samples received

for testing by the Seed Laboratory and a general decline in the quality of the seed offered for sale in the state.

In general, field bindweed, silver-leaf poverty weed, mouseear poverty weed, and whiteweed are rather readily controlled with 2,4-D. Canada WEED thistle, Russian CONTROL knapweed, woolly-

leaved poverty weed, and leafy spurge are much more resistant, but may be definitely supressed under proper conditions. They are particularly resistant when growing in isolated patches.

Branch Experiment Stations

Research findings reach many people directly through the Branch Stations. The "visiting days" at these Stations are intensive one-day schools at which research in progress is studied. The experimental results reported are applied immediately on the farms of many of the "students."

During the year, 3,960 people participated in organized visiting days. This is almost the same as the number of 4-year students at the College. Winter meetings and visits by individuals and small groups throughout the year increase the number of people learning from experimental work at Branch Stations to considerably more than are learning on the campus.

Local people through their organizations participate in the planning and development of research programs at the Branch Stations. Some groups assist in the actual work on the experiments and others give financial assistance. Cooperation of this kind r e s u l t s in experimental work that is more directly applicable to the problems of the people served by the Station and in quicker use of research findings.

Many of the accomplishments reported on the succeeding pages are the result of experimental work at Branch Stations. They are included along with other accomplishments because the Branch Stations are integral parts of the Colorado Agricultural and Mechanical College Experiment Station.—Dr. Walter R. Horlacher, Director of Branch Stations.

Editorial Service

Scientific journals published nine manuscripts bearing the Colorado Agricultural and Mechanical College Experiment Station scientific journal series. In addition, during the fiscal year 10 scientific numbered manuscripts were accepted for publication. Twenty other articles, authored by Station personnel, appeared in scientific journals or special publications. Twenty-two papers, listed with Station miscellaneous series numbers, were published in semi-technical journals or mimeographed form. A total of 375 news stories were released to newspapers, magazines, and radio stations. Special assistance, photographs, and other material was furnished at the request of regional newspapers and magazines.

Semi-Monthly Publications

Colorado Farm and Home Research. Six issues containing 57 articles on Station research progress.

Monthly Publications

Colorado A & M News. Twelve issues, Volume 5.

Commodity Letters. Six mimeographed publications sent to groups interested in artificial insemination, onions, potatoes, bees, carnations, and poultry.

Yearly Publications

Sixty-Third Annual Report, Colorado Agricultural and Mechanical College Experiment Station, 1949-50. 60 pages, 1,500 copies.

Technical Bulletins

No. 42—"Utilization of Phosphorus by Various Crops—As Affected by Source of Material and Placement."

By Sterling R. Olsen, W. R. Schmehl, Frank S. Watanabe, C. O. Scott, W. H. Fuller, J. V. Jordan, and Robert Kunkel.

3,000 copies ordered by Colorado; 100 by Idaho; 350 by Arizona. December 1950; 44 pages and cover.

No. 43—"Fertilization of Red McClure Potatoes in the San Luis Valley of Colorado."

By Robert Kunkel, Robert Gardner, and A. M. Binkley January 1951; 3,000 copies; 32 pages.

No. 44—"Moisture Changes in Sacked Raw Wool." By Eugene Bertone May 1951; 2,000 copies; 24 pages.

Popular Bulletins

Bul. 393-A (revised) "Handbook of Commercial Fertilizers and Soil Amendments."

By Robert S. Whitney and R. H. Tucker.

May 1950; 3,000 copies, 40 pages.

Bul. 403-A (revised) "Pasture and Forage Crops for Irrigated Areas in Colorado."

By D. W. Robertson, R. M. Weihing, and R. H. Tucker.

April 1950; 5,000 copies, 52 pages.

Bul. 405-A (revised) "When to Use Sprinkler Irrigation in Colorado."
By W. E. Code and A. J. Hamman.
June, 1950; 5,000 copies, 20 pages.

Bul. 409-A (reprint) "Freezing Fruits and Vegetables."By May Starek with the assistance of Gestur Johnson. July, 1950; 10,000 copies, 12 pages.

