A Research Report of the
Central Oregon
Agricultural Experiment Station

Irrigated Crops Research in Central Oregon 1985

Special Report 747
July 1985

Agricultural Experiment Station
Oregon State University, Corvallis

CONTENTS

UPDATE 1984-85

THE CENTRAL OREGON EXPERIMENT STATION (COES)

Frederick J. Crowe[1]

The COES is an off-campus branch experiment station of Oregon State University (OSU) and functions administratively similar to an on-campus department in the College of Agricultural Sciences through the OSU Agricultural Experiment Station, the research wing of the college. COES has three faculty members, the superintendent, a research agronomist, and a research assistant. Faculty and classified staff are listed below.

Central Oregon Experiment Station Personnel, 1984-85

Frederick J. Crowe	Superintendent and associate professor
Malcolm Johnson	Professor emeritus, retired
J. Loren Nelson	Research agronomist
Steven R. James	Research assistant
Kay Moore	Secretary
Rod Brevig	Technician
Pat Foltz	Farm Foreman
Sylvia McCallum	Bioaide
David Young	Bioaide (resigned October, 1984)
Peter Tomseth	Bioaide (hired January, 1985)

The COES mission is to conduct both applied and basic research on irrigated crops of the Central Oregon region. Facilities and cropland that the station maintains include:

At Redmond (Main Office): Offices, laboratory, storage, and shop facilities are owned by OSU. The land where the building is located and 11 acres of cropland are leased from the City of Redmond. The address is 1556 SE 1st St. (P.O. Box 246) and the phone number is 548-3340.

At Madras: Office, storage and shop facilities and 67 acres of cropland are leased from the City of Madras and Jefferson County. One acre of land where the buildings are located is owned by OSU. The address is 1778 NW Mill St. and the phone number is 475-7107.

At Powell Butte: 80 acres of cropland donated to OSU are leased by the COES from the OSU Foundation. Location is 12 miles east of Redmond and 6 miles west of Prineville on Highway 22.

---

1 Superintendent and associate professor, Central Oregon Experiment Station, P.O. Box 246, Redmond, OR 97756.

In most years, experiments also are off-station on growers' fields when COES fields are not sufficient to address specific problems. In 1984-85, no off-station studies were maintained. The COES cooperates with other OSU scientists, scientists from other universities, university Extension personnel, growers, and industry personnel in design and maintenance of tests. 1984-85 cooperators are indicated in the following research reports.

Growers serve on an advisory board to the COES on a voluntary basis, to help Station personnel determine what research information growers need and to provide a means for growers to communicate various interests to OSU scientists and administrators. For information on serving on the COES Advisory Board contact the COES offices, county agricultural Extension agents, or any Advisory Board member listed below.

DESCHUTES COUNTY REPRESENTATIVES

Larry Carpenter
RFD 1
Terrebonne, OR 97760
548-4327
Expires 12-31-86

Keith Cyrus
Star Route
Sisters, OR 97759
548-3149 - 549-6111
Expires 12-31-87

Robert Davidson
Vice Chairman
21330 Young Ave.
Bend, OR 97701
389-2004
Expires 12-31-85

CROOK COUNTY REPRESENTATIVES

Doug Breese
Paulina Star Route
Prineville, OR 97754
447-5003
Expires 12-31-85

Tom Evans
Route 1, Box 336
Powell Butte,
OR 97753
447-1207
Expires 12-31-86

Steve Carlson
Route 1, Box 837A
Prineville, OR
97754
447-6618
Expires 12-31-87

JEFFERSON COUNTY REPRESENTATIVES

Don Boyle
Route 2, Box 1450
Madras, OR 97741
475-2052
Expires 12-31-87

Jim Carlson
Route 1, Box 113
Culver, OR 97734
546-2632
Expires 12-31-86

Wes Hagman
Chairman
3347 SW Highland
Lane
Culver, OR 97734
546-9731
Expires 12-31-85

RECENT CHANGES AT THE COES

Fred Crowe became superintendent in May 1984, after Malcolm Johnson's retirement. Loren Nelson resumed regular research status after serving as acting superintendent. Steve James was promoted from Technician to Research Assistant in January 1984. Peter Tomseth replaced Dave Young in a Bioaide position in January 1985.

24 acres (dryland) cropland adjacent to the Madras field were added to the field by lease agreement with the City of Madras and Jefferson County, raising the field acreage to 67. A 22-acre water right was purchased for this acreage by a special grant from The Oregon Wheat Commission to Oregon State University. Oregon State University will retain control over the water right should the land lease be terminated. Irrigation system additions and improvements for the added acreage were partially provided by special allocation from the OSU Agricultural Experiment Station Directors' office and donations from the Central Oregon Seed Grower's Association, the Central Oregon Mint Grower's Association, and the Jefferson County Farm Fair. Irrigation system improvements, land leveling, and roadwork are needed.

At Redmond, a seed storage room was relocated and a "clean" laboratory room developed. Certain scientific equipment and supplies were procurred through special allocation from the OSU Agricultural Experiment Station Directors' Office to enable COES staff to perform basic microbiological, tissue culture, and other tasks requiring this facility.

At Madras, a new herbicide storage shed and other improvements to the shop and landscape were added through special allocation from the OSU Agricultural Experiment Station Director's Office.

METEROLOGICAL DATA - 1984
Redmond*

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1984 TOTAL
AIR TEMP. (°F)													
AVE. MAX. TEMP.	44	48	55	53	63	68	82	82	70	56	46	39	
AVE. MIN. TEMP.	24	28	30	30	34	39	44	45	37	30	29	19	
MEAN TEMP.	34	38	42	41	49	54	63	63	54	43	37	29	
AIR TEMPERATURE (No. of Days)													
MAX. 90 OR ABOVE	0	0	0	0	0	0	6	3	1	0	0	0	
MAX. 32 OR BELOW	8	0	0	0	0	0	0	0	0	0	0	4	
MIN. 32 OR BELOW	27	23	18	18	10	6	0	0	12	19	20	30	
MIN. 0 OR BELOW	0	0	0	0	0	0	0	0	0	0	0	3	
GROUND TEMP. (°F at 4")													
AVE. MAXIMUM	26	28	37	40	48	56	67	65	56	44	33	27	
AVE. MINIMUM	23	27	34	36	43	49	58	58	50	39	31	25	
MEAN TEMP.	25	28	36	38	46	52	63	61	53	41	32	26	
PRECIPITATION (inches)													
MONTHLY TOTAL	.22	.92	1.25	.90	.15	1.13	.10	.38	.47	1.23	3.05	.53	10.33
EVAPORATION (Ave. Inches per day)	----	----	----	----	.16	.20	.31	.26	.16	----	----	----	
WINDAGE (Ave. miles Per Day)	58	76	66	85	77	52	50	55	52	49	67	65	

Growing Season:	Last Date Before July 15	First Date After July 15	Total Number of Days Between Temp. Minimums
Air Temp. Min. 32° or below	6/22	9/10	79
Air Temp. Min. 28° or below	6/8	9/12	95
Air Temp Min. 24° or below	5/31	9/24	115

METEROLOGICAL DATA - 1984
Madras*

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1984 TOTAL
AIR TEMP. (^{o}F)													
AVE. MAX. TEMP.	42	46	54	54	64	70	85	84	72	57	46	38	
AVE. MIN. TEMP.	25	28	32	33	37	43	49	49	41	34	31	22	
MEAN TEMP.	34	37	43	44	51	57	67	67	57	46	39	30	
AIR TEMPERATURE (No. of Days)													
MAX. 90 OR ABOVE	0	0	0	0	0	0	7	6	1	0	0	0	
MAX. 32 OR BELOW	8	0	0	0	0	0	0	0	0	0	0	6	
MIN. 32 OR BELOW	25	24	18	17	7	2	0	0	2	12	19	28	
MIN. 0 OR BELOW	0	0	0	0	0	0	0	0	0	0	0	3	
GROUND TEMP. (^{o}F at 4")													
AVE. MAXIMUM	35	39	48	54	67	76	91	87	70	61	-	-	
AVE. MINIMUM	33	35	39	42	52	59	72	72	58	50	-	-	
MEAN TEMP.	34	37	44	48	60	67	82	80	64	56	-	-	
PRECIPITATION (inches)													
MONTHLY TOTAL	.28	1.53	1.86	.93	.54	1.50	.01	.08	.22	1.45	4.94	.27	13.61
EVAPORATION (Ave. Inches Per Day)	-	-	-	-	.22	.25	.37	.31	.21	.13	-	-	
WINDAGE (Ave. Miles Per Day)	-	-	-	87	80	62	60	52	49	56	-	-	

Growing Season:	Last Date Before July 15	First Date After July 15	Total Number of Days Between Temp. Minimums
Air Temp. Min. 32^{o} or below	6/8	9/24	108
Air Temp. Min. 28^{o} or below	5/31	9/24	116
Air Temp Min. 24^{o} or below	5/6	11/22	199

METEROLOGICAL DATA - 1984
Prineville*

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1984 TOTAL
AIR TEMP. (°F)													
AVE. MAX. TEMP.	44	50	56	56	67	73	89	87	75	59	48	40	
AVE. MIN. TEMP.	23	27	29	29	34	40	43	42	36	30	29	19	
MEAN TEMP.	33	38	43	42	51	56	66	65	55	45	39	29	
AIR TEMPERATURE (No. of Days)													
MAX. 90 OR ABOVE	0	0	0	0	1	3	14	12	3	0	0	0	
MAX. 32 OR BELOW	5	0	0	0	0	0	0	0	0	0	0	5	
MIN. 32 OR BELOW	29	25	18	20	12	5	1	1	11	20	20	30	
MIN. 0 OR BELOW	0	0	0	0	0	0	0	0	0	0	0	2	
PRECIPITATION (inches)													
MONTHLY TOTAL	.37	1.09	1.28	1.06	.28	1.24	.32	.39	.38	1.22	3.02	.56	11.21

Growing Season:	Last Date Before July 15	First Date After July 15	Total Number of Days Between Temp. Minimums
Air Temp. Min. 32° or below	7/7	8/20	43
Air Temp. Min. 28° or below	6/8	9/28	111
Air Temp Min. 24° or below	5/16	9/24	130

* No meterological data currently is recorded at the COES Powell Butte field. Redmond data is recorded at COES facilities. Prineville data is from KRCO located 4 miles NW of Prineville. Madras data is recorded at the North Unit Irrigation District offices, adjacent to the COES field.

CENTRAL OREGON ALFALFA VARIETY EVALUATION STUDY
1984 PROGRESS REPORT

Steven R. James[1]

ABSTRACT

Alfalfa variety trials were conducted at Madras and Powell Butte, Oregon. At Powell Butte, of 36 varieties, only DeKalb 120 yielded significantly (5%) better than Vernal. Varieties with marginal winter hardiness yielded approximately one ton/A less than DeKalb 120. Nearly one-half of the varieties tested at Madras yielded significantly (5%) better than check varieties Vernal and Saranac. Yield results at both locations indicate that some newer improved varieties are better than the older common varieties such as Vernal.

Alfalfa variety trials are conducted on a continuing basis at two locations in Central Oregon. The Powell Butte site (elevation 3,200 feet) provides information on winter hardiness and yield under a short growing season (80-90 days). The Madras site (elevation 2,440 feet) has a longer growing season (120 days) and milder winters than Powell Butte.

METHODS

<u>POWELL BUTTE</u>. The variety trial was planted June 20, 1980, and included 36 varieties. Plot size was 5 feet by 20 feet; harvest area was 3 feet x 14 feet. The plots were replicated four times. The plots were seeded with 15 lbs/A of uncoated seed and all seed was inoculated with Nitragin inoculant. One cutting was taken in 1980, three cuttings were taken in 1981, 1982, 1983, and two cuttings were taken in 1984. The plots were fertilized with 110 pounds of sulfur per acre and 90 pounds phosphate per acre in 1980, 1981, and 1982; 80 pounds S/A and 70 pounds P/A were applied in 1983 and 1984. The trial was sprayed with 1/2 pound of Metribuzin and 3/4 pint of Paraquat in March 1984.

---

[1] Research assistant, Central Oregon Experiment Station, P.O. Box 246, Redmond, OR 97756.

ACKNOWLEDGEMENT: These trials were supported in part by Cenex, Greenway Seed Co., North American Plant Breeders, Northrup King Co., Pioneer Hi-bred Inter., Inc., Ramsey Seed Co., Union Seed Co., and W-L Research, Inc.

MADRAS. Twenty-two varieties were planted June 3, 1982. The 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. Three cuttings were taken each year except the establishment year, when two cuttings were taken. Plots were fertilized with 110 pounds S/A and 90 pounds P/A in 1982 and 1983; 80 pounds S/A and 70 pounds P/A were applied in 1984. The trial was treated with two lbs/A of 2,4-DB when the alfalfa had three to four trifoliate leaves in 1982.

RESULTS

MADRAS. Yield and regrowth results are shown in Table 1. Nearly one-half of the varieties yielded (total yield) significantly (5%) better than check varieties Vernal and Saranac. The experimental variety "W-37" was included in the trial for yield comparisons. Although W-37 was an excellent yielding variety, thick stems, relatively few leaves, and low protein make it unsuitable for commercial production.

Pioneer 581 does not appear to be adapted to Central Oregon. It does not have the dormancy necessary to survive Central Oregon winters.

Regrowth was measured five weeks after the second cutting in 1983 and four weeks after the second cutting in 1984. Vernal was the slowest growing variety, W-37 the fastest. The majority of the varieties were not significantly different in regrowth.

POWELL BUTTE. Yield data from 1980-84 are shown in Table 2. Only DeKalb 120 was significantly (5%) better yielding than Vernal. Yields of varieties with marginal winterhardiness decreased markedly in 1983 and 1984. DeKalb 131 and W-37, for example, yielded well the first three years; yields of those varieties were among the poorest in 1984.

Table 1. Madras Alfalfa Variety Trial

VARIETY	1982 YIELD[1]	1983 YIELD[2]	1984 YIELD[2]	TOTAL YIELD[3]		% VERNAL	REGROWTH[4]
	tons/acre						cm
W-37	2.66	9.06	8.43	20.22	A	117	58.00
DeKalb 120	2.72	8.31	8.05	19.28	AB	112	49.38
Trumpetor	2.48	8.77	8.08	19.25	ABC	112	50.25
Pacer	2.24	8.82	8.03	19.05	ABCD	110	53.63
Vernema	2.71	8.43	7.62	18.89	ABCDE	109	52.38
DeKalb 130	2.34	8.55	7.85	18.89	ABCDE	109	52.63
Armor	2.58	8.26	8.08	18.84	ABCDEF	109	52.25
Greenway 360	2.65	8.38	7.73	18.78	ABCDEF	109	52.13
Blazer	2.64	8.55	7.46	18.69	ABCDEF	108	51.50
WL 220	2.59	8.32	7.62	18.65	BCDEF	107	50.25
RS209	2.64	8.11	7.70	18.51	BCDEF	107	52.00
Valor	2.27	8.45	7.77	18.47	BCDEF	107	50.25
Pioneer 532	2.35	8.58	7.51	18.43	BCDEF	107	52.88
Pioneer 545	2.62	8.23	7.28	18.35	BCDEF	106	51.38
Apollo II	2.61	8.45	7.45	18.30	BCDEF	106	51.88
WL 314	2.53	8.10	7.48	18.13	BCDEF	105	52.00
Cascade	2.59	7.83	7.44	17.92	BCDEF	104	50.75
WL 312	2.57	8.12	7.09	17.69	CDEF	102	52.38
W-45	2.63	7.45	7.48	17.59	DEF	102	53.25
Saranac	2.22	7.99	7.11	17.46	EFG	101	50.25
Vernal	2.30	7.74	7.44	17.29	FG	100	47.50
Pioneer 581	2.44	7.15	6.48	16.09	G	93	52.75
Average	2.51	8.25	7.60	18.40		-	51.80
LSD 5%	NS	0.76	0.75	1.31			3.34

1 - Establishment year-total of 2 cuttings
2 - Total of 3 cuttings
3 - Total of 8 cuttings-Yields followed by the same letter are not significantly different at the 5% level.
4 - Height measured 4 1/2 weeks after second cutting (average of 1983 and 1984)

Table 2. Powell Butte Alfalfa Variety Trial

VARIETY	1980 YIELD[1]	1981 YIELD[2]	1982 YIELD[2]	1983 YIELD[2]	1984 YIELD[3]	TOTAL YIELD[4]	% VERNAL
	--------------------tons/acre					------------------	
DeKalb 120	1.38	8.15	6.25	5.73	4.58	26.03	107
W-37	1.25	8.41	6.39	5.80	3.69	25.87	106
Pioneer 532	1.23	7.83	6.00	6.47	4.22	25.80	106
Anchor	1.30	7.71	6.02	6.03	4.40	25.33	104
Action	1.20	7.62	6.09	6.12	4.33	25.29	104
Armor	1.48	7.95	5.99	5.86	3.96	25.29	104
Iroquois	1.41	7.58	5.65	6.01	4.41	25.20	103
Classic	1.21	7.50	5.80	6.15	4.17	25.16	103
DeKalb 130	1.40	8.04	5.55	6.00	4.00	25.00	102
W-35	1.09	7.90	6.11	6.13	3.61	24.99	102
Gladiator	1.34	7.73	5.93	5.98	3.92	24.99	102
Spectrum	1.46	7.47	5.66	6.30	4.23	24.91	102
MS243	1.13	7.45	6.22	5.96	4.33	24.90	102
Vancor	1.36	7.33	5.61	6.07	4.80	24.88	102
Pioneer 545	1.22	7.03	6.00	6.19	4.08	24.70	101
Vernema	1.27	7.73	5.83	5.85	3.83	24.69	101
Weevlchek	1.27	7.76	5.78	6.37	3.50	24.69	101
Apollo	1.51	7.44	5.61	5.85	4.32	24.67	101
RS209	1.41	7.57	5.82	6.07	3.95	24.64	101
Valor	1.16	7.77	5.76	5.66	4.42	24.61	101
Agate	1.23	7.71	5.57	5.73	3.98	24.50	100
Haymaker	1.43	7.00	6.03	6.01	3.99	24.48	100
Vernal	1.24	7.25	5.86	6.05	4.11	24.41	100
DeKalb 131	1.27	8.31	5.47	5.71	3.56	24.27	99
Titan	1.29	6.95	5.74	6.00	4.29	24.25	99
WL 309	1.04	7.66	5.47	5.99	3.87	24.17	99
WL 220	1.20	7.08	5.93	5.94	4.14	24.15	99
Hiphy	1.35	6.99	5.82	6.14	3.79	24.06	99
Saranac	1.28	7.20	5.71	5.80	3.95	23.99	98
Pioneer 524	1.02	7.44	5.97	5.51	3.93	23.96	98
Cascade	1.67	7.08	5.57	5.87	3.63	23.95	98
Baker	1.36	7.80	5.21	5.52	3.88	23.89	98
Super 721	1.18	7.34	5.65	6.04	3.57	23.73	97
Ranger	1.03	7.54	5.61	5.44	4.03	23.38	96
WL 310	1.33	6.59	5.53	5.76	4.06	23.23	95
Pacer	1.12	6.16	5.42	5.41	3.59	21.88	90
Average	1.28	7.50	5.79	5.92	4.03	24.55	--
LSD 5%	NS	0.91	0.57	0.72	0.64	1.58	--

1 - Establishment year - 1 cutting
2 - Total of 3 cuttings
3 - Total of 2 cuttings
4 - Total of 12 cuttings

VARIETAL EVALUATION OF CEREAL GRAINS IN CENTRAL OREGON

Steven R. James and Rod Brevig[1]

ABSTRACT

Irrigated cereal trials were conducted at Madras and Powell Butte, Oregon in 1984. Winter wheat selection 72339 will be released in 1985. Selection 72339 has yielded over 110% of Stephens in variety trials conducted at Madras and Powell Butte from 1979 to 1984. Approximately 2,200 headrows were planted at Redmond for breeders seed and foundation seed increases. A winter/spring wheat date of seeding trial indicated Hill '81 should not be early spring planted. This trial also suggested that spring wheat varieties Waverly and Walladay could be seeded in late winter (February). Several experimental spring wheat varieties yielded better than Twin. These will be further evaluated in 1985. A spring barley trial planted at Madras indicated the variety Gustoe to be a promising new variety for Central Oregon.

Nine replicated yield trials and one headrow seed increase were established at three sites of Central Oregon Experiment Station in 1984. Table 1 indicates the various trials grown, their locations, and the number of lines grown.

Table 1. Summary of cereal grain variety trials planted in Central Oregon in 1984

TRIAL	LOCATION	NO. OF LINES
Winter Wheat Elite	Madras	34
Winter Wheat Variety	Powell Butte	23
Spring Wheat Western Regional	Madras	48
Spring Wheat Variety	Powell Butte	32
Winter/Spring Wheat Date of Seeding	Powell Butte	12
Winter Feed Barley	Madras	26
Winter Malting Barley	Madras	20
Spring Barley Variety	Madras	12
Spring Oat Variety	Powell Butte	8
Headrow Increase of 72339	Redmond	2,200*

* Number of individual heads increased.

