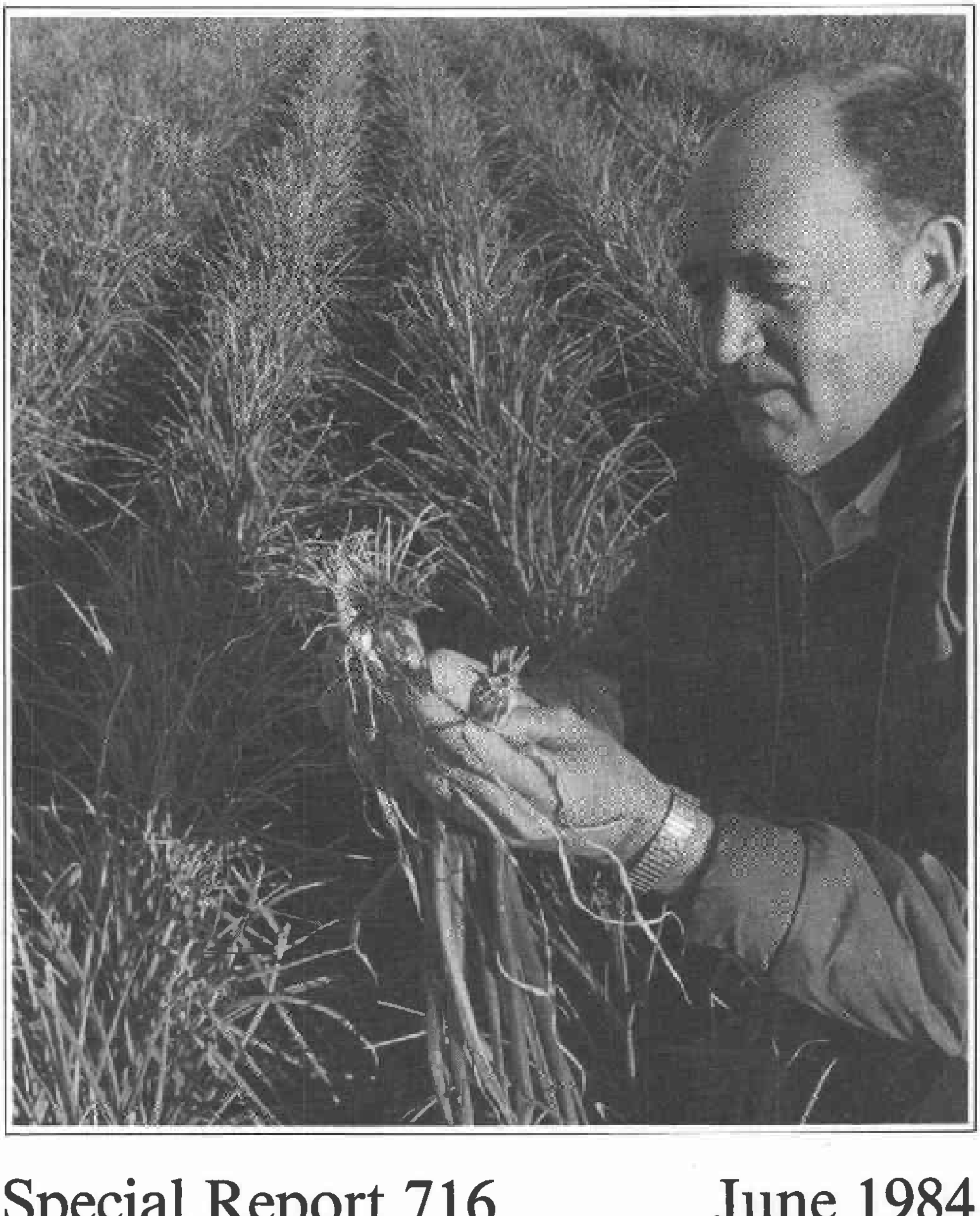
Malheur Agricultural Experiment Station Research



Special Report 716 June 1984

Agricultural Experiment Station
Oregon State University, Corvallis

CONTENTS

COVER: Charles E. Stanger, Malheur Experiment Station superintendent, checks station onions for root problems.

CONTRIBUTORS

MALHEUR EXPERIMENT STATION PERSONNEL:

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COMMON AND TRADE NAMES OF HERBICIDES EVALUATED IN EXPERIMENTAL PLOTS

Common Names	Trade Names
alachlor	Lasso
sethoxydim	Poast
bensulide	Prefar
bromoxynil	Brominal/Buctril
cycloate	Ro-Neet
DCPA	Dacthal
desmedipham	Betamix
diclofop	Hoelon
diuron	Karmex
EPTC	Eptam
EPTC + safener	Eradicane
ethofumesate	Nortron
fluozifop	Fusilade
hexazinone	Velpar
Hercules 22234	Antor
metham	Vapam
metolachlor	Dual
metribuzin	Sencor/Lexone
napropamide	Devrinol
nitrofen	Tok
oryzalin	Surflan
oxidiazon	Ronstar
oxyfluorfen	Goal
paraquat cl^-	Paraquat
pendimethalin	Prowl
phenmedipham	Betanal
propachlor	Ramrod
pyrazon	Pyramin
terbacil	Sinbar
vernolate	Vernam
vernolate + safener	Surpass

WEATHER REPORTAGE

Charles R. Burnett
Malheur Experiment Station - Ontario, Oregon, 1983

The Malheur Experiment Station has cooperated with the weather forecasting service of the U.S. Department of Commerce, Environmental Science Service Administration since the spring of 1962. Participation consists of daily 8 a.m. readings of air temperature, soil temperature, and precipitation. This information is called to radio station KSRV in Ontario and transmitted along with KSRV's readings to the Boise, Idaho, Weather Bureau. Evaporation, wind, and water temperature readings are also taken during the irrigation season.

1983 was the wettest year since we began monitoring the weather in 1943. Total precipitation was 16.87 inches, more than an inch greater than the previous record in 1981 (Table 1). Winter precipitation of 8.99 inches was well above the 30-year average of 5.73 inches, with October and December contributing most of the difference. The 3.73 inches accumulated during March, four times the 30-year average of .93 inches, delayed field work well into spring (Table 2). Precipitation was unusually high in July and August, and low in September and October.

Wind mileage during the 1983 irrigation season fell just 158 miles below last year's record (Table 3). Wind and evaporation were high throughout the season.

The 1983 growing season lasted 146 days (Table 4). Temperatures ranged from -10°F on December 23, 24, and 25, to 104°F on August 8, (Table 5). Soil temperatures at four inches were several degrees below the 17-year average in April, May, and June, and 5°F below the 17-year average in July (Table 6). A summary of air and soil temperatures and precipitation for 1983, compared with 10-year averages, is presented in Table 7 and Figure 1.

TABLE 1. Daily and monthly precipitation in inches at the Malheur Experiment Station, Ontario, Oregon, 1983

Day	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1	.01	T	.06	.01	.37	.03	.16		.09	T	.14	.33
2	T	T	.18	.23	.19	T	.25		.05	T	.04	
3	.05	T	.03	T	T					T	.10	.05
4	.15		1.37								.02	.12
5	.08		.07		.13						.01	.01
6	.03	.27	.17		.07						.01	.04
7	.01	T	.17								.01	.28
8		.09	.04					T				.06
9		.06	.01		.19	.01		.07		.09		.06
10				.15	.11						.05	.11
11		T	.18		T	.36		T		T	.47	.13
12			.08									.53
13		.39	.28			.02				T	.17	.04
14		T	.08				.08	.21	T	.02	.02	.11
15		.23	T		T		.13	T			.01	.20
16					T						.07	
17		.06	T				.04				.32	
18		.03	T	T		.02						
19	.08	.01	T	T							T	.02
20	.48	.01		.02				.22			.17	
21		.08										T
22		.11	T					.21				T
23	.04		.02	.12			.04	.15	T	.20	.04	
24		T	.17	.13			.02	T	T		.36	T
25	.22		.03	T				.01			.07	.08
26	.07	.12	T	.03				T				.32
27	T	T	.14			.02			T			
28		.02	.17			.01					T	.22
29	.24		T	.06						T	T	.13
30			.33	.03		.18			T	.02		.68
31			.15		T		T	T		T		.05
Total Monthly	1.46	1.48	3.73	.78	1.06	.65	.72	.87	.14	.33	2.08	3.57
Yearly Total	(16.87)											
30 Year Monthly Avg.	1.40	.96	.93	.76	.91	.75	.21	.49	.56	.76	1.22	1.47
30 Year Average	(10.43)											