- Bul. 413-A "Reseeding Sagebrush Lands of Western Colorado."
 By A. C. Hull, Jr., Clyde W. Doran, C. H. Wasser, and D. F. Hervey December, 1950; 4,000 copies, 24 pages.
- Bul. 414-A "Onion Production in Colorado."By A. M. Binkley, A. C. Ferguson, and H. Fauber.February, 1951; 5,000 copies, 48 pages.

Bul. 415-A "Quick Mixes for High-Altitude Baking." By Ferne Bowman and Elizabeth Dyar. February, 1951; 8,000 copies, 36 pages. Circulars

- "More Profits from Your Poultry Flock." By C. L. Gish
 - April, 1951; 10,000 copies, 16 pages.
- "Proposals to Bring Hundreds of Acres of Western Colorado Alkali Soils Back into Economic Production." (Cooperative Station Pamphlet). February, 1951; 1,000 copies, 4 pages.
- "10-Year Farm Inventory" Book. 3,120 copies

5,120 copies

"Farm Account" Book. (reprint) 6;405 copies By Avery Bice and J. Leo Paschal. September, 1950.

SCIENTIFIC SERIES (Published)

- Deming, G. W. Recent Results With Sugar Red Garden Beet Hybrids. 1950 Pro. American Society of Sugar Beet Technicians. Sci. Series 339.
- Frey, Paul R., and Singer, Robert. Nutritional Studies on Carotene Stereoisomers. Journal of Colorado-Wyoming Academy of Science, Vol. 4, No. 2, p 27, October 1950. Sci. Series 347.
- Olsen, O. Wilford. Natural Infection of Chinchillas with the Mouse Tapeworm, Humenolepis Nana var Fraterna. Veterinary Medicine, Vol. 45, No. 11, Nov. 1950. Sci. Series 338.
- Patton, A. R., and Chism, Patricia. Paper Chromatography of Browning Reaction Fluorogens. Nature, 167, 406 (1951). Sci. Series 346.
- Patton, A. R. Further Student Experiments Using Paper Chromatography. J. Chem. Education, 27, 574 (1950). Sci. Series 337.
- Payne, Merle G.; Fults, Jess; Hay, Ruth; Landblom, Nellie; Schaal, L. A. The Effect of Storage on Red Skin Color and Sprouting of Red McClure Potatoes Harvested from Plants Treated with Sodium Salt of 2,4-D. American Potato Journal, Vol. 28, No. 1, p 455-64. January 1951. Sci. Series 340.
- Rumley, Gail E., Thomas, W. D. Jr. Inactivation of Carnation Mosaic Virus. Phytopathology, Vol. 41, p 301-303, 1951. Sci. Series 332.
- Simonds, Austin O. Transmission of Apricot Ring Pox to Peaches and Plums. Plant Disease Reporter. 35, No. 4, pp 189-90, April 15, 1951. Sci. Series 355.
- Thomas. W. D. Jr.; Baker, R. R.; and Zoril, Joseph G. The Use of Ultraviolet Light as a Means of Diagnosing Carnation Mosaic. Science. Vol. 113, No. 2942, p 576-77, May 18, 1951. Sci. Series 351.

SCIENTIFIC SERIES (Accepted for Publication)

Fults, Jess; Payne, Merle G.; Gaskill, John O., and Hac, Lucille. Increase in Glutamic Acid Content of Colorado-Grown Sugar Beets by Spraying With Zinc Dimethyldithiocarbamate. Botanical Gazette. Sci. Series 350. Kunkel, Robert; Gregory, J.; Binkley, A. M. Mechanical Separation of Potatoes Into Specific Gravity Groups Shows Promise for the Potato Chip Industry. American Potato Journal. Sci. Series 359.

- Olsen, Sterling R. (USDA). Measurement of Surface Phosphate on Hydroxy. lapatite and Phosphate Rock. Journal of Physical and Colloid Chemistry. Sci Series 361.
- Patton, A. R. Teaching Amino Acid Formulation. J. of Chemical Education. Sci. Series 356.
- Patton, A. R. and Chism, Patricia. Quantitative Paper Chromatography of Amino Acids. Analytical Chemistry. Sci. Series 362.
- Payne, Merle G., Fults, Jess; and Hay, Ruth J. 2-4-D Treatment of Potato Plants Causes Accumulation of Glutamic Acid in Tubers. Science. Sci. Series 358.
- Payne, Merle G., Fults, Jess; and Hay, Ruth J. 2,4-D Treatment of Potato Plants Changes Free Amino Acids in Tubers. American Journal of Botany. Sci Series 360.
- Stonaker, H. H. A Herd of Hereford Cattle With an Average Inter-se Relationship Greater Than That Between Full Sibs. Journal of Heredity. Sci. Series 354
- Thomas, W. D., Jr., and Graham, R. W. Longevity of the Red-Node Virus in Beans. Phytopathology. Sci. Series 352.
- Thomas, W. D., Jr., and Graham, R. W. The Seed-Borne Transmission of Red Node in Pinto Beans. Phytopathology. Sci. Series 357.

