A Research Report of the
Central Oregon
Agricultural Experiment Station

Irrigated Crops Research in Central Oregon 1984

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CONTENTS

COVER: New machine plants tissue cultured potato plantlets at Powell Butte. The plants, part of 25,000 planted this year, will provide virus-free potatoes in the search for better potato varieties. (Photo by Andy Duncan)

IRRIGATED CROPS RESEARCH IN CENTRAL OREGON

INTRODUCTION

The research program of the Central Oregon Experiment Station consists almost exclusively of the field experiments conducted with farmer or rancher cooperators and at three leased sites, one each in Deschutes, Crook, and Jefferson Counties.

REDMOND. Slightly more than 10 acres of land is leased from the City of Redmond Airport Commission. The Station headquarters is also on this site. The land is used for: (1) the isolation of new potato varieties, selections or germplasm; (2) cereal crop research and seed increase, and (3) alternate/new crop adaptation experiments. Daily weather data are recorded for station research purposes and for submission to the national weather services, U.S. Department of Commerce.

POWELL BUTTE. The Station leases 80 acres for research from the Oregon State University Foundation. The land is 11.5 miles east of Redmond on Highway 126. Research with cereals, potatoes, and alfalfa is conducted at this site with major emphasis on potatoes.

MADRAS. About 40 acres near the Madras airport are leased from Jefferson County through the City of Madras for irrigated crop experimentation. The Station owns approximately .5 acres with a large building used for office, shop, and storage. Experiments on major crops of the area are conducted annually. Attention is also given to potential new or alternate crops.

Several scientists from the campus of Oregon State University are involved with station research as indicated in this report. Questions or requests for additional information on any report should be directed to the authors.

Special acknowledgement is made to the many farmers and ranchers who cooperate in many ways to assist the station research program.

The typing of this report by Sylvia McCallum is gratefully acknowledged.

CENTRAL OREGON ALFALFA VARIETY EVALUATION STUDY
1983 PROGRESS REPORT

Steven R. James[1]

INTRODUCTION

Alfalfa variety trials are conducted on a continuing basis at two locations in Central Oregon. The Powell Butte trial was planted June 20, 1980, and included 36 varieties. Plot size was 5 feet x 20 feet; harvest area was 3 feet x 14 feet. The plots were replicated four times. Seeding rate was 15 lbs/A of uncoated seed and all seed was inoculated with Nitragin inoculant.

The Madras trial was planted June 3, 1982, and included 22 varieties. Seeding rate was 18 lbs/A of uncoated seed; no inoculant was used. Plot size, harvest area, and replications were identical to the Powell Butte trial. The trial area was treated with 2 lbs/A of 2,4-DB when the alfalfa had 3 to 4 trifoliate leaves.

RESULTS

MADRAS. Three cuttings were taken in the first full year of production (Table 1). Yields were significantly different (5%) and ranged from 9.06 to 7.15 tons/acre in 1983. The newer, improved varieties yielded better than the check varieties Vernal and Saranac. An experimental variety, W-37, was included in the trial for yield comparisons. Although W-37 is an excellent yielding variety, it will never be released for public use because of excessively thick stems, relatively few leaves, and low protein content. Pioneer 581 does not appear to be adapted to Central Oregon. It does not have the dormancy necessary to survive the Central Oregon winters.

Regrowth was measured five weeks after the second cutting. W-37 was the fastest growing variety. Vernal was the slowest. The majority of the varieties produced 50 to 54 centimeters of growth five weeks after cutting.

POWELL BUTTE. Yield results are shown in Table 2. 1983 was the third full year of production for the Powell Butte trial. Powell Butte is nearly 800 feet higher in elvation, has a two to three week shorter growing season, and has more severe winters than Madras. Thus, the less winter hardy varieties generally yielded less than the hardier, more dormant varieties. DeKalb 131 and W-37, for example, yielded well in earlier years, but appear to be subject to thinning stands and winterkill, so yields are declining.

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Table 1. Madras Alfalfa Variety Trial

VARIETY	1982 YIELD[1]	1983 YIELD[2]	TOTAL YIELD	% VERNAL	REGROWTH[3]
	---------tons/acre---------				cm
W-37	2.66	9.06	11.72	117	60.7
TRUMPETOR	2.48	8.77	11.25	112	52.3
BLAZER	2.64	8.55	11.19	111	52.7
VERNEMA	2.71	8.43	11.14	111	53.9
APOLLO II	2.61	8.45	11.05	110	52.3
PACER	2.24	8.82	11.05	110	56.1
DEKALB 120	2.72	8.31	11.03	110	52.3
GREENWAY 360	2.65	8.38	11.03	110	53.4
PIONEER 532	2.35	8.58	10.93	109	54.0
WL 220	2.59	8.32	10.90	109	51.4
DEKALB 130	2.34	8.55	10.89	108	54.3
PIONEER 545	2.62	8.23	10.85	108	51.9
ARMOR	2.58	8.26	10.84	108	54.2
RS 209	2.64	8.11	10.76	107	54.4
VALOR	2.27	8.45	10.71	107	53.2
WL 312	2.57	8.12	10.69	106	52.3
WL 314	2.53	8.10	10.62	106	53.8
CASCADE	2.59	7.83	10.42	104	53.6
SARANAC	2.22	7.99	10.20	102	52.4
W-45	2.63	7.45	10.09	100	55.2
VERNAL	2.30	7.74	10.04	100	47.5
PIONEER 581	2.44	7.15	9.59	96	54.6
AVERAGE	2.51	8.25	10.78	107	53.5
LSD 0.05	NS	.76	.88	---	4.4

1 - 2 Cuttings, establishment year.
2 - Total of 3 cuttings.
3 - Height taken 5 weeks after second cutting.

Table 2. Powell Butte Alfalfa Variety Trial

VARIETY	1980 YIELD *	1981 YIELD **	1982 YIELD **	1983 YIELD **	TOTAL YIELD	% VERNAL
	----------------------tons/acre				----------------------	
W-37	1.25	8.41	6.39	5.80	21.87	107
Pioneer 532	1.23	7.83	6.00	6.47	21.55	106
DeKalb 120	1.38	8.15	6.25	5.73	21.53	105
Armor	1.48	7.95	5.99	5.86	21.29	104
W-35	1.09	7.90	6.11	6.13	21.24	104
Weevlchek	1.27	7.76	5.78	6.37	21.19	104
Anchor	1.30	7.71	6.02	6.03	21.08	103
Action	1.20	7.62	6.09	6.12	21.04	103
DeKalb 130	1.40	8.04	5.55	6.00	21.00	103
Gladiator	1.34	7.73	5.93	5.98	20.99	103
Spectrum	1.46	7.47	5.66	6.30	20.91	102
RS209	1.41	7.57	5.82	6.07	20.89	102
DeKalb 131	1.27	8.31	5.47	5.71	20.77	102
Iriquois	1.41	7.58	5.65	6.01	20.70	101
Vernema	1.27	7.73	5.83	5.85	20.69	101
Classic	1.21	7.50	5.80	6.15	20.66	101
Haymaker	1.43	7.00	6.03	6.01	20.48	100
Pioneer 545	1.22	7.03	6.00	6.19	20.45	100
Apollo	1.51	7.44	5.61	5.85	20.42	100
Vernal	1.24	7.25	5.86	6.05	20.41	100
MS 243	1.13	7.45	6.22	5.96	20.40	100
Vancor	1.36	7.33	5.61	6.07	20.38	100
Valor	1.16	7.77	5.76	5.66	20.36	100
Hiphy	1.35	6.99	5.82	6.14	20.31	100
Agate	1.23	7.71	5.57	5.73	20.25	99
Super 721	1.18	7.34	5.65	6.04	20.23	99
Cascade	1.67	7.08	5.57	5.87	20.20	99
WL 309	1.04	7.66	5.47	5.99	20.17	99
WL 220	1.20	7.08	5.93	5.94	20.15	99
Titan	1.29	6.96	5.74	6.00	20.00	98
Saranac	1.28	7.20	5.71	5.80	19.99	98
Pioneer 524	1.02	7.44	5.97	5.51	19.96	98
Baker	1.36	7.80	5.21	5.52	19.89	97
Ranger	1.03	7.54	5.61	5.44	19.38	95
WL 310	1.33	6.59	5.53	5.76	19.23	94
Pacer	1.12	6.16	5.42	5.41	18.13	89
Average	1.28	7.50	5.79	5.92	20.50	100
LSD 5%	NS	0.91	0.57	0.72	1.39	---

* Establishment year yield (1 cutting).
** Totals of 3 cuttings.

VARIETAL EVALUATION OF CEREAL GRAINS IN CENTRAL OREGON

Steven R. James and Rod Brevig[1]

ACTIVITIES AND RESULTS

Eight replicated yield trials were established at three sites of Central Oregon Experiment Station in 1983. Table 1 indicates the various trials grown, their location, and the number of lines grown.

Table 1. Summary of cereal grain variety trials planted in Central Oregon in 1983

TRIAL	LOCATION	NO. OF LINES
Winter Wheat Variety Trial	Madras	46
Winter Wheat Advanced Selections	Powell Butte	34
Spring Wheat Western Regional	Madras	48
Spring Wheat Advanced Selections	Powell Butte	16
Winter Barley Elite	Madras	28
Spring Barley Private Variety	Madras	12
Spring Barley Maturity	Redmond	4
Spring Oat Variety Trial	Redmond	8

A severe hailstorm at Madras on July 31, 1983, destroyed most of the trials. The barley trials were especially hard hit, and 99% of the grain was shattered from the grain heads. The winter wheat trial was also severely damaged, although some plots were combined to provide seed for 1984 trials. The spring wheat trial at Madras was harvested. Varieties that were mature at the time of the hailstorm were shattered more than the greener, less mature varieties. The data gathered are of questionable value and will not be used for recommendations.

WINTER WHEAT

Table 2 summarizes the Powell Butte winter wheat variety trial. The trial was planted November 15, 1982, at 96 lbs/acre. On April 20, 1983, 606 lbs/acre of 27-12-0 (NPK) fertilizer was applied. Two pints of Bronate were applied for weed control on April 19, 1983.

Selection 72339 continues to show excellent potential. Table 3 summarizes the performance of 72339 over the past five years at Powell Butte and Madras.