TABLE 2. Fall and winter precipitation - October through February and October through March - at the Malheur Experiment Station, Ontario, Oregon

Month	1973 -74	1974 -75	1975 -76	1976 -77	1977 -78	1978 -79	1979 -80	1980 -81	1981 -82	1982 -83	30 year Average
October	.48	.65	1.46	.09	.18	.01	1.21	.17	.93	2.06	.76
November	2.48	.71	.65	.19	1.85	.61	1.18	.84	2.76	.91	1.17
December	2.08	1.37	1.45	.12	1.81	.72	.97	1.73	3.53	3.08	1.39
January	1.10	.86	1.39	.93	2.33	1.93	1.28	1.07	1.73	1.46	1.40
February	.55	1.82	.97	.27	1.70	1.82	1.50	1.35	1.83	1.48	.96
Total	6.69	5.41	5.92	1.60	7.87	5.09	6.14	5.16	10.78	8.99	5.73
March	1.20	1.19	.49	.46	.53	.85	1.54	1.85	.68	3.73	.93
Total	7.89	6.60	6.41	2.06	8.40	5.94	7.68	7.01	11.46	12.72	6.66

TABLE 3. Evaporation in inches from a free water surface for the 7-month period comprising the irrigation season and total wind mileage immediately above the evaporation pan for 1974-1983. Malheur Experiment Station, Ontario, Oregon, 1983

Month		1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
April	W[1]	2744		2867		1856	1806	2808	2634	3164	3030
	E	6.03		5.71		4.03	6.20	6.90	5.95	6.19	5.46
May	W	1999	2399	2020	1342	3444	2826	2693	3523	3632	3073
	E	7.77	6.99	8.75	5.11	7.61	*	6.56	8.64	9.85	8.99
June	W	1510	1455	1571	1256	1173	2180	2153	2250	2275	2707
	E	11.11	7.35	8.47	9.67	8.90	*	8.40	8.31	9.32	10.23
July	W	1527	1187	1150	1110	1909	1934	2130	1976	2092	2284
	E	10.67	10.89	9.46	11.16	11.51	11.44	10.64	11.76	9.74	10.60
August	W	1501	1226	1201	694	1918	1476	2687	1859	2005	1829
	E	10.48	8.26	6.99	9.07	9.25	9.09	11.45	11.87	10.56	9.55
September	W	1163	1217	1024	645	1593	1853	1749	1855	2488	2717
	E	6.70	6.90	5.18	5.46	5.23	8.82	5.59	7.77	6.68	8.59
October	W	1250	1380	1026	796	1601	2468	1998	1907	2244	2102
	E	2.72	2.58	2.49	2.54	3.94	4.04	3.80	3.31	4.05	4.26
Total	W	11694	8864	10859	5843	13494	14543	16218	16004	17900	17742
	E	55.48	42.97	47.05	43.01	50.47		53.34	57.61	56.39	57.68

*Evaporation pan being repaired

[1]W = Wind, E = Evaporation

TABLE 4. Dates of latest frosts in the spring and the earliest frosts in the fall at the Malheur Experiment Station, Ontario, Oregon, 1954-83

Year	Latest Frost in Spring		First Frost in Fall		Frost-Free Period
	Date	Temp-°F	Date	Temp-°F	
1954	May 2	29	Sept 30	27	150
1955	Apr 27	26	Sept 27	29	152
1956	Apr 30	31	Sept 23	31	145
1957	Apr 27	32	Oct 18	29	173
1958	Apr 27	31	Oct 21	25	176
1959	May 3	30	Oct 26	28	175
1960	May 22	27	Oct 13	27	143
1961	May 5	31	Sept 22	30	139
1962	Apr 30	26	Oct 18	30	170
1963	Apr 21	28	Oct 26	27	187
1964	May 4	28	Oct 4	32	152
1965	May 5	30	Sept 17	30	134
1966	May 23	31	Oct 10	29	139
1967	May 11	32	Oct 16	31	158
1968	May 6	30	Oct 3	31	149
1969	Apr 30	28	Oct 5	30	157
1970	May 11	27	Sept 25	30	136
1971	Apr 8	28	Sept 18	30	162
1972	May 1	30	Sept 26	30	146
1973	May 11	31	Oct 3	31	144
1974	May 18	30	Oct 6	27	140
1975	May 25	27	Oct 24	23	151
1976	Apr 29*	33	Oct 5	32	158
1977	Apr 20	29	Oct 8	29	170
1978	Apr 23	31	Oct 14	30	173
1979	Apr 19	32	Oct 28	32	191
1980	Apr 13	32	Oct 17	28	186
1981	Apr 14	27	Oct 4	30	172
1982	May 5	30	Oct 5	32	152
1983	Apr 27	31	Sept 20	29	146
30 Yr Avg	May 2	30	Oct 7	29	158

*In 1976 on June 26, there was a severe killing frost in other areas around the valley giving a growing season of only 100 days.

TABLE 5. Summary of weather recorded at the Malheur Experiment Station, Ontario, Oregon, 1979-1983

Event	1979	1980	1981	1982	1983
Total Precipitation (inches)	12.06	12.26	15.58	13.79	16.87
Total Snowfall (inches)	31.00	12.50	14.50	32.70	35.10
First Snow in Fall	Nov 16	Nov 23	Nov 27	Nov 9	Nov 22
Coldest Day of the Year	Jan 31 -24°F	Jan 30 & 31 -5°F	Dec 31 0°F	Jan 8 -14°F	Dec 23, 24, & 25 -10°F
Hottest Day of the Year	July 19 104°F	July 23 102°F	Aug 8 & 12 101°F	July 31 Aug 7, 8, & 23 99°F	Aug 8 104°F
Days 0°F or Below	15	4	1	18	8
Days 32°F or Below	147	108	130	161	94
Days 100°F or Above	3	2	5	0	3
Days 90°F or Above	43	29	51	41	33
Last Killing Frost in Spring	Apr 19 32°F	Apr 13 32°F	Apr 14 27°F	May 5 30°F	Apr 27 31°F
First Killing Frost in Fall	Oct 28 32°F	Oct 17 28°F	Oct 4 30°F	Oct 5 32°F	Sept 20 29°F
Days Frost-Free Growing Season	191	186	172	152	146
Number of Clear Days	112	103	125	134	114
Number of Partly Cloudy Days	177	128	168	182	175
Number of Cloudy Days	76	135	71	49	75
Greatest Amount of Snow on Ground at One Time (date & inches)	26" Jan 22	3" Jan 27	8" Dec 30	18" Jan 1 & 3	15" Dec 31
Dates of Severe Wind Storms	Oct 19	Aug 3 & 15	None	None	None

TABLE 6. Average maximum, average minimum, and mean soil temperature at the 4-inch depth (in degrees F) for 1983, and the 17-year mean soil temperature. Malheur Experiment Station, Ontario, Oregon, 1983

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Maximum	33.4	42.1	51.5	59.1	71.9	82.3	86.4	88.9	77.2	63.7	47.2	32.9
Minimum	32.3	37.2	42.0	44.3	52.7	65.3	68.5	73.4	62.5	52.5	41.8	32.4
1983 Mean	32.9	39.7	46.8	51.7	62.3	73.8	77.5	81.2	69.9	58.1	44.5	32.7
17-Year Mean	32.4	36.2	45.4	54.3	66.3	75.1	82.6	81.0	70.3	55.2	40.9	33.6

TABLE 7. Summary of air and soil temperatures and precipitation for 1983, and the average of the last 10 years. Malheur Experiment Station, Ontario, Oregon, 1983