MISCELLANEOUS SERIES

- Branch Station Report, San Luis Valley, 1949-50. Sta. Mimeo. Misc. Series 478.
- Branch Station Report, Arkansas Valley Branch Station 1949-50. Sta. Mimeo. Misc. Series 481.
- Branch Station Report, Western Slope Branch Station 1949-50. Sta. Mimeo. Misc. Series 482.
- Code, W. E. How Much Water With a Sprinkler? The Western Farm Life, November 1, 1950, p. 5. Misc. Series 473.
- Division of Irrigation. Federal-State Cooperative Snow Surveys and Irrigation Water Forecasts for the Colorado River, Rio Grande, and Platte-Arkansas Drainage Basins for February, March, April, and May. Sta. Mimeo. Misc. Series 475, 476, 477, 484, 485, 486, 487, 488, 489, 491, 492, 493.
- Lare, George H., and Schaal, L. A. (USDA). New Chemical Treatments for Potatoes Prove Successful in Tests by Scientists. Colorado A & M News, Vol. 5, No. 12, p 3, June 1951. Misc. Series 490.
- Leonard, W. H.; Koonce, Dwight; Gausman, Glen J.; Fauber, Herman; Brandon, J. F.; Gausman, C. E. Performance Tests of Hybrid Corn Varieties Grown in Various Regions of Colorado in 1950. Sta. Mimeo. Misc. Series 480.
- Thomas, W. D., Jr., Soil Treatment for Carnations, 1950-51. Colorado Flower Growers Bulletin, No. 22, p 1-4. Misc. Series 474.
- Thomas, W. D., Jr., Soil Treatment for the Control of Fusarium of Carnations, 1949-50. Colorado Flower Growers Bulletin, No. 14, p 1-2, 1950. Misc. Series 474.
- Thomas, W. D., Jr., et al. General Report on Pinto Bean Investigations, 1950. Sta. Mimeo. Misc. Series 479.

PUBLISHED (Not Numbered)