---

[1] Research assistant and biology technician, Central Oregon Experiment Station, P.O. Box 246, Redmond, OR 97745

ACKNOWLEDGEMENT: This research was supported in part by a grant from the Oregon Wheat Commission.

RESULTS

WINTER WHEAT VARIETY EVALUATION

Approximately 2,200 headrows of Selection 72339 were planted and harvested at Redmond. Breeders seed was made available to the Foundation Seed Project for seed increase. Approximately 40 acres were seeded in late 1984 and early 1985.

Performance data for Selection 72339 compared with common check varieties are summarized in Tables 2 and 3 for 1979-1984. Yields of 72339 averaged 110% of Stephens at Madras and 113% of Stephens at Powell Butte; test weight, heading date, lodging, and height are all similar to Stephens. The trials were generally seeded in late October or early November and fertilized in the spring with 160 160 pounds of nitrogen per acre.

Results from 1984 winter wheat variety trials are shown in Tables 4 and 5. Soft white selections 72053 and 750144 yielded well at both Madras and Powell Butte. Further evaluation of these lines will be made in 1985.

Table 2. Winter wheat varieties grown at Powell Butte 1979-1984

VARIETY	YIELD	TEST WT.	HEAD DATE*	LODGING	HEIGHT**
	bu/a	lb/bu	mo/day	%	in
Hyslop	111	55.5	7/2	24	36
McDermid	114	56.0	7/1	31	36
Stephens	111	54.3	7/1	9	35
Nugaines	107	57.0	7/5	21	34
Daws	115	56.3	7/4	12	37
Hill 81	118	57.1	7/7	11	37
72339	125	54.9	7/2	7	36

* Data from 1979, 1980, 1981, 1984.
** Data from 1979, 1981, 1982, 1983, 1984.

Table 3. Winter wheat varieties grown at Madras 1979-1984, (1983 trials destroyed by hail)

VARIETY	YIELD	TEST WT.	HEAD DATE*	LODGING	HEIGHT**
	bu/a	lb/bu	mo/day	%	in
Hyslop	111	56.6	6/24	23	35
McDermid	97	55.0	6/23	27	35
Stephens	114	56.3	6/19	13	34
Nugaines	104	57.6	6/22	32	34
Daws	109	56.0	6/24	23	36
Hill 81	110	56.5	6/22	8	37
72339	125	56.4	6/20	14	35

* Data from 1981, 1982, 1984.
** Data from 1979, 1982, 1984.

Table 4. Madras winter wheat variety trial, 1984

VARIETY	YIELD	TEST WT.	HEAD DATE	LODGING	HEIGHT
	bu/a	lb/bu	mo/day	%	in
STEPHENS	129.9	57.3	6/25	39	40
DAWS	90.4	54.2	6/28	69	42
JACKMAR	75.7	52.9	6/25	35	39
HILL '81	104.2	56.4	6/28	24	43
NUGAINES	95.1	56.8	6/27	81	37
McDERMID	110.8	55.1	6/25	71	39
OWW72339	105.6	53.1	6/27	41	38
SWH72053	127.8	55.3	6/27	34	40
OWW74337C	109.5	56.5	6/29	26	40
OWW750144	124.8	58.8	6/24	19	40
OWW74220F	117.2	57.1	6/25	80	41
OWW74348D	112.4	56.3	6/27	39	41
SWM754666*-01H	112.8	60.1	6/22	13	39
SWM754666*-03H	112.2	57.6	6/25	16	40
SWM754666*-04H	102.7	55.5	6/26	53	38
OR CW8416	114.6	56.9	7/01	50	40
OR CW8417	120.4	60.4	6/24	68	41
OR CW8418	106.6	55.4	6/18	31	36
OR CW8419	98.7	59.7	6/24	44	39
OR CW8420	91.7	51.6	6/23	66	40
OR CW8421	108.0	55.6	6/28	43	41
OR CW8422	110.3	56.6	6/28	49	43
OR CW8423	118.2	59.1	6/24	54	40
OR CW8424	120.9	57.0	6/26	44	41
OR CW8425	116.8	58.1	6/24	41	44
OR CW8426	103.2	57.2	6/27	21	45
HYSLOP	106.5	55.5	6/27	59	40
OWW70364	102.5	55.6	6/27	91	40
OWW70111	104.3	55.1	6/26	29	42
72-1220	94.5	53.6	7/01	48	40
SWD71340	109.9	57.1	6/26	48	38
OWW71448	101.9	55.7	7/02	21	39
SWM754671	105.3	54.7	6/26	23	41
SWM754692	103.0	60.5	6/25	31	41
LSD-5%	13.7	2.0	6	44	2

PLANTING DATE: October 28, 1983 RATE: 96 lbs/acre
FERTILIZER: 27-12-0-10 RATE: 600 lbs/acre

WINTER WHEAT DATE OF SEEDING

Central Oregon wheat growers often seed winter wheat in late winter or early spring. A trial was planted at Powell Butte to evaluate which winter wheat varieties are better adapted to spring seeding. Also, spring wheat varieties were included in the trial to determine when to plant spring wheat versus winter wheat.

Table 5. Powell Butte winter wheat variety trial, 1984

VARIETY	YIELD	TEST WT.	HEAD DATE	LODGING	HEIGHT
	bu/a	lb/bu	mo/day	%	in
STEPHENS	93.5	52.7	7/10	45	33
DAWS	92.0	53.6	10	51	36
JACKMAR	63.3	50.2	14	21	29
HILL '81	105.8	55.9	10	31	36
NUGAINES	88.1	54.8	10	63	32
McDERMID	93.9	52.3	10	80	36
OWW72339	104.4	52.7	11	24	35
SWH72053	98.0	53.8	12	0	34
OWW74337C	95.6	54.0	11	45	34
OWW750144	101.5	54.6	10	39	33
OWW74220F	86.0	54.3	11	30	35
OWW742480	92.9	54.3	13	23	34
SWM754666*-01H	90.8	57.8	11	1	34
SWM754666*-03H	91.0	54.6	10	69	33
SWM754666*-04H	70.5	53.4	13	11	32
HYSLOP	85.6	51.5	11	80	36
OWW70364	90.1	52.3	12	73	40
OWW70111	97.0	52.7	11	58	36
72-1220	107.7	54.0	12	53	37
SWD71340	86.4	53.5	14	28	32
OWW71448	88.2	54.4	14	3	32
SWM754671	105.9	54.3	10	25	38
SWM754692	92.4	58.4	11	35	36
LSD-5%	16.7	2.3	2	44	3

PLANTING DATE: October 31, 1983 RATE: 96 lbs/acre
FERTILIZER: 27-12-0-10 RATE: 580 lbs/acre

The effects of date of seeding on yield of six winter and six spring wheat varieties are shown in Table 6. Yields of the winter wheat varieties decreased sharply when planted March 30, 1984. The data suggest Hill '81 should not be spring planted. Spring wheat should be planted instead of winter wheat after the first week in March.

Spring wheat varieties Walladay and Waverly produced excellent yields when fall planted. Walladay has yielded poorly in previous spring seeded trials. The facultative nature of Walladay and Waverly may prove beneficial in late winter or very early spring seeding situations.

SPRING WHEAT

Emphasis has been placed on identifying high-yielding, disease resistant, short-strawed varieties. At present, the majority of spring wheat varieties available to Central Oregon growers are several inches taller than winter wheat, are more susceptible to lodging, and more susceptible to leaf and stripe rust.

Table 6. The effect of seeding date on yield of six winter and six spring wheat varieties

		SEEDING DATE		
VARIETY	TYPE	10/30	2/29	3/30
		-----------	bu/acre	-----------
Hyslop	Winter	81	105	85
Stephens	Winter	106	106	83
Daws	Winter	83	97	67
Nugaines	Winter	96	93	72
Hill '81	Winter	102	100	54
72339	Winter	105	98	81
Twin	Spring	70	103	95
Dirkwin	Spring	74	83	93
Waverly	Spring	93	104	109
Owens	Spring	76	84	97
Walladay	Spring	102	93	90
Fielder	Spring	69	89	94
LSD-5%		15	15	15

Twin has been recommended for seeding in Central Oregon for years. Superior rust resistance and relatively high yields have been the basis for these recommendations. In trials conducted at Madras and Powell Butte in 1984, several experimental lines showed promise. These trials are shown in Tables 7 and 8.

WINTER AND SPRING BARLEY

Two winter barley variety trials were planted at Madras in 1984. Since winter barley is seldom planted in Central Oregon, these trials were planted to aid in statewide winter barley varietal development and selection. Results are shown in Tables 9 and 10.

A spring barley trial was planted at Madras to evaluate available varieties. Results are shown in Table 11. Gustoe, a first-year entry, produced excellent yields, high test weight, was relatively short, and did not lodge. M-3, which will be released by Oregon, also performed well.

Table 7 . Madras western regional spring wheat variety trial, 1984

VARIETY	YIELD	TEST WT.	HEAD DATE	LODGING	HEIGHT
	bu/a	lb/bu	mo/day	%	in
McKAY	74.0	60.5	7/8	0	37
EDWALL	73.8	58.5	8	4	37
FEDERATION	50.6	58.4	6	0	47
OWENS	79.1	60.4	6	0	38
WAVERLY	73.9	59.2	8	0	39
ID 000238	83.2	60.0	6	29	38
ID 000227	71.6	57.7	9	0	35
ID 000246	77.8	57.1	4	0	39
WA 006916	80.4	60.3	4	0	38
WA 006918	85.2	60.7	4	0	37
WA 006919	88.3	60.3	8	1	37
WA 006920	92.1	60.0	6	4	37
UT 000209	83.4	58.2	9	0	39
UT 002746	72.4	61.3	6	1	36
ID 000248	90.2	59.8	9	0	43
ID 000249	78.4	59.8	6	5	37
ID 000263	64.3	61.7	6	3	42
ORS 08411	82.9	59.2	8	0	35
ORS 08412	68.7	59.1	8	23	40
ORS 08413	76.7	58.9	6	0	34
WA 007073	81.2	60.0	4	0	37
WA 007074	88.7	60.9	4	0	36
WA 007075	74.2	59.4	6	0	36
ID 000269	74.2	60.5	6	6	38
ID 000271	74.3	60.9	6	9	37
ID 000232	74.5	58.9	4	6	37
ID 000266	88.0	62.2	6	3	39
ID 000285	94.6	62.8	2	0	40
ID 000286	88.5	60.6	9	0	39
ORS 08414	66.1	60.9	8	3	38
ORS 08415	86.1	63.6	7	0	35
UT 251294	71.0	61.0	7	0	38
UT 251303	86.5	61.6	9	0	38
UT 001376	76.5	56.4	9	0	37
UT 001382	69.7	54.6	9	0	38
WA 007181	65.6	60.6	8	0	42
WA 007182	73.6	57.9	8	4	40
WA 007183	87.9	60.2	8	0	36
FIELDER	75.0	59.5	8	0	37
TWIN	76.0	58.6	8	0	36
DIRKWIN	72.6	57.6	6	4	36
WAMPUM	63.3	58.3	6	46	43
906R	82.6	59.5	6	0	36
A77204S	76.2	58.1	11	0	34
A7891S-3	69.6	56.5	6	0	34
A7839S-2	78.5	57.0	4	24	35
A78112S-2	87.3	60.4	9	0	36
WALLADAY	62.6	57.4	12	0	35
LSD-5%	6.3	1.1	2	13	4

PLANTING DATE: April 6, 1984 RATE: 96 lbs/acre
FERTILIZER: 16-20/34-0-0 RATE: 500/235 lbs/acre

Table 8. Powell Butte spring wheat variety trial, 1984

VARIETY	YIELD	TEST WT.	HEAD DATE	LODGING	HEIGHT
	bu/a	lb/bu	mo/day	%	in
McKAY	62.2	58.3	7/12	0	33
WAMPUM	83.9	55.9	10	0	38
ANZA	62.2	58.7	12	0	29
BORAH	74.0	57.9	11	3	30
NK000751	75.8	57.3	12	10	30
OWENS	63.6	57.7	11	13	31
DIRKWIN	71.3	55.7	10	3	32
TWIN	66.8	56.8	13	0	34
FIELDER	76.3	58.5	11	0	32
FIELDWIN	81.4	59.7	11	0	31
ORS 8411	66.3	58.2	11	3	31
ORS 8412	71.4	56.5	12	10	32
ORS 8413	80.2	56.9	12	0	28
ORS 8414	73.5	58.4	13	0	29
ORS 8415	84.4	61.3	12	0	30
ORS 8416	77.0	59.4	12	0	31
ORS 8417	83.5	56.5	12	0	28
ORS 8418	63.6	58.4	11	0	27
ORS 8419	78.3	58.0	11	35	33
ORS 8420	64.1	56.4	11	0	30
ORS 8421	57.4	55.9	12	0	29
ORS 8422	71.7	57.9	12	5	26
ORS 8423	80.4	58.5	12	0	28
ORS 8424	62.5	59.0	11	0	33
ORS 8425	60.0	58.2	10	0	25
ORS 8426	57.1	55.6	10	5	38
ORS 8427	70.5	58.1	11	0	31
ORS 8428	69.2	56.9	12	0	29
ORS 8429	64.0	56.5	11	0	30
ORS 8430	54.5	55.2	14	0	28
WAVERLY	75.0	57.3	14	0	30
WALLADAY	66.3	54.2	15	0	32
LSD-5%	11.2	0.8	2	13	3

PLANTING DATE: March 23, 1984 RATE: 96 lbs/acre
FERTILIZER: 27-12-0-10 RATE: 500 lbs/acre

Table 9. Madras winter barley variety trial, 1984

VARIETY	YIELD	TEST WT.	HEAD DATE	LODGING	HEIGHT
	bu/a	lb/bu	mo/day	%	in
SCIO	136.2	47.5	6/26	15	43
WINTERMALT	75.2	46.8	24	80	39
BOYER	110.8	47.1	22	38	43
ERSIN	83.6	47.6	13	48	45
KAMIAK	89.7	47.4	26	60	42
OR WF8306	122.8	46.4	20	48	40
OR WF8307	105.0	46.7	20	51	44
OR WF8308	136.3	45.9	18	53	41
OR WF8309	107.2	46.0	22	58	41
OR WF8310	160.9	48.4	18	15	32
OR WF8311	128.1	48.8	23	41	43
OR WF8312	125.8	46.7	20	41	43
OR WF8313	107.8	45.0	18	54	41
OR WF8314	111.2	47.6	18	33	45
OR WF8315	117.5	46.3	13	44	41
OR WF8316	144.1	45.3	11	26	38
OR WF8317	123.0	47.0	8	30	42
OR WF8318	107.6	46.2	15	36	42
OR WF8319	125.8	48.4	11	30	42
OR WF8320	116.7	46.8	13	63	43
OR WF8321	127.7	48.8	16	45	43
OR WF8322	86.3	45.0	18	58	45
OR WF8323	115.2	45.2	24	56	40
OR WF8324	126.1	46.2	16	28	41
OR WF8325	133.4	45.8	15	43	41
OR WF8326	118.4	46.5	17	28	42
LSD-5%	19.7	1.3	10	25	3

PLANTING DATE: October 28, 1983 RATE: 96 lbs/acre
FERTILIZER: 16-20-0-12 RATE: 500 lbs/acre

Table 10. Madras winter malting barley variety trial, 1984

VARIETY	YIELD	TEST WT.	HEAD DATE	LODGING	HEIGHT
	bu/a	lb/bu	mo/day	%	in
SCIO	143.9	47.8	6/10	13	42
NY6005-18	81.6	46.1	16	78	39
COSSACK	83.7	50.3	12	4	42
PULL 12222	85.5	50.8	10	13	42
FB75075-01 H4	149.2	45.1	18	25	41
SWB763150*-02H-OH	98.0	50.3	12	0	40
FB73607D28-HHH33	160.6	46.7	15	5	41
OWB773032*-HRHH32	85.2	48.8	12	23	41
OWB773032*-HRHH33	104.5	49.6	16	6	42
OWB773051*-HRHH31	118.9	50.6	19	0	38
OWB773059*-HRHH31	132.8	49.5	6	10	41
OWB773268A-HRHH31	109.4	50.7	20	5	45
OWB773299A-HRHH34	117.2	48.7	11	28	40
OWB773051*-HRHS31	131.0	50.8	12	1	40
OWB773054*-HRHS32	102.3	51.8	16	8	44
FB75075-01-HHH31	126.0	47.5	13	29	39
FB75075-01-HHH32	136.0	47.0	13	33	38
FB73607-B71	145.5	46.6	12	16	40
OWB773180*-F5H 1	107.5	44.8	9	35	44
FB73130W-10	105.6	44.9	18	18	42
LSD-5%	22.7	1.8	10	28	3

PLANTING DATE: October 28, 1983 RATE: 96 lbs/acre
FERTILIZER: 16-20-0-12 RATE: 500 lbs/acre

Table 11. Madras spring barley variety trial, 1984

VARIETY	YIELD	TEST WT.	HEAD DATE	LODGING	HEIGHT
	bu/a	lb/bu	mo/day	%	in
STEPTOE	112.0	47.4	6/25	80	37
GUS	123.4	47.7	7/1	0	35
GUSTOE	138.6	49.0	7/1	0	32
KOMBAR	125.5	45.8	7/1	0	35
LUD	109.7	53.7	7/1	6	39
POCO	114.9	45.5	6/25	76	26
M-3	129.5	47.5	7/1	0	33
OSB72284	109.7	48.2	7/2	1	42
ADVANCE	104.3	48.4	6/25	26	42
KLAGES	98.3	51.6	7/1	55	42
MOREX	66.1	49.7	6/25	65	46
OSB74352	106.8	52.2	7/1	16	40
LSD-5%	15.1	0.8	1	25	2

PLANTING DATE: April 6, 1984 RATE: 96 lbs/acre
FERTILIZER: 16-20-0-12 RATE: 460 lbs/acre

SPRING OATS

Results from the Powell Butte spring oat variety trial are shown in Table 12. Of released varieties, Cayuse produced the highest grain yields and had a relatively high test weight. Both experimental lines, 74AB2300 and 75AB661, produced yields better than released varieties.

Table 12. Powell Butte spring oat variety trial, 1984

VARIETY	YIELD	TEST WT.
	bu/a	lb/bu
CORBIT	3378.7	36.7
PARK	3041.4	37.4
CAYUSE	3714.3	39.4
MENOMINEE	2682.6	40.3
OTANA	3109.3	38.7
TEXAS RED	2157.4	32.6
74AB2300	4655.6	36.6
75AB661	4743.4	36.9
LSD-5%	975.1	2.0

PLANTING DATE: March 23, 1984 RATE: 80 lbs/acre
FERTILIZER: 27-12-0-10 RATE: 500 lbs/acres/acre

PLANTING DATE: March 23, 1984 RATE: 80 lbs/acre
FERTILIZER: 27-12-0-10 RATE: 500

OSU CEREAL BREEDING AND GENETICS PROGRAM--ACTIVITY IN CENTRAL OREGON

Warren E. Kronstad[1]

The Central Oregon Experiment Station continues to be a vital link in the total OSU cereal breeding and genetics program. During the past 20 years, the station has evaluated advanced selections of wheat and barley for their adaptation to Central Oregon. In doing so, they have provided information to the growers in the area regarding the potential of new varieties. The Central Oregon staff have also been instrumental in obtaining data which have been helpful in giving direction to the breeders in planning their crossing strategy for the development of new varieties.

As a direct result of this interaction between scientists at Central Oregon Experiment Station and the OSU breeders, a new winter wheat selection is being multiplied for possible release in 1985-86. Yield trials conducted at both Powell Butte and Madras have clearly shown the yield superiority of this selection over existing varieties.

Also, a direct input of the Central Oregon researchers has been the emphasis by the OSU breeders to develop short, stiff-strawed varieties which would be easier to irrigate with the current methods employed. A triple dwarf hard red spring wheat is now being evaluated to partially meet this need for shorter varieties.

In 1982, the spring barley and wheat breeding program was moved to Madras. This includes not only yield trials, but the evaluation of early generation progeny. Currently, generations from F2 through F6 are being tested at this site. These materials resulted from crosses made at Corvallis for feed and malting spring varieties and hard red spring wheats obtained from the International Maize and Wheat Improvement headquarters in Mexico.

A new dimension to this cooperative effort is the evaluation of the potential for varieties representing the hard red winter market class. Potential new varieties of this market class are being grown under a series of different fertilizer treatments to determine if a consistent and acceptable protein content can be achieved. If successful, such varieties would avoid the major dependence on soft white wheat.