Months	Mean Air Temp.		Mean Soil Temp.		Precipitation	
	83	10 year	83	10 year	83	10 year
Jan	29.0	25.2	32.9	32.8	1.46	1.41
Feb	38.9	33.8	39.7	35.8	1.48	1.33
Mar	45.0	42.9	46.8	45.3	3.73	1.25
Apr	47.6	50.0	51.7	54.2	.78	.91
May	58.1	58.0	62.3	65.1	1.06	.77
June	64.5	67.1	73.8	74.3	.65	.70
July	69.9	73.7	77.5	81.8	.72	.47
Aug	73.9	72.1	81.2	79.8	.87	.63
Sept	60.8	63.0	69.9	70.0	.14	.61
Oct	51.1	51.2	58.1	55.9	.33	.71
Nov	41.8	37.6	44.5	40.8	2.08	1.18
Dec	23.9	29.3	32.7	33.6	3.57	1.84
TOTAL					16.87	11.81

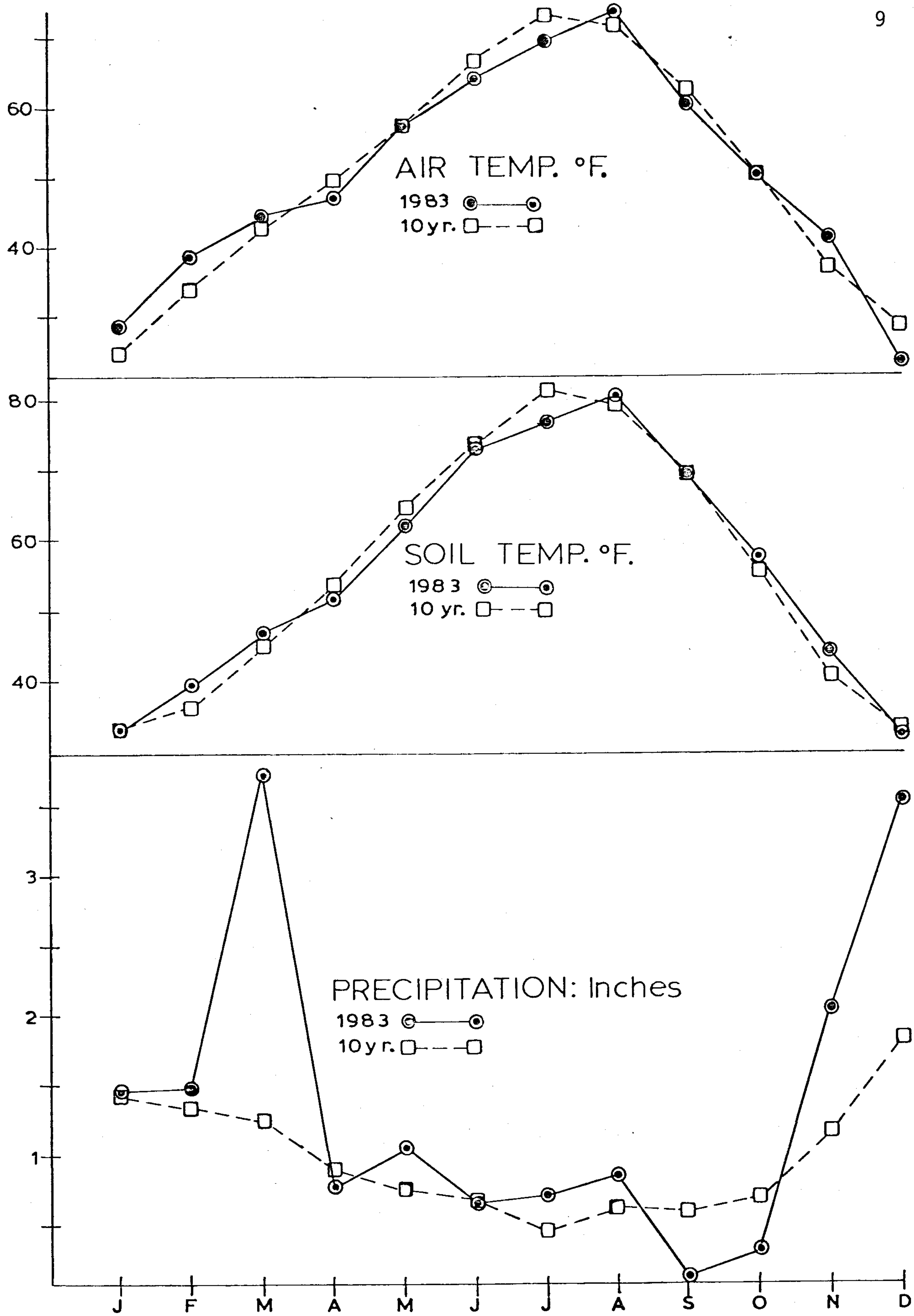

FIGURE 1. Summary of air and soil temperatures and precipitation for 1983 compared with 10-year averages.

ALFALFA VARIETY TRIAL

Oris Rudd
Malheur Experiment Station - Ontario, Oregon

The trial was established by hand-seeding on September 14, 1982. The prior year's crop was the spring grain nursery. Straw was disced in, then the plot was irrigated and disced again to destroy volunteer grain. Five hundred pounds per acre of P_2O_5 and 60 pounds per acre of nitrogen were then plowed down. The seedbed was prepared and hand-seeded on September 14, 1982. Individual plots were 5 X 20 feet, and each of the 21 private and 9 public varieties was replicated four times in a randomized block design. On March 10, 1983, the varieties Emeraude and Armor were replanted. On March 18, 1983, the trial was broadcast treated with one pound per acre of 2,4-DB plus one-half pound per acre of Fusilade plus one quart per acre of activated crop oil. The first irrigation was applied on May 13, 1983.

The plots were cut with a mower mounted on a 20-40 John Deere tractor. Forage was gathered with a pitch fork onto a tarp and weighed. Samples were taken from each plot and oven-dried to determine moisture percentage. Immediately following each cutting, plots were re-corrugated and irrigated.

Yields presented in Table 2 are reported as total dry matter production adjusted to 12% moisture. Table 1 presents crude protein on a dry weight basis for nine different varieties for the second cutting. In evaluating both the yield and the protein data it should be kept in mind that harvest losses are minimal, there is virtually no regrowth delay, and these data represent only one season's production.

Table 3 presents the information available to us on disease and insect resistance and winter hardiness.

TABLE 1. Protein values taken from the second cutting of selected varieties.[1] Malheur Experiment Station, Ontario, Oregon, 1983

Variety	Percent Crude Protein
Apollo II	21.58
Armor	20.09
WL 312	20.65
Pioneer 526	19.60
Dekalb 120	19.31
IOSG 8010	20.84
Greenway 360	19.70
Perry	20.23
Vernema	18.52

[1]Analysis provided by David Hannaway, Extension Agronomist, Oregon State University, Corvallis, Oregon.

TABLE 2. 1983 alfalfa variety forage yields adjusted to 12% moisture. Values are the average of four cuttings: The varieties were planted September 15, 1982, at the Malheur Experiment Station, Ontario, Oregon, 1983