- Holley, W. D., and Thomas, W. D., Jr. Condensation of Moisture in Greenhouses. Colorado Flower Growers Bulletin, No. 13, p 1-2.
- Kunkel, Robert, and Binkley, A. M. Potato Industry's Foremost Problem. Colorado Potato Grower, Vol. XXIX, No. 1, July, 1951.
- Kunkel, Robert. Fertilizer Tests on Colorado Spuds. A & M's Analysis of Important Points in Fertilizing Potatoes in Colorado. Colorado Potato Grower, Vol. XXVIII, No. 11, May 1951.
- Kunkel, Robert, and Binkley, A. M. People Pick Their Potatoes by Looks. Colorado A & M News. Vol. 6, No. 1, July 1951.
- Kunkel, Robert; Gardner, Robert, and Binkley, A. M. Results of Fertilizer Trials on Potatoes in the San Luis Valley. American Potato Journal. Vol. 27, No. 9, September, 1950.
- Kunkel, Robert. Results of Fertilizer Trials in Colorado. Western Colorado Horticultural Society Transactions, 1951.
- Kunkel, Robert; Edmundson, W. C.; Gregory, J. S., and Binkley, A. M. Potato Vine Killing in Relation to Stem End Discoloration of the Tubers. Proceedings Third Annual Conference on Potatoes, March 1951.
- Lang, C. T.; Skiles, R. L., and Thomas, W. D., Jr. Spray Tests for 1950. Colorado Onion Tips, Vol. 2, No. 1, p 1-2, 1951.
- Lucas, K.; Gassner, F. X.; Stonaker, H. H., and Wheeler, S. S. Relationship of Thyroid, Adrenal and Pituitary Characteristics to Body Development in Small and Conventional Types of Fat Hereford Steers. Proceedings Western Section of American Society of Animal Production, July, 1950.
- Safley, C. E.; Stonaker, H. H., and Wheeler, S. S. A Comparison of Small and Conventional Types of Hereford Steers as Evaluated by Body and Carcass Measurements. Proceedings Western Section of American Society of Animal Production, July, 1950.
- Schleicher, E. W.; Stonaker, H. H.; Hazaleus, M. H., and Wheeler, S. S. Feedlot and Carcass Characteristics of Small and Conventional Type Hereford Steer Calves. Proceedings Western Section of American Society of Animal Production, July, 1950.
- Thomas, W. D., Jr., et al. Top Soil Application of Chemicals for Control of Carnation Wilt Diseases. Carnation Craft, 151, p 3-7, 1950.
- Thomas, W. D., Jr.; Skiles, R. L., and Lang, C. T. Soil Treatment Tests, 1950. Colorado Onion Tips, Vol. 2, No. 3, p 2-4, May-June, 1951.
- Thomas, W. D., Jr., and Baker, R. R. Carnation Mosaic Can Spread Through Roots. Colorado Flower Growers Bulletin, 17, p 5-6, 1951.
- Thomas, W. D., Jr., and Lang, C. T. Purple Blotch Dissemination. Onion Tips, Vol. 1, No. 6, p 2-3, 1950.
- Thomas, W. D., Jr. Bacterial Fasciation Disease of Ornamental Plants. Colorado Flower Growers Bulletin, No. 12, p 5-6, September 1950.
- Thomas, W. D., Jr. A Great Friend Faces Destruction. Green Thumb. Vol. 7, No. 11, p 23-25, November 1950.
- Thomas, W. D., Jr. Neck Rot. Onion Tips, Vol. 1, No. 5, p 1-2.
- Thomas, W. D., Jr. Preliminary Studies of the Factors Affecting Development of Bacterial Wilt on Carnations. Colorado Flower Growers Bulletin, No. 9, p 3-4, July.
- Thomas, W. D., Jr. Winter Injury of Shade and Ornamental Trees. The Green Thumb, Vol. 8, No. 1, p 16-17.

SCIENTIFIC SERIES (Being Processed or Submitted for Publication)

- Benjamin, Maxine M., and Bracken, Frank K. Listeria Isolated from the Chinchilla. Sci. Series 353.
- Carlson, R. E.; Pyke, W. E.; Hay, Ruth, and Landblom, Nellie. Vitamin C Content of Red McClure Potatoes Increased by Spraying with Sodium Salt of 2,4-D. Sci. Series 341.

Hoerner, John L., and List, George M. Controlling the Cherry Fruitworm in Colorado. Sci. Series 345.

- Kano, Adeline K., and Charkey, L. W. Effects of Fasting on Chick Blood Levels of Free Lysine as Contrasted to Certain Other Amino Acids. Sci. Series 363.
- Moffett, Joseph O. Effect of Iodine on the Longevity of Caged Bees. Misc. Series 483.
- Sadler, W. W.; Buss, E. G., and Wilgus, H. S. Incubation Factors Affecting Hatchability of Poultry Eggs. II. Some Effects of Carbon Dioxide Upon Morphogenesis. Sci. Series 343.
- Sadler, W. W. The Inter-relationship of the Disappearance of the Vitelline Membrane and Closure of the Amino-Chorion to the Morbidity Pattern of the Avian Embryo. Sci Series 344.
- Stonaker, H. H.; Hazaleus, M. H., and Wheeler, S. S. Size and Type Studies in Hereford Cattle. I. Feedlot and Carcass Characteristics of Individually Fed Comprest and Conventional Type Steers. Sci. Series 364.
- Stonaker, H. H.; Ingalls, J. E., and Wheeler, S. S. Size and Type Studies in Hereford Cattle. II. Winter Hay Consumption of Breeding Females of Large, Intermediate, and Comprest Types. Sci. Series 365.
- Wilgus, H. S. Dehydrated Sugar Beet Leaves as a Poultry Feed Ingredient. Sci. Series 348.
- Wilgus, H. S. Effect of Alfalfa Meal on Early Growth of Chicks. Sci. Series 349.
- Wilgus, H. S., and Sadler, W. W. Incubation Factors Affecting Hatchability of Poultry Eggs. I. Levels of Oxygen and Carbon Dioxide at High Altitudes. Sci. Series 342.