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Table 2. Powell Butte winter wheat variety trial, 1983

VARIETY	YIELD	TEST WT.	PLANT HT.	LODGING
	bu/acre	lbs/bu	in	%
72-1220	142.8	55.5	38	10
OWW70364	139.1	56.2	40	0
Hill '81	137.6	56.3	40	0
OWW70111	137.1	57.9	39	0
OWW71439	137.0	55.4	37	0
OWW74295C	133.7	57.9	42	20
McDermid	133.0	56.5	39	0
Hyslop	132.1	55.4	39	0
SMT74-72	130.7	55.9	39	0
SW069086	125.7	56.8	40	0
SW071340	125.0	58.6	39	0
SWH72053	124.9	54.8	38	0
SW069282	124.7	57.9	39	10
SMT74-84	124.1	56.7	39	40
OWW71214	120.0	56.4	39	5
Faro	119.9	53.6	38	20
SMT74-48	119.1	55.1	36	0
SWH72434	116.8	56.2	38	0
OWW71730	114.3	54.0	38	0
OWW71229	112.8	52.2	38	0
Jackmar	112.3	52.8	35	0
OWW72435	111.1	54.7	41	25
OWW72342	110.9	55.7	36	0
OWW71603	110.8	53.8	39	5
Yamhill Dwarf	109.8	51.2	36	15
Daws	108.9	53.8	40	0
OWW74337C	103.0	53.5	39	0
OWW72339	99.8	52.4	37	0
OWW70094	98.5	54.3	37	0
Stephens	98.5	51.1	37	0
OWW72341	94.3	52.1	36	0
OWW72082	92.8	50.7	35	0
Nugaines	87.2	54.3	36	0
SW0730979C	80.8	51.3	34	0
Average	116.7	54.7	38	5
LSD 5%	16.6	2.0	3	-

Data collected in 1983 indicates that 72339 is very similar to Stephens in disease susceptibility, especially to Septoria. Selection 72339 was also infected by stem rust in 1983.

Head rows of 72339 have been planted in Redmond and breeders seed will be available in the fall of 1984.

Table 3. The yield of 72339 compared with check varieties from 1979-1983 at Powell Butte and Madras, Oregon

	POWELL BUTTE					
VARIETY	1979	1980	1981	1982	1983	AVERAGE
	bu/acre					
72339	118	147	124	159	100	130
Stephens	101	136	101	132	98	114
Daws	105	122	122	140	109	120
Hill '81	79	119	119	146	138	120

	MADRAS					
VARIETY	1979	1980	1981	1982	1983*	AVERAGE
	bu/acre					
72339	96	148	154	123	62	117
Stephens	76	144	141	78	63	100
Daws	81	152	137	85	54	102
Hill '81	91	132	134	89	66	102

* Hail Damaged.

SPRING WHEAT

Emphasis has been placed on identifying high-yield, disease resistant, short-strawed varieties. At present, the majority of spring wheat varieties are several inches taller than winter wheat, are more susceptible to lodging and leaf stripe rust. Several short-strawed varieties were obtained from Aberdeen, Idaho, and grown at Madras. No performance data are available because of the hailstorm, but a small quantity of seed is available for planting in 1984.

Of the available varieties, Twin is most widely adapted to Central Oregon. Several selections in the Powell Butte trial yielded better than Twin, had better test weights, but were taller. Table 4 summarizes the results of the spring wheat variety trial conducted at Powell Butte.

Table 5 summarizes the performance of selected spring wheat varieties at Powell Butte and Madras. The summaries are based on two years of data at each location.

Table 4. Powell Butte Spring Wheat Variety Trial, 1983

VARIETY	CLASS	YIELD	TEST WT.	PLANT HT.	HEAD DATE	STRIPE RUST
		bu/acre	lbs/bu	in	mo/day	%
K7905168	SW	90.1	59.0	38	7/11	0
WAMPUM	HR	88.3	59.0	43	7/12	0
K7905171	SW	85.3	58.7	37	7/13	0
ID0228	SW	85.0	58.7	39	7/14	10
ID0225	SW	84.7	57.8	39	7/10	25
FIELDER	SW	81.6	58.9	38	7/9	40
906R	HR	81.6	59.6	38	7/9	0
ID0249	SW	81.6	59.3	37	7/14	40
ID0253	SW	77.8	59.8	37	7/10	0
OWENS	SW	72.9	58.4	39	7/10	40
TWIN	SW	72.2	56.9	37	7/10	10
ID0250	SW	71.9	57.4	39	7/10	5
DIRKWIN	SW	65.6	56.1	38	7/15	5
McKAY	HR	64.2	58.6	37	7/9	0
WAVERLY	SW	64.0	57.5	39	7/11	0
WALLADAY	SW	52.6	56.1	39	7/12	60
AVERAGE		72.6	58.2	39	7/11	15
LSD (5%)		9.2	.9	4	4	--

Planted 4/5/83 at 96 lbs/acre, Fertilized with 500 lbs of 27-12-0.

Table 5. Spring wheat variety performance in Central Oregon

VARIETY	CLASS	AVERAGE YIELD	TEST WT.	HEAD DATE	PLANT HT.	LODGING	STRIPE RUST	PROTEIN
				MADRAS[1]				
		bu/acre	lbs/bu	mo/day	in	%		%
OWENS	SW	92.7	58.7	6/27	37	15	R	10.8
TWIN	SW	92.1	56.6	6/27	38	10	VR	10.9
WAVERLY	SW	90.3	57.3	6/29	36	15	VR	11.8
McKAY	HR	87.3	58.8	6/27	37	15	R	10.8
WAMPUM	HR	86.2	57.5	6/27	40	15	VR	12.6
FIELDER	SM	85.1	57.4	6/27	37	0	VS	10.6
DIRKWIN	SW	83.0	56.3	6/28	38	0	VR	11.9
WALLADAY	SW	81.1	56.9	7/5	36	0	MR	10.1

VARIETY	CLASS	AVERAGE YIELD	TEST WT.	HEAD DATE	PLANT HT.	LODGING	STRIPE RUST	PROTEIN
				POWELL BUTTE[2]				
		bu/acre	lbs/bu	mo/day	in	%		%
WAMPUM	HR	103.5	59.1	7/9	44	15	VR	-
FIELDER	SW	99.8	59.6	7/7	38	10	VS	-
WAVERLY	SW	97.6	58.1	7/8	38	0	VR	-
TWIN	SW	96.2	57.1	7/7	37	30	R	-
OWENS	SW	95.3	59.0	7/7	38	40	MS	-
WALLADAY	SW	92.9	56.8	7/11	39	0	MS	-
McKAY	HR	88.5	58.8	7/7	38	0	VR	-
DIRKWIN	SW	87.1	56.3	7/9	39	30	VR	-

1 - 1981 and 1982 data (Hail damaged 1983 trials).
2 - 1982 and 1983 data.

SPRING BARLEY

A trial was planted at Redmond to determine the earliness of maturity of selected spring barley varieties. In Central Oregon, an early maturing spring barley variety would be beneficial in rotating to alfalfa. The spring barley grain crop would mature in early August and alfalfa could be planted in the grain stubble. Thus, the alfalfa would be well established by winter and one crop year could be saved in establishing the alfalfa stand.

The spring barley varieties Steptoe, Kombar, Advance, and Poco were planted at two dates and two seeding rates. Results are summarized in Tables 6 and 7.

Table 6. Yield, test weight, height, and ripening date of four spring barley varieties planted April 15, 1983, at Redmond, Oregon

VARIETY	SEEDING RATE	YIELD	TEST WT.	PLANT HEIGHT	RIPE DATE
	lbs/acre	tons/acre	lbs/bu	in	mo/day
Poco	100	2.16	46.6	19	8/8
	160	2.35	46.4	19	8/8
Steptoe	100	2.75	47.0	32	8/17
	160	2.77	46.1	31	8/17
Kombar	100	2.70	45.3	29	8/17
	160	2.78	45.1	28	8/16
Advance	100	2.23	44.5	29	8/14
	160	2.09	44.0	30	8/14
LSD 5%	-	0.42	1.3	3	8/3

Fertilized with 570 lbs/acre of 16-20-0.

Table 7. Yield, test weight, height, and ripening date of four spring barley varieties planted May 2, 1983, at Redmond, Oregon

VARIETY	SEEDING RATE	YIELD	TEST WT.	PLANT HEIGHT	RIPE DATE
	lbs/acre	tons/acre	lbs/bu	in	mo/day
Poco	100	2.03	45.8	21	8/16
	160	2.57	46.0	22	8/16
Steptoe	100	2.19	44.4	38	8/20
	160	2.29	44.6	37	8/20
Kombar	100	1.23	40.1	30	8/26
	160	1.71	42.0	30	8/24
Advance	100	1.60	42.3	34	8/18
	160	2.15	43.0	33	8/16
LSD 5%	-	0.42	1.3	3	8/3

Fertilized with 570 lbs/acre of 16-20-0.

The data suggest that more than two tons of Poco barley can be harvested by early August, thus enabling alfalfa to be seeded in the stubble by mid-August. The variety Poco was earlier and shorter than the other varieties evaluated. Increasing the seeding rate at the later planting date increased grain yields, but late seeding prolonged grain maturity about one week.

SPRING OATS

Eight spring oat varieties were evaluated at Redmond for grain yield, test weight, plant height, and hay yields. The varieties were planted April 15, 1983, at 80 lbs/acre. One-half of the plot area was cut for hay on August 3, 1983; most of the varieties were in the soft dough stage. Results are summarized in Table 8.

Table 8. Redmond Spring Oat Variety Trial, 1983

VARIETY	GRAIN YIELD	HAY YIELD	TEST WT.	PLANT HEIGHT	LODGING
	tons/acre	tons/acre	lbs/bu	in	%
74 AB2300	2.49	6.04	39.5	50	25
75 AB661	2.11	6.32	38.8	49	0
Cayuse	2.07	6.47	40.5	52	10
Menominee	1.79	6.06	40.8	54	25
Park	1.60	5.90	37.3	54	10
Corbit	1.55	6.28	36.8	52	35
S 7884	1.39	6.00	39.4	54	5
Texas Red	1.05	5.27	34.2	54	45
LSD 5%	.50	NS	2.1	4	NS

Fertilized March 14, 1983, with 570 lbs/A of 16-20-0.

BENEFITS

The primary objective of the cereals project in Central Oregon is to evaluate potential new varieties for yield, test weight, maturity, height, lodging, winter hardiness, and disease resistance. The release of selection 72339 in 1984 will have significant impact on Central Oregon wheat growers. The yields of 72339 have averaged 115% of Stephens the last five years.

The search for better spring wheat varieties will continue. Central Oregon wheat producers have requested high yielding, short-strawed, rust resistant varieties. Yield trials included varieties from private industry, Washington, Oregon, and Idaho.

Early maturing barley varieties such as Poco may fit well into the rotation schedules of Central Oregon growers. Traditionally, alfalfa has been seeded in the spring and one small, weedy cutting taken the establishment year. It may be possible to harvest more than two tons of barley and then seed the alfalfa in the barley stubble in late summer. Full alfalfa production would be possible the following year.

Central Oregon also served as a cooperating site in the statewide cereals testing program. Variety information was obtained for irrigated and severe winter areas.