---

1 Professor of agronomy, Oregon State University, Corvallis, OR.

POTATO VARIETY DEVELOPMENT

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

ABSTRACT

All potato research is conducted at the Powell Butte site of Central Oregon Experiment Station. In 1984, high quality, relatively disease-free seed of 32 potato selections was provided for a four-location, replicated, statewide yield trial. Seed was also provided for a 116 selection, three-location statewide preliminary yield trial, and a 530 selection, two-location statewide screening trial. In addition, seed of six selections was provided for 11 Western Regional potato variety trials. Over 30,000 single-hill selections were grown; 550 were selected for further evaluation. Two yield trials were conducted in which 148 advanced selections were evaluated. Selection A74212-1 has yielded well in variety trials in Oregon, Wyoming, Colorado and California. This variety yields better than Russet Burbank and has a higher percentage of U.S. No. 1 tubers. Selection A74212-1 will be evaluated in advanced agronomic testing and commercial production and packout in 1985. This selection is not suited for commercial processing.

In recent years, major emphasis has been placed on developing new potato varieties for the Pacific Northwest. Needed are new potato varieties with yield potential, disease resistance, a high percentage of U.S. No. 1 tubers; they must also process well and maintain their quality in long-term storage.

Central Oregon Experiment Station plays a major role in the tri-state (Oregon, Washington, Idaho) and Western Regional potato variety development effort. The station is ideally located to produce high quality, relatively disease-free seed. Also, the station is one of two Oregon locations where a large number of seedlings grown from true potato seed are initially evaluated.

METHODS

SEED INCREASES. Seed was increased for Western Regional potato variety trials, statewide advanced variety trials, and statewide preliminary variety trials. A total of 38 varieties

---

[1] Research assistant and professor emeritus, Central Oregon Experiment Station, P.O. Box 246, Redmond, OR 97756.

ACKNOWLEDGEMENT: This research was supported in part by grants from the Oregon Potato Commission and U.S. Department of Agriculture.

were increased for regional and/or statewide advanced trials. One hundred thirteen lines were increased for statewide preliminary trials. Thirty tuber units of each variety were planted in the regional/statewide increase, 15 tuber units of each line were planted in the preliminary increase. Seed pieces were placed 12 inches apart; 18 inches separated tuber units. Figure 1 indicates the row spacing for each planted 40 feet.

Before planting, five pts/A of Eptam 7-E was incoporated into the soil. An Iron Age potato planter was used to band 800 lbs/A of 10-20-20 (NPK) fertilizer at planting time. All increases were hand planted.

All increases were rogued for potato virus Y (PVY), potato virus X (PVX), potato leaf roll virus (PLRV), as well as other diseases every two weeks. Each week, one pound per acre of Orthene 75S and a 1% solution of Stylet spray-oil were applied by a ground sprayer at 250 psi.

Seed increases were sprayed with two quarts per acre of dinitro on September 14 and September 19, 1985. All varieties were dug, placed in polymesh bags and shipped to Klamath Falls for storage during the first week of October.

VARIETY TRIALS. Before planting, 5 1/2 pts/A of Eptam 7-E was incorporated into the soil. Plots were planted May 17, 1984, and 1,000 lbs/A of 16-16-16 (NPK) was banded at planting time.

Statewide Variety Trial. Twenty-seven seed pieces were planted nine inches apart in three-foot rows. Plots were separated by two hills of "All Blue" potatoes. Plots were arranged in a randomized block design replicated four times. Vines were dessicated on September 21, 1984, with an application of 2 qts/A of dinitro. Plots were dug October 15, 1984, and graded the following day. 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 air and water. Between 10 and 18 tubers from each plot were cut and internal defects were recorded as percent of tubers with a given defect. Four tubers from each plot were stored for two months at 55°F. for french frying. Four 1/4-inch square strips from each of four tubers were fried for four minutes at 350° 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.

Preliminary Variety Trial. The methods for the preliminary trial were indentical with the statewide trial except 16 seed pieces per plot were planted. Also, only two replicates were planted and the trial was harvested October 11, 1984.

SELECTION TRIALS. Three selection trials were conducted in 1984. Twenty-seven thousand seedling tubers (small tubers grown from true potato seed) were planted 27 inches apart in rows spaced as shown in Figure 1. Five thousand seedling tubers were obtained from Colorado State University and also North Dakota State University; 17,000 seedling tubers were obtained from the USDA Germplasm Enhancement Program at Aberdeen, Idaho. The tubers were planted into soil treated with 5 pts/A of Eptam 7-E and fertilized with 800 lbs/A of 10-20-20 (NPK).

Approximately 3,000 seedlings grown from true potato seed were transplanted June 19, 1984. The two-to three-inch seedlings were gently pulled from the growing medium and transplanted bare-root with a mechanical transplanter. The soil had been treated with 5 pts/A of Eptam 7-E four weeks before planting. Five hundred pounds per acre of 16-20-0 (NPK) was broadcast before planting. The transplants were hilled with a Lilliston cultivator three times at approximately two week intervals after planting.

Five-hundred thirty lines selected from 1983 seedling tubers were planted May 29, 1984. Three or four tuber units of each line were planted in rows spaced as shown in Figure 1. All lines were separated by "All Blue" potatoes. Fertilizer and weed control were the same as used for seedling tubers.

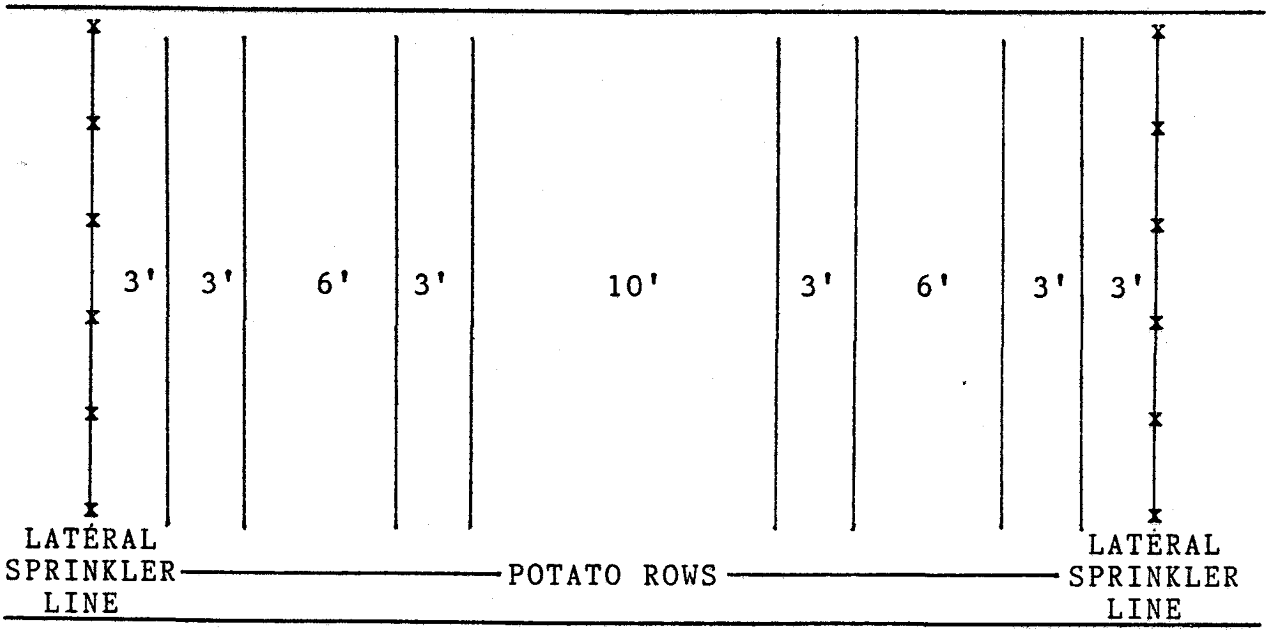

Figure 1. Planting scheme used for seed increases and selection trials, 1984

RESULTS

SEED INCREASES. Thirty-eight lines were increased for regional and statewide variety trials. Mosaic levels were very low; only 1.32% of the tuber units planted were visually identified as containing either PVX or PVY. Two thirds of all mosaic diagnosed and rogued were contained in lines A7532-1 and NDA1242-3. Both lines were dropped from the program.

One-hundred thirteen lines tested in 1984 preliminary trials were increased for 1985 statewide variety trials. Eighteen of these lines were selected for evaluation in 1985. Mosaic levels were slightly higher in this increase block as 2.06% of the plants expressed mosaic symptoms. Selection A080432-10 contained more than one-third of all mosaic rogued. This selection was dropped.

Even though several lines contained significant amounts of PVY, spraying of oil and Orthene 75S contained virus levels and prevented significant spread to other selections.

STATEWIDE VARIETY TRIAL. Yield and quality characteristics for the 1984 statewide potato variety trial are shown in Table 1. The overall trial was excellent; yields were relatively high and the trial coefficient of variation for total yield was 9.7%. The percentage of US No. 1 tubers in some varieties was very low because of the presence of severe growth cracks. More growth cracks than normal were noted in 1985.

Nine of the 32 selections tested will be retained for further evaluation in 1985. Selection A079492-2, a first-year entry, showed excellent yield potential. Although this variety yields well, the light tan skin, light russetting, and round shape may prevent this variety from acceptance by the northwest potato industry.

Selection A74212-1 also yielded well. This variety does not fry well, but may be suitable for the fresh market. A74212-1 has shown excellent yield potential in all Oregon testing locations, as well as northern California, Wyoming, and Colorado. Seed will be increased in 1985 for advanced agronomic testing and commercial production and packout.

Internal defects and tuber characteristic data are shown in Table 2. Selection A74212-1 was moderately susceptible to black spot, although not nearly as susceptible to black spot as Lemhi. Hollow heart and internal brown spot have not been a problem with A74212-1.

Two North Dakota selections, ND534-4 and ND388-1, were retained for further evaluation. Neither variety performed well at Powell Butte. Both varieties will be released by North Dakota State University soon. Selection ND534-4 does not process well; the specific gravity is relatively low. It has, however, produced excellent yields in the Columbia Basin. Selection ND388-1 has performed poorly in Oregon. This selection processes and stores relatively well.

Selections NDA1309-6 and A7869-5 were retained for further evaluation as processing selections.

PRELIMINARY STATEWIDE VARIETY TRIAL. One hundred sixteen selections were evaluated in the 1984 preliminary variety trial at Powell Butte. Preliminary trials were also conducted at Klamath Falls and Hermiston. The 21 selections retained for 1985 testing are shown in Table 3. The selections were chosen based on performance at all three Oregon locations. Overall, most of the varieties yielded better than Russet Burbank, had more US No. 1 tubers, and better internal qualities. These selections will be placed in the 1985 Statewide Variety Trial.

SEEDLING TUBERS AND TRANSPLANTS. Five-hundred eighty lines were selected from more than 30,000 seedling tubers and transplants. These selections will be grown at Hermiston and Powell Butte in 1985. Selections were based on visual criteria, such as relative yield, tuber size, shape, uniformity, and overall appearance.

The percentage of selections made from transplants was nearly equal to the percentage of selections made from seedling tubers. Although tubers from transplanted seedlings were smaller, a visual evaluation could be easily made. Transplanting will be utilized on an increasing basis in the future.

SIXTEEN HILL SCREENING TRIAL. Five-hundred thirty lines selected from 1983 seedling tubers were grown in 1984 at Hermiston and Powell Butte. Approximately 150 lines were visually selected in the field. After specific gravities and french fry color tests were performed on these varieties, 37 selections were retained for evaluation in 1985 preliminary variety trials. Nearly all these selections had high specific gravities and fry colors lighter than Russet Burbank.

SUMMARY

The number of lines evaluated and selected in 1984 are shown in Table 4. In each of the last four years, the number of new lines brought into Oregon from regional breeding programs has increased. This should enhance the prospect of identifying potato varieties better suited for commercial production and processing.

Table 1. Yield and quality characteristics for 32 selections and varieties, Powell Butte Statewide Variety Trial, 1984

SELECTION	YIELD RANK	YIELD (CWT/A) TOTAL	NO. 1	% NO. 1	OZ/ TUBER[1]	SPEC GRAV[2]	FRY COLOR[2]	DISPO
R. Burbank	14	482	359	74	8.0	1.085	0.38	Keep
Lemhi	11	496	357	72	9.9	1.082	0.31	Keep
Norgold	30	393	320	81	7.2	1.069	1.56	Keep
Nooksack	9	499	279	56	13.0	1.091	0.25	Drop
A68678-2	17	463	297	64	8.9	1.075	1.75	Drop
A69870-10	20	458	262	57	8.9	1.081	0.38	Drop
A71997-8	7	510	377	74	8.5	1.077	0.75	Drop
A7242-3	8	504	399	79	9.7	1.080	2.13	Drop
A7279-12	13	488	407	83	9.1	1.089	0.13	Drop
A72685-2	6	511	361	71	7.9	1.082	1.56	Drop
A74132-7	12	488	340	70	9.2	1.076	1.44	Drop
A74212-1	2	592	496	84	11.1	1.077	1.50	Keep
A7532-1*	10	498	272	55	9.3	1.079	0.25	Drop
A77153-3	25	439	287	65	8.9	1.084	0.88	Drop
A7811-16*	16	465	336	72	9.7	1.074	0.38	Drop
A7814-6*	18	461	301	65	7.1	1.071	2.25	Drop
A7836-28*	24	440	315	72	8.0	1.081	0.44	Drop
A7869-5*	3	592	431	73	12.7	1.079	0.06	Keep
AO79492-2*	1	604	463	77	9.3	1.074	0.13	Keep
CO07908-1*	22	448	307	69	8.3	1.079	0.88	Drop
CO07921-1*	5	520	383	74	8.9	1.075	1.56	Drop
ND388-1*	29	397	322	81	9.2	1.076	0.19	Keep
ND534-4*	28	425	339	80	10.3	1.067	0.88	Keep
ND681-3	23	444	349	79	8.8	1.077	0.44	Drop
ND678-8*	4	561	379	68	8.9	1.072	0.06	Drop
NDA815-1*	31	354	274	77	6.2	1.075	0.13	Drop
NDA1238-2*	26	433	306	71	6.7	1.065	1.75	Drop
NDA1242-1*	21	455	383	84	9.7	1.070	0.56	Drop
NDA1242-3*	27	428	347	81	8.7	1.078	0.13	Drop
NDA1246-4*	19	461	288	62	10.0	1.062	2.00	Drop
NDA1276-3*	32	326	262	80	6.4	1.061	0.50	Drop
NDA1309-6*	15	472	361	76	10.7	1.080	0.19	Keep
Average	-	472	342	72	9.0	1.076	0.80	--
LSD 5%	-	65	70	--	1.6	.005	0.80	--

* - New entry
1 - Average weight of all tubers
2 - Air/Water Method
3 - Stored 2 months at 55°F, fresh fried 4 minutes at 350°F

Table 2. Internal defects and tuber characteristics, Powell Butte Statewide Variety Trial, 1984

SELECTION	% INTERNAL DEFECTS[1] HH	BLSP	IBS	TUBER CHARACTERISTICS SK COLOR	RUSSET	SHAPE	GR CRACKS
R. Burbank	0	2	20	Brown	Medium	Long	None
Lemhi	8	13	4	Brown	Heavy	Blocky	None
Norgold	9	6	9	Brown	Medium	Blocky	None
Nooksack	0	12	4	Brown	Medium	Rnd-Fl	Few-Shallow
A68678-2	6	8	7	Brown	Medium	Blocky	Few-Shallow
A69870-10	17	5	9	Brown	Medium	Blocky	Few-Shallow
A71997-8	4	0	0	Brown	Medium	Blocky	None
A7242-3	2	7	0	Tan	Med-Lt	Blocky	None
A7279-12	0	2	0	Brown	Med-Lt	Blocky	None
A72685-2	0	5	6	Brown	Medium	Blocky	None
A74132-7	4	5	2	Brown	Medium	Blocky	None
A74212-1	0	8	0	Tan	Med-Lt	Blocky	None
A7532-1*	0	4	0	Brown	Heavy	Blocky	Few-Shallow
A77153-3	2	5	2	Tan	Med-Lt	Blocky	None
A7811-16*	2	6	0	Brown	Heavy	Blocky	None
A7814-6*	0	2	0	Brown	Medium	Long	None
A7836-28*	4	11	2	Brown	Medium	Blocky	None
A7869-5*	0	2	0	Brown	Medium	Long	None
AO79492-2*	4	2	2	Tan	Light	Round	None
CO07908-1*	2	5	0	Brown	Medium	Blocky	None
CO07921-1*	0	0	0	Brown	Heavy	Blocky	Few-Shallow
ND388-1*	0	0	2	Brown	Heavy	Blocky	Many-Deep
ND534-4*	6	0	2	Brown	Medium	Long	None
ND681-3	0	2	2	Brown	Medium	Blocky	Few-Deep
ND678-8*	0	6	0	White	None	Round	Few-Shallow
NDA815-1*	0	2	2	Brown	Medium	Pear	None
NDA1238-2*	10	2	6	Brown	Heavy	Blocky	None
NDA1242-1*	0	4	0	Brown	Medium	Blocky	None
NDA1242-3*	0	3	0	Brown	Heavy	Blocky	None
NDA1246-4*	0	5	9	Tan	Light	Pear	None
NDA1276-3*	0	2	0	Brown	Heavy	Blocky	None
NDA1309-6*	3	6	4	Brown	Heavy	Blocky	Few-Shallow

* - New entry

1 - Percent of 6-10 oz. tubers expressing defect
HH = Hollow Heart, BLSP = Black Spot, IBS = Internal Brown Spot

Table 3. Yield and quality characteristics of retained selections from Statewide Preliminary Variety Trial, Powell Butte, 1984

SELECTION	YIELD (CWT/A) TOTAL	NO. 1	% NO. 1	SPEC GRAV[1]	FRY COLOR[2]	% HH[3]	% BL SP[3]	% IBS[3]
A7919-1	579	515	89	1.082	0.63	4	0	7
A7987-14	492	403	82	1.082	0.88	0	3	0
A79141-3	480	351	73	1.085	0.00	4	0	0
C008014-1	554	492	89	1.082	0.38	4	0	4
C008018-3	479	443	92	1.078	0.75	0	4	0
A08035-3	567	433	76	1.081	2.13	7	0	15
A08035-8	518	417	80	1.085	1.63	0	0	0
A08036-6	473	426	90	1.071	0.00	0	0	0
A08036-18	534	446	84	1.069	0.00	0	4	4
A08037-12	559	443	79	1.078	0.75	5	5	0
A08096-10	429	278	65	1.093	0.13	0	4	0
A080432-1	399	258	65	1.077	0.38	0	8	0
A080432-7	421	234	56	1.074	0.38	14	5	0
A080437-6	465	282	61	1.071	1.25	12	4	0
A080437-7	470	287	61	1.078	1.50	0	0	0
A080570-10	606	437	72	1.073	2.38	4	10	8
A080576-5	487	339	70	1.070	1.25	0	0	0
A080592-1	594	373	63	1.079	1.38	26	0	9
R. Burbank	453	327	72	1.081	1.13	0	14	24
Lemhi	466	390	84	1.087	1.00	0	31	0
Norgold	403	333	83	1.073	1.25	8	0	4
Average	450	336	75	1.077	1.05	7	4	3
LSD 5%	90	105	--	.008	1.05	18	12	11

1 - Air/Water Method
2 - Stored 2 months at 55°F., fresh fried 4 minutes at 350°F.
3 - Percent of 6-10 oz. tubers expressing defect

Table 4. Number of potato lines evaluated and selected at Powell Butte in 1984

TRIAL	NUMBER OF LINES GROWN	NUMBER OF LINES SELECTED
Statewide	32	9
Preliminary	116	21
16 Hill Screening	530	37
Seedling Tubers	26,627	492
Seedling Transplants	3,000	59
Total	30,305	618

EFFECT OF DIQUAT ON VINE DESSICATION AND STEM END BROWNING IN RUSSET BURBANK POTATOES

Steven R. James[1]

ABSTRACT

An experiment at Powell Butte, Oregon was established to evaluate the effects of one, two, four, and six pints/A of Diquat on dessication of potato vines before harvest. An untreated check treatment and four pints/A of dinitro were also included in the experiment. Effective potato vine dessication was achieved by using Diquat. Two pints/acre of Diquat resulted in vine dessication similar to that of dinitro. There was no advantage in using more than 2 pints/acre of Diquat. The use of Diquat did not increase stem end browning as compared with the untreated check.

Dessication of potato vines is often necessary to mature tubers before harvest in Central Oregon. Dinitro is the most commonly used dessicant. In this study, the effect of Diquat was evaluated for potato vine dessication and its subsequent effect on stem end browning after four months in storage.

METHODS

A randomized, complete block experiment was established at the Powell Butte site of Central Oregon Experiment Station. Soil type was an Ayers-Ochoco sandy loam with a pH of 6.1. Russet Burbank potatoes were planted on May 17, 1984. The trial was fertilized with 1,000 lbs/acre of 16-16-16 at the time of planting. Eptam 7E was applied before planting (5 1/2 pts/ acre).