FINANCIAL REPORT, COLORADO AGRICULTURAL EXPERIMENT STATION

For the year ending June 30, 1951

	Hatch Fund	Adams Fund	Purnell Fund	Bankhend- Jones Fund	Hope Flannagan	State Mill Levy	Special	TOTAL
Receipts Balance July 1, 1950	\$	5	\$	\$ 90.055.00	\$ 10,072.96	\$ 30,296.93	\$ 23,535.941	\$ 63,905.83
other sources than the U.S.	nn'nnn'et	no'non'et	00,000,00	00,000,02	10.71.1.11	123,303.94	276,925,58 =	400,229.52
Total Receipts Expenditures	15,000.00	15,000.00	60,000.00	26,055.98	51,815.60	153,600.87	300,461.52	621,933.97
Personal Services	9,452.03	11,587.98	47,725.24	21,044.45	28,667.68	65,764.08	133.747.34	317 988 80
Travel	1,877.08	148.90	2,592.48	387.39	1,343.08	2,985.17	6,092.48	15,426.58
Transportation of Things	20 10	91.05	30.97	33.51	18.812	983.84	1,346.12	2,758.80
Rents and Litility Service	00'10	245.01	448.26	695.99	541 49	1 190 60	12 556 26	10 507 00
Printing and Binding	321.15	-	311.21	48.81	254.80	6.646.50	2.115.75	00.100.01
Other Contractual Services	2,570.40	171.70	431.88	127.35	1,266.68	4,760.69	8,869,45	18.198.15
Supplies and Material	159.35	2,141.41	4,208,43	1,521.59	5,729.45	21,544.49	75,433.70	110.738.42
Equipment Lands and Structures	161.72	285.49	2,131.63	1,337.40	6,736.15	25,946.24	15,184.93	51,783.56
Contributions to Retirement	426.41	322.21	1,962.08	830.53	1,082.87	1,843.32	3,700.42	10,167.84
Total Expenditures.	15,900.00	15,000.00	60,000.00	26,055.98	46,018.94	138,569.37	261,144.85 a	561,789.14
Balance on hand June 30, 1951.	0	0	0	0	5,796.66	15,031.50	39,316.67 4	60,144.83
GRAND TOTAL	15,000.00	15,090.00	60,000.00	26,055,98	51,815.60	153,600.87	300,461,52	621,933.97

¹ Includes receipts 22,824.77 Station Special; 711.17 Hybrid Corn.

Includes disbursements 107,491.84 Station Special: 107,910.68 House Bill No. 22; 9,989.99 Bindweed; 24,999.86 Flant Disease; 8,350,00 Pure " includes receipts 120,986.33 Station Special; 108,000.00 House Bill No. 22; 10,000.00 Bindweed; 25,000.00 Piant Disense; 8,350,00 Pure Seed; 4.588.65 Hybrid Corn.

Seed; 2,402.48 Hybrid Corn.

+ includes 36,319.86 Station Special, 2,897.34 Hybrid Corn Carry-over; 89.32 House Bill No. 22, 10.01 Bindweed, .14 Plant Disease-Returned to the State Treasurer.

(3) (3) previous year. This money is available only for certain projects worked on in cooperation with other State Experiment Stations, this amount \$22,244.65 was spent during this fiscal year. In addition the Colorado Station spent \$3,686.80 of Hope-Frannagan 9 (b) Regional Travel funds and \$7,183.79 of Hope-Flannagan 10a funds.