	HARVEST DATE					
Variety	June 1 Tons/Acre	July 22 Tons/Acre	August 19 Tons/Acre	October 18 Tons/Acre	Total	Percent Lahontan
WL 312	3.32	3.30	4.55	3.09	14.23	123
IOSG 8010	3.83	3.27	4.12	2.90	14.12	122
Greenway 360	3.83	3.28	4.09	2.85	14.02	121
WL 314	3.49	3.11	4.33	2.92	13.84	120
Dekalb 120	3.78	3.20	4.16	2.65	13.79	119
Armor	3.66	3.52	3.97	2.56	13.71*	118
Perry	3.52	3.11	4.24	2.85	13.71	118
Classic	3.42	3.14	4.05	3.07	13.69	118
RS 209	3.53	3.38	4.02	2.71	13.63	118
Hi-phy	3.07	3.27	4.35	2.87	13.56	117
Apollo II	3.46	3.26	4.14	2.63	13.50	117
IH-101	3.35	3.11	4.25	2.79	13.50	117
H-103	3.52	3.02	4.27	2.80	13.36	115
WL 316	3.25	3.08	4.29	2.66	13.26	115
Seagull	3.05	3.16	4.25	2.71	13.16	114
Pioneer 545	3.11	2.96	4.40	2.68	13.16	114
Vernema	3.44	3.11	4.01	2.59	13.15	114
Vancor	3.49	3.25	3.80	2.59	13.13	113
Pioneer 532	3.31	3.15	4.13	2.50	13.08	113
Trumpetor	3.18	3.28	3.98	2.52	12.97	112
Pioneer 526	3.75	3.38	3.90	2.37	12.92	112
W-37	3.46	2.92	3.86	2.50	12.74	110
Riley	2.72	2.88	4.12	2.74	12.46	108
NS 79 P2 Syn2	2.91	2.33	3.95	2.58	12.43	107
IOSG 8020	2.96	2.87	3.97	2.34	12.13	105
Agate	3.04	2.95	3.84	2.19	12.01	104
NS 82 P2 Syn2	2.85	2.91	3.90	2.35	12.00	104
Baker	2.45	2.76	3.69	2.72	11.62	100
Lahontan	2.57	2.66	3.85	2.50	11.58	100
Emeraude	1.90	2.12	3.61	2.36	10.00**	86
CV (%)	12.65	10.84	8.28	13.32		
LSD (.10)	.482	.389	.396	.415	1.0482	
LSD (.05)	.576	.465	.473	.496	1.2525	
LSD (.01)	.763	.615	.627	.657	1.6597	

*One replication of Armor was replanted on March 10, 1983.

** All four replications of Emeraude were replanted on March 10, 1983

TABLE 3. Alfalfa variety trial at the Malheur Experiment Station, Ontario, Oregon, 1983

Seed Source	Variety	Release Year	WH	BW	FW	VW	PRR	AN	SBS	CLS	LLS	DM	AW	PA	SAA	LH	RKN	SN
PUBLIC																		
NV/ USDA	Lahontan	54	MH	MR		S	LR					S	S	LR	R	S	S	R
MN/USDA	Agate	72	H	HR	HR		R	LR	LR	R	LR			LR	R			
NE/USDA	Baker	77	H	R	R	S	S	LR		MR		LR	MR	R	R	R		
NE/USDA	Perry		H	R		S		LR				MR		R	R	LR		
KS/USDA	Riley	78	H	HR	R		S	R				MR	S	HR	HR	R		
NE/USDA	*NS 79 P2 Syn2		H			S												
NE/USDA	*NS 82 P2 Syn2		H															
WA/USDA	Vernema		H	MR		MR	LR	LR							MR			R
WA/USDA	W-37		MH			R												
PRIVATE																		
NAPB	Apollo II	82	MH	R	HR	R	R	MR						MR		MR		MR
NAPB	Armor	81	H	R	R	S	R	MR						MR		MR		
Ferry Morse	H 103		H	R	MR		MR	MR						MR	MR			MR[1]
Ferry Morse	IH 101	82	MR	R	MR	MR	R	R		MR		MR		MR	MR	MR	MR	MR
Waterman Loomis	WL 316	81	MH	MR	R	R	LR	R						R	R			LR[2]
Waterman Loomis	WL 314	81	MH	MR	R	LR	LR	LR						HR	R			HR[3]
Waterman Loomis	WL 312	78	MH	HR	MR	LR	MR	MR						HR	HR			MR[4]
Green Thumb	Seagull		MH	R	MR	S	R	MR	LR	MR	MR	MR	LR	R	R	S	S	MR
Pioneer	532	79	H	HR	MR		LR	MR		MR		MR		LR	R		LR	
Pioneer	526	81	VH	R			LR	LR		MR		MR		LR	R	LR		
Pioneer	545	77	H	R	R		R			MR		MR			R	LR	LR	MR
Dekalb/Ramsey	RS 209																	
Dekalb/Ramsey	Dekalb 120		H	R			LR	R										
ID-OR Seed Grw.	IOSG 8010																	
ID-OR Seed Grw.	IOSG 8020																	
Shield Seed Co.	Emeraude	62	MH									MR	S	MR				
FFR Coop.	Classic	76	H	R			LR	LR							S	LR		
FFR Coop.	Hi-phy	76	H	HR	HR		MR	S							LR	LR		
Northrup-King	Vancor	80	H	R	MR	S	R	R				MR	MR	MR	S			R
Northrup-King	Trumpetor	81	MH	MR	R	MR		R		MR	MR	MR		R				MR
Greenway Seed	Greenway 360	81		R	MR	LR	R	R		MR			LR	MR	MR			LR

*Experimental- no information released

[1] 1-2 years from release, [2] Blue alfalfa aphid = MR, [3] Blue alfalfa aphid = MR, [4] Blue alfalfa aphid = LR

WH = Winter Hardiness, BW = Bacterial Wilt, FW = Fusarium Wilt, VW = Verticillium Wilt, PRR = Phytophthora Root Rot, AH = Anthracnose, SBS = Spring Black Stem, CLS = Common Leaf Spot, LLS = Lepto Leaf Spot, DM = Downy Mildew, AW=Alfalfa Weevil, PA = Pea Aphid, SAA = Spotted Alfalfa Aphid, LH = Leaf Hopper, RKN = Root Knot Nematode, Sn = Stem Nematode.

VH = Very Hardy, H = Hardy, MH = Moderately Hardy, MNH = Moderately Non-Hardy

Disease and Insect Resistance: 51% = HR(Highly Resistant), 31-50% = R(Resistant), 15-30% = MR(Moderately Resistant)
6-14% = LR(Low Resistance), 5% = S(Susceptible)

WEED CONTROL IN ESTABLISHED ALFALFA

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1983

Purpose

Several herbicides were applied to established alfalfa in the spring to evaluate each treatment for crop tolerance and weed control. The alfalfa had about one inch of new growth and winter annual weeds were emerged when the herbicides were applied.

Procedures

The following herbicides were applied on February 27 to three-year-old vernal alfalfa: Sencor/Lexone, Paraquat, Velpar, Sinbar, Goal, Surflan, Simozine, Kerb, and 2,4-DB. Paraquat was not applied as a single treatment but was applied as a tank-mix combination with each of the herbicides listed except Velpar. The herbicides were applied as soon as the soil surface was dry, but by this time the alfalfa had started spring growth and new shoots were about 1.0 inch long. Weed species that were emerged when herbicides were applied included flixweed, tumbling mustard, blue mustard, shepherds purse, prickly lettuce, and downy brome. Downy brome was three to four inches tall and the largest broad-leaf weeds had rosettes with approximately three-inch diameters.

The herbicides were applied with a bicycle wheel plot sprayer. The 8.5-foot spray boom was equipped with size 8003 teejet nozzles. Nozzles were spaced 10 inches apart on the boom and herbicide treatments were applied as double-overlap broadcast applications. Spray pressure was 35 pounds per square inch and water, as the carrier, was applied at a rate of 42 gallons per acre.

Individual plots were 30 feet long and 9 feet wide. Each treatment was replicated three times and placed at random in a complete block-type experimental design.

The herbicides applied on February 27 were activated by an adequate amount of rainfall which fell a few days after the treatments were applied. March rainfall data:

Dates	Amount inches	Maximum Amount in 24-Hour Period inches	
March 1 -10	1.93	1.37	March 4
March 11-20	0.62	0.28	March 13
March 21-30	0.86	0.33	March 30
Total	3.41		

The treatments were evaluated on April 6, for crop tolerance and percent weed control. These results are discussed in the results section and numerical data are reported in Table 1.

Results

The most effective treatments for weed control included Sinbar plus Paraquat, Velpar (one pound), Sencor/Lexone plus Paraquat, Goal and Goal plus Surflan. Each of these treatments effectively controlled most weed species. One-half pound of Velpar was not enough material to give adequate control of all weeds. Some downy brome grass was in the trial area. It was noted that it took one pound of Velpar to effectively control downy brome. Goal was most active of all herbicides on mallow, giving good control of all seedling mallow plants. Goal did not control downy brome and tended to be weak on shepherds purse. It caused some burning, but new growth was starting and it appeared that many plants of both species would recover. Treatments most effective on downy brome included Sencor/Lexone, Sinbar, Kerb, Simazine, and Paraquat. Sencor/Lexone turned emerged mallow chlorotic, but it was never killed. Kerb was very active on downy brome, blue mustard, and shepherds purse. It had very little activity on tumbling mustard, mallow, and prickly lettuce. The Surflan plus Paraquat treatment did not do well. There were many weed escapes of all species in the Surflan plus Paraquat plots. 2,4-DB was active on all species of broadleaf weeds except mallow, but many of these weeds were stunted and did not appear to be making any vegetative growth. I am sure some would escape the effects of 2,4-DB to become problem weeds. Shepherds purse in 2,4-DB plots was only about two inches tall and the plants were flowering heavily but did not appear to be growing at this time.

