Cooperative Extension
Colorado State University, Fort Collins, Colorado 80523

Colorado State University

AGRON-  -GRAM

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There are several different items included in this newsletter. Jim Echols has provided an update on the Russian wheat aphid and Bob Croissant has summarized the soil compaction study that he conducted last summer with pinto beans. We have been getting several calls regarding the use of wood ashes on garden soils, therefore, I have written a one-page article about the use of wood ashes on garden soils.

Dan Smith and John Shanahan have provided alfalfa variety test information from Fort Collins and Harold Golus and Calvin Pearson provided the alfalfa variety test information from Fruita. We have also attached two Technical Reports for your information.

Sincerely,

Hunter Follett

R. Hunter Follett
Extension Specialist (Soils)
Professor

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Attachments

RUSSIAN WHEAT APHID UPDATE

James W. Echols, Extension Agronomist

At the recent Agronomy Research Conference, I talked with Dr. Frank Peairs, Extension Entomologist and several other people from throughout the state. Current scouting surveys indicate the potential for a very serious Russian aphid problem in wheat and barley fields in 1988. The Russian aphid has been found in every wheat and barley producing county in Colorado. In the fall of 1987, winged forms were present and flight migrations occurred as late as early November. Recent examination of plants below snow cover has produced live healthy aphids. They seem to get along with Colorado winters better than most of us do.

Dr. Frank Peairs' information indicates 1987 yield losses and spraying costs to exceed 27 million dollars. Aphids were present in damaging numbers in only about one-third of the fields in 1987; but at present, are distributed throughout the state. There are strong indications that they could be a problem in the majority of the fields and it is quite possible that our losses and spray expenses could approach one hundred million dollars in 1988.

Most reports have not made statements regarding the detrimental effect of aphids on milling and baking quality of wheat. After looking at our 1987 test plot data and talking with many farmers, I am convinced that any significant feeding by the Russian aphid will seriously reduce the test weight or density of the grain. Flour millers need 60-pound wheat to produce flour that is acceptable for the baking trade. The brewing industry requires high bushel weight barley for their needs. Livestock feeders can utilize low bushel weight grain, but consider it to be poor quality and pay a reduced price. The production of very high quality wheat and barley has always been our goal in Colorado and in most years, excellent quality grain has been produced. The aphid could drastically change this quality and totally wreck our reputation as a high quality grain state if significant aphid feeding occurs in 1988 and future years.

Now, what are the solutions? At present, the use of insecticides is the only effective one. In future years, it is hoped that predators, biological agents, or resistant varieties could solve the problem. Unfortunately, these solutions are not in sight at the present time. The following cultural practices can help:

1. Control volunteer wheat and barley continuously from wheat harvest time in July until planting time in September. Remember that only the "non-vernalized" winter wheat plants will grow through the summer. This means volunteer plants that came up after warm weather occurred in the spring. The aphids must have green living tissue as a source of food from the time that the wheat matures at harvest until the new growth occurs in the fall. Unfortunately, the aphids can live quite well on most of the wheat grasses and a few other grassy-type plants.

2. Date of Planting. This means planting winter wheat as late as possible in the fall and spring grains as early as possible in the spring. Scouting reports in northeastern Colorado indicate only slight infestation in wheat fields planted after September 15, but moderate to severe infestation in some fields planted earlier than that date. For southeastern Colorado, we do not know the most effective planting date for aphid control, but I am sure that it would be after September 20 and preferably after September 25. I realize that this is dust bowl country and erosion must be controlled. **When farmers start to work their 1987 wheat stubble fields in the spring of 1988, their first concern should be to maintain residue for erosion control and then consider planting late in the fall of 1988.** This office will continue to work closely with Dr. Frank Peairs and send out cultural information in the spring of 1988.