Personnel Changes

Joining the staff during the fiscal year were:

Minoru Amemiya	Associate Agronomia
C. E. Evans	Soil Scientist (USDA)
Bentley W. Greb	Assistant Agronomia
Harry S. Puleston	Assistant Chemis
Cyrus O. Guss	Assistant Chemis
Ruth J. Hay	Research Assistan
Celeste Parker	Laboratory Assistant
Walter R. Graham	Assistant Veterinary Pathologist
Charles Terwilliger, Jr	Assistant Range Conservationist
John Dixon	Assistant Agricultural Engineer
C. S. Yih	Associate Civil Engineer
A. R. Robinson	Assistant Civil Engineer
I. L. Madsen	Assistant Poultry Husbandman
Lois Lucas	Research Assistant

Resignations from the staff during the fiscal year were:

Walter R. Heald	Associate Agronomist (Soils)
C. J. Gausman	Assistant Agronomis
Eugene Bertone	Associate Animal Husbandman
A. L. Banta	Assistant Animal Husbandman
L. H. Holland	Assistant Animal Husbandman
R. E. Atkinson	Associate Plant Pathologist
Frank K. Bracken	Assistant Veterinary Pathologis
Patricia Chism	Assistant Chemis
Elsie Foreman	Research Assistant
Madeline Ferrigan	Laboratory Assistant
H. S. Wilgus, Jr.	Chief Poultry Husbandman
C. L. Gish	Assistant Poultry Husbandman
L. E. Jenneke	Assistant Mechanical Engineer
Irving S. Dunn	Assistant Civil Engineer
S. W. McBirney	Senior Agricultural Engineer (USDA)
George Stafford	Engineering Aide (USDA)

STAFF

COLORADO A & M COLLEGE COLORADO AGRICULTURAL EXPERIMENT STATION

Fort Collins, Colorado

STATE BOARD OF AGRICULTURE

walter G. Lehor, Pres Denver	George McClave McClave
P. Warren, Vice Pres. Fort Collins	L. S. McCandless Craig
Inmes R. Miller, Sec'y Fort Collins	Jesse McCabe
m C. McPherson San Acacio	W. H. Monfort
Paman A. Miller Strasburg	

EXPERIMENT STATION OFFICERS

w. E. Morgan, M.S. President	Joseph M. Whalley, M.S. Treasurer
Homer J. Honney, M.S. Director	Rex W. Brown, B.S.
Jean MaunierClerk	Director, News and Radio Service
Nellie L. Landblom, A.B. Statistician	F. J. Shideler, B.S. Assistant Editor

EXPERIMENT STATION STAFF

Agronomy

D. W. Robertson, Ph.D.	Chief Agronomist
Robert Gardner, M.S.	Agronomist (Soils)
W. H. Leonard, Ph.D.	Agronomist
D. S. Romine, M. S	Associate Agronomist (Soils)
R. W. Whitney, Ph.D.	Associate Agronomist (Soils)
W. R. Schmehl, Ph.D	Associate Agronomist (Soils)
Forrest M. Willhite, M.S.	Associate Agronomist (Soils)
Minoru Amemiya, Ph.D.	Associate Agronomist (Soils)
Dwight Koonce, M.S.	Associate Agronomist

Thilo Haus, M.S.	Associate Agronomist
Thilo Haus, M.S •J. L. Mellor, B.S	Associate Agronomist Assistant Agronomist (Soils)
Thilo Haus, M.S *J. L. Mellor, B.S R. E. Danielson, M.S	Associate Agronomist Assistant Agronomist (Soils) Assistant Agronomist (Soils)
 Thilo Haus, M.S J. L. Mellor, B.S R. E. Danielson, M.S D. E. Miller, B.S 	Associate Agronomist Assistant Agronomist (Soils) Assistant Agronomist (Soils) Assistant Agronomist (Soils)
 Thilo Haus, M.S J. L. Mellor, B.S R. E. Danielson, M.S D. E. Miller, B.S Bentley W. Greb, B.S 	Associate Agronomist Assistant Agronomist (Soils) Assistant Agronomist (Soils) Assistant Agronomist (Soils) Assistant Agronomist (Soils)
Thilo Haus, M.S *J. L. Mellor, B.S R. E. Danielson, M.S D. E. Miller, B.S Bentley W. Greb, B.S Donald R. Wood, M.S	Associate Agronomist Assistant Agronomist (Soils) Assistant Agronomist (Soils) Assistant Agronomist (Soils) Assistant Agronomist (Soils) Assistant Agronomist

Cooperators:

John G. Dean, M.S.	Agronomist	(USDA)
G. W. Deming, B.S.	Assistant Agronomist	(USDA)
S. R. Olsen, Ph.D.	Senior Soil Scientist	(USDA)
0. J. Kelley, Ph.D.	Principal Soil Scientist	(USDA)
E. M. Payne, B.S.	Soil Scientist	(USDA)
L. B. Nelson, Ph.D.	Soil Scientist	(USDA)
C. E. Evans, Ph.D.	Soil Scientist	(USDA)
R. C. Accola, B.S.	Soll Scientist	(USDA)
Frank Watanabe, M.S.	Soil Scientist	(USDA)
C. Vernon Cole, Ph.D.	Soil Scientist	(USDA)
H. K. Rouse, C.E.	Irrigation Engineer	(USDA)
E. W. Cowley, C.E.	Irrigation Engineer	(USDA)
J. L. Paschal, Ph.D.	Agricultural Economist	(USDA)

Animal Investigations

S. S. Wheeler, Ph.D.	Chief	Animal	Husbandman
L. E. Washburn, Ph.D.		Animal	Husbandman
*H. H. Stonaker, Ph.D.		Animal	Husbandman
W. E. Connell, M.S.		.Animal	Husbandman
Melvin H. Hazaleus, M.S.	Associate	Animal	Husbandman
Eugene Bertone, M.S.	Associate	Animal	Husbandmar
A. Lamar Esplin, M.S.	Associate	Animal	Husbandman
E. K. McKellar, M.S.	Assistant	Animal	Husbandma
T. R. Blackburn, M.S.	Assistant	Animal	Husbandman

Animal Pathology and Veterinary Medicine

A. W. Deem, D.V.M., M.S. Chief	Veterinary	Pathologiat
Floyd Cross, D.V.M.	Veterinary	Pathologist
Rue Jensen, D.V.M., M.S.	Veterinary	Pathologist
Lynn A. Griner, B.S., M.S., D.V.M. Assistant	Veterinary	Pathologist
Maxine M. Benjamin, B.S., D.V.M. Assistant	Veterinary	Pathologist
Walter R. Graham, D.V.M. Assistant	Veterinary	Pathologist
Frank K. Bracken, D.V.M. Assistant	Veterinary	Pathologis
J. W. Tobiska, B.S., M.S., Assistant	Veterinary	Pathologist

Botany and Plant Pathology

L. W. Durrell, Ph.D.	Chief Botanist and Plant Pathologist
Jess L. Fults, Ph.D.	Botanist
Bruce J. Thornton, M.S	Associate Botanist in Charge of Seed Laboratory
R. H. Porter, Ph.D	Botanist
Walter D. Thomas, Jr., Ph.D	Plant Pathologist
A. O. Simonds, Ph.D	Associate Botanist
H. D. Harrington, Ph.D	Associate Botanist
George H. Lane, M.S.	Associate Plant Pathologist
Norman R. Gerhold, M.S	Assistant Plant Pathologist
Carl E. Seliskar, Ph.D	Assistant Plant Pathologist
*R. L. Skiles, M.S	Assistant Botanist
Cooperators:	
J. O. Gaskill, M.S.	Plant Pathologist (USDA)
L. A. Schaal, Ph.D.	Associate Plant Pathologist (USDA)
E. A. Lungren, M.S.	Associate Plant Pathologist (USDA)
Ross Davidson, B.S., M.S.	Senior Pathologist (USDA)

Chemistry

W. E. Pyke, Ph.D.	Chief	Chemist
Paul R. Frey, Ph.D.		Chemist
A. R. Patton, Ph.D.		.Chemist
R. E. Carlson, Ph.D.	Associate	Chemist
L. W. Charkey, Ph.D.	Associate	Chemist
H. A. Durham, M.S.	Assistant	Chemist
M. S. Hopwood, B.S.	Assistant	Chemist
Gestur Johnson, M.S.	Assistant	Chemist
J. J. Lehman, Jr., Ph.D.	Assistant	Chemist
Marjorie Mayer, M.S.	Assistant	Chemist
Merle G. Payne, B.S.	Assistant	Chemist
Harry S. Puleston, Ph.D.	Assistant	Chemist
Duane K. Johnson, B.S.	Research A	Assistant

STAFF

deline Kano, B.S. Research	Assistant
with J. Hay, B.S. Research	Assistant
undeline Ferrigan, B.S. Laboratory	Assistant
v X. Gassner, D.V.M., M.S. Endoc	rinologist
Tore Sulzberger, B.A. Research	Assistant
p. P. Martin, B.A. Research	Assistant
Lois Lucas, B.S. Research	Assistant