Individual plots were four rows wide (12 feet) by 30 feet long. Rows were spaced 36 inches apart. Cut seed pieces were spaced at nine inches.

Diquat was applied at rates of 1, 2, 4, and 6 pints/acre. Dinitro was applied at 4 pints/acre. Application data are shown in Table 1. All treatments were applied on September 10, 1984. Efficacy of the dessicants was evaluated on Sep-

---

1 Research assistant, Central Oregon Experiment Station, P.O. Box 246, Redmond, OR 97756.

ACKNOWLEDGEMENT: This study was supported in part by a grant from Chevron Chemical Company.

tember 13 and September 18, 1984. Twenty pounds of tubers were placed in storage after harvest on October 17, 1984. Storage temperatures were gradually lowered to 37°F. Twenty 6-10 ounce tubers from each treatment were evaluated for stem-end browning on February 26, 1985.

Table 1. Dessicant application data

APPLICATION DATE: September 10, 1984
- AIR TEMPERATURE: 65° F.
- SOIL TEMPERATURE: 54°F.
- PERCENT CLOUD COVER: Clear
- WIND SPEED AND DIRECTION: North, 0-2 mph
- DEW PRESENT: None
- TIME OF DAY: 10 AM
- SOIL MOISTURE: 13.2%
  - PERCENT AT FIELD CAPACITY: 18.9%
  - PERCENT AT WILTING POINT: 8.3%

METHOD OF APPLICATION
- TYPE OF SPRAYER: Unicycle
- GROUND SPEED: 3 mph
- TYPE OF CARRIER AND VOLUME: Water, 30 gals/acre
- LENGTH OF BOOM: 80 inches
- NOZZLE SPACING: 18 inches
- NOZZLE SIZE AND TYPE: 8002 flat fan
- BOOM HEIGHT: 20 inches
- PRESSURE: 30 psi
- SURFACTANT AND RATE: Activator 90, 12 oz/acre

Table 2. Effect of dessicants on potato vine kill, Powell Butte, 1984

TREATMENT	RATE	EVALUATION DATES 9/13/84	9/18/84
	pints/acre	% Vine Kill*	
Diquat	1	76	95
Diquat	2	90	98
Diquat	4	93	100
Diquat	6	95	100
Dinitro	4	84	98
Check	0	29	55
LSD (5%)	-	14	9

* 0 = No vine kill
100 = Complete vine kill

RESULTS

Table 2 summarizes the effects of Diquat on potato vine dessication. The 2, 4, and 6 pints/acre treatments of Diquat resulted in faster dessication of vines after three days than the 1 pint/acre rate. After eight days, there were no significant differences in percent vine kill among all dessication treatments.

No dessicants were applied to the untreated check treatment. The percent vine kill recorded for the check treatment was a result of vine killing frosts. Temperatures of 26, 27, and 29°F were recorded on September 12, 13, and 14, respectively.

The evaluation of stem end browning after four months of storage at 37°F is summarized in Table 3. There were no significant differences among treatments. Very slight stem end discoloration was noted in all treatments, including the untreated check treatment.

Table 3. Effect of dessicants on stem end browning of Russet Burbank potatoes stored at 37 degree F for four months, Powell Butte, 1984

TREATMENT	RATE pints/acre	STEM END BROWNING rating*
Diquat	1	0.32
Diquat	2	0.38
Diquat	4	0.25
Diquat	6	0.28
Dinitro	4	0.40
Untreated Check	0	0.32
LSD (5%)	-	NS

* Rating Scale
- 0 = No discoloration
- 1 = slight discoloration, less than 1/16" deep
- 2 = mild discoloration
- 3 = moderate discoloration, to 1/8" deep
- 4 = moderately severe discoloration
- 5 = severe discoloration, greater than 1/4" deep

CONTROL OF QUACKGRASS IN RUSSET BURBANK POTATOES

Steven R. James[1]

ABSTRACT

Recently, a relatively new class of herbicides has been developed which kill grasses in broadleaved crops. An experiment was established at Redmond to evaluate percent quackgrass kill in commercial potatoes. Fusilade 2000 was evaluated in this experiment. At the time of this writing, Fusilade 2000 was labeled for experimental purposes only. An application of 0.25 pounds ai/acre (either split or single) of Fusilade 2000 resulted in excellent quackgrass control and significantly increased total yield and yield of No. 1 tubers over the untreated check. One hundred percent control was not achieved because of the severe quackgrass infestation in the field.

Quackgrass (Agropyron repens, L.) has been a major problem in commercial and seed potato fields in Central Oregon. The problem has been especially severe when potatoes follow pasture or alfalfa, especially where alfalfa stands have been left in for a number of years.

Preplant herbicides have been variable in controlling quackgrass. Newer post emergent herbicides have been introduced which selectively control grasses in broadleaf crops. Fusilade 2000 was evaluated in this study. This compound, when applied to actively growing grasses, is systemic; it translocates into the roots, rhizomes, stolons, and growing points of grasses and kills the entire plant.

METHODS

A randomized, complete block experiment was established in a very heavily quackgrass-infested field at the Redmond site of the Central Oregon Experiment Station. Soil type was a Deschutes Sandy Loam with a pH of 6.0. Russet Burbank potatoes were planted on June 1, 1984, and hilled July 2, 1984. No preplant herbicides were applied. The trial was fertilized with 1,000 lbs/acre of 16-16-16 at time of planting.

---

[1] Research assistant, Central Oregon Experiment Station, P.O. Box 246, Redmond, OR 97756.

ACKNOWLEDGEMENT: This study was supported in part by a grant from ICI Americas, Inc.

Individual plots were four rows (12 feet wide by 30 feet long). Rows were spaced 36 inches apart. Cut seed pieces were spaced at nine inches.

Table 1 indicates treatments and dates applied. Application data are shown in Tables 2 and 3. The percent of quackgrass plants killed was evaluated on July 23, 1984, August 15, 1984, and September 13, 1984. The trial was harvested, weighed, and graded October 24, 1984.

Table 1. Treatments, rates, and application dates

TREATMENT	RATE*	DATE APPLIED
	lbs ai/acre	mo/day
Fusilade 2000	0.063	7/9
Fusilade 2000	0.125	7/9
Fusilade 2000	0.250	7/9
Fusilade 2000	0.125 + 0.125	7/9 + 7/13
Poast	.50	7/9
Untreated Check	---	---

* 10 oz./acre of oil concentrate added to each treatment except untreated check.

Table 2. Fusilade 2000 application data, July 9, 1984

APPLICATION DATE: July 9, 1984
- TEMPERATURE: 64°F
- SOIL TEMPERATURE (4 in): 57°F
- PERCENT CLOUD COVER: Clear
- WIND SPEED AND DIRECTION: None
- DEW PRESENT: None
- TIME OF DAY: 8:30 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, 30 gal/acre
- LENGTH OF BOOM AND NOZZLE SPACING: 80 in., 18 in.
- NOZZLE SIZE AND TYPE: 8002 Flat Fan
- BOOM HEIGHT: 20 in.
- PRESSURE: 30 PSI
- SURFACTANT AND RATE: Oil concentrate, 10 oz/acre

STAGE OF GROWTH:
- CROP: 25% Ground Cover
- QUACKGRASS: 8-9 in.

Table 3. Fusilade 2000 application data, (Treatment 4 only)

APPLICATION DATE: July 13, 1984
TEMPERATURE: 65°F
SOIL TEMPERATURE (4 in): 56°F
PERCENT CLOUD COVER: Clear
WIND SPEED AND DIRECTION: None
DEW PRESENT: None
TIME OF DAY: 9 AM
SOIL MOISTURE: 90% Field Capacity
METHOD OF APPLICATION: Broadcast
TYPE OF SPRAYER: Unicycle
GROUND SPEED: Approximately 3 MPH
TYPE OF CARRIER AND VOLUME: Water, 30 gal/acre
LENGTH OF BOOM AND NOZZLE SPACING: 80 in., 18 in.
NOZZLE SIZE AND TYPE: 8002 Flat Fan
BOOM HEIGHT: 24 in.
PRESSURE: 30 PSI
SURFACTANT AND RATE: Oil concentrate, 10 oz./acre
STAGE OF GROWTH:
CROP: 40% Ground Cover
QUACKGRASS: 9 in.

RESULTS

Table 4 summarizes the effects of Fusilade 2000 on quackgrass control. Two weeks after application, 0.250 pounds ai/acre gave the greatest quackgrass control. There was no difference in control between one application of 0.250 pounds ai/acre and splitting the application. Later evaluations of quackgrass control revealed no statistical (5%) differences between the 0.125 and 0.250 lbs ai/acre application rates. Because the quackgrass infestation was extremely severe, 100% control was not achieved.

Table 4. The effect of Fusilade 2000 on quackgrass control in Russet Burbank potatoes, Redmond, 1984

TREATMENT	RATE	EVALUATION DATES 7/23/84	8/15/84	9/13/84
	lbs ai/acre	% Control*		
Fusilade 2000	0.063	9	33	44
Fusilade 2000	0.125	50	70	76
Fusilade 2000	0.25	83	90	88
Fusilade 2000	0.125+0.125	85	93	84
Poast	0.50	29	43	40
Untreated Check	----	0	0	0
LSD - 5%	----	21	25	34

* 0 = No quackgrass plants killed
100 = 100% of quackgrass plants killed

Potato yields were lower than those generally achieved in Central Oregon because of the severe quackgrass infestation. Although control was excellent for 0.125 and 0.25 pounds ai/acre treatments of Fusilade 2000, actual quackgrass kill did not occur until late in the growing season.

Potato yields and grades are summarized in Table 5. Yields were significantly (5%) increased with the higher application rates of Fusilade 2000. The increase in yield was because of an increase in yield of U.S. No. 1 grade potatoes. The yield of undersized (less than 4 ounce) potatoes was constant over all treatments.

Table 5. Effect of Fusilade 2000 on yield and grade of Russet Burbank potatoes, Redmond, 1984

		YIELD		
TREATMENT	RATE	TOTAL	NO. 1	<4 OZ.
	lbs ai/acre		tons/acre	
Fusilade 2000	0.063	8.8	4.5	3.8
Fusilade 2000	0.125	12.8	7.8	4.6
Fusilade 2000	0.25	11.5	6.2	4.7
Fusilade 2000	0.125+0.125	13.4	8.4	4.4
Poast	0.50	9.4	5.1	4.0
Untreated Check	----	7.6	3.4	4.0
LSD-5%	----	3.4	2.7	NS

CENTRAL OREGON POTATO NITROGEN FERTILIZER TRIALS

1984 Progress Report

Alvin R. Mosley, Shelton C. Perrigan and Steven R. James[1]

ABSTRACT

This preliminary nitrogen rate x time of application study suggests that yield and quality of Russet Burbank potatoes peaked at about 200 pounds per acre. Further, data indicated that for best yields approximately two thirds of the nitrogen complement should be banded at planting and the remainder sidedressed about 40 days later. Nitrogen applied in excess of 200 pounds per acre or after the end of June seemed to be largely wasted. Petiole NO_3-N levels on August 1 seemed to agree well with yields when compared against nitrogen rates but not when compared against times of application. These findings are preliminary in nature. Additional studies are currently underway to expand and confirm trends observed in 1984.

Proper nitrogen management is one of the most important tasks facing potato growers. Too little nitrogen, or nitrogen improperly applied, can reduce yields drastically. Too much nitrogen, especially late in the season, can also lower yields through delayed maturity in short season areas such as central Oregon.

Yields are not the only factor to be considered when planning fertilizer programs, however. The effect of nitrogen on tuber quality and storage life is too often ignored in the pursuit of high yields. It is probably a safe assumption that losses in the storage and packing shed from nitrogen mismanagement are more common than actual yield reductions.

Adverse effects of nitrogen fertilizer on quality in central Oregon are most often caused by excess nitrogen late in the growing season from about mid-August on. Late levels tend to delay tuber maturity and skin set causing excess harvest injury. Mechanical injury not only leads to increased cullage during packing but also promotes storage losses from wound invasion by various decay organisms. A factor often overlooked in assessing quality is specific gravity. High nitrogen rates late in the season almost invariably lower specific gravity, a definite quality reduction for processing potatoes.

Although most growers are acutely familiar with the effects of nitrogen mismanagement on their crop and bank account, few feel confident in predicting optimum nitrogen rates and very few would be willing to guess whether crop nitrogen status is optimal in mid-August, for example. Optimum application rates at planting can easily be offset by excess

[1]Associate professor and research assistant, Department of Crop Science, Oregon State University, and research assistant, Central Oregon Experiment Station.

water or some other stress during the growing season. Nutrient imbalances in the soil can also affect the amount of nitrogen entering the plant. Potassium, for example, is known to influence nitrogen uptake. Because of these possible interferences, a knowledge of nitrogen levels in plant tissues at any given time would be most useful to growers.

Petiole NO_3-N content has been shown to be a useful indicator of nitrogen actually present in the plant. Using this tool and judicious fertilizer applications, growers can maintain optimum crop nitrogen levels regardless of soil, weather, or cultural conditions. Petiole nitrate monitoring is particularly useful when combined with periodic soil tests and occasional determinations of P, K, and other elements in the tissues.

Seasonal curves of recommended petiole nitrate levels have been developed for Russet Burbank in most major producing areas. These have not yet been adequately fitted to central Oregon conditions, however. The goal of these studies is to develop recommendations for nitrogen fertilization of Russet Burbank in central Oregon using petiole NO_3-N monitoring to help maintain optimum levels throughout the season.

PROCEDURES

A large field trial was planted at the Central Oregon Experiment Station Powell Butte site in 1984. This test included nitrogen rates of 0, 100, 200, and 300 pounds/A and applications at planting (May 15) and on June 26 and August 6. The May 15 component was banded at planting; June 26 and August 6 treatments were broadcast immediately before irrigating and watered in. Each treatment plot consisted of four rows 25 feet long. The 16 treatments were repeated four times in a randomized complete block statistical design. P and K were applied at recommended rates at planting.

Planting, cultural and pest control practices were characteristic of the central Oregon area. Petioles were collected approximately every two weeks from late June through mid-August. These were analyzed for nitrate nitrogen content in the Crop Science Department at Oregon State University, using a nitrate electrode to reduce costs. Only the August 1 determinations will be presented in this report. Other dates will be included in the final report on this work.

Plots were harvested on October 18 and grade-out and specific gravity data were collected shortly afterward.

RESULTS

Results are summarized in Tables 1-3. Tables 2 and 3 are derived from averaging rate effects across application dates (Table 2) and averaging application timing effects across rates (Table 3). Discussions will center around the latter two tables.

RATE EFFECTS. Both total and No. 1 yields tended to peak around 200 pounds of N per acre (Table 2). It appears, therefore, that nitrogen in excess of about 200 pounds was wasted on the site used in this study. Specific gravity levels characteristically declined steadily from 1.093 with no nitrogen applied to 1.083 for 300 pounds applied. Gravities did not change appreciably between 200 and 300 pounds per acre.

Petiole NO_3-N levels on August 1 corresponded roughly to yield as expected. Based on data presented here, about 18,000 ppm seemed optimal on August 1 in central Oregon.

TIMING EFFECTS. Banding approximately two thirds of the nitrogen complement at planting followed by sidedressing the remainder in late June favored high yields and quality (Table 3). Nitrogen applications in early August appeared to be essentially wasted; likewise, omitting nitrogen at planting did not favor high yields.

Petiole NO_3-N levels on August 1 did not relate well with yields when summarized across fertilizer rates. This was expected since nitrogen sidedressed in late June had not yet been depleted, particularly for the high midseason/zero at planting regimes.

DISCUSSION. The above comments should be considered preliminary in nature, particularly those relating to petiole NO_3-N levels. Additional petiole data will be presented for this study as well as an identical 1985 trial in subsequent reports. These and similar studies in the Willamette Valley will eventually determine optimum rates and timing of nitrogen fertilization as well as corresponding petiole NO_3-N levels throughout the growing season.

1. Effect of nitrogen rate and timing on yield, quality, and petiole NO_3-N levels of Russet Burbank potatoes at Powell Butte, Oregon, 1984

Nitrogen, lbs/A[1] and timing	Yield, cwt/A Total	No. 1	% No. 1	PPM Nitrate 8/1/84	Specific Gravity
0-0-0	280	159	57	2,260	1.093
100-0-0	341	227	66	14,475	1.088
67-33-0	359	235	65	11,790	1.089
33-33-33	321	205	63	10,217	1.090
0-67-33	324	225	70	10,950	1.087
0-100-0	313	196	62	13,557	1.087
200-0-0	380	255	67	19,500	1.085
133-66-0	410	274	67	17,575	1.084
66-66-66	359	235	65	15,700	1.084
0-133-66	361	247	68	19,950	1.088
0-200-0	369	253	68	19,175	1.080
300-0-0	376	245	65	22,600	1.083
200-100-0	390	273	70	22,200	1.082
100-100-100	396	260	65	20,750	1.086
0-200-100	340	254	74	22,400	1.083
0-300-0	354	240	68	22,450	1.082
LSD, .05	53	42	6	4,874	.004

[1]Nitrogen applied as ammonium nitrate by banding at planting on May 15 and sidedressing before irrigating on June 26 and August 6.

2. Effect of nitrogen rate on yield, specific gravity, and petiole NO_3-N application on Russet Burbank potatoes in central Oregon, 1984

Nitrogen[1] lbs/acre	cwt/A total	cwt/A No. 1	% No. 1	Specific gravity	NO_3-N, PPM x 1,000
0	280	159	57	1.093	2.3
100	331	218	65	1.088	12.2
200	376	253	67	1.084	18.4
300	359	254	68	1.083	22.1

[1]Averaged across five times of application regimes.

3. Effect of time of application of nitrogen on yield, specific gravity, and petiole NO_3-N content of Russet Burbank potatoes at Powell Butte, Oregon, 1984

% N applied on:[1]			cwt/A total	cwt/A No. 1	% No. 1	Specific gravity	NO_3-N, PPM x 1,000
5/16	6/26	8/6					
100	0	0	366	242	66	1.085	18.8
67	33	0	386	261	68	1.085	17.2
33	33	33	359	233	65	1.087	15.5
0	66	33	342	242	71	1.086	17.7
0	100	0	345	230	67	1.083	18.4

[1]Averaged across rates of 100, 200, and 300 lbs N per acre.

OBSERVATIONS ON FIELD PERFORMANCE OF TISSUE CULTURED TRANSPLANTS IN CENTRAL OREGON

1984 Progress Report

Alvin R. Mosley and Shelton C. Perrigan

ABSTRACT

Seed potato production from greenhouse-grown transplants or tubers appears to have become an established practice for Russet Burbank in western states. We have studied field transplanting since 1981 and have had trials in Central Oregon since 1982. Experiments at Powell Butte in 1984 to further examine effects of frost protection, weed control, transplanting depth, and transplant size on performance were not definitive due to partial stand loss from too early planting and frost. Research now underway at Klamath Falls, Powell Butte and Corvallis will provide additional guidelines for these and other cultural practices. Both Klamath Falls and Powell Butte tests will compare field performance of three types of transplants with various sizes and ages of minitubers as well as standard seedpieces. Results of these tests will be reported in December 1985.

Suggestions in this report are based on observations in Central Oregon and the Willamette Valley over the last five years. They are general in nature since more work remains to be done.

Several aspects of field transplanting need further study. However, the following suggestions should be helpful to growers contemplating transplanting.

PLANTING

Transplants are sensitive to frost injury. After losing a substantial number of plants to frost in 1984, we recommend delaying field transplanting until about June 15 in Oregon seed production areas. Earlier plantings could probably be successful with frost protection from row covers or solid-set irrigation. But it is doubtful that yield increases would justify the additional risk.

We recommend a mechanical transplanter for plantings of an acre or more. Transplanters are fast, easy to operate, efficient and relatively cheap. A one-row version can be purchased for as little as $650. Mechanical transplanters have an added advantage in that most have a tank and a water-metering device which irrigates each plant as it is set. A dilute, high-phosphorus transplant "starter" fertilizer in the water promotes early growth. Transplanting into moist soil reduces transplant shock and minimizes "sifting" of soil away from plantlets in sandy areas.

[1]Associate professor and research assistant, Department of Crop Science, Oregon State University.

Plants should be set relatively deep to favor good rooting and reduced water loss. An 18-inch in-row spacing seems about right for good yields per plant. Skipping every third row allows for spraying, inspection and roguing without touching plants unnecessarily.

IRRIGATION

Improper irrigation has caused more transplant losses among Oregon growers than any other single mistake. Our experience has shown that transplants must be watered during or immediately after planting and be kept reasonably moist for the next week or 10 days. Frequent light irrigations are probably best during this period. Watering not only insures adequate soil moisture but also cools the plants, an important factor in hot weather. Beginning about two weeks after transplanting, plants can be put on a typical potato irrigation regime.