At our field days in June, we will discuss the effect of cultural practices on the aphid. It is hoped that we can obtain funding to initiate significant research projects in 1988. The Commissioner of Agriculture has recently appointed an emergency task force committee and Colorado State University is requesting supplemental appropriations for Russian aphid extension and research projects.

At present, our crops testing program is rebuilding a specialized combine with a 10-foot grain head that can be transported to locations throughout the state for harvesting research plots in cooperation with other personnel from Colorado State University. If any of you have ideas concerning what we need to be doing about the aphid, feel free to contact me.

SOIL COMPACTION LOSSES IN PINTO BEANS

Robert L. Croissant, Extension Agronomist

Soil compaction may be a significant factor limiting maximum economic yields in pinto beans. Very often because of wet soil during harvest or subsequent seedbed preparation and planting, severe compaction occurs causing yield losses for periods extending over several years.

The effect of soil compaction on pinto bean production was the objective of a study conducted at the Colorado State University Agronomy Farm in 1987. A John Deere Model 4030 tractor weighted to 15,000 pounds was used to compact soils simulating compaction occurring during farming operations. Planting time ripping (PTR) was used to study one tillage method for reducing wheel traffic compaction caused by previous tillage operations. Planting time ripping consisted of using diamond point chisels operating 6" to each side of the row 8" deep. The treatments consisted of compacted and uncompacted soil each with and without PTR. The experiment was analyzed as a 2 x 2 factorial.

Soil samples were collected before planting to evaluate soil nutrient availability. Additional samples were taken at weekly intervals after planting for soil moisture determinations. Soil moisture averaged 17.9% (dry basis) for the first sampling period, 16.5% for the second and 15.7% for the third. Table 1 shows moisture relationships from the analysis.

Table 1. Soil compaction dry bean study showing the main effect of compaction and planting time ripping (PTR) on various agronomic characteristics of dry beans grown in 1987.

Treatment	Mean % Moisture	Plants/ Acre	Compaction k pa	Seed Size gm/100 seeds	Yield lb/A
Compaction	16.6 a	63679 a	534 a	35 a	3115 a
No compaction	16.8 a	60495 a	1216 b	36 a	3600 b
Probability	.63	.19	.0001	.07	.03
PTR	16.5 a	59433 a	636 a	35 a	3497 a
No PTR	16.8 a	64740 b	1114 b	36 a	3218 a
Probability	.45	.04	.001	.07	.17

Data followed by identical letters are considered nonsignificant at the (.05) level. Probability shows actual level of significance.

The data showed identical soil moisture levels in noncompacted, compacted and PTR treated soils. Plants growing on compacted soils showed severe drought symptoms and considerable stunting. Thus, the soil water was present but bean plants were unable to use it due to compaction. It is assumed that poor root growth and distribution resulted from compaction. Thus, the beans were unable to extract H_2O present.

A heavy driving rain occurred two days after planting and caused considerable crusting prior to emergence. Some stand variability occurred as shown in Table 1. The PTR treatments had 8% fewer plants emerge than the No PTR treatments. This could be due to seed falling in dry zones of

the seedbed during planting. The subsequent rain initiated germination of those seeds which failed to completely emerge prior to drying and hardening of the crust.

Soil penetrometer data were taken at planting and at ten day intervals thereafter. For each measurement, penetrometer readings were the average of 3 probes within the row obtained in each replicate plot. Penetrometer resistance in the compacted plots was twice that in noncompacted. Planter time ripping reduced penetrometer readings of compacted plots to equal the non-compacted plots. The methods of PTR used were very effective in keeping soil tilth at an optimum level.

Yield differences of pinto beans on the compaction x PTR interactions were highly significant.

Table 2. Effect of compaction and PTR on yields of pinto beans showing the compaction x PTR interaction.

	Compaction	No Comp
	- - - - - -lb/A - - - - -	
PTR	3515	3479
No PTR	2714	3721
P=.022		

By looking at Table 2, it is noted that compaction only treatments yielded 2714 pounds per acre while compaction with PTR plots yielded 3515 pounds per acre. The compaction plus no PTR plots yielded 3721 pounds while no compaction plus PTR plots yielded 3479. It is interesting to note that yield reduction from compaction was reversed by PTR showing equal yields to the no compaction treatments.