THE EFFECT OF pH AND POTASSIUM CHLORIDE ON THE YIELD AND TEST WEIGHT OF DAWS WINTER WHEAT

Stephen R. James[1] and T.L. Jackson[2]

A long-term study on a Deschutes sandy loam soil at Powell Butte was initiated in the spring of 1979 to study the effects of soil pH and potassium fertilizer (KCl) on potato production. In 1983, the study area was planted to Daws winter wheat. Yield and test weight data were collected. An in-depth study was not undertaken since this was a transitional year between the potato experiments and long-term alfalfa experiments planned for 1984.

The data presented in this report are from one growing season only, hence care should be exercised in interpretation of the data. Ideally, conclusions should be based on two or more years of repeated experimentation. Since this was not possible with our current objectives for the pH and potassium study, no conclusions or recommendations will be made.

METHODS

Four soil pH levels were created by the application of 1½ tons/A of sulfur, no lime, 2 tons/A of lime, and 4 tons/A of lime on April 16, 1979. For each pH level, five rates of KCl were applied; 0, 100, 200, 400, and 800 lbs/A of actual potassium were broadcast on May 5, 1980. Another identical application of KCl was made on April 29, 1982. No KCl was applied in 1983.

Treatments were arranged in a completely random experimental design with four replications. Plots were 20 x 30 feet.

Daws winter wheat was planted on November 16, 1982, at approximately 100 lbs/A with a field drill. Two pints of Bronate were applied on April 19, 1983 for broadleaf weed control. On April 20, 1983, 606 lbs/A of 27-12-0 (NPK) fertilizer were applied.

Fifty square feet from the center of each plot were harvested September, 1983. Individual plots were then weighed and test weights determined.

RESULTS

A wide range of soil pH levels was created by the application of lime and sulfur in 1979. The pH levels two months after application on May 10, 1979, were: sulfur, 4.6; no lime, 5.3; two tons/acre lime, 6.3; and four tons/acre

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Table 2. The effect of four soil pH levels and five potassium treatments on the yield of Daws winter wheat at Powell Butte, Oregon, 1983

TREATMENT	YIELD 4.6 pH	5.4 pH	5.9 pH	6.4 pH	AVERAGE
	------bu/A------				
No K	115.2[1]	115.2	111.9	115.8	114.5[3]
100 lb/A K	105.1	119.8	127.1	119.5	117.9
200 lb/A K	124.9	131.7	132.1	121.1	127.5
400 lb/A K	100.6	131.9	139.8	127.7	125.0
800 lb/A K	104.7	124.9	130.2	123.9	122.2
AVERAGE	110.1[2]	124.7	130.2	123.9	122.2

1 - LSD 5% among pH x potassium treatments = 15.7 bu/A.
2 - LSD 5% among pH treatments = 7.0 bu/A.
3 - LSD 5% among potassium treatments = 7.8 bu/A.

Table 3. The effect of four soil pH levels and five potassium treatments on the test weight of Daws winter wheat at Powell Butte, Oregon, 1983

TREATMENT	TEST WEIGHT 4.6 pH	5.4 pH	5.9 pH	6.4 pH	AVERAGE
	------lbs/bu------				
No K	56.6[1]	55.8	55.2	55.8	55.8[3]
100 lb/A K	56.4	55.7	56.2	55.5	55.9
200 lb/A K	57.5	57.7	56.8	56.1	57.0
400 lb/A K	56.3	57.4	57.6	57.0	57.1
800 lb/A K	56.8	56.7	56.4	56.7	56.7
AVERAGE	56.8[2]	56.7	56.4	56.7	56.7

1 - LSD 5% among pH x potassium treatments = not significant.
2 - LSD 5% among pH treatments = not significant.
3 - LSD 5% among potassium treatments = 0.9 lbs/bu.

lime, 6.8. The April 5, 1983, soil analysis for the pH and potassium treatments is shown in table 1. After four years the pH's of the sulfur treatment and check plot (no lime) have not changed. The pH of both lime treatments dropped 0.4 in four years.

YIELD. Both pH and KCl affected the grain yield of Daws wheat (Table 2). The pH x KCl interaction was statistically significant (p=0.05). Grain yields were uniformly low among pH levels when no KCl was applied. However, the greater the amount of KCl applied, the greater the grain yield response to the soil pH. With an application of 100 lb/A of KCl, yields varied from 105.1 to 127.1 bu/A or 22.0 bu/A. When 400 or 800 lb/A of KCl were applied, yields varied nearly 40 bu/A among pH treatments. The data indicate that the higher the soil potassium level, the greater the response of grain yield to soil pH.

In all treatments where KCl was applied, maximum yields were obtained at soil pH of 5.9.

Septoria was present in the trial and may have influenced yields but its severity was not measured. Research has shown that chloride will decrease the incidence of take-all and stripe rust in winter wheat (1, 2). Chloride may have a similar effect in controlling *Septoria*. Since the incidence of *Septoria* was not measured for each treatment, this is mere speculation.

TEST WEIGHT. Soil pH had no effect on test weight. However, the greater the application of KCl, the higher the test weight was (Table 3).

LITERATURE CITED

1. Christensen, N.W., R.L. Powelson, and T. Fairweather. 1983. Chloride Suppression of Stripe Rust Development in Wheat. 1982-83 Wheat Research Project Reports. Agricultural Experiment Station, Oregon State University.

2. Jackson, T.L., R.L. Powelson, and N.W. Christensen. 1983. Combating Take-All Root Rot of Winter Wheat in Western Oregon. Fact Sheet 250, Oregon State University Extension Service.

Table 1. Soil Potassium and pH analyses for the Lime x Potassium experiment (April 5, 1983)

POTASSIUM	ppm	TREATMENT	pH
No K	152	Sulfur	4.6
100 lb/A K	178	No Lime	5.4
200 lb/A K	224	2 Ton Lime	5.9
400 lb/A K	294	4 Ton Lime	6.4
800 lb/A K	526		
LSD 5%	35		0.1

SEED YIELD RESPONSE OF PARADE KENTUCKY BLUEGRASS TO TIME OF NITROGEN APPLICATION

J. Loren Nelson[1]

Growers in Central Oregon apply approximately 200 pounds of nitrogen (N) per acre each production year to obtain high yields of Kentucky bluegrass seed. Historically this N was applied in the fall or split half and half between fall and spring which many growers preferred. However, during the last 10 years, most growers have favored a single fall N application to reduce costs. Recently some growers have applied small quantities (30 to 40 pounds) of N per acre after postharvest residue burn and the remainder of the N in the fall. There may also be other times during the annual seed production cycle in which N applications could be beneficial. Therefore, an experiment was initiated in the fall of 1980 to investigate the effect of different N application times on the seed yield of Parade Kentucky bluegrass on two grower fields in Jefferson County.

MATERIALS AND METHODS

The fields selected for study were in the first and second year of seed production on the Robert Farrell and James Dinkel Farms, respectively. Both fields have a Madras sandy loam soil type but the soil depth varied on each -- about 3 feet for Farrell's field and 12 inches for Dinkel's. The experimental areas were irrigated by the growers according to their regular field schedules. Farrell applied about two inches of water per irrigation through a center pivot system. Hand-move irrigation lines were used to apply about four inches of water at a time on the Dinkel farm. Normal seed production practices were followed except for fertilizer applications. The forage on all plots was removed during the winter with sheep when the fields were grazed. Soil phosphorous, potassium, and sulfur were maintained at levels not to limit seed production. The schedule for different N applications is shown in Tables 1 and 2. Ammonium nitrate was the source of N for all treatments. The 15 treatments were replicated four times in a randomized complete block design. All results were analyzed statistically. Only the seed yield data will be presented in this report.

RESULTS AND DISCUSSION

Fall vs fall/spring split fertilizer application (treatment 1 vs 2). There were no significant differences in seed yield between these treatments at either location (Tables 1 and 2). However, large quantities of rain during

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the winter could cause N losses by leaching with subsequent seed yield reductions if a grower depended entirely upon a fall N application. For this reason, fall/spring split N fertilization is recommended.

Small amount of N after the burn and remainder of N in fall vs fall N application. On the Farrell Farm in 1981 there was a significant seed yield increase from 30 lb N/A after the burn and 170 lb N/A in November compared to 200 lb N/A in November (Table 1). But no difference in the number of panicles harvested/ft^2, number of seeds per panicle, and seed weight was detected. Seed yields for these treatments (No. 1 and 2) were similar at the same location in 1982 and 1983 as they were in both years at Dinkel's (Table 2). Therefore, the practice of applying small amounts of N after postharvest residue burn and irrigating it into the soil doesn't appear to have a beneficial effect in terms of increasing seed yield.

Other N application times. A number of comparisons can be made by an examination of Tables 1 and 2 that will help growers determine the value of applying different N amounts at different times of the year. Not many significant differences can be observed at either test location for the years involved.

Table 1. Effect of N scheduling on seed yield of Parade Kentucky bluegrass, Farrell Farm, Madras, Oregon, 1981-83

TRT. NO.	LB N/A APPLIED						SEED YIELD (lb/A)			
	SEPT.	NOV.	JAN.	2/15-3/15	3/15-4/15	MAY	1981	1982	1983	3 YR. AVG.
10	0	100	50	0	50	0	1517 abc[1]	956 a[1]	723 abc[1]	1065
2	30	170	0	0	0	0	1635 a	793 a	653 a-d	1027
14	60	70	35	0	35	0	1570 abc	920 a	589 c-f	1026
5	30	85	0	85	0	0	1518 abc	902 a	632 a-e	1017
4	0	100	0	100	0	0	1412 a-d	893 a	692 a-d	999
11	0	100	33	0	33	33	1583 ab	759 a	620 a-e	987
15	60	35	35	0	35	35	1561 abc	870 a	472 f	968
3	60	140	0	0	0	0	1448 a-d	849 a	599 b-f	965
1	0	200	0	0	0	0	1338 cd	815 a	740 ab	964
7	30	0	0	170	0	0	1353 b-d	898 a	637 a-d	963
6	60	70	0	70	0	0	1474 a-d	826 a	585 c-f	962
8	0	0	0	200	0	0	1248 d	862 a	752 a	954
12	30	85	42	0	42	0	1405 a-d	820 a	618 a-e	948
9	60	0	0	140	0	0	1510 abc	744 a	573 def	942
13	30	42	42	0	42	42	1385 bcd	849 a	490 ef	908
Coefficients of variability (%)							9.5	15.6	14.0	

[1] Values within a column with the same letter are not significantly different at .05 level of probability using Duncan's multiple range test.