FERTILIZATION

We have not yet done extensive fertilizer trials. However, some precautions are suggested with regard to rate and timing. Since planting dates are generally delayed to avoid frosts, it is doubtful that transplants can use more than 100 to 150 pounds of nitrogen per acre. Higher rates would delay maturity in plants which already tend to mature late.

Timing and method of application are also important. High rates of banded fertilizer could damage roots on transplants. One acceptable approach is to either broadcast all the fertilizer pre-plant or broadcast the majority pre-plant followed by a side-dress about two or three weeks after transplanting. As noted earlier, we recommend a starter fertilizer in the water at transplanting.

It is possible to open furrows and band fertilizer with a standard potato planter by removing the covering disks. If you use this method, be extremely careful that you do not place the plant roots in or below the fertilizer band.

WEED CONTROL

Our studies with non-typical potato herbicides have met with limited success. Thus far, EPTC and metribuzin seem to work well when properly used. Low rates of either material pre-plant offer decent weed control with little plant injury. EPTC applied about three weeks after planting also seems to be relatively safe. Metribuzin should probably be avoided during the first three weeks after planting since plant injury could theoretically occur even with the Russet Burbank variety. Other varieties, such as Norchip, are much more sensitive to metribuzin than Russet Burbank. Transplants recover slowly from herbicide injury.

HILLING

Hilling favors smooth tuber shape and an easier harvest. Vines from tissue-cultured plants do not stand up well and can be buried through careless hilling.

PEST CONTROL

Seed growers are familiar with pest control requirements for seed potatoes. Obviously, control efforts should be especially stringent with Nuclear seed plots. One of the best approaches is to place pre-Nuclear/Nuclear plots near the center of a large, well-cared-for, early-generation planting. Leave a bare buffer strip around the plot to prevent lot mixing and cross-contamination by diseases. Check with the Certification Office at Oregon State University for recommendation in this regard.

Placing Nuclear plots within other seed fields seems contradictory. However, control of pests in the surrounding planting reduces insect pressure on the Nuclear plants. Conversely, a small isolated plot of lush potato plants situated in an otherwise barren location seems to attract every hungry insect in the vicinity, making control difficult.

HARVEST

Since transplants tend to be planted late and grow slowly at first, tuber maturity is delayed. Harvest as late as common sense allows to avoid mechanical injury and storage losses. Late harvest will favor maximum yields as well.

We dig with a level-bed digger and pick up the tubers by hand. This is hard work but pre-Nuclear plantings are small. Tubers are generally normal sized and could be run through a standard harvester, but the potential loss of valuable undersized tubers could be expensive. A level-bed digger kept specifically for pre-Nuclear plantings would reduce the possibility of disease cross-contamination from other seed lots.

STORAGE

Use typical seed storage conditions. Temperatures of 38-40^{o}F and high relative humidity are recommended. Nuclear seed lots are small and storage space requirements are correspondingly low. Stackable wooden bins work well provided air movement is adequate. Slatted wooden covers may be desirable to help reduce varietal mixtures. Since Nuclear lots are typically small, even a few off-type or diseased tubers can represent a major portion of the next season's crop and might result in downgrading or rejection of the crop for certification.

TRANSPLANTS VS. GREENHOUSE TUBERS

Our experiences with minitubers from greenhouses have been positive. In general, they are less susceptible to frosts and stand loss than transplants and are easier to handle for most growers. We are doing our first good yield comparisons of transplants and minitubers this season at Powell Butte and Klamath Falls. By November we should have solid figures.

At this time we still feel transplants have a place in Oregon's seed potato industry. They allow for rapid multiplication over the winter months and pose no dormancy problems. They also produce well when properly handled.

EFFECT OF NITROGEN RATE AND APPLICATION TIME ON FOURTH YEAR SEED YIELDS OF BARON, MERIT, AND RUGBY KENTUCKY BLUEGRASS

J. Loren Nelson[1]

ABSTRACT

Nineteen different nitrogen (N) rate/schedule treatments were each imposed on a three-year-old stand of Baron, Merit and Rugby Kentucky bluegrass to determine effects on seed yield. No difference was found for any variety between 200 lb N/A applied in the fall, 100-100 lb N/A split on October 19 and March 2, and 150-50 lb N/A in fall and spring, respectively. Generally these are the standard practices used by seed growers. Some other N rate/schedules improved seed yield. For Baron, 90-200 lb N/A September 15 and October 19 gave significantly more seed than 200 lb N/A on October 19. For Merit, the same September-October treatment was superior to either 100-100 lb N/A on October 19-March 2 and 200 lb N/A on October 19. However, for Rugby, the 60-200 lb N/A September 15-October 19 produced higher seed yield than 100-100 lb N/A October 19-March 2. Variety x nitrogen rate/ schedule interaction existed.

The use of nitrogen fertilizer is an important practice in the management of seed crops. Previous experiments and grower experience have shown that about 200 pounds of nitrogen per acre are necessary to maximize seed yield of Kentucky bluegrass in Central Oregon. All of the N may be applied in the fall or split with a spring application which is preferred to improve N use efficiency. Efforts to improve seed production efficiency by utilizing other N rates and schedules have not been successful. However, in the fall of 1983, a three-year-old stand each of Baron, Merit, and Rugby became available for experimentation. Therefore, another study was initiated with higher N rates than previously used at different times in the fall to determine effects on seed yield.

---

[1] Research agronomist, Oregon State University, Central Oregon Experiment Station, P.O. Box 246, Redmond, OR 97756.

ACKNOWLEDGEMENT: Appreciation is expressed to the staff of the Central Oregon Experiment Station for assistance with many parts of this research.

MATERIALS AND METHODS

Field areas of Baron, Merit, and Rugby Kentucky bluegrass were selected on the Madras research site of the Central Oregon Experiment Station for the study. All straw had been baled and removed from the field before stubble and regrowth removal with two passes of a propane field burner at 1.3 mph on August 19, 1983. The field was harrowed and watered back on August 22. Banvel at 3 lb/A was applied September 2 and watered in with .5 inches of water. A representative soil sample from each of the three replications of each variety was taken on September 14 from the 0-12 inch depth and analyzed for nitrate and ammonium nitrogen.

Nineteen N rate and timing treatments were started on September 15 and completed on March 2, 1984, as shown in Table 1. Each treatment was replicated three times and arranged in a randomized complete block design. These same treatments were made on each variety and considered as a separate experiment. Each plot was 12 feet long x 8 feet wide. About two inches of water was applied by sprinkler after treatments on September 15 and October 3. One and one half inches of water were applied after the October 19 treatments. Ammonium nitrate was the N source for all treatments. A 3.3 feet wide x 12 feet long section through the center of each plot was harvested by machine on July 17 early in the morning when dew was on the panicles. Cut material was placed in cotton bags and dried naturally on lines.

Seed was threshed with a stationary thresher, delinted, scalped, and conditioned with a M-2B air screen machine. Seed yields per acre were determined and analyzed statistically. Duncan's multiple range test at the .05 level of probability was used to test for significant differences among treatments. Seed yield component data were obtained but it has not been fully analyzed. It will be reported later.

RESULTS AND DISCUSSION

Soil samples from each field, Baron, Merit, and Rugby, showed from 2.0-2.2, 2.6-3.0, and 4.6-5.2 ppm, of nitrate, ammonium, and total nitrogen, respectively (Table 1). Relatively low amounts of nitrogen were available for new tillers to utilize. The ppm values may be converted to lbs N/A by multiplying ppm by four.

On September 7, 1983, the tiller height was from two to three inches on each cultivar.

<u>Standard Fertilizer Practices</u>. There was no significant difference in seed yield for any cultivar between treatments 17, 18, and 19; 100 lb N/A each on October 19 and March 2, 150-50 lb N/A in fall and spring and 200 lb N/A in the fall "water-

Table 2. Effect of nitrogen rate and time on fourth year seed yields of Baron, Merit, and Rugby Kentucky bluegrass, Madras, Oregon, 1984

Trt. No.	LBS N/A APPLIED				SEED YIELD (LB/A)					
	DATE	RATE	DATE	RATE	Baron		Merit		Rugby	
1	9-15	30	10-19	170	696	a-e[1]	718	bcd[1]	675	a-d[1]
2		60		140	666	a-e	637	bcd	641	cd
3		90		110	635	b-e	682	bcd	589	d
4		30		200	733	abc	777	bc	767	ab
5		60		200	740	ab	807	abc	789	a
6		90		200	842	a	1003	a	744	abc
7	10-3	30	3-2	170	599	b-e	586	cd	682	a-d
8		60		140	521	e	795	abc	692	a-d
9		90		110	756	ab	803	abc	742	abc
10	10-19	30		170	541	de	648	bcd	688	a-d
11		60		140	549	cde	551	d	742	abc
12		90		110	777	ab	849	ab	682	a-d
13	--------NO NITROGEN---------				83	h	99	f	80	h
14	10-19	30	3-2	0	141	gh	174	ef	206	g
15		60		0	290	fg	289	ef	365	f
16		90		0	357	f	349	e	470	e
17		100		100	738	ab	731	bcd	671	bcd
18		150		50	725	a-d	799	abc	760	ab
19		200		0	623	b-e	749	bcd	686	a-d
	Variety Mean				580		634		614	
Coefficients of variability (%)					17		18		10	

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

in" (Table 2). However, for each variety, there was a slight trend for increased yield from the split applications. It was in favor of treatment 18 and 19 for Merit and Rugby but for

Table 1. Soil nitrate, ammonium, and total nitrogen in fields of Baron, Merit, and Rugby Kentucky bluegrass before treatments, Madras, Oregon, 1983

Variety	Nitrate Nitrogen	Ammonium Nitrogen	Total Nitrogen
	ppm		
Baron	2.2	3.0	5.2
Merit	2.0	2.9	4.9
Rugby	2.0	2.6	4.6

Baron both of these treatments were fairly close. The large CV's were probably caused by the small plot size, stand variability, and some non-uniformity in fertilizer applications. Seed yields were similar for all cultivars when 75 percent of the N was applied in the fall (October 19, 150 lb N/A) and 25 percent in the spring (March 2, 50 lb N/A) compared to Treatments 17 and 19.

Other N Rate/Schedules. A significant increase (219 lb/A) in seed yield was obtained on Baron from Treatment 6 compared to Treatment 19. From Treatment 6, Merit produced 272 and 254 pounds more seed per acre than after Treatments 17 and 19, respectively. However, on Rugby it was Treatment 5 that gave a yield increase (118 lb/A) compared to one of the standard practices (Treatment 17). Generally higher N rates are needed to maintain high seed yields as grass stands age. For those treatments from 60-90 lb N/A, in addition to 200 lb N/A, was required to increase yield. For grower application at 30 cents per pound of N, an additional cost of $18-$27 per acre would have been needed for fertilizer but even if the seed was sold at 20 cents per pound, $5.60 would have been realized above N cost for the lowest seed increase case (Rugby-Treatment 5 vs 17).

It is interesting to note that a trend existed for higher seed yield on Baron and Merit with an increase of N from 30-90 lb/A on October 19 (Treatments 4-6). On Baron and Merit, Treatment 6 produced significantly more seed than Treatment 3. The only difference between these two treatments was the additional 90 lb N/A on October 19. Perhaps the 90 lb N/A on September 15 stimulated the production of more secondary tillers and/or more vigorous primary tillers which required the additional N to maximize yield. Seed yield component data which await complete analysis may define the effect of this additional N. The value of a 90 lb N/A application September 15 can also be seen by comparing Treatments 6 and 19 for Baron and Merit in which Treatment 6 was superior. This was not the case for

Rugby. It is reasonable to assume that all varieties would not respond in the same manner to a N rate/schedule treatment. For Rugby in this test, both 60 and 90 lb N/A more on October 19 (Treatments 5 and 6) were better combinations than either Treatment 2 and 3 without the additional N. However, unlike Baron and Merit, Treatment 6 (September 15, 90 - October 19, 200) on Rugby was not better than Treatment 19 (200 lb N/A October 19), but Treatment 5 did affect more seed than Treatment 17. This later response appears to indicate there was not sufficient N (100 lb N/A) in the fall/ winter period to maximize yield on this three-year-old stand of Rugby. The implication of this result for a seed producer is that the fourth year seed yield of Rugby would not have been maximized with a 50-50 N split between fall and spring.

It was surprising that Treatments 7-12 on Rugby gave similar results. No explanation can be given for this. Generally, most of the N should be applied in the fall rather than in the spring.

Seed yields were similar on Baron and Rugby after an application of 30, 60, and 90 lb N/A each on October 3 and 19 when each was followed by 170, 140, and 110 lb N/A on March 2 (Treatments 7 vs 10, 8 vs 11, 9 vs 10). Treatments 7 vs 10 and 9 vs 12 on Merit were also similar but 60 lb N/A on October 3 (Treatment 8) was more beneficial than delaying the application 16 days (Treatment 11). It is not known how this treatment comparison produced different results than the same treatment on Baron and Rugby. Apparently the 16-day age difference or composition of the tiller populations was of no significance for most of these fall N treatments. The seed yield component information may give some clues on N use efficiency during this fall-winter thermo-photo induction period. Variety x nitrogen interactions are likely to occur.

Split applications of nitrogen between fall and spring are still recommended for Kentucky bluegrass seed production in Central Oregon. This practice minimizes N losses from volatilization, leaching, and denitrification. Further improvements in N use efficiency can probably be expected if N application can be synchronized with the needs of the bluegrass plants. The research reported here on Baron, Merit, and Rugby and previously on Parade have failed to find N rates and schedules that consistently maximized seed yields compared to present grower practices.

Reference

Nelson, J.L. 1984. Seed Yield Response of Parade Kentucky Bluegrass to Time of Nitrogen Application, p. 14-17. In Irrigated Crops Research in Central Oregon 1984. Agricultural Experiment Station, Oregon State University. Special Report 717. July 1984.

EFFECT OF FOLIAR FERTILIZATION ON THE SEED PRODUCTION OF MERIT KENTUCKY BLUEGRASS IN 1984

J. Loren Nelson[1]

ABSTRACT

The use of foliar nutrient sprays is an alternative method for getting nutrients into plants rapidly. However, the benefits of the practice to seed production of Kentucky bluegrass have not been demonstrated. In 1984, the Station studied the response of Merit Kentucky bluegrass to applications of two nutrient formulations, High Yield and High K; each applied at the five-pound per acre rate. No statistically significant increase in seed yield was obtained compared to the normal soil fertilization program. There was a significant increase in the number of florets and number of seeds per spikelet at the bottom of the panicle after treatment with High Yield at early boot stage and with High K three-four days after pollination began compared to soil fertilization alone. Perhaps 10-15 lb/A rates of foliar nutrients would increase seed yields.

Foliar feeding of plant nutrients is an established practice with many horticultural and vegetable crops (2). However, the practice has not been adopted for field crops like wheat, corn, soybeans, alfalfa and grasses for seed. Both positive and negative results have been obtained. Limited experimentation by the author has failed to show benefits from applications of foliar nutrients to Baron and Merit Kentucky bluegrass (1). Since there are many aspects or variables involved in the use of foliar nutrients and their subsequent value it was decided to continue the work. An experiment on Merit Kentucky bluegrass was conducted in 1984 to determine the effect of foliar nutrient application at early boot and again after flowering.

---

1 Research Agronomist, Oregon State University, Central Oregon Experiment Station, P.O. Box 246, Redmond, OR 97756.

ACKNOWLEDGEMENTS: Appreciation is expressed to Rod Brevig, Technician, Central Oregon Experiment Station, for assistance in this study and to Smith & Ardussi, Inc., 201 Elliott Ave. West, Suite 501, Seattle, Washington 98108 for providing the foliar nutrient concentrates.

MATERIALS AND METHODS

Merit Kentucky bluegrass in its fourth year of seed production at the Madras research site of the Central Oregon Experiment Station was top-dressed with 25-10-0-S-15 at 448 and 390 lbs/A on October 15, 1984, and February 26, 1985, respectively. This soil fertilization program was supplemented by foliar nutrients. The analyses for the two water soluble foliar feed concentrates, High Yield and High K, are shown in Table 1. The treatments were arranged in a randomized complete block design with five replications. Each plot was 7 feet wide x 12 feet long. The kind of foliar nutrient formulation, the stage of plant development, and date of application for each treatment appear in Table 2. The foliar nutrients were applied with a bicycle type sprayer early in the morning when the grass leaves were moist and humidity was high in the grass leaf canopy. The bluegrass had been irrigated 1-2 days before applications. Before harvest, approximately 20 panicles were selected randomly from each plot and stored in a freezer until 10 panicles were chosen from which the spikelets were counted. An area 3.3 feet wide through the center of the plot x 12 feet long was cut by machine early in the morning when dew prevented seed shatter. The cut material was placed in a cotton bag and hung on a line to air dry. All seed was threshed with a stationary machine. Seed weights per plot and quart seed weights were used to calculate seed yield/A and bushel weights, respectively. The number of panicles/1,000^2 centimeters were obtained from two samples selected randomly along the border of each harvested plot. Four panicles were selected randomly from each panicle number sample for counting the number of florets/spikelet and seeds/floret, each from two spikelets at the bottom, middle, and top of the panicle. The percent seed set was calculated by dividing the number of seeds/spikelet by the number of florets/spikelet and multiplying by 100. Four 100-seed lots per plot were counted by hand and weighed to determine an average 100-seed weight value per plot.

All results were analyzed statistically. Differences between treatments must be larger than the LSD at the 5% level of probability before a significant difference can be claimed.

RESULTS AND DISCUSSION

The three foliar nutrient treatments showed no significant beneficial effect on seed yield, bushel weight, panicles/ 1,000^2 cm, seeds/panicle, 100-seed weight, spikelets/panicle, seeds/ spikelet, and percent seed set compared to no foliar nutrient application or soil fertilization alone (Table 2). However, there was a significant increase in the number of florets/ spikelet for Treatment four compared to Treatment one. And, this increase occurred in the bottom portion of the panicle rather than at the middle or top (Table 3). It is also interesting to note that there was a significant increase in the number of seeds/spikelet at the bottom of the panicle although the percent seed set was not significant. If one is searching, this treatment comparison may show a trend in favor of Treatment four for an increase in number of fertile tillers/unit area (panicles/1,000 cm^2), seeds/panicle, spikelets/ panicle, seeds/spikelet, and percent seed set.

Considering trends, for control vs Treatment 4, the magnitude of the difference between these two treatments is either the same or similar for florets/spikelet, seeds/spikelet, and percent seed set at both the bottom and top of the panicle (Table 3). No such "response" appeared for these traits for the middle portion of the panicle. In fact, the percent seed set was 2.1% lower on Treatment 4 than for the control. Since organ differentiation begins near the middle of the panicle and proceeds both toward the base and apex of the panicle at the same time, it may be that the second application of foliar nutrient (High K) should be made sometime before the onset of flowering. Perhaps a positive response could be obtained for the middle portion of the panicle with increases in seed yield.

For the foliar nutrient formulations tested, from 5 to 10 or a high of 15 lbs/A are recommended application rates on some crops so the application rates in this study were on the low side. One could speculate that higher rates of foliar nutrients than tested may show significant benefits. A test to evaluate responses from several high level treatments may be elucidative.

It may be productive to study the response of foliar nutrients applied before or at early boot stage and again after the panicles are fully extruded from the flag leaf but before flowering.

References

1. Nelson, J. Loren. 1984. Effect of Foliar Fertilization on the Seed Production of Baron and Merit Kentucky Bluegrass at Madras, Oregon, in 1982 and 1983. p. 18-23. In Irrigated Crops Research In Central Oregon 1984. Oregon Agricultural Experiment Station Special Report 717. July 1984.

2. Wittwer, S.H., M.J. Bukovac, and H.B. Tukey. 1963. Advances in Foliar Feeding of Plant Nutrients, p. 429-448. In Fertilizer Technology and Usage. Soil Science Society of America, Madison, Wisconsin.

Table 1. Analyses of foliar nutrients applied on Merit Kentucky bluegrass in 1984

Element	High Yield[1]	High K[1]
	--------------------%	--------------------
N	15	12
P_2O_5	20	8
K_2O	20	30
S	2	2
B	.08	1
Ca	.25	.5
Mn	.10	.1
Fe	.10	.1
Mo	.0005	.0005
Zn	1	1

[1] Application Rate: 5 lbs/A in 25 gal. water/A.

Table 2. Effect of foliar fertilization on seed yield and related characteristics of Merit Kentucky bluegrass, Madras, Oregon, 1984

Trt. No.[1]	Seed Yield (lb/a)	Bu. Wt. (lb)	Panicles Per 1,000 cm^2	Seeds Per Panicle	100 Seed Wt. (mg)	Spikelets Per Panicle	Florets Per Spikelet	Seeds Per Spikelet	Seed Set (%)
1	360	24.0	167	244	45.5	94.4	2.79	2.58	92.5
2	400	23.7	198	251	46.0	93.8	2.87	2.68	93.1
3	407	23.8	214	245	45.9	94.4	2.83	2.61	92.1
4	405	23.6	218	267	45.6	97.2	2.93	2.76	94.1
LSD .05	NS	NS	NS	NS	NS	NS	.126	NS	NS
CV (%)	11.6	1.9	21.3	11.1	1.9	9.4	3.2	5.1	3.4

[1] Trt. Descriptions:

1. Control (No Foliar Fertilizer).
2. High Yield Applied At Early Boot, May 3, 1984.
3. Trt. 2 + High Yield 3-4 Days After Pollination Began, June 8, 1984.
4. Trt. 2 + High K 3-4 Days After Pollination Began, June 8, 1984.