The results reported in this study are from the first year of an ongoing project which will be repeated in 1988. Recent studies conducted in Washington State have shown similar yield responses of pinto beans to compaction.

WOOD ASHES -- SHOULD THEY BE USED FOR GARDEN SOILS?

BY HUNTER FOLLETT[1]

Many suburban homeowners use wood ashes from their fireplaces as fertilizers in their gardens. Wood ashes when used in moderation can provide some beneficial nutrients to the soil. For example, wood ashes contain about 5% K_2O (potash) and about 20% calcium plus other nutrients such as phosphorus.

It is interesting to note that the preparation of potassium carbonate or "potash" by leaching and concentrating wood ashes was the subject of the first United States patent, issued to Samuel Hopkins in 1790. The patent was signed by George Washington. The process used about five acres of timber to produce one ton of potash. The term "potash" was derived from the manufacture of this product by leaching of hardwood ashes into large iron pots.

The following experiment was run on a garden soil to evaluate how wood ashes would change the soil pH and soluble salt level. The soil had a silt loam texture and came from a garden near Laporte, Colorado.

Effect of wood ashes on soil pH and soluble salt level of a garden soil.

Treatment (Ratio of Ashes/Soil)	Soil pH	Salts (mmhos/cm)
Soil (no ashes)	7.3	3.0
1:20	7.3	5.6
1:4	8.5	11.7
1:3	8.8	17.6
1:2	9.5	29.3
1:1	9.9	30.2
Ashes (no soil)	10.8	62.1

The above experiment indicates that wood ashes have the potential of greatly increasing the soil pH and soluble salt level of a garden soil. A mix of one part wood ashes and four parts soil (by weight) increased the soil pH to 8.5 and soluble salt level to 11.7.

Most garden plants do best if the soil pH is in the range of 6.5 to 7.5 and the soluble salt level is less than 4.0 mmhos/cm. Wood ashes are beneficial on acid soils to help raise the soil pH and also as a source of potash. However, most Colorado soils have an adequate supply of potassium and are already alkaline (soil pH above 7.0). Therefore, wood ashes are not recommended for garden soils in Colorado except at low rates of 5 to 10 pounds per 1000 square feet.

[1]Professor and Extension Agronomy Specialist, Extension Agronomy, Colorado State University, Fort Collins, Colorado 80523.

1987 REPORT

ALFALFA VARIETY YIELD TEST
FORT COLLINS RESEARCH CENTER
FORT COLLINS, COLORADO

Conducted by: D. H. Smith, Associate Professor
J. F. Shanahan, Assistant Professor

Department of Agronomy
Colorado State University
Fort Collins, Colorado 80523

Comments:

1. Planting date was 15 May 1986. Weed control during establishment was accomplished by hand cultivation. Plots were well established and essentially weed-free by the end of the 1986 season.

2. Commercial entries were included on a fee basis. Each entry was replicated four times.

3. All plots were irrigated after each cutting.

4. Cutting dates were 4 June, 7 July, 10 August, and 24 September.

5. Yields from these stands will be evaluated over a total period of three years (1987-89).

6. Results reported on the back of this page are from only a single year of testing. Complete results from previous stands (harvested from 1984 to 1986) were reported in 1986 and are available upon request from D. H. Smith.

Dry matter yields from Fort Collins alfalfa variety tests conducted in 1987.