Table 2. Effect of N scheduling on seed yield of Parade Kentucky bluegrass, Dinkel Farm, Culver, Oregon, 1981-82

TRT.	LB N/A APPLIED						SEED YIELD (LB/A)		
NO.	SEPT.	NOV.	JAN.	2/15-3/15	3/15-4/15	MAY-JUNE	1981	1982	2 YR. AVE.
12	30	85	42	0	42	0	1085 a-d[1]	1315 a[1]	1200
2	30	170	0	0	0	0	1384 a	998 bc	1191
11	0	100	33	0	33	33	1154 a-d	1159 ab	1157
6	60	70	0	70	0	0	1298 ab	1014 bc	1156
1	0	200	0	0	0	0	1217 a-d	1082 bc	1150
14	60	70	35	0	35	0	1240 abc	1006 bc	1123
15	60	35	35	0	35	35	1291 abc	951 c	1121
3	60	140	0	0	0	0	1259 abc	966 bc	1113
5	30	85	0	85	0	0	1200 a-d	1008 bc	1104
7	30	0	0	170	0	0	1257 abc	946 c	1102
13	30	42	42	0	42	42	1066 a-d	1110 abc	1088
10	0	100	50	0	50	0	1029 bcd	1114 abc	1072
9	60	0	0	140	0	0	1089 a-d	969 bc	1029
4	0	100	0	100	0	0	967 cd	1002 bc	985
8	0	0	0	200	0	0	905 d	982 bc	944
Coefficients of variability (%)							16.6	11.7	

[1] Values within a column with the same letter are not significantly different at .05 level of probability using Duncan's multiple range test.

EFFECT OF FOLIAR FERTILIZATION ON THE SEED PRODUCTION OF BARON AND MERIT KENTUCKY BLUEGRASS AT MADRAS, OREGON, IN 1982 AND 1983

J. Loren Nelson[1]

The use of foliar nutrients on a number of economically important crops is an established practice to correct nutrient deficiencies and/or to supplement soil fertilization. However, with Kentucky bluegrass for seed production, the practice is not well established nor are the benefits documented. Therefore, studies were conducted in 1982 and 1983 to determine some effects of foliar fertilization on bluegrass seed production.

MATERIALS AND METHODS

The experiments in both years were conducted at the Central Oregon Experiment Station Madras site on a Madras loam soil.

Experiment I and II. Baron Kentucky bluegrass in its second year of seed production was selected for the test in 1982. The field had been fertilized with 25-10-0-15 (N-P_2O_5-K_2O-S) to supply 70 lb N/A each on October 21, 1981, and December 4, 1981, and 84 lb N/A on February 17, 1982, a crop season total of 224 lb N/A. All applications of foliar nutrients were planned to be supplemental to the soil fertilization program. Three foliar nutrient formulations were applied at recommended rates (Table 1). These treatments along with a non-treated control were arranged in a randomized complete block design with four replications. Each plot was 7 feet wide x 12 feet long. The Leffingwell and Ortho products were each applied as a tank mix in 25 gallons water/A on May 28 (Experiment I). At this time, the Baron bluegrass was 30 centimeters (11.8 inches) tall and the panicles had emerged from only a few tillers. Plant development was defined as the very late boot stage. The Pure-Gro product was not available for application until June 2 so consequently it was not compared with the Leffingwell and Ortho products. Subsequently, results from this treatment were compared only

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Table 1. Quantity of nutrients applied per acre of three different formulations in 1982 on Baron Kentucky bluegrass at Madras, Oregon

Nutrient	Leffingwell[1]	Ortho[2]	Pure-Gro[3]
	lb/A	lb/A	lb/A
N	1.20	.65	1.0100
P_2O_5	.60	.44	.6060
S	.05	-0-	.5050
Ca	.25	-0-	.2525
Mg	.10	.16	.1010
Zn	.10	.68	.1010
Fe	.09	.05	.0505
Mn	.04	.09	-0-
B	.05	-0-	.0505
Cu	-0-	.04	-0-

APPLICATION RATES:

[1]Leffingwell: 1 qt/A of Sorba-Spray MIP (Liquid), 0-10-0 ($N-P_2O_5-K_2O$) and 5 lb/A of Nutra-Phos N (Wettable Powder), 20-12-0 ($N-P_2O_5-K_2O$).

[2]Ortho: 1 qt/A (Liquid), 10-20-0 ($N-P_2O_5-K_2O$) and 5 lb/A Nutrient D (Wettable Powder), 9-4-0 ($N-P_2O_5-K_2O$).

[3]Pure-Gro: 1 gal/A (Liquid), 10-6-0 ($N-P_2O_5-K_2O$).

with the non-treated control (Experiment II). On June 2, about 20 panicles were selected at random throughout each plot. From these, 10 panicles were chosen at random and the number of spikelets counted on each. Florets/spikelet from 2 spikelets each at the bottom, middle, and top of four panicles were also counted. An area 3.3 feet wide x 12 feet long of each plot was cut by machine in the early morning when dew prevented seed shatter and placed in a cotton bag and allowed to air dry. All seed was threshed with a stationary machine, delinted, scalped, and cleaned with a M-2B air screen machine. Seed weights per plot and quart seed weights were used to calculate seed yield/A and bushel weights, respectively. After harvest the panicles were clipped at stubble height from a 6-inch wide by 24-inch long strip on the border of each plot and bagged until determination of panicle numbers per square foot could be made. Four 100-seed lots per plot were counted by hand and weighed to obtain an average 100 seed weight value for each plot. The number of seeds/spikelet were calculated from panicles/ft^2, number of spikelets/panicle, and 100 seed weight data. The percent seed set was calculated by dividing the number of seeds/spikelet by the average number of florets/spikelet and multiplying by 100.

All results were analyzed statistically. Duncan's multiple range test at the .05 level of probability was used to test for significant differences among treatments.

Experiment III. Merit Kentucky bluegrass in its third year of seed production was used in the 1983 test. The field was fertilized with 25-10-0-15 ($N-P_2O_5-K_2O-S$) to give 130 and 60 lb N/A on October 18, 1982, and February 28, 1983, respectively. Foliar nutrient applications were supplemental to the soil fertilization program. Leffingwell Sorba-Spray MIP and Mg with Nutra-Phos N were mixed and sprayed as a tank mix at early boot, late boot, start of pollination, and seed fill. These four stages of growth along with a non-treated control constituted the five treatments which were replicated four times in a randomized complete block design. Quantity and rate of foliar nutrients applied are shown in Table 2. Data from each 7 x 12 foot plot were collected and analyzed in a manner similar to

Experiments I and II. In addition, a germination test on seed from each plot was conducted by the Oregon State University Seed Laboratory.

RESULTS

Experiments I and II. No significant beneficial effect from foliar fertilization as a supplement to soil fertilization was found for any variable that was measured (Table 3).

Experiment III. There was no advantage to foliar fertilizer applications at the four growth stages tested (Table 4).

Table 2. Quantity of foliar nutrients applied per acre* at each growth stage of Merit Kentucky bluegrass at Madras, Oregon, 1983

Nutrient	Sorba-Spray MIP	Sorba-Spray Mg	Powder Nutra-Phos N	Total**
	lbs/A			
N	---	---	1.00	1.00
P_2O_5	.20	.20	.60	1.00
Ca	---	---	.25	.25
Mg	---	.06	.10	.16
S	.05	.06	----	.11
Zn	---	.02	.10	.12
Mn	.04	---	----	.04
Fe	.04	---	.05	.09
B	---	---	.05	.05

* Amount of nutrients/A were calculated from application rates of 1 qt/A each of Sorba-Spray MIP & Mg (Liquids) and 5 lbs/A of Nutra-Phos N (Wettable Powder).

** Total of each nutrient applied at each growth stage.

Table 3. Effects of foliar fertilization on seed yield and related characteristics of Baron Kentucky bluegrass, Madras, Oregon, 1982

Product Source	Seed Yield (lb/A)	Bu. Wt. (lb/bu)	Panicles Per Ft.^{2}	Seeds Per Panicle	100 Seed Wt.(gm)	Spikelets Per Panicle	Florets Per Spikelet	Seeds Per Spikelet	Seed Set (%)
Experiment I									
Leffingwell	1712	21.8	293	149	.0420	125.0 b[1]	3.4	1.2	35.6
CONTROL	1640	21.9	323	132	.0414	140.0 a	3.6	1.0	25.9
Ortho	1556	22.2	322	123	.0412	134.0 ab	3.6	.9	25.8
C.V. (%)	6.7	1.8	17.0	21.5	2.4	5.3	5.9	17.0	23.0
Experiment II									
Pure-Gro	1867	22.3 a[1]	342	139	.0414	130.0	3.4 a[1]	1.1	32.4
CONTROL	1640	21.9 b	323	132	.0414	140.0	3.6 b	1.0	25.9
C.V. (%)	10.2	.6	21.7	23.1	1.3	8.6	2.0	13.9	14.7

[1]Values within the column with different letters are significantly different at .05 level of probability using Duncan's Multiple Range Test.

Table 4. Effects of foliar fertilization at four growth stages on seed yield and related characteristics of Merit Kentucky bluegrass, Madras, Oregon, 1983

Stage of Growth	Seed Yield (lb/A)	Bu. Wt. (lb)	Panicles/ 1000 cm^2	Seeds/ Panicle	100 Seed Wt. (mg)	Spikelets per Panicle	Florets per Spikelet	Seed Set (%)	Germination (%)
Early Boot	550	25.1	222 ab[1]	59	47.1	100	3.1	18.9	93.8
Late Boot	534	24.7	251 ab	51	47.4	98	3.2	16.5	93.8
Anthesis	598	24.3	204 b	71	47.1	101	3.0	23.7	94.3
Seed Fill	593	24.8	265 a	53	47.5	103	2.8	18.6	93.5
CONTROL	583	24.8	265 a	53	47.5	103	2.8	18.6	93.5
C.V. (%)	13.0	2.1	12.3	21.0	1.5	9.7	7.4	22.6	1.3

[1] Values within the column with different letters are significantly different at .05 level of probability using Duncan's Multiple Range Test.

CONTROL OF VOLUNTEER PARK KENTUCKY BLUEGRASS IN A NEW PLANTING OF BARON KENTUCKY BLUEGRASS

W.O. Lee and J.L. Nelson[1]

Contamination of new varieties of Kentucky bluegrass by seed in the soil continues to be a problem in Central Oregon. This area has been in Kentucky bluegrass production for about 40 years and on some fields, a number of different Kentucky bluegrass varieties has been grown on the same field. Since Kentucky bluegrass seed remains viable in the soil for many years, newly planted varieties can become easily contaminated with volunteer plants from seed in the soil. Also, when fields are taken out of bluegrass seed production and rotated into mint or certain other crops, the old stands are not completely killed and thus, with some fields, remnants of previous stands continue to exist and produce seed, even though alternate crops have been produced. In addition, there is bluegrass growing along irrigation canals, roadsides, fencerows, etc.. This bluegrass produces seed which moves in irrigation water to the fields when alternate crops are grown and thus adds to the problem of volunteer Kentucky bluegrass plants when fields are planted to new varieties.