Table 3. Effect of foliar fertilization on plant height at harvest, florets per spikelet, seeds per spikelet and percent seed set of Merit Kentucky bluegrass, Madras, Oregon, 1984

Trt. No.[1]	HT. (cm)	Florets/Spikelet (B)[2]	(M)	(T)	AVG.	Seeds/Spikelet (B)	(M)	(T)	AVG.	Seed Set (%) (B)	(M)	(T)	AVG.
1	52.2	2.59	2.78	2.99	2.79	2.32	2.61	2.83	2.58	88.8	93.8	94.6	92.5
2	52.6	2.63	2.88	3.10	2.87	2.39	2.65	2.99	2.68	90.3	92.1	96.3	93.1
3	52.6	2.63	2.84	3.00	2.83	2.43	2.57	2.84	2.61	92.1	89.8	94.4	92.1
4	52.4	2.76	2.85	3.17	2.93	2.57	2.63	3.08	2.76	92.8	91.7	97.1	94.1
LSD .05	3.1	.149	NS	NS	.126	.217	NS	NS	NS	NS	NS	NS	NS
CV (%)	4.3	4.1	4.3	4.8	3.2	6.5	7.4	6.4	5.1	4.5	5.7	3.2	3.4

[1] Trt. Description:
1. Control (No Foliar Fertilizer).
2. High Yield Applied At Early Boot, May 3, 1984.
3. Trt. 2 + High Yield 3-4 Days After Pollination Began, June 8, 1984.
4. Trt. 2 + High K 3-4 Days After Pollination Began, June 8, 1984.

[2] (B), (M), (T) represent the bottom, middle, and top portion of the panicle.

POST-HARVEST RESIDUE MANAGEMENT OF KENTUCKY BLUEGRASS FOR SEED PRODUCTION IN CENTRAL OREGON

J. Loren Nelson[1]

ABSTRACT

Fourth year (1984) seed yields were obtained from Merit, Baron, Parade, America, Mystic, and Rugby Kentucky bluegrass varieties that had been subjected to eight residue removal schemes in August 1983. This is part of the 1984 data from a study initiated in the fall of 1980 to determine the effect that different regrowth drying/removal techniques might have on the subsequent year's seed production. Total rainfall of 1.9 inches from the 1983 seed harvest to August 1 obliterated the seed yield advantage from early open-field burning (OFB) generally observed because plots for this treatment had regrowth which did not exist in prior years of this study. Therefore, all varieties were similar in yield after OFB and Treatment 7 (straw fluffed up out of regrowth, OFB, and residue clean-up with a propane field burner). Paraquat was a more effective dessicant for regrowth than Contact (Dinitro-) so OFB removed residue satisfactorily which eliminated the need to use the propane field burner. Parade, America and Rugby appear to have a greater tolerance to regrowth drying and removal by burning than the others. All varieties studied do not respond the same to each management method.

The production of Kentucky bluegrass (<u>Poa pratensis</u> L.) seed has been an important enterprise in Central Oregon for many years. Growers have recognized the necessity of removing the postharvest residue for maintenance of maximum seed productivity throughout the life of the stand. The most economical and effective technique has been the use of open field burning during the last of August and the first week of September. From none to various amounts of straw have been burned on different fields depending, in many cases, upon the market price of bluegrass straw for hay. In years when field soil moisture is low and no or very little rainfall is received, the bluegrass residue can be burned quite effectively. However, if for various reasons the bluegrass plants remain green through harvest or initiate regrowth after combining, the growers are

---

1 Research agronomist, Oregon State University, Central Oregon Experiment Station, P.O. Box 246, Redmond, OR 97756.

ACKNOWLEDGEMENTS: Special appreciation is expressed to Rod Brevig, technician, and other staff members of the Central Oregon Experiment Station for assistance with many parts of this research.

confronted with the problem of drying the regrowth or the straw if rainfall occurs. Several methods have been and are presently used to prepare the residue for either open-field or machine burning with varying degrees of success. Therefore, a study was initiated in 1980 to evaluate the effect of clipping, dessicants, open-field burning and different machine burning temperatures on seed yield and its components for a four-year period.

MATERIAL AND METHODS

A field with soil classified as a fine-loamy, mixed, mesic Aridic Agrixerolls at the Madras research site of the Central Oregon Experiment Station was selected. The land was clean cultivated during the summer of 1980 and planted September 3 and 4, 1980, with Merit, Baron, Parade, America, Mystic, and Rugby Kentucky bluegrass at about three pounds per acre. Each variety was planted with Planet Jr. units equipped with double disk openers in rows 12 inches apart with 12 rows wide (12 feet) per variety across the field in strips that were replicated randomly four times. The following eight residue management treatments were imposed on each variety:

Trt. No.	Treatment Description
1	Residue Open-Field Burned (OFB), control
2	Regrowth machine burned at high temperature, 800-900^{o}F (HT-MB)
3	Regrowth machine burned at medium temperature, 500-600^{o}F (MT-MB)
4	Regrowth machine burned at low temperature, 300-400^{o}F (LT-MB)
5	Regrowth dried with Paraquat, OFB (Par-OFB)
6	Regrowth dried with Contact (Dinitro-), OFB, Propane Burned (Con-OFB-PF)
7	Straw fluffed-up from regrowth, OFB, PF (St-OFB-PF)
8	Regrowth clipped, OFB, PF (Clip-OFB-PF)

The experimental design was a split plot with the management treatments as whole plots (80 feet x 30 feet) and varieties as sub plots (12 feet x 30 feet). There were four replications. All treatments were imposed after each seed harvest in 1981, 1982, 1983, and 1984. The dates of each treatment each year varied because of weather, plant, soil, residue conditions, etc. Only dates and conditions of 1983 treatments are given since only 1984 results are presented. Prior year treatments undoubtedly had some effect on the 1984 results but these will be reported later.

Treatment 1 was burned by lighting the periphery of each plot with a propane torch on August 16. Approximately 25% additional straw from nearby plots not needing straw was placed on all plots receiving Treatments 1 and 7 to obtain field burns comparable to large fields. Straw was baled and removed from the other plots. There was a stubble height of about three inches on all plots after swathing at seed harvest.

There was 1.9 inches of rain after seed harvest, sufficient to promote development of regrowth. About four inches of regrowth occurred on all plots to receive Treatments 2-6 and 8. Plots for Treatment 7, which had a straw load similar to those for Treatment 1 had from 6-8 inches of regrowth. Treatment 2 was burned on August 16 and Treatments 3 and 4 were burned on August 17.

The machine burns (Treatments 2, 3, 4) were done with the research plot sanitizer constructed for and used by Dr. C.L. Canode at Washington State University in his research program (1). The temperature was regulated by pressure from two-120 gallon propane tanks. The sanitizer was operated at 28-32, 18-22 and 8-10 psi for the high, medium and low temperature burns with a ground speed of 1.3 mph. Temperatures were measured by temperature sensitive paint spots on 3 x 3 inch 20 gauge aluminum pieces placed with the paint spots down on the soil surface. A thermocouple with 20-guage type K chromel-alumel wire was also used to set machine temperatures and to obtain burn temperatures within the plots. The thermocouple junction was placed at the soil surface between the rows of grass. Residue was placed over the junction to represent conditions of the test plot as nearly as possible.

Wide fluctuations in temperature readings with both the paint plates and thermocouple were observed. Treatment 5 and 6 plots were sprayed on August 9 and OFB on August 15. The amount of residue after OFB on treatment 6 was too great so it was cleaned-up with a propane field burner at 1.3 mph ground speed. Paraquat at 1 qt/A with 1 qt/A X-77 Spreader and Contact at 2 qt/A with 1.5 qt/A Mor-Act were each applied with 25 gallons water/A.

The straw on Treatment 7 plots was pulled-up out of the regrowth and fluffed with a British Lely Pheasant 80 drum tedder on August 12. This machine did a superb job compared with a side-delivery rake with hand spreading and a 'Kuhn' tedder with contra-rotating rakewheels used in previous years. These plots were OFB on August 16. The regrowth on plots for treatment 8 was clipped on August 9 as close to the soil surface as possible (about two inches) with a Taarup disc mower conditioner without the swathing deflectors. This machine was superior to the rotary blade mower used in a previous year. These plots were OFB August 15 but there was insufficient amount of residue to carry the fire for a uniform burn. Therefore, the propane field burner was used on August 18 to clean up the plots.

All plots were irrigated after all treatments were completed as needed. All plots were harrowed after residue removal to disperse the ash before application of 3 lb/A Banvel on September 2 to control rattail fescue. The whole experimental area was fertilized with 25-10-0 split about 50/50 between fall and spring application to give about 200 lb N/A for the year. An application of .5 + .25 lb/A of 2,4-D and Banvel were applied in the spring of 1984 to control broadleaf weeds.

Seed harvest occurred July 18 and 19. An area 3.3 feet wide x 18 feet long from each plot was cut by machine in the early morning when dew prevented seed shatter and placed in a cotton bag to air dry. All seed was threshed with a stationary thresher, delinted, scalped, and cleaned with a M-2B air screen machine. Seed weights per plot were used to calculate seed yield/A. Other samples were collected for seed yield components but these results will be reported later. This report presents only information and seed yields pertaining to the 1983-84 crop year.

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

RESULTS AND DISCUSSION

There were several irregularly shaped spots where plant crown regions had been burned out in plots of Treatment 1 (OFB) and Treatment 7. High temperatures from burning the straw were attained in spite of the regrowth. Regrowth was similar on plots of these two treatments because of the late July rains so the completely dry plots for OFB control were not obtained. The main differences between the two treatments were the pulling and fluffing of the straw out of the regrowth and the cleaning up of all residue with the propane field burner for Treatment 7. Because of these conditions, the seed yields of cultivars subjected to Treatment 7 were similar for each cultivar except Baron (Table 1). Generally, OFB was the superior residue removal method in previous years.

No observable differences in time and amount of regrowth among cultivars within each management scheme were noted.

Seed Yield Comparisons Among Management Treatment Means. The fourth year (1984) average seed yields of all varieties following OFB and Treatment 7 were similar, 655 and 625 lb/A, respectively (Table 1). These were the best treatments. Few differences existed among other management techniques. The use of Paraquat had no adverse affect on seed yield for any cultivar compared to Dinitro- or Contact (Treatment 6). Paraquat was more effective in drying the regrowth than Contact. There was too much green plant material in all of the Contact treated plots for a satisfactory removal by OFB which necessitated the use of a propane field burner for clean up.

Seed Yield Comparisons Among Variety Means. Parade, America, and Rugby were similarly the highest seed yielders considering the effect of all management practices. Mystic was the lowest seed producer and Merit and Baron, which were similar, averaged 488 and 472 lb/A over all treatments.

Differential Seed Yield Responses of Varieties to Management. Merit, Parade and Rugby each yielded a similar amount of seed after OFB and Treatment 7 but the seed yield of Baron was higher from OFB than from Treatment 7. In terms of seed yield, it made no difference for America whether residue was removed by OFB or the regrowth dried with Paraquat, Contact or straw fluffed up and a clean up by propane burning. This variety appeared to be more tolerant of different residue removal methods than the other cultivars tested.

A seed grower probably does not need to be too concerned about maintaining the maximum seed yield on any variety as long as the residue can be OFB. However, if regrowth occurs, the grower may not get the same seed yield the subsequent year after various practices to dry and remove the residue.

Reference

(1) Canode, C.L. and A.G. Law. 1977. Post-harvest residue management in Kentucky bluegrass seed production. Washington State University College of Agriculture Research Center Bulletin 850.

Table 1. Fourth year seed yield of Merit, Baron, Parade, America, Mystic, and Rugby Kentucky bluegrass after eight different residue management treatments, Madras, Oregon, 1984

Mgt. Trt.	Merit	Baron	Parade	America	Mystic	Rugby	Mgt. Trt. Mean
1. OFB	694 a[2]	721 a	760 a	663 a	325 a	766 a	655 a
	a[3]	a	a	a	b	a	
2. HT-MB	369 c	352 c	438 b	459 bc	25 a	449 b	349 c
	a	a	a	a	b	a	
3. MT-MB	463 bc	379 bc	453 b	483 bc	41 b	557 b	396 bc
	ab	b	ab	ab	c	a	
4. LT-MB	377 c	450 bc	462 b	425 c	42 b	562 b	386 bc
	b	ab	ab	ab	c	a	
5. Par-OFB	464 bc	452 bc	574 b	691 a	189 ab	489 b	477 b
	b	b	ab	a	c	b	
6. Con-OFB-PF[1]	481 bc	380 bc	569 b	619 ab	43 b	607 b	450 b
	ab	b	a	a	c	a	
7. St-OFB-PF	615 ab	534 b	832 a	726 a	279 a	764 a	625 a
	bc	c	a	ab	d	a	
8. Clip-OFB-PF	439 c	509 bc	593 b	486 bc	92 b	511 b	438 bc
	b	ab	a	ab	c	ab	
Cultivar Mean	488	472	585	569	129	588	
	b	b	a	a	c	a	

[1] PF = Remainder of residue removed with propane field burner.

[2] Values among mgt. trts. within a variety (column) with different letters beside the value are significantly different at the .05 level of probability using Duncan's Multiple range test.

[3] Values among varieties within a mgt. trt. (row) with different letters below the value are significantly different at the .05 level of probability using Duncan's Multiple range test.

1984 ONION VARIETY TRIAL AT MADRAS, OREGON

J. Loren Nelson and N.S. Mansour[1]

ABSTRACT

Twenty-three yellow onion varieties and four white bulb types were evaluated in 1984 by the Central Oregon Experiment Station at its Madras site. The objective was to identify high yielding early maturing varieties with acceptable characteristics for potential markets accessible to Central Oregon growers. All varieties were rated for maturity, neck and top growth characteristics, bulb shape, color, and uniformity, total yield, yield by bulb size, and storability. The information indicated that Golden Cascade, Simcoe, Rocket, Yula, Early Shipper "75", Ringmaker, Foxy, Columbia, HXP2610, Matador and Progress may have some potential for commercial production in the Madras area. The best potential white varieties appear to be White Delite and Blanco Duro. However, they are later maturing than most of the yellow varieties tested which causes difficulties in bulb drying and curing for good storage. Onions can be grown in the area but additional data are needed for varietal selection. Growers should investigate marketing opportunities before they experiment with a few acres.

Growers in Central Oregon have experimented on a few acres with the commercial production of fresh onions. Among the problems encountered were high losses of bulbs in storage from decay that probably occurred primarily from planting varieties that were too late and improperly cured before storage and possibly unsuitable storage conditions. The need to find varieties adapted to the area became apparent. Therefore, seed companies were contacted for seed of early varieties of both the yellow sweet Spanish types and yellow, long storage, medium size onions for inclusion in a test to determine their adaptation.

---

1 Research agronomist, Oregon State University, Central Oregon Experiment Station, P.O. Box 246, Redmond, OR 97756 and Extension Vegetable Crops Specialist, Oregon State University, Corvallis, OR 97331.

ACKNOWLEDGEMENTS: This research was supported in part by grants from the following seed companies: ARCO, Asgrow, Crookham, Ferry Morse, Joseph Harris, Moran Seeds, Nickerson-Swaan, and Sun Seeds. Appreciation is expressed to the following for information, supplies, faciilities and aid in data collection: Staff of the Central Oregon Experiment Station; Charles Stanger, Professor of Crop Science Clinton Shock, Superintendent and staff of the Malheur Experiment Station, Ontario, OR; Oregon Onion, Brooks, OR; and Central Oregon Seeds, Madras, OR.

MATERIALS AND METHODS

The onions were planted on April 20, 1984, in a Madras loam textured soil on the Madras research site of the Central Oregon Experiment Station. Spring wheat was grown in this field in 1983 and fall plowed after the stubble was burned. The field was left rough throughout the winter. A soil sample was taken from the 0-12 inch depth on February 8, 1984. The pH was 7.1. Other results in ppm of P, K, nitrate-N, and Zn were 29, 464, 9.4, and .6, respectively. The field was disked, harrowed, and bedded in the spring. Two hundred pounds (lbs) N, 87.4 lbs P, 33.3 lbs K, 40 lbs S and 10 lbs Zn per acre were incorporated into the soil during seedbed preparation. No fertilizer was applied during the growing season.

A total of 27 varieties were evaluated; 23 yellow and four white bulb types. Each entry was replicated five times in a randomized complete block design. Each plot was two rows wide (14 inches between rows on a three-foot wide bed) and 25 feet long. Onion seed was planted at 12 live seeds per linear foot of row and hand-thinned when the onions had two-four leaves to a final stand of four plants per foot of row. Ethion 8% granules at two lbs ai/acre were applied in furrow at planting time for onion maggot control. Parathion at one lb ai/acre was applied on July 11, 24, 28, and August 11 for onion thrip control. On July 24 and August 11, metasystox at .75 lb ai/acre was applied with the parathion.

Weeds were controlled by herbicides and hand weeding. A tank-mix of Dacthal (6 lb ai/a) and Ramrod (4 lb ai/a) was applied over partially finished beds. The herbicides were incorporated shallowly with a spike-tooth harrow before planting. Ramrod was applied again at 4 lb ai/a before the onions emerged. Hand weeding in July helped keep the trial free of weeds.

The onion trial was irrigated with a solid-set sprinkler system when needed. The last irrigation was on August 21.

Maturity was rated on August 23 and 29, and September 5 and 12. The ratings were expressed as a percent of the plants with tops fallen over to total plants within a plot. Each value represents an average of five replications.

All varieties were scored for neck and top growth characteristics on September 13. The bulb shape, uniformity scores, and the score for overall maturity uniformity of bulbs were also determined on the same date. The scale ranged from one to 10: one for poor uniformity, light color, and large or heavy necks and tops, 10 for the most uniform, dark color, and refined or small diameter neck. These data are shown in Table 2. Comments on some varieties are given in Table 3.

The bulbs were lifted on September 14 and hand-topped on October 11. Fifteen feet of each 25-foot row were harvested and the bulbs were placed in mesh bags for storage. Bulbs with tissue breakdown were left in the field. The number of bulbs and size range of bulbs in this category are shown in the column Field Rot in Table 2. All sacks were stored in a metal building at Madras until November 1 when they were taken to an onion storage facility with forced air ventilation at the Malheur Experiment Station in Ontario, Oregon. The storage temperature ranged from 32 to 35°F and the relative humidity was approximately 62%.

On January 22, 1985, the onions were removed from storage and graded to determine bulb size, bulb yield, and percent bulbs with storage rot. The bulb size classes of 1 1/2-2 1/4, 2 1/4-3, 3-4, and 4-inch and larger were determined by machine. The split or double bulbs which were picked off the grading table by hand were classed as number two's. Bulbs showing symptoms of <u>Botrytis</u> neckrot were weighed to determine percent neckrot and then sized. Weights for each category, except number two's, were used to calculate total onion yields. Data subjected to statistical analysis are shown in Table 1, which best shows differences among varieties. Differences greater than the LSD at the five and one percent level should exist before one variety could be considered superior to another for that particular trait in this test. Neckrot is reported as an average and as potential neckrot. The average neckrot is an average for the neckrot occurring in all bags for each variety. Potential neckrot represents the amount of neckrot in a single sack with the most rot from one of the five replications. A sprout score from 1 to 10 was also given at grading time with a one for no sprouts and a 10 for an excessive number of sprouted bulbs.

RESULTS AND DISCUSSION

<u>Yellow onions</u>. The average bulb yield for all yellow varieties was 342 hundredweight (17.1 tons) per acre. Ringmaker with 462 cwt/a was significantly higher yielding at the five percent level than all other yellow varieties except Yula, Golden Cascade, Foxy, Matador, and Early Shipper 75 (Table 1). With the smaller bulb varieties a 5-6 plant/ft. spacing would have given higher yields. As a group these varieties also were among those with the largest diameter bulbs. Of these, only Yula and Foxy had no bulbs larger than four inches in diameter. However, Spanish Main, which was significantly lower in yield (245 cwt/a) than Yula and Foxy, had some four-inch plus bulbs. Other differences in the size distribution of bulbs can be observed.

Most varieties had no four-inch plus bulbs. Bulb size is an important trait to consider if one's market demands a particular size, such as jumbo's (3-4 inches) or larger, mediums

(2 1/4-3 inches) or undersizes (1 1/2-2 1/4 inches). More than one year's data on yield is desirable but several varieties seem to be worthy of grower production on a limited acreage basis when number two's (defective bulbs), maturity, and storability are considered.