Variety	Source or Brand	First Cut	Second Cut	Third Cut	Fourth Cut	Total
		-----Tons Dry Matter/Acre-------				
R.S.7890 (Exp.)	VISTA	2.25	1.60	1.28	1.15	6.29
Dart	AGRIPRO	2.18	1.67	1.35	1.08	6.28
526	PIONEER HI-BRED INT'L	2.11	1.65	1.36	1.10	6.22
AV 120 Brand	ARKANSAS VALLEY SEED CO.	2.25	1.71	1.29	0.97	6.21
Summit	STAUFFER SEEDS, INC.	2.13	1.76	1.29	1.04	6.21
Magnum +	DAIRYLAND RESEARCH INT'L	2.17	1.63	1.28	1.13	6.21
Edge	RESEARCH SEEDS, INC.	2.17	1.65	1.31	1.07	6.19
Elevation	JACQUES SEED CO.	2.21	1.61	1.30	1.04	6.16
Endure	CARGILL, INC.	2.17	1.63	1.24	1.09	6.13
120	DEKALB-PFIZER GENETICS, INC	2.13	1.62	1.30	1.07	6.12
5432	PIONEER HI-BRED INT'L	1.92	1.66	1.35	1.15	6.08
Crown	CARGILL, INC.	2.19	1.59	1.25	1.06	6.08
Emerald	ANDERSON SEED & GRAIN, INC.	2.23	1.58	1.23	1.03	6.07
Big 10	GREAT LAKES HYBRIDS, INC.	2.16	1.58	1.25	1.05	6.05
Dynasty	DAIRYLAND RESEARCH INT'L	2.00	1.62	1.34	1.08	6.04
DS 647 (Exp.)	DAIRYLAND RESEARCH INT'L	1.95	1.62	1.31	1.15	6.03
Arrow	AGRIPRO	2.13	1.60	1.25	1.05	6.02
Perry	USDA & NEBRASKA AES	2.19	1.60	1.23	0.99	6.02
GLH 334 (Exp.)	GREAT LAKES HYBRIDS, INC.	2.01	1.71	1.24	1.04	5.99
Verta +	NC+ HYBRIDS, INC.	2.14	1.60	1.26	0.99	5.99
WL 83-2 (Exp.)	W-L RESEARCH, INC.	1.86	1.67	1.30	1.15	5.99
AP 46 (Exp.)	AGRIPRO	2.11	1.57	1.25	1.05	5.98
WL 225	W-L RESEARCH, INC.	2.14	1.55	1.24	1.05	5.98
WL 320	W-L RESEARCH, INC.	1.77	1.66	1.35	1.18	5.96
AP 45 (Exp.)	AGRIPRO	2.04	1.60	1.23	0.96	5.83
WL 316	W-L RESEARCH, INC.	1.92	1.63	1.23	1.01	5.79
Vernal	USDA & WISCONSIN AES	2.04	1.49	1.22	0.90	5.65
Mean		2.10	1.62	1.28	1.06	6.06
LSD (.05)		0.19	N.S.	0.08	0.08	0.31

Exp. - Indicates experimental entry

TABLE 1. Forage yields[1] of 18 alfalfa varieties at Fruita, Colorado during 1987.