Over the years, a number of experiments have been conducted in this area to find means of controlling volunteer Kentucky bluegrass in new bluegrass plantings. The charcoal planting method has been quite successful but has not been accepted by the growers in Central Oregon because some of the fields have very light soils and injury has occurred. Also, since there is little use of this method in the area, no one is equipped to make carbon plantings. This experiment was conducted to evaluate other cultural practices that might be used to control volunteer Kentucky bluegrass which would be as effective or more effective than carbon seeding and less expensive, and more acceptable to the growers.

MATERIALS AND METHODS

An experiment was conducted from August, 1980, to June, 1982, at the Central Oregon Experiment Station Madras Research site on a Madras loam soil. Ten treatments as shown in Table 1 were arranged in a randomized complete block design with three replications. Each plot measured 20 feet wide by 45 feet long.

The field on which this experiment was conducted had a barley nursery in the summer of 1980. After harvest the field was burned to remove all straw and subsequently, Park Kentucky bluegrass seed was broadcast at 40 pounds per acre over the entire field. Park is a tall-growing variety that is easily

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Table 1. Control of volunteer Park Kentucky bluegrass in a new planting of Baron Kentucky bluegrass on the Central Oregon Experiment Station Madras Research Site, Madras, Oregon, 1980-82

Cultural and herbicide treatment[a]	Herbicide Rate (lb/A)	No. of Volunteer Plants/m^2 [b]	Volunteer Control Score[c]
A. Baron Kentucky bluegrass planted 9-16-80			
1. Field disked, rolled and planted - no herbicide	---	Solid Stand	0
2. Field harrowed, rolled, and planted - no herbicide	---	Solid Stand	0
3. Field harrowed, rolled, carbon-planted, diuron applied	2.5	45	3
4. Field disked, rolled, carbon-planted, diuron applied	2.5	29	7
B. Baron Kentucky bluegrass planted 4-7-81			
5. Field disked, rolled, and planted - no herbicide	---	4	8
6. Propham (11-20-80), glyphosate (3-27-81), undisturbed seedbed, and planted	4.0 +2.0	16	7
7. Propham (11-20-80), glyphosate (3-27-81), rolled and planted	4.0 +2.0	1	10
8. Propham (11-20-80), glyphosate (3-27-81), undisturbed seedbed, carbon-planted, diuron applied	4.0 +2.0 +2.5	5	8
9. Propham (11-20-80), glyphosate (3-27-81), disked, rolled, carbon-planted, diuron applied	4.0 +2.0 +2.5	0	10
10. Field disked, rolled, carbon-planted, diuron applied	2.5	3	9

[a] Herbicides were applied in 40 gal. water/A.

[b] The number of volunteer Park Kentucky bluegrass plants between the seeded rows of Baron Kentucky bluegrass were counted on August 16, 1981.

[c] The volunteer Park Kentucky bluegrass control score: 0 = no control, 10 = 100% control.

recognized when present in lower-growing varieties of bluegrass. After the field was overseeded, it was sprinkle-irrigated with about 2 inches of water during the week of September 8, 1980. On September 16, 1980, several cultural treatments were made and then Baron Kentucky bluegrass was drilled in 12-inch rows without additional treatment or was carbon-planted and treated with diuron at 2.5 lb/A. Baron is a low-growing variety of Kentucky bluegrass and when contaminated by Park Kentucky bluegrass, the Park heads much earlier and is much taller than Baron so that it is easily recognized. After the planting of Treatments 1-4, the field was again irrigated as needed to sprout the seed and to get it established in the fall.

For treatments 5-10, a number of different chemical seedbed and cultural practices were applied during the fall and winter of 1980-81. The remaining bluegrass was planted on April 10, 1981. On those plots that were carbon-seeded on April 10, diuron was applied at 2.5 lb/A immediately after planting. The April 7 seeding was irrigated as required to germinate and establish the bluegrass crop. Likewise, the sprinkle-irrigation was used to move the diuron into the soil and to activate it. The other herbicide treatments depended on natural precipitation. Kentucky bluegrass seed production in the Madras area is entirely dependent on irrigation.

Acceptable Kentucky bluegrass seed production practices for fertilization, rattail fescue and broadleaf weed control, irrigation, and post-harvest residue removal were followed.

Volunteer bluegrass plants between the seeded rows of Baron were counted in a one square meter area for each plot on August 16, 1981. An average number of volunteers for each treatment was calculated from these data.

Control of volunteer bluegrass (Park) was evaluated again on June 4, 1982, by a 0-10 visual scoring system (0 = no control, 10 = 100% control). At this time, Park and Baron had fully expanded panicles and showed a height difference. Plots were not harvested for seed yield because of poor stand for Baron in some plots.

RESULTS AND DISCUSSION

There was a solid stand of Park Kentucky bluegrass on fall planted plots that received tillage alone without herbicide (Table 1). No control of volunteers was achieved. It was impossible to determine the location of the seeded rows. In Treatments 3 and 4, where Baron Kentucky bluegrass was carbon-seeded in the fall and treated with diuron, the rows were distinguishable but there was still a large number of volunteer Park plants between the rows, even though diuron had been applied to control them. When the bluegrass was seeded in the spring, after the various herbicides or cultural practices, there was a marked reduction in the number of volunteer Park plants growing between the rows of Baron Kentucky bluegrass. The volunteer population was eliminated on Treatment 9, where the field was disked, rolled, carbon-planted, and treated with diuron. This was an excellent treatment. A number of other treatments also drastically reduced the volunteer plants between the rows. All of the spring treatments were much more effective in controlling volunteer Park Kentucky bluegrass than were the fall treatments when evaluated by count of volunteer plants between rows on August 16, 1981.

Further observations on June 4, 1982, when both Park and Baron were fully headed and the Park was 8 to 12 inches taller than the Baron, also, showed that spring plantings have fewer volunteers than did the fall plantings (Table 1). Treatments 7 and 9 gave complete control of volunteer Park Kentucky bluegrass.

These results indicate that much of the problem faced by farmers in Central Oregon is caused by the cultural practice which they follow in growing Kentucky bluegrass. The common practice is to burn grain stubble after harvest in the fall, pre-irrigate, and then plant Kentucky bluegrass as soon as possible. On occasion, they do get some sprout of volunteer grain, etc., which is sprayed with Roundup or paraquat, but because of the need to get the bluegrass planted early so it will produce a seed crop the following summer the grower seldom waits long enough to get the sprout that helps in controlling volunteer Kentucky bluegrass. Thus, as shown in Treatments 1 and 2, when this practice is followed, most of the seed present in the soil survives and germinates along with the crop and contaminates new varieties as they are planted. Carbon planting in the fall reduced the volunteer stand considerably as compared to the common practice but under the conditions in this trial, where the field was overseeded with a heavy rate of Park bluegrass, the treatments were not good enough to overcome the problem. When the seedings were delayed until spring, all of the treatments were much more effective in controlling volunteer Kentucky bluegrass than were treatments planted in the fall, and several of these treatments gave complete, or nearly complete control of the volunteer Kentucky bluegrass. Thus, it would appear that if the problem becomes serious enough so that volunteer Kentucky bluegrass prevents certification of seed fields in Central Oregon, the problem can be overcome by spring planting and coupling this with various herbicide and tillage treatments to control volunteer Kentucky bluegrass that comes from seed in the soil.

FABABEANS - A NEW CROP FOR CENTRAL OREGON?

Steven R. James, J. Loren Nelson, and Rod Brevig[1]

Fababeans (Vicia faba L.) are an Old World crop that has been grown for centuries in North Africa and Europe for human consumption and animal feed. Other commonly used names include broadbean, horsebean, favabean, and tickbean (1, 2, 3, 4).

Fababeans are a tall, upright, annual legume that is well adapted to cool climates and short growing seasons. Being a legume, nodules of Rhizobium bacteria are formed on fababean roots and fix atmospheric nitrogen which can be utilized by the fababean plant and subsequent crops (3).

Common usage of Fababeans in North America is high protein silage or a grain protein supplement. The plants are indeterminate (flower continuously) and this results in seed pods forming throughout the growing season. Pods containing three or four seeds are borne along the main stem and are found in various stages of maturity. The seeds average 28 to 32% protein (3).

Fababeans are frost tolerant and can withstand temperatures as low as 21 degrees F. For maximum production, a growing season of 100 to 120 days is required. Water usage is somewhat high and irrigation is required in Central Oregon.

METHODS

MADRAS. Three fababean varieties were planted in a randomized block experimental design on April 18, 1983. All seed was inoculated with Rhizobium leguminosarum before planting. Plots consisted of four rows which were 12 inches apart and 12 feet long. Seeds were spaced approximately two inches apart. Plots were not fertilized. The trial was irrigated as needed; 17 inches of water was applied during the growing season. Plots were harvested by hand August 17, 1983. Material was placed in large burlap bags and air dried. All plots were threshed, the seed cleaned, and weighed.

REDMOND. Four fababean varieties were planted in a latin square experimental design on April 18, 1983. Plots were 12 feet long, five feet wide, and contained four rows spaced 12 inches apart. Before planting, all seed was inoculated with Rhizobium leguminosarum. Seeds were spaced about two inches apart and later thinned to four inches. The plots were fertilized before planting with 600 lbs/acre of 0-10-0-14 (NPKS). The plots were sprinkler irrigated weekly and received a total of 30 inches of water. The plots were cut by hand on Sept. 19, 1983. Plot material was allowed to dry for three days, then was bagged and stored inside. Plots were later threshed, cleaned,

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and weighed. No chemical weed control was applied; instead, plots were hand weeded once when plants were approximately 12 inches high.

RESULTS AND DISCUSSION

MADRAS. A severe hailstorm on July 31, 1983, damaged the Madras trial. Leaves were stripped from the plants, seed pods were battered and split open, and a large amount of seed was lost. In spite of the damage, yields averaged more than one ton per acre. The seed weights were lower than normal. Many seeds were shriveled and off-color, which was a result of the hail damage. The fababean plants flowered and set seed through much of the summer. It has been noted at temperatures higher than 80 degrees F, blossom dropping can occur which results in a failure to set seed (2). In trials conducted in the Columbia basin, failure to set seed was a problem.

Two disease organisms were identified in the Madras trial by the Oregon State University Plant Pathology Laboratory. Chocolate spot, caused by the fungi *Botrytis* sp., was identified. Crop losses because of the reduction in leaf area caused by *Botrytis* have been observed by others (2). *Alternaria* leaf spot was also identified. There is little information available on *Alternaria* and fababeans.