The alfalfa was about six inches tall in all plots except Goal. The growth of the alfalfa in the Goal plots was about 20 percent less, but the alfalfa had a nice color, appeared healthy, and was growing rapidly. The alfalfa in the weed free plots was beautiful.

TABLE 1. Precent weed control and crop tolerance from herbicides applied in the spring to established alfalfa. Malheur Experiment Staiton, Ontario, Oregon, 1983

Herbicide	Rate lbs ai/ac	Crop Injury	Percent Weed Control: Blue Mustard	Shepherd Purse	Tumbling Mustard	Prickly Lettuce	Mallow	Downy Brome
Sencor/Lexone	1.0	0	100	100	100	100	50	96
Sencor/Lexone/Paraquat	1 + ½	0	100	100	100	100	60	99
Velpar	½	0	90	94	95	93	0	20
Velpar	1.0	0	100	100	100	100	20	65
Sinbar/Paraquat	1 + ½	0	100	100	100	100	75	98
Goal	1.0	10	100	85	98	99	80	10
Goal/Surflan	1 + 1½	10	100	97	100	99	83	60
Surflan/Paraquat	1½ + ½	0	82	76	83	73	0	60
Princep/Paraquat	1 + ½	0	98	98	98	98	10	92
Kerb/Paraquat	2 + ½	0	93	90	53	67	0	99
2,4-DB	1.0	0	90	92	89	86	0	0
Check	---	0	0	0	0	0	0	0

Evaluated April 6, 1983.

Rating: 0 = no herbicide effect, 100 = all plants killed.

Surfactant X-77 added with a Paraquat treatment at a rate of 0.5% V/V.

1983 HYBRID CORN PERFORMANCE TRIALS

Oris Rudd
Malheur Experiment Station - Ontario, Oregon

Silage and grain corn varietal trials were conducted at the Malheur Experiment Station during the 1983 growing season. Entry in the trials was on a fee basis.

Procedures

The trials were conducted in the north one third of field B-8. The previous crop was wheat, for two years. The straw was disced in and the field irrigated to sprout volunteer grain. The field was fall-plowed.

On April 22, 1983, fertilizer was applied at the rate of 216 pounds of nitrogen and 10 pounds of zinc per acre. Seedbed preparation was begun. Lasso at the rate of one gallon per acre was applied on May 3, and incorporated by discing twice and harrowing. Seedbed preparation was interrupted by rain. Final preparation was done with a triple K and harrow on May 10.

The trial was planted on May 11, into good soil moisture, using a John Deere flexi planter with Almaco cone seeders. The plots were 25 feet long with four rows per plot, spaced at 30 inches. A four-row border was planted along each side and between the grain and silage varieties. A 25-foot buffer was also planted at each end of the trial.

After emergence,the plots were hand-thinned to the desired populations and a three-foot alley was cleared perpendicular to the rows between all plots. Disyston at the rate of two pounds per acre was sidedressed on June 18, for mite control. On July 26 and 27, a water-run application of 30 units of nitrogen as anhydrous ammonia was applied. The trial was furrow-irrigated to meet evaporative demand.

Weather Summary

Table 1 is included in this report to provide a brief summary of weather conditions during the corn-growing period. The temperature and rainfall data in this table are recorded from an N.O.A.A. weather station at the Malheur Experiment Station. The average monthly temperatures during the growing season were below the 30-year averages except August, with July temperatures almost 5^{o}F below the 30-year average. Precipitation was up in July and August and down in September, resulting in a total for the growing season slightly above the 30-year average. The column headed "degree days" is a record of accumulated heat units calculated from daily temperatures.

The formula is the daily maximum temperature, less than or equal to 86^{O}F, plus the daily minimum temperature, greater than or equal to 50^{O}F, divide by 2, and subtract 50. The daily amounts are accumulated and reported by month in Table 1, and the totals from planting date to grain harvest are also recorded. Degree day data from the 1982 season are included for comparison.

The corn trials sustained neither hail nor wind damage throughout the season. Killing frosts occurred on September 20, 21, and 22, with minimum temperatures of 29^{O}F, 29^{O}F, and 31^{O}F recorded for these days.

TABLE 1. Weather summary at the Malheur Experiment Station during the 1983 hybrid corn trials

Month	Average Temperature	Deviation from 30-year Average	Degree* Days	1982 Degree Days	Precip-tation	Deviation from 30-year Average
	^{O}F	^{O}F			inches	inches
May 11-	61.2	---	286.5	231.5	trace	---
June	65.4	-2.1	475.5	515.0	0.65	-0.10
July	69.9	-4.8	575.0	602.0	0.72	+0.51
August	73.9	+1.3	663.0	651.5	0.87	+0.38
September	60.8	-1.9	421.5	380.0	0.14	-0.42
-October 4	53.6	---	32.5	34.0	trace	+0.37
TOTAL			2454.0**	2414.0	2.38	+0.37

*Degree days equal daily maximum temperature ($\leq$ 86^{O}F) + daily minimum temperature ($\geq$ 50^{O}F) $\div$ 2 - 50.

**Degree day total for silage corn (5/11 - 9/12) = 2181.5 $AccDD_{50}$ as compared to 2197 $AccDD_{50}$ for the same period in 1982.

Silage Trial

Twenty-four varieties from nine companies were tested in 1983. The varieties were planted in a randomized block style, and replicated five times.

The results are presented in Table 3.

The trial was harvested with a two-row forage chopper which cut the two center rows from each plot into a specialized wagon which weighed each plot for yield. A sample was taken from each plot and oven-dried to determine the percentage of moisture for each plot. The average for each hybrid is reported in Table 3. Silking dates were noted when 50 percent of the plants in a plot had visible silk. Table 3 also reports the number of years each hybrid has been tested at the Malheur Experiment Station, and the multi-year yield average, if any, is also listed.

Grain Trial

The 1983 hybrid grain corn trial included 52 hybrids submitted by 12 companies. Hybrids were planted in a randomized block style, and replicated five times.

The two center rows of each plot were hand-picked and weighed for yield. A 10-ear sample from each plot was used to determine moisture and shelling percentages.

The results of this trial are reported in Table 2. Yields are reported in tons per acre of shelled corn adjusted to 15.5% moisture.

The moisture percentage was determined using a John Deere electronic moisture tester. Three readings were averaged for the shelled grain from each plot. The average of these readings is reported as percent moisture at harvest for each variety.

The shelling percentages were determined by shelling the 10-ear sample taken from each plot. The five replication average is the number reported for the variety.

The silking date represents the date when 50% of the ears in the plot show silk.