VARIETY[2]	SOURCE	1ST CUT	2ND CUT	3RD CUT	4TH CUT	TOTAL CUT
		----------Tons/acre----------				
AP45	AGRIPRO	2.71	2.49	1.66	1.75	8.60
AP46	AGRIPRO	2.47	2.76	2.02	2.00	9.26
AP47	AGRIPRO	2.95	2.69	1.89	1.83	9.37
ARROW	AGRIPRO	2.52	2.62	1.82	1.93	8.89
AV120	ARKANSAS VALLEY SEED CO	3.07	2.41	1.69	1.57	8.74
COMMANDOR	NORTHRUP KING CO.	2.56	2.59	1.68	1.66	8.50
CROWN	CARGILL, INC.	2.78	2.66	1.80	1.87	9.11
DESERET	PUBLIC	2.91	2.67	1.57	1.01	8.16
LAHONTAN	PUBLIC	2.36	2.25	1.38	1.07	7.06
NK83580	NORTHRUP KING CO.	2.37	2.71	1.87	1.76	8.70
PIKE	NORTHRUP KING CO.	2.43	2.52	1.53	1.62	8.10
P526	PIONEER HI-BRED INT'L	2.62	2.54	1.57	0.96	7.69
P5432	PIONEER HI-BRED INT'L	2.60	2.59	1.61	1.37	8.16
RANGER	PUBLIC	2.33	2.30	1.30	0.91	6.83
VERNAL	PUBLIC	2.62	2.30	1.33	1.11	7.36
WL83-2	W-L RESEARCH, INC.	2.51	2.63	1.99	1.88	9.02
WL316	W-L RESEARCH, INC.	2.63	2.65	1.57	1.35	8.20
WL320	W-L RESEARCH, INC.	2.35	2.41	1.85	1.72	8.32
COLUMN MEAN		2.60	2.54	1.67	1.52	8.34
LSD (0.05)		0.34	NS	0.21	0.20	0.56
CV (%)		9.2%	9.1%	8.7%	9.3%	4.7%

[1] Yields were calculated on an air-dry basis.
[2] Table is arranged alphabetically by variety.

1987 Report
of
Alfalfa Variety Performance Test
Fruita Research Center
Fruita, Colorado

Conducted by: Harold M. Golus
Calvin H. Pearson
Fruita Research Center
P.O. Box 786
Grand Junction, CO 81502
(303) 858-3629

Comments:

Alfalfa variety plots were planted September 9, 1986. Emergence and subsequent plant establishment were excellent. Herbicides were applied preplant incorporated and in the spring to control weeds. Plot stands are uniform and weed-free.

Each variety is replicated four times within the test area. Varieties are evaluated under irrigation.

Private varieties were entered on a fee basis. Public varieties were included as checks.

Data from this test will be obtained for three years (1987, 1988, and 1989).

Harvest dates for 1987 were June 5, July 9, August 19, and October 9.

Forage yields of each variety for each of the four cuttings and the total yield for 1987 are shown in Table 1 (opposite side of page).

'Old' public varieties yielded considerably less than many other varieties. Several private varieties had excellent yields.

Dry matter yields from 1987 alfalfa variety trial at the Arkansas Valley Research Center, Rocky Ford, Colorado.

Variety	Source	Yield/Cutting (T/A) 1st	2nd	1987 Total
Lahontan	USDA NV-AES	1.77	1.09	2.86
Meteor	Northrup King	1.60	1.19	2.78
Fortress	Northrup King	1.68	1.09	2.76
339	Cargill	1.66	1.08	2.74
WL 320	Waterman Loomis Research	1.58	1.11	2.69
Ranger	USDA NE-AES	1.67	1.01	2.69
Emerald	Anderson	1.55	1.12	2.68
WL 316	Waterman Loomis Research	1.68	0.95	2.63
AP 47	Agri-Pro	1.64	0.92	2.56
526	Pioneer	1.78	0.77	2.55
WL 832	Waterman Loomis Research	1.48	1.05	2.52
Perry	USDA NE-AES	1.59	0.92	2.51
Summit	Stauffer	1.46	0.97	2.42
Arrow	Agri-Pro	1.49	0.92	2.42
AP 46	Agri-Pro	1.48	0.87	2.35
AP 47	Agri-Pro	1.50	0.83	2.33
Wrangler	USDA NE-AES	1.38	0.93	2.31
AV 120	Arkansas Valley Seed Co.	1.52	0.79	2.30
5432	Pioneer	1.47	0.83	2.29
Riley	USDA KS-AES	1.40	0.83	2.23
Vernal	USDA WI-AES	1.38	0.85	2.23
LSD 0.05		0.16	0.13	0.24
Average		1.56	0.96	2.52

Planting Date: 4/22/87
Harvest Dates: 8/24,9/23

(Earlier harvests were not conducted due to high weed populations and excessive hail damage in the plots.)