REDMOND. Fababeans appear to be well adapted to the soils and climate in the Redmond area. Plants were not as vigorous or as tall as those grown at Madras. However, yields were the best of any location in the Western region fababean trials. The 100 seed weight for all varieties was approximately 10 grams heavier than the Madras trial, also, the seeds were not shriveled, deformed, or discolored.

Frost had little effect on the fababeans. Four days of severe frost (21, 27, 25, 29 degrees F) in mid-May had no observable effect on the seedlings. Beans were set throughout the entire growing season until late August. Plants in Redmond were about 20 inches shorter than those in Madras. The higher elevation and cooler climate may have influenced the height.

There were no plant diseases observed in the Redmond trial. Also, no insect problems were apparent. Weed control may be necessary in commercial stands. Because of wider row and plant spacings, it is easier for weeds to compete successfully. Hand weeding when the plants were 12 inches controlled most weeds, however, later germinating and grassy weeds were a problem. Early cultivation may also be beneficial.

Further work with Fababeans will continue in 1984. Excellent yields coupled with favorable markets and prices may enable Central Oregon farmers to produce fababeans for profit.

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Table 1. Madras fababean variety trial, 1983

VARIETY	YIELD	100 SEED WT.	1ST BLOOM DATE	PLANT HEIGHT	1ST POD HEIGHT
	lbs/acre	gms	mo/day	in	in
Alladin	2584	37.7	6/16	78	24
Herz-Freza	2547	36.6	6/16	80	23
Diana	2383	38.2	6/15	73	20
Average	2505	37.5	6/16	77	22
LSD 5%	NS	NS	--	4	NS

Table 2. Redmond fababean variety trial, 1983

VARIETY	YIELD	100 SEED WT.	PLANT HEIGHT	1ST POD HEIGHT
	lbs/acre	gms	in	in
Alladin	6569	49.6	57	14
Frederick	6095	43.6	60	18
Herz-Freza	5468	44.8	55	16
Diana	4254	46.6	51	17
Average	5597	46.2	56	17
LSD 5%	1173	2.8	3	NS

POTATO VINE DESSICANT STUDY

Steven R. James[1]

ABSTRACT

Two potato vine dessicants, Diquat (1 pt/A) and dinoseb (2 qt/A), were compared with and without vine rolling. Diquat was slower acting than dinoseb, however, after 10 days both compounds produced complete dessication. Vine rolling immediately before dessicant application improved vine killing effectiveness.

METHODS

A randomized, complete block experimental design with four replicates was used to evaluate potato (Russet Burbank) vine dessication. Diquat (1 pt/A) and dinoseb (2 qt/A) were compared with and without vine rolling, and at early (Sept. 6, 1983) and late (Sept. 20, 1983) spray dates. Frosts of 24 degrees F on Sept. 19 and 22 degrees F on Sept. 20, 1983, prevented application of dessicants on the late spray date. Vines were rolled immediately before spraying with a 12-foot wide rubber tire roller mounted on a three-point hitch.

Application data are outlined in Table 1. Dessicants were applied on Sept. 6, 1983. Percent vine kill was evaluated on Sept. 9, Sept. 13, and Sept. 16, 1983. Ten tubers from each treatment were cut and visually evaluated for vascular ring discoloration after two months of storage at 55 degrees F.

RESULTS

Table 2 summarizes the effects of 1 pt/A of Diquat and 2 qt/A of dinoseb on vine dessication of Russet Burbank potatoes. Three days after dessicant application, dinoseb resulted in an average 81% vine kill, Diquat averaged 68% vine kill. After one week, there were no significant (5%) differences in percent vine kill between both compounds. After 10 days, vines in all plots were 100% killed. A frost on Sept. 9, 1983, of 30 degrees F had minimal effects on the treatments.

Vine rolling before application significantly increased dessicant effectiveness. Three days after application, vine rolling produced 25% greater vine kill than plots where the vines were not rolled. After seven days, the effect of vine rolling was not significantly different.

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Table 1. Dessicant application data

LOCATION: Powell Butte, Crook County, Oregon

EVALUATION SCALE: 0 = no effect, 100 = complete kill

EVALUATION DATES: Sept. 6, Sept. 9, Sept. 13, Sept. 16, 1983

CROP (Cultivar): Potatoes (Russet Burbank)

PLANTING DATE: May 17, 1983

HARVEST DATE: Oct. 12, 1983

SEED SPACING: 9 inches

PLOT SIZE; ROW SPACING: 12 x 30 ft.; 36 inches

SOIL SERIES AND TYPE: Deschutes Sandy Loam

SOIL pH: 6.5

FERTILIZER: 1000 lbs/acre 16-16-16

EXPERIMENTAL DESIGN: Randomized Complete Block, 4 Replicates

APPLICATION DATE: Sept. 6, 1983

- TEMPERATURE: 74 degrees F
- SOIL TEMPERATURE (4 in.): 58 degrees F
- PERCENT CLOUD COVER: Clear
- WIND SPEED AND DIRECTION: 0-4 MPH, West
- DEW PRESENT: None
- TIME OF DAY: 10:00 AM
- SOIL MOISTURE: 60-70% Field Capacity

METHOD OF APPLICATION: Broadcast

- TYPE OF SPRAYER: Unicycle
- GROUND SPEED: Approximately 3 MPH
- TYPE OF CARRIER AND VOLUME: Water, 40 gal/acre
- LENGTH OF BOOM AND NOZZLE SPACING: 80 in., 16 in.
- NOZZLE SIZE AND TYPE: 8002 Flat Fan
- BOOM HEIGHT: 24 in.
- PRESSURE: 32 PSI
- SURFACTANT AND RATE: X-77, 12 oz/acre

Tubers from each treatment were cut and evaluated for vascular discoloration. All tubers from all treatments showed very slight stem end vascular discoloration. There were no differences among treatments.

Table 2. Effect of diquat and dinoseb on dessication of potato vines

TREATMENT		RATE/ ACRE*	9/6**	9/9	9/13	9/16
			------------% Vine Kill-----------			
DIQUAT	VINES ROLLED	1 PT.	0	81	96	100
DIQUAT	VINES NOT ROLLED	1 PT.	0	54	90	100
DINOSEB	VINES ROLLED	2 QT.	0	90	95	100
DINOSEB	VINES NOT ROLLED	2 QT.	0	73	94	100
AVERAGE			0	74	94	100
LSD 5%			-	15	NS	---
CV%			0	13	4	0

* 12 oz/A of X-77 added.

** Application Date.

SOIL FERTILITY, PLANT NUTRITION, AND PLANT DISEASE INTERACTIONS AFFECTING POTATOES

T.L. Jackson, Robin McBride, M.L. Powelson,
M.J. Johnson, and S.R. James[1]

ABSTRACT

An experiment was established at Powell Butte, Oregon, to evaluate the effect of different rates and sources of potash (K) on yield, nutrient concentration of potato petioles and tuber quality (size, hollow heart, and processing quality), and the relationships between fertilizer treatments applied and nutrient concentrations in petiole and tuber samples and yield and quality effects.

Yield and quality (grade) were good; yields of 25.5 T/A were produced. Application of K fertilizers increased yield (total) as well as increasing the percent of 6+ oz. tubers and reduced the amount of hollow heart.

Potassium chloride was more efficient than K sulfate in increasing K concentration in petiole samples, in increasing yield and in reducing hollow heart. Yield increases and quality effects resulting from potash applications have been associated with a wide range in petiole K concentrations (for example, petiole K was increased from 6 to 10% in the 1983 Central Oregon Experiment and from 9 to 14% in previous Central Oregon Experiments).

It is becoming evident that yield, quality, and disease responses following an application of potassium chloride fertilizers must be associated with the chloride present in the fertilizer as well as from the potassium. Relationships among K, Ca, and Mg are being evaluated.

These results leave some growers in a dilemma concerning sources of K. Potassium sulfate has increased specific gravity when compared with potassium chloride. Also, potassium sulfate is an excellent K source to band with N, P, and S near the seed at planting. We need a better understanding of the total effects of chloride in this production system.

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Table 1. Nitrogen rate, and potash rate and source effects on potato yield, grade, and hollow heart, Powell Butte, Oregon, 1983

	Treatments*			Yield T/A			In 10 Largest		In 20 Largest	
	5/18	7/7	7/27	Total	6+oz	4oz	%HH	%HH+BC	%HH	%HH+BC
1	K_0	N_2		18.3	6.0	4.3	27.5	37.5	15.0	20.0
2	K_1Cl	N_2		22.7	9.1	4.3	2.5	10.0	1.25	6.25
3	K_1S	N_2		21.2	7.4	4.4	10.0	12.5	5.0	10.0
4	K_3Cl	N_2		25.2	12.2	4.4	5.0	10.0	2.5	6.25
5	K_3S	N_2		23.2	8.8	5.4	5.0	17.5	2.5	12.5
6	K_1Cl	N_2K	K_1	24.2	9.8	4.5	5.0	5.0	2.5	5.0
7	K_1S	N_2K_1	K_1	23.4	9.8	4.7	10.0	22.5	5.0	12.5
8	K_1Cl	N_2K_2	K_2	25.7	11.9	4.7	0.0	10.0	0.0	10.0
9	K_3Cl	N_2K_2	K_2	24.5	12.6	3.8	5.0	5.0	2.5	4.0

TIME AND RATE OF NITROGEN APPLICATION EFFECTS

	Treatments			Yield T/A			In 10 Largest		In 20 Largest	
	5/18	7/7	7/27	Total	6+oz	4oz	%HH	%HH+BC	%HH	%HH+BC
10		N_1		23.8	10.7	4.3	0.0	2.5	0.0	2.5
11		N_2		25.2	12.2	4.4	5.0	10.0	2.5	6.25
12	N_2			25.5	12.9	3.6	0.0	2.5	0.0	2.5
13		N_1	N_1	25.4	11.3	4.6	0.0	0.0	0.0	0.0
14		N_2	N_2	24.9	10.8	4.6	2.5	5.0	1.25	2.5
15		N_4		25.0	11.0	4.6	5.0	10.0	3.75	7.5
16	N_2K_0			21.5	8.6	4.3	5.0	12.5	2.5	8.75

* All plots: 40-150-0-32 ($N-P_2O_5-K_2O-S$)/A banded at planting on May 18.

Trts. 1 thru 9 had 120 lbs. N added on 7/7.

Trts. 10 thru 15 had K_3Cl broadcast before planting.

N_1, N_2, N_4 = 60, 120, 240 lbs. N/A added on dates shown.

K_1, K_2, K_3 = 100, 200, 300 lbs. K_2O/A, Cl as Chloride, S as sulfate.

K on 7/7 and 7/27 added as KCl.