Golden Cascade, Simcoe, Rocket, Spartan Sleeper, Autumn Pride '83', Columbia, and North Star had no number two's (Table 1).

Simcoe, Rocket, Yula, Columbia, Progress, and HXP 2610 were the earliest maturing varieties on August 23, but on September 12, two days before lifting, the tops were still green and standing on 23 to 9 percent of the plants among the group. The rate of maturation or variability in maturity differs among plants within varieties. For example, HXP 2610 was about 24 percent mature on August 23 but had reached only 81 percent by September 12 compared to 5 and 91 percent for Rocket on the same dates. The latest varieties included XPH 739, -3215, Autumn Beauty, Spartan Sleeper, Autumn Pride '83', Spanish Main, North Star, Bronze Reserve, Spanish Beauty, and Cima.

From 93 to 46 percent of the tops were green and upright when these varieties were lifted but these onions dried and cured sufficiently during the 27 days from lifting to harvest so all of them stored fairly well except Spanish Main. However, the potential storage loss was 9.9, 11.1, and 12.6 percent for Spartan Sleeper, XPH 3215, and Autumn Pride '83', respectively. At the time of grading the number of sprouted bulbs for Autumn Beauty, Spartan Sleeper, Autumn Pride '83', and Spanish Main were too high (Table 2). This condition relates to the lateness of these varieties. The latest varieties generally had the poorest neck, top growth, and over-all maturity/uniformity scores (Table 2). The number of rotted bulbs in the field was high for Early Shipper "75", Spanish Main, North Star, Matador, and Spanish Beauty. This was expected but a similar high loss from field rot for Rocket and Yula was not expected because these varieties were early and had good neck-top growth characteristics.

The two frosts on September 24 and 25 from temperatures of 28 and 29^{o}F, respectively, appeared to contribute to the field rot, although most varieties recovered from frost without injury. When several bulbs of different diameters were cut open, approximately one-half to one-inch thickness of translucent tissue was observed. The field rot contributed to the low yields of Rocket and Yula.

Several varieties were noted as having good general characteristics (Table 3). Bolting occurred on several plants within the Ringmaker variety. No other variety in the trial bolted.

Considering the information obtained from the 1984 trial it appears that Golden Cascade, Simcoe, Rocket, Yula, Early

Shipper "75", Ringmaker, Foxy, Columbia, HXP 2610, Matador, and Progress may have some potential for commercial production in the Madras area. Growers are advised to investigate marketing opportunities before planting. Experimentation with a few acres and an understanding of the risks involved seem to be a prudent approach.

White onions. The four white varieties, Avalanche, Blanco Duro, White Delite, and White Keeper, were similar to one another in total yield (Table 1). There were no bulbs larger than four inches in diameter for any variety. However, a tendency existed for larger diameter bulbs for Avalanche and White Delite than Blanco Duro and White Keeper. No number two bulbs were found in Avalanche and Blanco Duro. There were about twice the number of split bulbs for White Delite compared to White Keeper. All varieties stored well except Avalanche, which had 6.4 percent neckrot. Its potential neckrot was 14 percent. This storage problem relates to the late maturity of the variety -- the latest of the group. Blanco Duro and White Delite were similarly the earliest in maturity but White Keeper was intermediate.

All white varieties had low neck, top growth, and over all maturity/uniformity scores (Table 2). Large necks and tops were quite evident when these varieties were lifted but they dried and cured well during the next 27 days. There appeared to be little or no adverse effect from the September 24 and 25 frosts. Avalanche and White Delite had no field rotted bulbs. Red scale on some bulbs was noted in each of the varieties (Table 3).

White Delite and Blanco Duro appear to be the best potential white varieties if growers have a market and are prepared to experiment on a few acres. These varieties are the earliest but they are still much later than most of the yellow onions tested in 1984. The split bulbs on White Delite are undesirable but the variety tends to produce a larger diameter bulb than Blanco Duro. If bulbs are to be stored they should be allowed to have maximum opportunity to dry and cure in the field. Good fall weather conditions would be necessary. Growers should be aware that the risks to produce good quality white onions are extremely high. The use of artificial drying to prepare bulbs for storage may be a consideration. A study in 1984-85 at the Malheur Experiment Station by Dr. Charles Stanger showed that heat drying was very effective in controlling *Botrytis* infection during storage. He also observed that the onion bulbs dried by artificial heat were more attractive. The bulbs were firmer, the skins drier and had a brighter, more uniform color. With artificial drying, the Avalanche variety may have some potential but without it losses to *Botrytis* during storage would probably counter any increase in yield.

NOTES ON STORAGE OF ONION BULBS GROWN IN CENTRAL OREGON

J. Loren Nelson and N.S. Mansour[1]

ABSTRACT

A small field each of Simcoe and Progress onions was sampled October 5, 1984, after several frosts. Bulbs protected by other bulbs, leaves, and soil within the swath were selected for comparison with bulbs on top of the swath that had been frosted. All onions in mesh bags were stored in an onion barn with forced air ventilation near Brooks, Oregon, until May 2, 1985. The protected bulbs of both varieties stored very well for the nearly seven-month period. There were only four and zero percent internally rotted bulbs from Simcoe and Progress, respectively, when protected from frost. This compares to 19% internal rot for frosted bulbs of Simcoe and 11% for Progress. More marketable bulbs can be obtained by avoidance of frost.

Growers in Central Oregon have experienced losses of onion bulbs in storage. During the fall of 1984, temperatures in the twenties occurred with severe frost on onion bulbs drying and curing in the swath. Subsequently, growers wondered what effect such conditions would have on the storability of bulbs. A Simcoe and Progress field of Pete Read and Errol Ohlde, Culver, Oregon, was sampled to determine effect of frost on onion bulb storability.

MATERIALS AND METHODS

Eight samples each of Simcoe and Progress were selected randomly on the afternoon of October 5, 1984, from the swaths. Each swath was formed from onions grown in three-rows on 40-inch beds. They were lifted on September 16. Maleic Hydrazide (MH-30) had been applied as a sprout inhibitor. Ten to 15 bulbs were selected from four different areas of each variety within and outside the swath. Bulbs in the swath were

---

1 Research Agronomist, Oregon State University, Central Oregon Experiment Station, P.O. Box 246, Redmond, OR 97756 and Extension Vegetable Crops Specialist, Oregon State University, Corvallis, OR 97331.

ACKNOWLEDGEMENTS: Appreciation is expressed to Pete Read and Errol Ohlde, the growers, for their cooperation and to Harvey Lea of Oregon Onion, Inc., Brooks, OR, for use of his storage facility and assistance in bulb evaluation after storage.

protected outside the swath. Bulbs within the swath were protected from the frost by other bulbs, tops and/or soil. Bulbs on top of the swath were labeled as unprotected. All bulbs were hand-topped and enclosed in mesh bags for storage in an onion storage shed at Brooks, Oregon. Bags were placed one layer deep on a pallet with adequate air circulation beneath and around the pallet.

All samples were examined on May 2, 1985, after about seven months of storage, for number of soft and firm bulbs. External and internal rot was determined for each bulb. All bulbs were cross-sectioned to examine for internal decay. Bulb sprouting, dehydration, greening, and scale retention were also noted.

The data were not analyzed statistically, therefore, caution must be exercised in its interpretation.

RESULTS AND DISCUSSION

By September 1, 1984, approximately 50 and 25 percent of the tops had fallen over on Progress and Simcoe, respectively. There was greater variation in neck diameter among Simcoe than Progress. However, bulbs of Simcoe were larger than Progress. Swaths of Simcoe contained considerably more green top growth on September 29 and were larger than the Progress swaths. The swaths of Progress seemed to be much drier at sampling time than Simcoe because Progress is earlier and had small refined necks. Bulb drying and curing could have been aided by turning or lifting the swaths for aeration. Low night temperatures in September and October coupled with severe frosts (Table 1) contributed to slow drying. No temperature readings were available at Read-Ohlde field but the bulbs were probably subjected to temperatures within the range shown in Table 1. Mr. Ohlde recorded a 22^{o}F reading at his home on September 24, about two miles from the field. The same temperature was recorded at Redmond.

There was more internal rot in frosted (UP) bulbs than in bulbs within the swath which were protected (P) (Table 2). No difference in external rot was found between UP and P bulbs of Simcoe. A somewhat lower incidence (2 1/2%) of external rot existed for the protected Progress bulbs. The number of soft and firm bulbs were similar for Simcoe regardless of position in the swath although there was less internal rot for protected bulbs.

The protected bulbs of Progress had no internal rot compared to the unprotected bulbs. There were more sprouted bulbs in the protected bulbs of Progress.

No Simcoe bulbs were classified as sprouted. There were more multiple centers in Progress bulbs.

Table 1. Minimum air temperatures 32°F and below in September and October 1-5, 1984 at Redmond and Madras, Oregon

REDMOND Date	REDMOND °F	MADRAS Date	MADRAS °F
Sept. 10	32	Sept. 24	28
12	26	25	29
13	27		
14	29		
24	22		
25	27		
26	27		
27	26		
28	24		
29	26		
30	30		
Oct. 1	28		
2	29		
5	26		

There was a marked difference in degree of firmness between Simcoe and Progress, with Progress bulbs being softer. Also, scale retention was much poorer on Progress bulbs compared to those of Simcoe which probably affected bulb dehydration. The soft tissue in the Progress bulbs was more dehydrated. Frosts may have also been a contributing factor. To lessen tissue injury from ice crystals within frosted bulbs, bulbs should not be handled while frozen.

The Oregon Danver (Leedy Strain) data were obtained on all bulbs in a 50-pound mesh bag taken from Oregon Onions' packing line May 2, 1985. These onions with tops had been placed in tote bins with slatted bottoms in the grower's field and stored at about 40°F in Oregon Onions' cold storage building. Bulbs were topped mechanically before packing on May 2, 1985. The external rotted bulbs had been removed on the packing line so none was in the sack. The protected bulbs of Simcoe and Progress were similar to Oregon Danver onions. All Simcoe and Progress samples were handled by hand. Growers would have used machines from which additional bulb injury besides frost may have occurred. Therefore, a grower may not get as good a result after seven months storage.

Table 2. Percent soft, firm, and rotted bulbs of Simcoe and Progress onions after seven months storage at Brooks, Oregon

Variety	Bulb Status[1]	Bulbs Stored	Percent Bulbs				
			Soft	Firm	Ext. Rot	Int. Rot	Sprouted
Simcoe	UP	49	11	89	9	19	0
	P[2]	55	9	91	9	4	0
Progress	UP	51	32	68[2]	9	11	2
	P	76	5	95[2]	2	0	12
Danver		122	16	84	0	3	16

1 UP and P = unprotected and protected bulbs, respectively.

2 Progress bulbs were only medium firm.

GUIDELINES FOR CENTRAL OREGON GROWERS TO ASSURE GOOD RESULTS FROM LONG-TERM ONION STORAGE.

1. **Select an early maturing variety.**

2. **Apply maleic hydrozide (MH-30) when 50% of tops are down and tops are still green.**

3. **Lift onions by September 5-10.**

4. **Remove bulbs from field by September 24 to avoid frosts or when scales are dry and brittle and juice cannot be felt in the neck where the leaves break over. DO NOT HANDLE FROSTED BULBS.**

5. **Store onions in bulk or bags on slatted floor or in tote boxes with forced air ventilation beneath. Air may be heated to properly cure onions.**

6. **Maintain temperature of about 32°F and 50-75 percent relative humidity in storage building.**

References

Mansour, N.S., H. Mack, and James Hay. 1979. Commercial Onion Production in Oregon. Oregon State University Extension Circular 817.

Matson, W.E., Mansour, N.S., and Richardson, D.G. 1985. Onion Storage, Guidelines for Commercial Growers, Oregon State University Extension Circular 948.

PYRETHRUM ADAPTATION TO CENTRAL OREGON

Daryl Ehrensing and Ken Haines[1]

Pyrethrum (Chrysanthemum cinerariaefolium) is under study as a commercial crop in Oregon. Flowers of this perennial chrysanthemum are the source of the natural insecticide pyrethrin which is valuable for its effectiveness and very low mammalian toxicity. Development of commercial production is now limited by a lack of knowledge of the adaptation of pyrethrum to the Oregon climate and soils.

To determine the basic adaptation of pyrethrum to Central Oregon, observation plots were established on the Redmond, Madras, and Powell Butte Experiment Station sites in the summer of 1984. Each trial contained 20 plants each of five selections. Preliminary survival observations were recorded in May 1985; yield data will be obtained later in the summer.

Because of considerable grower interest after the Madras and Powell Butte field days, a small commercial planting was established near Culver in August 1984 using the selection CR-8.

Table 1. Survival of pyrethrum selections by site

Location	Selection	% Survival
Madras	CR-10	60
	CR-9	80
	CR-8	100
	CR-5	90
	HY-4	90
Powell Butte	CR-10	0
	CR-9	60
	CR-8	80
	CR-5	60
	HY-4	60
Redmond	CR-10	0
	CR-9	0
	CR-8	40
	CR-5	0
	HY-4	0

1 Research assistant and graduate research assistant, Crop Science Department, Oregon State University, Corvallis, OR 97331.

FABABEAN VARIETY TRIALS

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

ABSTRACT

Fababeans (Vicia faba L.) are well adapted to Central Oregon but no markets exist which will enable the crop to contribute to the economy. Trials were conducted in 1984 to obtain additional information on variety performance. Conditions in the Madras test did not permit a proper evaluation of Chinese, Herz-Freza, Ackerperle, Diana, Alladin, and Petite. All were similar in yield. However, at Powell Butte the 3,775 lb/A yield of Herz-Freza was significantly greater than the other varieties. The yield of Petite was similar in both trials but the production of seed from the other varieties was greatest at Powell Butte. Excellent seed yields were also obtained from Alladin, Frederick, Herz-Freza, and Diana at Redmond in 1983. Climatic conditions in Crook and Deschutes counties may be the most favorable for fababean production.

Fababeans continue to interest Central Oregon growers because the crop is well adapted to cool climates and short growing seasons, but market development looms as a gigantic challenge. This annual legume has excellent potential for rotation with cereal crops. The greatest opportunity in our area appears to be for seed production, reseeding, or protein supplement in livestock rations. Therefore, two trials were conducted in 1984 to obtain additional information on adaptation of varieties.

MATERIALS AND METHODS

Seed of six varieties was obtained from the USDA Regional Grain Legume Group at Washington State University for tests at Madras and Powell Butte in 1984. Each variety was replicated four times in a randomized complete block design.

Madras. Non-inoculated seed of each variety were planted about three inches deep on April 17, 1984, in plots 14 feet long and four feet wide with eight inches between rows. Two hundred pounds per acre of 16-20-0 and 100 lb/A of 0-0-60 were worked into the seedbed. A pre-plant application of 1.5 pts/A Treflan was also soil incorporated. About 20 inches of irri-

1 Research agronomist, research assistant, and technician, Oregon State University, Central Oregon Experiment Station, P.O. Box 246, Redmond, OR 97756.

gation water was applied by sprinkler as needed throughout the season. A four foot x ten foot plot was harvested by hand August 30. Plants with seed pods were placed in large burlap bags and air dried. Seed was threshed with a stationary plot thresher, conditioned, and weighed. Data on seed yield, 100-seed weight, and mature plant height were analyzed statistically.

Powell Butte. Seed inoculated with *Rhizobium leguminosarum* was planted April 30, 1984, about two inches deep in plots four feet wide and 16 feet long with eight inches between rows. Five hundred pounds per acre of 27-12-0 was incorporated into the seedbed. All plots were hand weeded. The nursery was irrigated as needed throughout the season. A four foot x 14 foot area of each plot was harvested on September 24, 1984. Material and data were handled in a manner similar to the Madras trial.

RESULTS AND DISCUSSION

Madras. No significant differences existed among varieties for seed yield (Table 1). Considerable variation existed within the trial. The stands were poor and seedling diseases may have been involved. Because of the wet soil condition, the seedbed was too cloddy and in poor tilth. Consequently, planting was difficult with poor seed coverage. Seed shatter at harvest time ranged from 0-25 percent. The variety Petite did not shatter. The pod wall and inner tissue adhered tightly around the seeds which made threshing difficult and growers probably would have problems threshing this variety. The variety Chinese was also hard to thresh but not as much as Petite. The seed of Petite was about one-fourth inch in diameter, much smaller than the other varieties. In contrast, the seed of Chinese was by far the largest. The seeds were rather flat and oval in shape with the largest ones measuring about one-half inch wide by three-quarters inch long. This made planting difficult with the station plot drill. It is doubtful if a grower could plant Chinese with a conventional grain drill without severe seed damage.

All varieties were rather short which probably was caused by heat stress. Likewise, seed yield probably was adversely affected. Symptoms of chocolate spot (Botrytis) began to appear on all varieties June 18 and gradually increased in severity.

Powell Butte. The seed yield of Herz-Freza was significantly higher than other varieties (Table 2). Diana, Ackerperle, Chinese, and Alladin were similar in yield. Petite was the poorest seed producer. The 100-seed weights reflect the seed size of the varieties. Chocolate spot existed in this trial on all varieties but was not nearly as severe compared to Madras.

Excellent seed yields of Fababeans can be obtained in Central Oregon. However, the greatest productivity may be expected

Table 1. Madras fababean variety trial, 1984

Variety	Yield (lbs/A)	Pod Shatter (%)	100 Seed Wt.(gm)	Height (in)
Chinese	2,612	1	77.1	32
Herz-Freza	2,507	11	46.8	36
Ackerperle	2,422	25	41.5	36
Diana	2,017	13	41.6	34
Alladin	2,073	24	42.7	40
Petite	1,832	0	27.6	26
LSD 5%	NS	--	3.5	3
CV (%)	25	--	5	6

from planting in the cooler areas, Deschutes and Crook counties. An aggressive market development program to establish favorable markets and prices for the seed as a protein supplement for livestock and for replanting is a critical need. Future research on weed control is planned in cooperation with growers. No variety trial is planned in the near future.

Table 2. Powell Butte fababean variety trial, 1984

Variety	Yield (lbs/A)	100 Seed Wt. (gm)	Height (in)
Herz-Freza	3,775	50.3	41
Diana	3,021	46.0	35
Ackerperle	3,017	43.0	39
Chinese	2,756	79.9	28
Alladin	2,690	45.9	36
Petite	1,868	28.1	24
LSD 5%	488	3.1	3
CV (%)	11	4	6

References

1. Hebblethwaite, P.D. 1983. The Faba Bean: A Basis for Improvement. Butterworth Publishers, 80 Montrale Ave., Stoneham, MA 02180.

2. James, S.R., J.L. Nelson and R. Brevig. 1984. Fababeans-a New Crop for Central Oregon? pp 28-30. In Irrigated Crops Research in Central Oregon 1984. Oregon Agricultural Experiment Station, Special Report 717. July 1984.

LENTIL VARIETY TRIAL

J. Loren Nelson and Rod Brevig[1]

ABSTRACT

Lentils (<u>Lens culinaris</u> Medik.) may be adapted in some areas of Central Oregon to complement crop production programs. Therefore, the six newest varieties were tested at Madras under irrigation. The best variety was Eston which produced 1,611 pounds of seed per acre. This yield was considerably less than the 2,257 lbs/A for Chilean Common grown in a small test at Redmond in 1977. However, the conditions of the 1984 Madras test were not conducive to the proper evaluation of the new cultivars.

Lentil is a cool season, annual legume. Approximately 190,000 acres are produced in the Palouse area of Eastern Washington and Northern Idaho which is the main production area in the United States. Most of the crop is exported. Supplies, demands, and prices fluctuate as with most crops but the Palouse growers have utilized the crop to real advantage to replace peas in the rotation with winter wheat on many fields. There should be areas in Central Oregon where lentils are well adapted. From one test in 1977 at Redmond, the Chilean variety yielded 2,257 pounds of seed per acre which was impressive. This compares to many yields of 800-1,500 pounds per acre in the Palouse. Perhaps there would be an opportunity to break into the export market. However, the economics of lentil production in Central Oregon is unanswered. Nevertheless, it was decided to evaluate several new varieties to obtain additional information on adaptation.

MATERIALS AND METHODS

The trial was at the station's Madras research site. Two hundred pounds of 16-20-0 per acre and 1.5 pints/A of Treflan were incorporated into the seedbed on April 6, 1984. Seed of six varieties as shown in Table 1 was obtained from the USDA Grain Legume group at Washington State University.

Each variety was replicated four times in a randomized complete block design. The nursery was planted April 17, 1984, in four feet x 14 feet plots. Each plot consisted of six rows eight inches apart. The seed was not inoculated with

---

[1] Research agronomist and technician, Oregon State University, Central Oregon Experiment Station, P.O. Box 246, Redmond, OR 97756.