Entomology

reglie B. Daniels, M.S.	Chief	Entomologist
John L. Hoerner, M.S.	Associate	Entomologist
r H Newton, B.S.	Associate	Entomologist
mhendore O. Thatcher, Ph.D.	Assistant	Entomologist
Togenh O. Moffett, Ph.D.	Assistant	Entomologist
George M. List, Ph.D.	Profes	sor Emeritus

Forestry and Range Management

C H. Wasser, M.S., M.F. Chief	Range	Conser	vationist
*Donald F. Hervey, M.S. Assistant	Range	Conser	vationist
Charles W. Barney, D.F.	As	sistant	Forester
H E. Troxell, Jr., M.F.	As	sistant	Forester

Home Economics

El.zaboth Dyar, Ph.D.	Chief	Home	Economist
Ferne Bowman, Ph.D.		Home	Economist
Miriam E. Hummel, M.S. Ass	sistant	Home	Economist
Marianne Kulas, M.S Ass	istant	Home	Economist
Vay E. Combs, M.S. Ass	istant	Home	Economist

Horticulture

A. M. Binkley, M.S	Horticulturist
George A. Beach, M.S.	Horticulturist
Robert Kunkel, Ph.D.	Horticulturist
A. C. Ferguson, Ph.D	Horticulturist
Carl J. C. Jorgensen, M.S. Associate	Horticulturist
W. D. Holley, M.S. Associate	Horticulturist
J. S. Gregory, B.S. Assistant	Horticulturist
R. F. Farmer, B.S. Assistant	Horticulturist

Poultry

E.	G.	Buss,	M.SActing C	Chief	Poultry	Husbahdman
C.	L.	Gish, I	M.SAssis	stant	Poultry	Husbandman
I.	L.	Madser	n, B.SAssis	atant	Poultry	Husbandman

Rural Economics and Sociology

R. T. Burdick, Ph.D. Chi	ef R	ural	Economist
C. R. Creek, M.S. Associa	te R	ural	Economist
D. M. Stevens, M.S. Associa	te R	ural	Economist
Arthur Katona, Ph.D.	ssoc	iate	Sociologist
H. Prentiss Gazaway, M.S. Assista	nt R	ural	Economist
Catherine R. Clark, A.B.	Res	earch	Assistant
Cooperators:			
J. C. Crecink, M.S. Agricultural	Eco	nomi	st (USDA)
H. G. Sitler, M.S. Agricultural	Eco	nomi	st (USDA)

"On Leave

COLORADO AGRICULTURAL EXPERIMENT STATION

Civil Engineering

D. F. Peterson, D.C.E.	Chief	Civil	Engines
W. E. Code, B.S.	Associate Irriga	ation	Engine
M. L. Albertson, Ph. D.	Associate	Civil	Enginee
S. D. Resnick, M.S.	Assistant	Civil	Engine
Jack E. Cermak, M.S.	Assistant	Civil	Enginese
Ralph L. Rollins, M.S.	Assistant	Civil	Engines
Maxwell Parshall, B.S.		Mete	eorologia
Conversions:			Graft

C. H.	Rohwer, B.S., C.E. Ser	nior	Irrigation	Engineer	(USDA)
H. J.	Stockwell, B.S.		Irrigation	Engineer	(USDA)
Jack	N. Washichek, B.S.		Enginee	ring Aide	(USDA)

Mechanical Engineering

J. T.	Strate, M.S.,	M.E	Chief	Mechanical	Engine
R.D.	Barmington,	B.S., M.E.	Associate	Mechanical	Engine
John	E. Dixon, B.	S., A.E. A	ssistant .	Agricultural	Engineer

Branch Stations

W. R. Horlacher, Ph.D.	Directo
Herman Fauber, M.S.	
Ferris M. Green, B.S.	Superintendent, Western Slop
C. Dale Rea, M.S.	Director, San Juan Bas
James Ingalls, M.S. Assistan	t Animal Husbandman, San Juan Bas
Cooperators:	

W. C. Edmundson, M.S. Senior Horticulturist, USDA, Colorado Potato Station J. F. Brandon, B.S. Associate Agronomist, USDA, Dry Land Field Station