STATISTICAL ANALYSES OF YIELD DATA:

LSD (0.05) Total 2.5 6+oz. 2.3

(0.10) Total 2.1 6+oz. 1.9

P = .0000 P .0000

RESULTS AND DISCUSSION

Soil analysis for Powell Butte experiment:

pH	P	K	Ca	Mg
	-----ppm-----		--Meq/100g---	
5.9	28	130	7.0	3.0

Effects of potash and nitrogen fertilizer treatments on yield, size distribution and hollow heart are given in Table 1.

Potash fertilizer increased total yields from 18.3 to 25.2 T/A (Treatment 4) and the yield of 6+ oz. tubers from 6.0 to 12.2 T/A, a doubling of yield of larger sized tubers. There was no advantage from split applications of K (Treatment 6 or 7 vs 4 or 5).

There was a marked decrease in hollow heart (HH) and brown center (BC) when potash was added, 27.5% (Treatment 1) down to 5 or 1%. The decrease in hollow heart was greater when K chloride was applied than when K sulfate was applied.

Those treatments receiving 160 pounds of N, 40 at plant + 120 later, produced maximum yield with essentially no effect from varying the time of application. However, when the effects of time and rate of nitrogen application on hollow heart are considered, it was evident that more than 60 pounds N/A on July 7 increased hollow heart dramatically (Treatment 10 vs 11 or 15). Those treatments with only 40 pounds N at planting had "run out" of nitrogen by July 7, therefore, the accelerated increase in growth from the higher N rates on July 7 apparently resulted in growth stress that increased hollow heart and brown center.

The effects of treatments on K, Ca, Mg concentration in petioles are given in Table 2 for July 7 and 27. Potash (K) increased K concentrations and decreased Ca (calcium) and Mg (magnesium) concentrations with K chloride being more effective in increasing K uptake than a comparable rate of K sulfate.

It is probably logical to assume that the higher rates of potash fertilization reduced the susceptibility of potato plants to stress. The higher total salt concentration presumably increases osmotic concentration of plant cell sap, thus reducing the susceptibility of plants to stress.

The N (nitrogen) fertilizer effects are interesting and support the idea that factors associated with "growth stress" "trigger" or cause hollow heart. Forty pounds N at planting plus an added 120 (160 pounds N total), resulted in optimum yield. It was evident that different times of application for the supplemental 120 pounds N (Treatment 11-15), all produced comparable yield of both total and 6+ oz. tubers. However, when all of the 120 or 240 pounds of N application was applied July 7, when first tubers set were 0.75 to 1.0-inch diameter, the growth stimulation increased hollow heart. Note that applying all of the N at planting (May 18) or splitting an added 120 pounds N application had lower levels of hollow heart and brown center.

Increasing the N rate from 40 lb/A at planting to the 160 pounds total also increased the K level in potato petioles (Table 2 Treatment 10 vs 12). We assume these petiole samples will have higher levels of chloride and nitrate-N which should increase total uptake of K+Ca+Mg.

Table 2. Nitrogen rate and potash rate and source effects on K, Ca, and Mg concentrations in petioles on July 7 and July 27, 1983, Powell Butte, Oregon

Treatments*			July 7			July 27		
5/18	7/7	7/27	% K	% Ca	% Mg	% K	% Ca	% Mg
1 K_0	N_2		6.5	1.94	1.65	4.1	2.07	2.33
2 K_1Cl	N_2		9.6	1.73	1.25	6.4	1.78	1.86
3 K_1S	N_2		8.4	1.76	1.39	5.4	1.66	2.00
4 K_3Cl	N_2		10.8	1.82	1.31	8.3	1.79	1.72
5 K_3S	N_2		9.6	1.54	1.28	8.3	1.39	1.58
8 K_1	N_2	K_2				8.2	1.77	1.80
10 K_3	N_1		9.8	1.66	1.46			
12 N_2K_3			11.1	1.66	1.53			
16 N_2K_0			7.2	1.94	1.73			

* K_1, K_2, K_3 = 100, 200, 300 lb K_2O/A; Cl as chloride, S as sulfate.

All plots: 40-150-0-32 banded at planting plus N_1 or N_2 at 60 or 120 lbs N/A at planting on May 18.

OREGON'S POTATO VARIETY DEVELOPMENT PROGRAM

CENTRAL OREGON RESEARCH

Steven R. James and Malcolm J. Johnson[1]

The potato variety development program is a major endeavor at Central Oregon Experiment Station. The Russet Burbank variety has been grown many years. However, recent advances in russet-skinned potato variety development in the eastern U.S. coupled with disease and physiological disorders of the Russet Burbank variety have threatened the Northwest potato industry. New potato varieties are needed that possess high yield potential, disease resistance, a high percentage of U.S. No. 1 tubers, and excellent processing and cooking qualities.

More than 20,000 potato lines were grown during 1983. Seed of nearly 700 lines was increased to provide seedstock for 1984 potato variety trials. Evaluation of a large number of lines at many locations will increase the likelihood of identifying superior potato varieties.

METHODS

Twenty thousand seedling tubers (small tubers grown from true potato seed) were planted on 27-inch centers in 3-foot rows at Powell Butte. Five thousand seedling tubers were obtained from the Colorado potato breeding program and 15,000 from the Aberdeen, Idaho, breeding program.

Four hundred thirty-five lines selected from 1982 seedling tubers were planted at Redmond. Plots contained 3 seedpieces which were quartered and planted as tuber units. Also, 56 advanced lines were increased at Powell Butte to provide seedstocks for 1984 variety trials in the western U.S.. Thirty tuber units of each variety were planted in 3-foot rows.

An application of 5.25 pt/A of Eptam 7-E was incorporated into the soil four days before planting. All seed increases were hand planted the fourth week of May, 1983. An iron age potato planter was used to open furrows for hand planting and also band 800 lb/A of 10-20-20 (NPK) fertilizer. Plots were hilled after hand planting and re-hilled and cultivated upon emergence. Commencing at plant emergence, seed increases were sprayed weekly with a high pressure (200 psi) application of Stylet Spray-Oil and Orthene to curb aphid populations and reduce the spread of potato virus Y (PVY). One-third of a gallon/A of Stylet Spray-Oil was applied in 35 gallons water/A. One

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lb/A of Orthene 75S was added to the spray mixture each week. Sevin (1.1 lb/A) was applied on July 26, 1983, to control Colorado potato beetles. Potato vines were dessicated on Sept. 9, 1983, with an application of 2 qt/A of Dinitro.

The 20,000 seedling tubers were dug and visually evaluated by a team of potato researchers from Oregon, Washington, Idaho and North Dakota. Tubers were evaluated for yield, grade, shape, russetting, and eye depth. Five tubers were selected and were eye-indexed and screened for viruses during the 1983-84 winter season in the Corvallis greenhouses. The 12-hill lines in Redmond were evaluated on the visual criteria above, as well as specific gravity and fry color. Fifteen tubers of selected lines were winter eye-indexed and evaluated.

Before digging, leaf samples from 5 tuber units of each of the 56 seed increase lines were taken. These leaf samples were ELISA tested for PVX, PVY, and potato leaf-roll virus (PLRV). Units that tested clean were hand dug and 35 tubers retained for winter eye-indexing and subsequent seedstock for 1984 seed increases. The remaining hills were later harvested and stored to provide seedstocks for variety trials.

A variety trial containing 32 advanced lines was planted May 17, 1983, at Powell Butte. Twenty-seven seedpieces were planted nine inches apart in 3-foot rows. Varieties were separated by two hills of "All Blue" potatoes. The plots were arranged in a randomized block design replicated four times. Plots were banded with 900 lb/A of 16-16-16 (NPK) at planting time. Colorado potato beetles were controlled with an application of Parathion in late July and a follow-up application of Sevin two weeks later. Vines were killed by frost in mid-September and plots were harvested on October 10, 1983. Tuber characteristic notes were taken at harvest. A 10 pound sample from each plot was taken for french frying, specific gravity determination, and internal defect grading.

Specific gravities were determined by weighing approximately 10 pounds of tubers in water and air. Eighteen tubers per plot were cut and internal defects recorded as percent of tubers with a given defect. Four tubers were stored two months at 55 degrees F for french frying. Four ¼-inch square strips from each of four tubers was fried for four minutes at 350 degrees F. Each strip was evaluated for color and dark ends. Color was scored from 0-4 based on the USDA Standard Color Chart for frozen french-fried potatoes.

RESULTS

Of the 20,000 seedling tubers planted, 486 lines were selected for further evaluation and seed increase. Eighty-three lines were selected from Colorado seedling tubers and 403 lines were selected from Aberdeen, Idaho, seedling tubers. The selected lines will be planted in a 4-hill screening trial at Hermiston in 1984. Also, all selections will be increased for seed in 16-hill plots at Powell Butte in 1984.

One hundred-thirteen selections were made from the 12-hill plots in Redmond. The selections included 2 white-skinned varieties, 4 red varieties, and 107 russet-skinned varieties. The selected lines will be placed in a twice replicated preliminary yield trial at Hermiston and Klamath Falls in 1984. Fifteen tubers of each line will be increased for seed at Powell Butte in 1984.

Fifty-six lines were increased to provide seedstock for 1984 statewide and regional variety trials. Twenty lines were dropped from the program because of poor yields, poor grade, fry color, specific gravity, or internal quality problems. Table 1 lists the 1983 seed increase entries and their disposition.

Also, 39 selections were made from the 12-hill plots grown in Aberdeen, Idaho. These selections will be placed in 4/16 hill screening plots at Hermiston and Powell Butte in 1984.

Yield and quality characteristics for the 1983 Powell Butte statewide variety trial are shown in Table 2. The overall trial was excellent; yields were high, percent USDA No. 1's was very high, and fry colors generally light. The coefficient of variation for total yield was 9.32%. The relatively long growing season allowed tubers to size in most varieties; undersize tubers (less than 4 oz.) averaged 9.0% for the entire trial. Selections A77236-6 and A77532-4 failed to size well and yielded 29.7% and 20.4% undersize respectively.

Although TXA657-27 was an excellent yielding selection, it was dropped from the testing program. The specific gravity was low and it did not yield as well at other statewide trial locations (Hermiston and Klamath Falls). The regional trial entries, A69870-10, A72685-2, and A74212-1 performed well. Only A69870-10 appears to have processing potential. A72685-2 has an acceptable specific gravity but does not fry well; it has been dropped from the regional trial because it has been tested three years. This selection will undergo further large scale commercial testing. A69870-10, A74132-7, and A74212-1 were selected as entries for the 1984 Western Regional Variety Trial.

Selection A7279-12 yielded well in all statewide locations, has a very high specific gravity (1.104), and fries well (0.6). The seedstock of this variety has contained potato virus X and potato virus S. Clean seed will be planted in the 1984 seed increase block. A7279-12 shows excellent multipurpose potential and will be entered in the 1985 Western Regional Trial. Black spot may be a minor problem in A7279-12. This selection showed no hollow heart, internal brown spot, or stem end browning.