TABLE 2. Summary information for hybrid grain corn trial at the Malheur Experiment Station, Ontario, Oregon, 1983

Company or Brand	Hybrid	*Yield	% Moisture at Harvest	----- RANK ----- Yield	% Moisture	Years Tested	Avg Yield	Population	Shelling	Silking Date
		T/A					T/A	1000/Acre	%	
PAG	SX 181	5.26	26.1	45	10	4	5.39	26	82	7-24
PAG	SX 193	5.99	27.0	17	14	1		26	86	7-26
PAG	SX 195	5.56	27.3	36	17	1		26	82	7-26
PAG	SX 239	5.94	28.7	20	23	2	5.97	26	83	7-26
PAG	SX 275	5.79	29.0	27	25	2	5.85	26	84	7-27
Cargill	426	5.03	26.1	48	10	1		26	72	7-26
Cargill	834	5.39	24.0	42	6	1		26	77	7-25
Cargill	861	5.27	26.1	44	10	1		26	81	7-27
Cargill	867	5.45	28.3	40	22	1		26	83	7-27
Cenex	2096	5.48	21.2	38	2	1		26	86	7-24
Cenex	2106	5.29	28.2	43	21	1		26	82	7-27
Cenex	2110	5.52	31.8	37	32	1		26	82	7-28
Cenex	2114	5.96	33.1	18	35	1		26	82	7-29
Cenex	2115	6.39	32.2	5	33	1		26	83	7-29
Dairyland	DX 1094	6.11	22.2	10	4	2	5.86	30	85	7-25
Dairyland	DX 1096	6.67	24.7	1	7	2	6.09	28	84	7-24
Dairyland	DX 1003	5.87	27.0	23	14	1		30	83	7-26
Dairyland	DX 1006	5.56	28.3	36	22	1		30	82	7-25
Dairyland	DX 10073	5.69	27.4	29	18	1		26	83	7-25
Dairyland	DX 1007	5.84	27.2	25	15	2	5.72	26	83	7-27
Dairyland	DX 1008	5.85	30.7	24	29	2	6.03	30	80	7-28
Dairyland	DX 1012	6.12	32.7	9	34	1		30	82	7-28
Keltgen	KS 89	5.41	22.9	40	5	1		26	83	7-24
Keltgen	KS 92	5.49	25.5	39	8	2	5.60	26	78	7-24
Keltgen	KS 95	5.61	26.0	32	9	2	5.46	26	80	7-25
Keltgen	KS 101	5.69	26.9	30	13	2	5.35	26	83	7-26
Keltgen	KS 1020	5.83	26.2	26	11	2	5.57	26	82	7-28
Keltgen	KS 1030	6.09	26.7	12	12	2	5.55	26	83	7-26
Crookham	SS 70	6.59	31.2	3	30	3	6.32	26	84	7-29
Crookham	CX 01061	5.93	27.4	19	18	1		26	83	7-29
Crookham	CX 02063	5.62	30.2	31	27	1		26	80	7-28
Crookham	CX 01064	5.58	28.7	34	23	1		26	84	7-28
Crookham	CX 02061	5.57	33.9	35	38	1		26	81	7-30
Crookham	CX 02054	5.70	30.4	29	28	1		26	82	7-27
Crookham	CX 02051	5.41	27.6	41	19	1		26	82	7-25
Funks	G 4342	6.61	27.2	2	16	2	6.16	26	83	7-25
Stauffer	S 4880	5.89	28.1	22	20	1		26	84	7-25
Stauffer	S 5340	6.10	28.7	11	23	2	6.15	26	85	7-26
Northrup-King	PX 74	6.13	33.7	8	37	4	6.30	26	80	8-1
Northrup-King	PX 9527	6.45	33.9	4	38	2	5.93	26	86	7-30
Kennington	O.P.	5.12	29.7	47	26	1		26	82	7-27
Dekalb-Pfizer	T 950	5.22	27.1	46	15	3	5.73	26	78	7-25
Dekalb-Pfizer	T 1100	5.76	34.2	28	40	3	6.03	26	80	7-29
Dekalb-Pfizer	TXS 115A	6.18	34.0	7	39	3	6.49	26	83	8-3
Dekalb-Pfizer	XL 71	5.91	33.3	21	36	2	6.36	26	83	7-31
Dekalb-Pfizer	XL 73	5.95	33.7	19	37	2	6.58	26	78	8-3
Dekalb-Pfizer	XL 74b	5.91	33.9	21	38	2	6.67	26	76	8-2
Dekalb-Pfizer	T 1000	5.60	28.8	33	24	3	5.92	26	82	7-23
Dekalb-Pfizer	DK 556	6.21	29.7	6	26	1		26	83	7-28
Ferry-Morse	GT 3006	6.06	31.4	14	31	2	5.88	32	81	7-29
Ferry-Morse	GT 2006	6.04	30.4	15	28	4	5.78	32	83	7-26
Ferry-Morse	GT 1822	6.08	26.7	13	12	1		32	80	7-26
90 Day Check		5.41	18.9	41	1	1		26	84	7-22
100 Day Check		5.57	21.5	35	3	1		26	87	7-24
110 Day Check		6.03	27.3	16	17	1		26	83	7-28
120 Day Check		6.10	31.2	11	30	1		26	84	8-1
	Avg	5.80								
	LSD (.10)	.37								
	LSD (.05)	.44								
	LSD (.01)	.58								
	CV (%)	6.16								

*Yields are reported in tons per acre adjusted to 15.5% moisture.

Maturity--A killing frost occurred on September 20 and 21.

Plots were hand-harvested on October 11 and 13.

No significant lodging was noted at harvest.

TABLE 3. Summary information for hybrid corn silage trial at the Malheur Experiment Station, Ontario, Oregon, 1983

Company or Brand	Hybrid	Silage* Yield Tons/Acre	% Moisture at Harvest %	Plants/ Acre (Thousands)	Silking Date	Years Tested	Avg *** Yield Tons/Acre
Keltgen	KS 1150	40.7 a	71.0	26	8-2	1	
PAG	SX 351	40.2 a	71.5	28	8-1	3	40.6
Dairyland	DX 1017	38.2 b	72.5	28	8-3	2	40.1
Funks	G 4507	38.2 b	73.0	26	8-1	5	39.1
Dekalb-Pfizer	XL 74A	38.1 bc	72.5	26	8-3	2	38.8
Dekalb-Pfizer	TXS 115A	38.0 bc	72.5	26	8-3	3	42.4
Cenex	2115	37.6 bc	72.5	26	8-2	1	
Dekalb-Pfizer	XL 72AA	37.6 bc	73.0	26	8-2	2	38.5
Ferry Morse	4693	37.5**bc	74.0	26	8-4	1	
Funks	G 4657	37.3 bc	73.0	26	8-3	3	39.6
Cenex	2124	36.8 bc	74.0	26	8-4	1	
120 Check	---	36.5 bc	73.0	26	8-3	1	
Crookham	CX 02065	36.3 bc	75.0	26	8-4	1	
Dairyland	DX 1016	36.1 bcd	75.0	28	8-3	1	
PAG	SX 379	35.9 cd	74.0	28	8-3	2	37.8
Crookham	SS 70	35.7 cd	74.0	26	8-2	5	37.4
Dekalb-Pfizer	XL 73	34.4 de	75.5	26	8-1	1	
Kennington	OP	34.3 de	68.5	26	7-25	1	
Crookham	CX 02064	34.2 de	69.5	26	7-28	1	
Crookham	SS 605	34.1 de	72.5	26	7-30	3	37.9
Crookham	CX 02061	33.6 e	73.0	26	7-31	1	
Dekalb-Pfizer	DK-699	32.9 e	74.0	26	7-31	1	
Cenex	2110	32.6 e	70.0	26	7-26	1	
Crookham	CX 02063	32.3 e	69.5	26	7-28	1	
	Avg	36.2	72.6				
	CV (%)	4.2	2.3				
	LSD (.05)	1.9	3.4				
	LSD (.01)	2.1					

* Average of five replications adjusted to 70% moisture.

** Represents two of five replications.

*** Average for varieties which have been tested at the Malheur Experiment Station for more than one year.

Means within column followed by the same letter are not significantly different at the 5% level using Duncan's multiple range test.

AN EVALUATION OF HERBICIDE TOLERANCE TO SWEET CORN

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1983

Purpose

The tolerance of Golden Jubilee variety of sweet corn was evaluated when treated with Ro-Neet, Ro-Neet plus R-29148, Eradicane plus Ro-Neet, and Surpass. Rates (pounds active ingredients per acre) applied were: Ro-Neet, four and six pounds; Eradicane plus Ro-Neet, one plus four pounds and two plus two pounds; and Surpass, four pounds. The herbicides were preplant incorporated and were evaluated for weed control, crop injury, and residue. Samples of ears, corn, and stalks were harvested for analysis of possible herbicide residues. Weed species included redroot pigweed (*Amaranthus retroflexus*) and barnyard grass (*Echinochloa crusgalli*).