Rhizobium bacteria. About 20 inches of irrigation water was applied by sprinkler as needed. A four feet wide x 10 feet long area was harvested from each plot. On September 9, plants were pulled by hand and placed in burlap bags to dry. Seed was threshed in a stationary plot thresher and conditioned with a M2-B air screen machine. Yields per acre, 100 seed weight, and plant height were analyzed statistically.

RESULTS AND DISCUSSION

Eston yielded 1,611 pounds of seed per acre, significantly more than any other variety (Table 1). This Canadian variety is a small-seeded yellow cotyledon type. The yield of Eston was much lower than the 2,257 pounds per acre for Chilean Common obtained at Redmond in 1977. Perhaps the lentil yields at Madras were adversely affected by the high temperatures but the poor stands and seed shatter (5-20%) were probably more contributory. It may be that the lentils would perform better in the cooler areas of Central Oregon, Deschutes and Crook Counties, similar to the areas where good fababean responses have been obtained. However, conditions in this trial were not sufficient to evaluate seed yields.

Differences in seed size are evident from an examination of the 100-seed weights.

The mature plant height ranged from 16-22 inches.

Table 1. Madras Lentil variety trial, 1984

Variety	Yield (lbs/A)	100 Seed Wt. (gm)	Height (in)
Chilean 78	818	5.9	16
Red Chief	755	6.0	20
Eston	1,611	4.2	18
Brewer	1,201	6.7	19
Laird	1,158	7.2	19
Emerald	1,102	6.1	22
Mean	1,108	6.0	19
LSD 5%	350	0.5	3
CV (%)	21	5	10

References

1. Proceedings of The Palouse Symposium on Dry Peas, Lentils, and Chickpeas, held February 23 and 24, 1982, at the University Inn, Moscow, Idaho. 235 pp.

2. Summerfield, R.J., F.J. Muehlbauer, and R.W. Short. 1982. Description and Culture of Lentils. USDA, ARS, Production Research Report No. 181.

ACTIVITIES WITH MISCELLANEOUS CROPS FOR POTENTIAL PRODUCTION IN CENTRAL OREGON

J. Loren Nelson and Rod Brevig[1]

ABSTRACT

The search continues for crops of economic value to Central Oregon agriculture. Experimental plantings of an edible pod pea (Pisum sativum L. cv MHP 303 or Japanese Snow Pea), meadowfoam (Limnanthes alba Benth. cv 703-A) and broccoli (Brassica oleracea Exp. 83-1002-2) were made at the Madras site in 1984. The primary objective for each crop was to determine adaptation for seed production. The edible pod pea produced 2,114 pounds of seed per acre. If growers can obtain a contract this pea is a suitable candidate for production. On meadowfoam, a large percentage of the seed-bearing stems did not elongate which would preclude machine harvest with equipment available by the area farmers. Therefore, spring planted meadowfoam does not appear to be adapted for seed production at Madras. Broccoli has potential as a seed crop but additional research is needed to define conditions necessary for high yields.

I. PEAS

A seedbed in two small fields was prepared in the spring with a disk, harrow and roller. On April 6, 195 pounds of 16-20-0 per acre was incorporated. Treflan at 1.5 pts/A was pre-plant soil incorporated on April 13. Field two of 2.27 acres and the north end of Field eight, .9 acres, were planted at 100 and 40 pounds seed per acre, respectively, on April 13. Fields were sprinkle irrigated as needed.

On August 3, 14 plants were selected randomly throughout each of the two fields from which information in Table 1 was obtained.

Both fields were swathed on August 10 and harvested with a John Deere 45 combine on August 21 with a cylinder speed of 350 rpm - the lowest setting. Excessive seed splitting amounting to 16 percent clean-out, occurred at this speed. The total clean seed from the fields was 6,700 pounds (2,114 lbs/A). A substantial gain in yield could have been achieved

---

1 Research agronomist and technician, Oregon State University, Central Oregon Experiment Station, P.O. Box 246, Redmond, OR 97756.

by proper combining. The mechanical damage was reflected in the 60 percent germination with 40 percent abnormal seedlings. This variety of peas has a tall vine and is rather late maturing. The seed is smooth with yellow cotyledons and is from one-quarter to three-eighths of an inch at its widest diameter. There were slightly more shoots, pods, seeds per pod, and seeds per plant in Field eight which was planted at 40 lb/A (Table 1).

The light planting rate gave maximum seed increase. It would be particularly appropriate for small quantities of stock seed.

However, the 100-pound-per-acre planting rate probably would give the highest yield per acre.

Table 1. Characteristics of Japanese Snow Pea, Madras, Oregon, 1984

Characteristic	Field Number 2	Field Number 8
Average plant height (in)	49	47
Number first pod-bearing node	16	14
Average number shoots/plant	2.2	2.6
Average number pods/plant	14	20
Average number seeds/pod	3.5	3.8
Average Number seeds/plant	48	75

Harrisburg Seed Processing was the contracting firm and originally it was thought that the Japanese Company would be interested in 400-500 acres for 1985 production in Central Oregon. No information is available on whether this intention was fulfilled.

Growers probably could produce high yields of this type of pea with good quality.

II. MEADOWFOAM

Meadowfoam is a winter annual plant domesticated at Oregon State University for its potential useful seed oil. The crop is especially well adapted to the climate, soils, and farming practices of the Willamette Valley. A grower's association has been formed in the Valley for the production and marketing of the seed. Last year, questions arose about its adaptation in Central Oregon as a spring planted crop since it is not winter hardy. Therefore, the Station planted about 15 rows for observation at Madras, each plot about 20 feet long at weekly intervals starting on March 15, 1984. Environmental conditions were such that very little stem elongation occurred. Flower buds formed in April and early May almost regardless of planting dates. Some buds and flowers were at soil surface and others extended to eight inches tall (Table 2). Perhaps plants would have been a few inches taller in a mass seeded stand. A grower probably would have extreme difficulty swathing and combining such a crop. These difficulties combined with the fact that the seed shatters rather easily may preclude this crop from economically feasible seed production in Central Oregon.

Seed was obtained only from plantings made on March 15, 22, and 29 and April 5 and 12. Data from the first three plantings showed that only slightly less than 50 percent of the flowers set seed with an average of three seeds per flower. There is usually a potential of five seeds per flower. No purity and germination tests were made on any seed but it was small, shriveled, and of poor appearance.

Table 2. Average height, percent fertile flowers and seeds per flower on Meadowfoam planted on three dates, Madras, Oregon, 1984

Planting Date	Ht. (in)	Fertile flowers (%)	Avg. No. seeds/flower
March 15	7.5	49	3
March 22	8.3	44	3
March 29	8.3	48	3

Seed production of meadowfoam in Central Oregon does not appear to be a feasible consideration based on the limited observations given in this report.

III. BROCCOLI

Experimental 83-1002-2 broccoli from Scattini Seeds, Inc., was planted April 23, 1984, on raised beds three feet wide with 14 inches between rows. The field was prepared in the spring. Two hundred pounds of nitrogen, 87.4 pounds P, 33.3 pounds K, 40 pounds S, and 10 pounds Zn per acre were incorporated during seedbed preparation. Irrigation was by sprinkler as needed. A poor stand was obtained because of planting in loose, improperly formed beds that were too wet to obtain good seed coverage. A much earlier spring planting date was planned but the wet weather interferred. The object was to obtain some cool weather to induce bolting (seedstalk development). Generally, for biennial vegetables like broccoli the stems need to be nearly one-eighth inch in diameter when exposed to average chilling temperatures below 45^{o}F for 1-2 months. Cooler temperatures may shorten the exposure period.

For seed production it is important to obtain 100 percent bolting. However, only about 15 percent of the plants bolted but these seedstalks had numerous flowers. Honey bee activity was good but the growing season was too short to get mature seed on most plants. In mid-October, about 20 plants with the most mature seed pods were pulled by hand, bagged, and allowed to air dry before threshing. Approximately 1.5 pounds of clean seed were obtained. The seed condition was poor. Most seed was small, wrinkled, and showed signs of immaturity. Scattini received the seed but no germination or other data are available yet. There was a problem with the imported cabbage worm which completely defoliated many plants. Also, plants were not thinned in the rows, which had some effect.

It may be possible for growers to obtain economic yields of high quality seed by planting early (February and March). However, additional research should be conducted on broccoli seed production.

References

Jolliff, G.D., I.J. Tinsley, W. Calhoun and J.M. Crane. 1981. Meadowfoam (Limnanthes alba): Its Research and Development as a Potential New Oilseed Crop for the Willamette Valley of Oregon. Oregon Agricultural Experiment Station Bulletin 648. November, 1981.

O.A. Lorenz and D.N. Maynard. 1980. Knott's Handbook For Vegetable Growers. John Wiley & Sons. NY.

RESPONSE OF VEGETABLES TO FLOATING ROW COVERS AND PLANT PROTECTORS IN CENTRAL OREGON

J. Loren Nelson, Rod Brevig and Marvin Young[1]

ABSTRACT

The effect of Vispore and Reemay floating row covers and Wallo'Water plant protectors on tomatoes, cucumbers, and sweet corn was observed at Madras and Redmond in 1984. Wallo'Water gave very effective frost protection and did extend the growing season for tomatoes and cucumbers. Ripe tomato yield was similar from Vispore and Reemay covers although there appeared to be significantly more green fruits from the Reemay. Vispore was beneficial in hastening maturity and increasing the ear yield of sweet corn. Use of floating row covers and Wallo'Water plant protectors could be helpful to home gardeners for frost protection and yield increase of vegetables.

Vegetable production is either eliminated or seriously limited in many Central Oregon localities because of low air and soil temperatures and the length of the growing season. Several methods are available for home gardeners to stimulate early production and/or extend the growing season, including transplanting, clear or black plastic ground mulches, hoop-supported plastic tunnels, floating row covers and rigid or semi-rigid structures. In 1984, the Central Oregon Experiment Station in cooperation with the Oregon State University Deschutes County Extension Service conducted some non-replicated tests with floating row covers and a plant protector called Wallo'-Water to determine effects on production.

MATERIALS AND METHODS

Two floating row materials, Reemay, spunbonded polyester (DuPont Co.) and Vispore, finely perforated clear polythylene (Ethyl Visqueen Corp.), were applied after planting. The Wallo'Water is an 18-inch tall cylinder made of 6 mil clear polyethylene plastic. Its two layers are heat sealed at three-inch intervals, forming 18 vertical pockets which are filled with about three gallons of water. It is rigid enough to stand by itself and surrounds an area about 14 inches in

1 Research agronomist and technician, Oregon State University, Central Oregon Experiment Station, P.O. Box 246, Redmond, OR and Oregon State University Deschutes County Extension Chairman, P.O. Box 756, Redmond, OR 97756.

diameter (Figure 1). These protectors were either placed over the soil in which seed was planted or over the transplants.

Madras. Transplants of Early Girl tomato were set out on different dates starting May 1 and covered with the row materials and Wallo'Waters as shown in Table 1. Seed of Straight Eight cucumbers, a 65-day maturity table type, was planted. Cucumber fruit were picked when they were about four inches long. Wallo'Waters were removed the first part of June on the cucumbers.

Redmond. Three transplants of cherry tomatoes were set out on May 3 with and without Wallo'Waters. The Wallo'Waters were removed July 10. Other transplants were set out June 7 and 11. Two 50-foot-long rows of sweet corn were planted May 24, one row each of Golden Jubilee and Golden Hybrid Blend (20% each of Yukon, NK51036, Wonder Gold and NK 199 plus 10% each of Golden Cross and Queen Anne). Immediately after planting, 20 feet of each row was covered with Vispore. Corn seedlings were thinned to about eight inches between plants when they were about four inches tall. Ears were picked from both treatments of each variety at fresh market maturity.

Table 1. Effect of row covers and plant protectors on tomato fruit yield, Madras, Oregon, 1984

Transplanting Date	Type of Cover	Ripe fruit Yield (lbs/plant)	Total Yield[1] (lbs/plant)	First Harvest of Ripe Fruit
May 1	Wallo'Water	26	56	Aug. 28
May 15	Wallo'Water	25	55	Aug. 28
May 15	Vispore	13	35	Aug. 28
May 15	Reemay	12	50	Aug. 28
June 1	Wallo'Water	11	51	Sep. 5
June 1	Vispore	11	39	Sep. 5
June 1	Reemay	13	59	Sep. 5
June 18	No Cover	3	16	Aug. 28

[1] Total yield includes green and ripe fruit.

RESULTS AND DISCUSSION

Madras. The Wallo'Water on transplants May 1 gave protection from frosts or kept them living but there appeared to be no advantage over the May 15 date after which more favorable temperatures for growth occurred (table 1). There was no difference in the time first ripe fruit was harvested. From the May 15 transplants those surrounded by the Wallo'Waters yielded more ripe fruit than those under Vispore and Reemay. The

Reemay seemed to be more effective in stimulating additional fruiting, although they did not ripen by August 28, than Vispore cover. Reemay also exhibited this same effect when placed on June 1 transplants. Both covers and Wallo'Waters had beneficial effects on tomato yields compared to the use of naked transplants set out June 18. Temperature measurements were not taken but it was evidently more favorable under covers and Wallo'Waters. And, the soil temperature was probably higher for a longer time into the night. Research with these products by other persons indicate that the Wallo'Waters have given protection to 16°F and the row covers to 4-5°F below freezing.

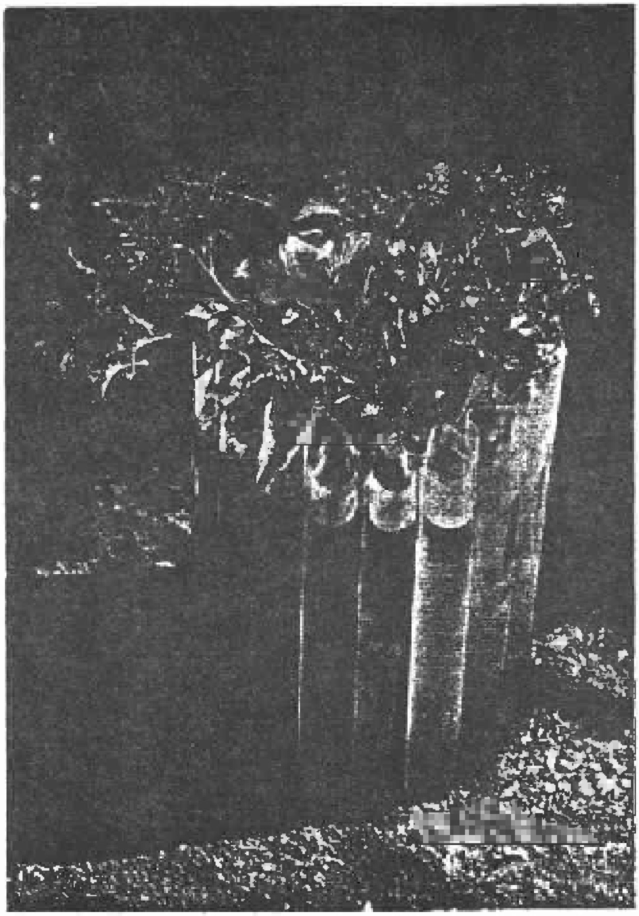

Figure 1. Free standing Wallo'Water (around a tomato plant) put in place at transplanting time.

The Wallo'Waters protected the cucumbers from frost. Fruit were available for picking about three weeks earlier than cucumbers without Wallo'Waters from the June 1 planting (Table 2).

Table 2. Effect of Wallo'Water vs. no protection on yield of cucumber fruit, Madras, Oregon, 1984

Planting Date	Cover Type	Total Yield (lbs/hill)	First Harvest Date
May 1	Wallo'Water	15	July 25
May 15	Wallo'Water	29	July 25
June 1	No Cover	32	August 14
June 18	No Cover	4	September 5

There did not appear to be an advantage to Wallo'Waters in increasing total yield of fruit compared to their absence.

Redmond. The three tomato transplants set out May 3 without Wallo'Waters died as a result of the 25°F temperature the next morning. The three protected plants continued to grow and by July 10 were about 32 inches tall, approximately 14 inches of growth above the top of the Wallo'Water. Three tomato transplants were set out June 7 but the 28°F temperature that night or early the next morning killed all plants. Three more transplants, set out without protectors June 11, survived. Transplanting time can be quite a guessing game each year which the Wallo'Waters can eliminate. The picking of cherry tomatoes began August 3 from the May 3 Wallo'Water plants compared to August 23 for the June 11 transplants. No data were collected on total numbers or weight of ripe or green fruit. However, the advantage of the Wallo'Waters was demonstrated.

One week after planting corn, seedlings of both varieties under Vispore were from one-half to one inch tall compared to the tip of the first corn leaf just visible above the ground on the rows not covered. On July 10, 47 days after planting, the Vispore was removed. At this time, the corn plants were 24-26 inches tall compared to 14-18 inches for plants that had no cover. A temperature reading of 80°F six inches above the soil was recorded under Vispore compared to only 75°F under no cover. The tips and margins of corn leaves close to and touching the Vispore were burned and the plant tops were bent over under the cover. However, they straightened up in a few days after the Vispore was removed. On August 3, pollination was occurring on plants of Golden Hybrid which had Vispore cover but none was observed on plants without the cover. For Golden Jubilee, Vispore-treated plants had fully emerged tassels compared to tassels starting to emerge on plants that had no cover. Ears were ready for harvest about a week earlier from the Vispore treatment on Golden Hybrid (Table 3). It appeared that Vispore helped each corn variety to mature about a week early. There were fewer plants treated with

Vispore. The data indicate that the total number of harvestable ears from Golden Hybrid by September 11 was also greater from Vispore compared to no Vispore treatment. Ears of Golden Jubilee were obtained on September 11 only from plants covered early in the season with Vispore. From a September 11 examination of the ears on non-Vispore-treated plants it was estimated that they needed about 10 days or more to reach maturity.

It appears from these limited observations that the Vispore row cover was beneficial in getting more ears earlier in the season compared to not using the practice.

Table 3. Effect of Vispore on number of ears from Golden Hybrid Blena and Golden Jubilee, Redmond, Oregon, 1984

Variety	Vispore Cover	No. Plants	Harvest Dates 8-28	9-4	9-11	Total
			---no. of ears---			
Golden Hybrid	Yes	30	1	13	13	27
	No	79	0	0	26	26
Golden Jubilee	Yes	28	0	0	40	40
	No	76	0	0	0	0

OBSERVATIONS ON A NEW BUSH BEAN FOR CENTRAL OREGON GARDENERS

J. Loren Nelson and Marvin Young[1]

Gardeners in Central Oregon have a challenge in the selection of plant varieties adapted to the cool climate and short growing season. In 1984, the Central Oregon Experiment Station, in cooperation with the OSU Extension Service, observed a new bush bean variety (Blue Mountain Bush Bean) for home gardens.

MATERIALS AND METHODS

This variety matures in 60-65 days and is resistant to curly top virus. It was developed by the Agricultural Research Station, Prosser, Washington. A few seeds were planted about 1.5 inches deep in a sandy loam soil May 24, 1984, at Redmond. This plot received 600 lb/A of 27-12-0 on March 20 and was incorporated at seedbed preparation. Irrigation was by sprinkler when needed. A stand of 18 plants with about two inches between each was observed. No plants of other bush bean varieties were available for comparison. The planting was not replicated and no statistical analysis was performed.

RESULTS AND DISCUSSION

Thirty-three percent of the plants had pods ready to be picked on August 14 (Table 1). The greatest yield of pods (1,027 grams) was obtained at first picking followed by the last picking date, September 4.

A sample of 71 pods from two plants taken on August 14 was measured. The average pod length was 5.3 inches. The longest pod was 7.7 inches. There was predominantly a large number of long slender pods at each picking date. Some of the longest pods touched the ground. The average diameter of these pods was slightly more than one-fourth of an inch. The average plant height was 22 inches. All plants were profusely branched. In general this new bush bean was rated better than average for taste and cooking qualities.

---

1 Research agronomist, Oregon State University, Central Oregon Experiment Station, P.O. Box 246, Redmond, OR 97756 and Oregon State University Deschutes County Extension Chairman, P.O. Box 756, Redmond, OR 97756.

Table 1. Percent plants with harvestable pods and number and weight of pods harvested on four picking dates, Redmond, Oregon, 1984

Picking Date	Plants with Harvestable Pods (%)	No. Pods	Ave. No. Pods/Plant	Pod Wt. (gm)
August 14	33	150	25	1,027
August 17	78	90	6	421
August 21	83	47	3	171
September 4	89	157	10	815

The Agricultural Research Station at Prosser does not plan to release this bean for commercial production because it does not have suitable characteristics for mechanical handling. However, observation and experience show it to be very suitable for home gardens in Central Oregon. Evidently the seed will not be available commercially. So gardeners should plan to save their own seed. Leave the pods on 4-6 plants until they are "rattle" dry. Remove the pods and place them in a well ventilated area at room temperature. When pods are completely dry, remove the seed. To keep seed free from weevil infestation, place the seeds in the freezer for 24-30 hours. Remove from freezer, dust with Captan or other fungicide and store in a glass jar with a lid that seals.