The selections entered in the variety trial for the first time performed poorly as a group. Only A77153-3 of the new entries will be returned for further testing. The poor yields of these new entries has uncovered the need to examine the early selection techniques of the program. A preliminary yield trial will be grown at two locations (Hermiston and Klamath Falls) in 1984. This should produce better material for future statewide variety trials.

Table 3 highlights the internal defects and tuber characteristics of the

Powell Butte variety trial. Hollow heart was a minor problem in the 1983 trial. Only selection A77131-5 had a hollow heart problem. Lemhi is the standard of comparison for black spot; only selection A77254-1 had more black spot than Lemhi. Russet Burbank has had problems with internal brown spotting in the northwest. Selection A7742-6 is similar to Russet Burbank in susceptibility to internal brown spot. A fault of A69870-10 is stem end browning. This defect has been noted several years in that selection. Selection A71997-8 also had 16.7% stem end browning and also had many, shallow growth cracks (Table 3).

Eighteen lines were dropped from the 1983 trial. These were evaluated for yield, size, grade, specific gravity, fry color, internal quality, and appearance at Powell Butte, Hermiston and Klamath Falls. The following lines have been dropped because of failure to meet the above criteria.:

A7596-1	A77131-5	ATP62-3
A7683-16	A77236-6	B8972-1
A7727-1	A77254-1	ND385-4
A7735-1	A77254-9	NDA848-3
A7742-6	A77529-8	TXA582-4
A7787-3	A77532-4	TXA657-27

Eighteen new entries will replace the discarded selections in 1984 trials. The seed of these was increased in 1983 (Table 1).

Increasing the number of new selections brought into Oregon from regional breeding programs will greatly enhance the prospect of identifying potato varieties better suited for commercial production and processing. The greater the number of lines evaluated from good parents, the greater the likelihood of finding a superior variety. Also, as more selections are obtained, research techniques will be improved to provide quality selections for intensive evaluation in later generation variety trials. Table 4 outlines the plans for 1984 and compares them with work accomplished in 1981, 1982, and 1983.

Table 1. Potato lines increased at Powell Butte in 1983 for seedstock in 1984 statewide and regional variety trials

NO.	VARIETY	INCREASE	DISP.	NO.	VARIETY	INCREASE	DISP.
1	All Blue	S	Keep	29	A77254-1	S	Drop
2	Bintje	0	Drop	30	A77254-9	S	Drop
3	Butte	0	Drop	31	A77529-8	S	Drop
4	Denali	0	Keep	32	A77532-4	S	Drop
5	Lemhi	S,R	Keep	33	A7811-16	(S)	Keep
6	Norchip	0	Keep	34	A7814-6	(S)	Keep
7	Norgold	S,R	Keep	35	A7836-28	(S)	Keep
8	Rosa	0	Keep	36	A7869-5	(S)	Keep
9	1982 VTSC	S,R	Keep	37	AOR79492-2	(S)	Keep
10	1981 VTSC	S,R	Keep	38	ATP62-3	S	Drop
11	A68678-2	S	Keep	39	B8972-1	S	Drop
12	A69870-10	S,R	Keep	40	COOR7908-1	(S)	Keep
13	A71997-8	S	Keep	41	COOR7921-1	(S)	Keep
14	A7242-3	S	Keep	42	ND385-4	S	Drop
15	A7279-12	S	Keep	43	ND388-1	(S)	Keep
16	A72685-2	S,R	Keep	44	ND534-4	(S)	Keep
17	A74132-7	S	Keep	45	ND681-3	S	Keep
18	A74212-1	S,R	Keep	46	ND678-8	(S)	Keep
19	A7532-1	(S)	Keep	47	NDA815-1	(S)	Keep
20	A7596-1	S	Drop	48	NDA848-3	S	Drop
21	A7683-16	S	Drop	49	NDA1238-2	(S)	Keep
22	A7727-1	S	Drop	50	NDA1242-1	(S)	Keep
23	A7735-1	S	Drop	51	NDA1242-3	(S)	Keep
24	A7742-6	S	Drop	52	NDA1246-4	(S)	Keep
25	A7787-3	S	Drop	53	NDA1276-3	(S)	Keep
26	A77131-5	S	Drop	54	NDA1309-6	(S)	Keep
27	A77153-3	S	Keep	55	TXA582-4	S	Drop
28	A77236-6	S	Drop	56	TXA657-27	S	Drop

S - State Increase R - Regional Increase ( ) - New Entry 0 - Other

Table 2. Yield and quality characteristics for thirty-two selections and varieties, Powell Butte statewide variety trial, 1983

SELECTION	YIELD RANK	YIELD (CWT/A) TOTAL	NO. 1	% NO. 1	OZ./ TUBER[1]	SPECIFIC GRAVITY[2]	FRY COLOR[3]
R. Burbank	21	476	418	88	5.6	1.088	0.3
Lemhi	4	566	534	95	8.4	1.087	0.1
Norgold	30	374	316	84	5.2	1.074	1.8
81 VTSC	6	560	477	85	6.1	1.087	0.8
A68678-2	7	558	532	96	12.3	1.081	0.9
A69870-10	9	544	493	91	6.7	1.088	0.0
A71997-8	16	511	437	86	5.9	1.077	1.3
A7242-3	17	496	441	89	7.1	1.080	3.3
A7279-12	11	541	523	97	9.2	1.104	0.6
A72685-2	5	564	515	92	6.7	1.089	1.8
A74132-7	2	592	551	93	8.3	1.082	1.7
A74212-1	13	529	502	95	8.3	1.078	1.4
A7596-1	3	581	518	89	7.0	1.087	0.6
A7683-16*	25	434	397	91	6.3	1.084	1.8
A7727-1*	10	542	438	81	5.4	1.105	1.0
A7735-1*	18	492	404	82	6.8	1.085	1.7
A7742-6*	27	431	370	86	6.9	1.073	0.7
A7787-3*	19	485	440	90	6.2	1.081	1.6
A77131-5*	28	407	376	93	7.0	1.109	0.0
A77153-3*	12	538	500	93	8.2	1.088	1.5
A77236-6*	24	435	306	70	4.0	1.094	1.8
A77254-1*	20	483	444	92	6.7	1.085	1.4
A77254-9*	23	454	378	83	5.2	1.080	0.8
A77529-8*	29	396	368	93	7.5	1.083	0.0
A77532-4*	31	365	289	79	4.9	1.082	1.0
ATP62-3*	26	432	385	89	5.9	1.076	2.3
B8972-1*	32	364	324	89	6.3	1.083	0.0
ND385-4	22	464	403	87	7.3	1.085	0.0
ND681-3	14	522	499	96	8.9	1.083	0.5
NDA848-3*	15	521	473	91	8.9	1.082	0.9
TXA582-4*	8	545	464	85	5.8	1.106	0.3
TXA657-27*	1	593	557	94	9.3	1.078	1.0
Average		494	440	89	7.0	1.086	1.0
LSD 5%		65	63	5	1.0	.005	0.6

* - New entry.
1 - Average weight of all tubers.
2 - Air/Water method.
3 - Stored 2 months at 55 degrees F, Fresh fried 4 minutes at 350 degrees F.

Table 3. Internal defects and tuber characteristics for thirty-two selections and varieties, Powell Butte statewide variety trial, 1983

	% INTERNAL DEFECTS[1]				TUBER CHARACTERISTICS		
SELECTION	HH	BS	IBS	SEB	RUSSET[2]	SHAPE[3]	GR. CRACKS[4]
R. Burbank	1.4	0	16.7	0	MD	LN	NONE
Lemhi	0	13.9	0	0	MD	BL	FEW, SH
Norgold	1.4	0	5.6	0	MD	BL, RD	NONE
81 VTSC	4.2	2.8	15.3	0	MD	LN	NONE
A68678-2	1.4	5.6	0	0	MD	BL	NONE
A69870-10	0	5.6	0	23.6	MD-HV	BL	FEW, SH
A71997-8	0	0	0	0	MD-HV	BL	MANY, SH
A7242-3	1.4	5.6	0	0	LT	RD, FL	NONE
A7279-12	0	5.6	0	0	MD	BL, RD	NONE
A72685-2	0	5.6	0	0	MD	BL	NONE
A74132-7	0	4.2	0	0	LT	BL	NONE
A74212-1	0	5.6	0	5.6	LT	BL	NONE
A7596-1	0	4.2	0	0	MD HV	BL	MANY, DP
A7683-16*	0	0	1.4	0	LT	BL,PR	NONE
A7727-1*	0	0	0	0	MD	BL	NONE
A7735-1*	1.4	4.2	0	0	HV	BL	FEW, SH
A7742-6*	4.2	0	15.3	0	MD	BL, LN	NONE
A7787-3*	0	2.8	0	0	MD-HV	BL	NONE
A77131-5*	38.9	4.2	0	0	HV	BL, RD,	NONE
A77153-3*	0	6.9	1.4	0	LT	BL, PR	NONE
A77236-6*	0	0	1.5	0	MD	BL, LN	NONE
A77254-1*	0	19.4	0	1.4	MD	FL, BL	NONE
A77254-9*	0	4.2	0	2.8	LT	BL	NONE
A77529-8*	2.8	1.4	0	0	HV	BL	NONE
A77532-4*	0	2.8	1.4	0	MD	BL	NONE
ATP62-3*	0	1.4	0	0	MD	BL, PR	NONE
B8972-1*	0	0	0	0	HV	BL	FEW, SH
ND385-4	0	5.6	0	0	--	--	--
ND681-3	0	1.4	0	0	MD	BL	FEW, SH
NDA848-3*	0	0	2.8	0	MD-HV	RD, BL	NONE
TXA582-4*	0	1.4	0	5.6	MD-HV	RD, BL	NONE
TXA657-27	1.4	1.4	0	0	LT	BL	NONE

* - New entry.
1 - HH = Hollow Heart, BS = Black Spot, IBS = Internal Brown Spot, SEB = Stem End Browning.
2 - Russetting - LT = Light, MD = Medium, HV = Heavy.
3 - Shape - LN = Long, BL = Blocky, RD = Round, PR = Pear, FL = Flat.
4 - Growth Cracks - SH = Shallow, DP = Deep.

Table 4. The number of selections in the Oregon Potato Variety Development Program from 1981-1984

GENERATION	1981	1982	1983	1984
	---------- number of lines -----------			
Seedling Tubers	5,000	15,000	20,000	27,000
4/12 Hill Screening	39	94	435	528
Preliminary Yield Trials	0	0	22	116
Statewide Yield Trials	50	45	32	32
Total	5,089	15,139	20,467	27,676