Procedures

The herbicides were applied to silt loam textured soil with a pH of 7.3 on June 3, 1983. The plots were 12 feet wide and 25 feet long. Spraying was done with a bicycle plot sprayer equipped with teejet nozzles size 8002 with 10-inch spacing on a six-foot boom to apply the herbicide as a broadcast double-overlap treatment. Spray pressure was 35 pounds per square inch and water, as the carrier, was used at a rate of 42 gallons per acre.

The herbicides were mechanically incorporated immediately after application with a triple K and a trailing-spike-tooth harrow. The plots were triple K'ed twice, once length-wise to the plots and the second time in a direction opposite the first. The triple K had straight teeth and the teeth were set to till five to six inches deep with a tractor speed of four miles per hour.

Golden Jubilee variety of sweet corn was planted on the same day the herbicides were applied and incorporated. Each plot consisted of four rows planted at 30-inch spacing between rows. After planting, the plot area was irrigated by furrow-irrigation for moisture to germinate the corn and weeds and to activate the herbicides.

On June 30, the treatments were evaluated for weed control and injury to seedling corn. Dense populations of pigweed and barnyard grass occurred in check plots, especially in the second and third replications. On August 26, the treatments were evaluated for any malformed ears caused by the herbicides. Evaluations were made by collecting 25 ears, pulled at random from the two center rows of each four-row plot. On this date, the ear and stalk samples were taken and frozen for later residue analysis. The corn was in late milk to very early dough stage of development when samples were collected.

Results

Golden Jubilee corn showed good tolerance to the following herbicide treatments: Ro-Neet at four pounds, Ro-Neet plus R-29148 at four and six pounds, Eradicane plus Ro-Neet at one plus four pounds and two plus two pounds, and to Surpass at four pounds. Six pounds of Ro-Neet caused three to five percent of the seedling corn plants to have twisted or curled leaves in the whorl. All other plants in the six pound Ro-Neet plots appeared normal in size and morphology. R-29148 increased safety of corn to Ro-Neet at six pounds, but it also reduced the ability of Ro-Neet to control weeds. This was particularly striking at the four pound Ro-Neet rate. The better combination treatment of Eradicane plus Ro-Neet was the one pound Eradicane and four pounds Ro-Neet. Lowering the rate of Ro-Neet in the combination treatments reduced weed control. Weed control was excellent with Surpass as would be expected with these species of weeds.

Counts taken for the ratings of deformed ears showed that ears were normal for all treatments when compared to those from the check plots.

Numerical ratings of weed control and crop injury have been recorded in attached tables one and two.

TABLE 1. Percent weed control and crop injury ratings to Golden Jubilee Sweet Corn treated with herbicides. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicides	Rate	Crop Injury				Percent Weed Control: Pigweed				Percent Weed Control: Barnyard Grass			
	lbs ai/ac	Rep 1	Rep 2	Rep 3	Avg	Rep 1	Rep 2	Rep 3	Avg	Rep 1	Rep 2	Rep 3	Avg
Ro-Neet	4.0	0	0	0	0	96	98	98	97	98	99	98	98
Ro-Neet	6.0	20	10	10	13	99	99	98	98	99	99	99	99
Ro-Neet + R-29148	4.0	0	0	0	0	90	93	90	91	92	90	92	91
Ro-Neet + R-29148	6.0	0	0	0	0	95	96	98	96	95	98	99	97
Eradicane + Ro-Neet	1 + 4	0	0	0	0	92	95	92	93	99	98	98	98
Eradicane + Ro-Neet	2 + 2	0	0	0	0	85	85	88	86	98	98	98	98
Surpass	4	0	0	10	3	99	99	99	99	99	99	99	99
Check	---	30	35	40	35	0	0	0	0	0	0	0	0

Ratings: 0 = no herbicide effect, 100 = Plants killed.

Crop injury rating of 10-20 estimates 3-5 percent of plants with curled-twisted whorls.

TABLE 2. Number of normal and curved ears from harvested Golden Jubilee Sweet Corn treated with preplant incorporated herbicides. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicides	Rate	Number of Normal Shaped Ears[1]				Number of Ears Curve Shaped[1]			
	lbs ai/ac	Rep 1	Rep 2	Rep 3	Avg	Rep 1	Rep 2	Rep 3	Avg
Ro-Neet	4.0	23	24	25	24.0	2	1	0	1.0
Ro-Neet	6.0	24	23	24	23.7	1	2	1	1.3
Ro-Neet + R-29148	4.0	25	23	24	24.0	0	2	1	1.0
Ro-Neet + R-29148	6.0	23	23	24	23.3	2	2	1	1.7
Eradicane + Ro-Neet	1 + 4	22	23	23	22.7	3	2	2	2.3
Eradicane + Ro-Neet	2 + 2	21	23	22	22.0	4	2	3	3.0
Surpass	4	23	24	24	23.7	2	1	1	1.3
Check	---	22	23	23	22.7	3	2	2	2.3

[1]A total of 25 ears sampled from each plot on August 26, 1983.

AN EVALUATION OF HERBICIDES TO OBTAIN SELECTIVE WEED CONTROL IN FURROW AND SPRINKLER IRRIGATED PEPPERMINT AND SPEARMINT

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1983

Introduction

Fifteen herbicides were evaluated at various rates and tank-mix combinations at six locations in the Treasure Valley area of Southwest Idaho and Eastern Oregon. The herbicides were applied to established mint stands at five locations. At one location herbicides were applied in the spring to a new fall-planting of spearmint and peppermint. Also, for the first time, herbicides were evaluated as post-harvest treatments to control weeds emerging and competing with mint as it resumes growth after harvest. Weed species at the trial sites included both winter and summer annual broadleaf and grassy weeds. Winter annuals included prickly lettuce (Lactuca scariola), blue mustard (Chorispora tenella), tumbling mustard (Sisymbrium altissimum), tansy mustard (Descurainia pinnata), shepherds purse (Capsella bursa-pastoris), salisfy (Tragopogan porrifolius), marestail (Erigeron canadensis), and downy brome (Bromus tectorum). Summer annuals were kochia (Kochia scoparia), lambsquarters (Chenopodirum album), redroot pigweed (Amaranthus retroflexus), barnyard grass (Echinochloa crusgalli), hairy nightshade (Solanum sarrachaides), and green foxtail (Setaria viridis). Herbicides applied to established mint stands were activated by moisture from rain or snow. Post-harvest applied herbicides were either foliar-active or activated in the soil by sprinkler irrigation. The spring applied treatments applied to new mint plantings were soil-activated by using a rotary-hoe to incorporate the herbicides.

Procedures

Herbicides applied as late fall treatments included Prowl (Pendimethalin), Sinbar (terbical), Paraquat (paraquat cl-), Surflan (oryzalin), Devrinol (napropamide), Goal (oxyfluorfen), Dual (metolachlor), SSH 0860, and CP 55097. These herbicides were applied to experimental plots located at Kenny Naugle's, Meridian, Idaho; Stuart Batt's, Oregon Slope, Oregon; and Bob Kido's, Ontario, Oregon. The mint was furrow-irrigated at Kido's and Naugle's and sprinkler-irrigated at Batt's. The furrow-irrigated mint had been recorrugated before herbicide application. The fall growth of mint had been clipped at all sites and conditions were good for applying the herbicides.

Herbicides applied in the early spring included Paraquat as a tank-mix combination with Prowl, Sinbar, Surflan, Goal, Dual, and both the wettable powder and dry flowable formulation of Devrinol. These treatments were applied to spearmint and peppermint on Owen Frorer's farm near Nyssa, Oregon, and to peppermint at Lewis McKelly's farm near Nampa, Idaho. Paraquat and X-77 were added to the herbicide mixture to aid in the control of existing weeds which had emerged during the winter.

Herbicides applied on April 29 to a fall planting of peppermint and spearmint and mechanically incorporated with a rotary-hoe included Sinbar, Devrinol, Prowl, Prefar (bensulide), Dual, Surflan, and Sonalan (ethalfluralin). An activated oil was applied at the rate of one quart per acre in all Sinbar and Sinbar tank-mix combination treatments. Vegetative shoots from the mint plants were starting to emerge through the soil surface when the herbicide treatments were applied. The field was corrugated and previously prepared for furrow-irrigation before the herbicides were applied. The soil was mellow at the surface which is essential for adequate incorporation to activate the herbicides when a rotary-hoe is used. The field was irrigated the day after the herbicides were incorporated. This trial was conducted at the Malheur Experiment Station near Ontario, Oregon.

The post-harvest trials included herbicides applied on August 1 and August 9. The trial applied on August 9 included the same herbicides but at a reduced rate of Goal because of the injury to the mint observed when Goal was applied on August 1. The spearmint was harvested on July 21, and sprinkle irrigated on July 24. The mint had started to regrow when the herbicides were applied. Many seedling pigweed, barnyard grass, and green foxtail plants were present when the herbicide treatments were applied.

Individual plots for each treatment were nine feet wide and 30 feet long. All treatments were replicated three times and randomized in a complete block-type experimental design. Teejet fan nozzles, size 8003, were used to apply the herbicides as double-overlap broadcast treatments. Spraying pressure was 40 pounds per square inch and water, as the herbicide carrier, was applied at 42 gallons per acre.

Summary of Results

Because of the number of different weed species present in these trials and the variation in the susceptibility of specific weed species to single herbicides, tank-mix combinations of herbicides were the superior treatments. Prowl plus Sinbar combinations applied in the fall or early winter effectively controlled all winter and summer species of weeds except blue mustard. The only herbicide effective on blue mustard evaluated in this trial was Goal. Goal alone or in combination with Prowl or Devrinol resulted in excellent control of blue mustard as well as many other species of weeds. Goal alone was least effective on marestail and usually did not persist to control late emerging summer annuals in open mint stands. Goal plus Prowl and Goal plus Devrinol combinations were the superior treatments, at some locations, if marestail was not a problem weed. Prowl was not effective on prickly lettuce at rates below three pounds. Goal plus Prowl is an excellent herbicide combination. It has given effective weed control and did not persist in the soil to injury alternate crops. Devrinol in combination with Sinbar and Goal not only improved grass control but increased the percent control of late emerging broadleaf weeds compared to the control received from Sinbar or Goal applied singly. Surflan was not a good treatment in these trials on many weed species. It did control certain species of summer annuals but severe injury to mint occurred when it was used singly or at reduced rates in tank-mix combinations with Sinbar.

The better treatments for weed control and crop selectivity to new plantings of spearmint and peppermint included Sinbar and Sinbar in combination with Prefar and Devrinol. These treatments were applied in the spring and activated by mechanical tillage. Mechanical tillage is essential for consistant weed control from spring applied treatments in furrow-irrigated mint. Other herbicides evaluated in this trial included Prowl, Sonalan, Dual, and Surflan. These herbicides effectively controlled problem weeds, but prevented the mint from making normal early season growth when these plots were compared to plots treated with Sinbar or Sinbar plus Prefar and Devrinol combinations. Surflan caused injury to the extent it was considered unacceptable. Two formulations of Devrinol were evaluated. The percent weed control and crop tolerance was comparable between the wettable powder and dry flowable materials, thus, equal in herbicidal activity. Prefar and Devrinol were the only acceptable treatments when applied in combinations with Sinbar. Prefar and Devrinol increased late season control of both grass and broadleaf weeds compared to plots treated with Sinbar alone.

Results from preliminary trials show that certain weeds emerging as mint growth resumes after harvest can be selectivily controlled. The most effective treatments for control of both annual grasses and broadleaf weeds included tank-mix combinations of Goal with either Poast, Fusilade, or SC 1084. Other new grass herbicides applied as foliar active treatments would probably be as effective as those used in this trial. Goal applied at 0.25 to 0.50 pounds active ingredient per acre in combination with a grass herbicide at 0.25 pounds active ingredient per acre was very effective in controlling redroot pigweed, barnyard grass, and green foxtail. These are particularly troublesome weeds in mint following harvest. Prowl was not as effective as Goal and caused more injury to the new growing mint. Goal caused foliar burn to the mint but stands and mint vigor were not affected when the results were evaluated at the end of the growing season.

TABLE 1. Percent weed control and crop injury ratings from herbicides applied in the fall to established spearmint. Stuart Batt Farm, Oregon Slope, Oregon, 1982-83

Herbicides	Rate lbs ai/ac	Crop Injury Replications 1	2	3	Avg	Percent Weed Control: Prickly Lettuce Replications 1	2	3	Avg	Salisfy Replications 1	2	3	Avg	Blue Mustard Replications 1	2	3	Avg
Prowl	1.5	0	0	0	0	65	60	65	63	65	75	75	72	55	65	65	62
Prowl	2.0	0	0	0	0	70	65	75	70	80	80	75	78	80	75	80	78
Prowl	3.0	0	0	0	0	85	85	80	83	75	80	80	78	75	70	80	75
Prowl + Sinbar	1.5 + 1.0	0	0	0	0	100	100	100	100	95	95	95	95	60	65	60	62
Prowl + Sinbar	1.5 + 1.5	0	0	0	0	100	100	100	100	98	98	95	97	60	65	60	62
Prowl + Sinbar	2 + 1.5	0	0	0	0	100	100	100	100	100	100	100	100	70	65	70	68
Prowl + Sinbar	2 + .75	0	0	0	0	100	100	100	100	100	100	98	99	65	70	70	68
Prowl + Sinbar	2 + 1	0	0	0	0	100	100	100	100	98	98	100	98	75	80	75	73
Surflan	1.0	20	30	30	27	25	30	30	28	10	15	15	13	15	20	20	18
Surflan	1.5	35	40	45	40	40	45	40	42	15	20	20	18	10	15	20	15
Surflan	2.0	65	70	70	68	45	50	50	48	20	25	20	22	20	20	20	20
Surflan + Sinbar	1 + 1	20	15	20	18	100	100	100	100	85	80	80	82	20	30	20	23
Surflan + Sinbar	1 + 1.5	20	25	20	22	100	100	100	100	85	90	85	87	30	20	20	23
Surflan + Sinbar	1.5 + 1	35	40	40	38	100	100	100	100	75	70	75	73	20	30	20	23
Surflan + Devrinol	2 + 4	25	20	20	22	100	100	100	100	95	90	95	93	30	25	30	28
Goal	1.5	0	0	0	0	100	100	100	100	70	65	60	65	100	100	100	100
Goal + Devrinol	1.5 + 2	25	30	30	28	100	100	100	100	65	70	60	65	100	100	100	100
Dual	4	0	0	0	0	20	15	20	18	10	15	10	12	10	0	0	3
Sinbar	2	0	0	0	0	100	100	100	100	85	80	85	83	0	0	0	0
Check	---	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Ratings: 0 = No herbicide effect, 100 = all plants eliminated.

Application Date: November 9, 1982.

Evaluated: June 23, 1983.

Crop: Scotch Spearmint.

Location: Stuart Batt, Oregon Slope or eight miles north of Ontario, Oregon.

Irrigation: Sprinkle.

Soil Conditions:
a. Clayloam texture.
b. Soil surface moist.
c. 0.89% organic matter.

Plant Conditions:
a. No weeds emerged
b. No green residue of crop.

TABLE 2. Percent weed control and crop injury ratings from herbicides applied on December 2, 1982, to an established stand of spearmint. Kenny Naugle, Meridian, Idaho, 1983

Herbicides	Rate	Crop Injury				Percent Weed Control															
						Salisfy				Prickly Lettuce				Mares Tail				Downy Brome			
	lbs ai/ac	Replications				Replications				Replications				Replications				Replications			
		1	2	3	Avg	1	2	3	Avg	1	2	3	Avg	1	2	3	Avg	1	2	3	Avg
Prowl	2.0	0	0	0	0	0	20	30	17	85	80	80	82	40	50	55	48	40	50	40	43
Prowl	3.0	10	0	0	3	0	10	40	17	95	98	98	96	45	55	65	55	65	75	75	72
Prowl + Sinbar	1 + 1	0	0	0	0	95	100	100	98	100	100	100	100	90	90	95	92	100	100	100	100
Prowl + Sinbar	1.5 + .75	0	0	0	0	95	95	98	96	90	100	100	97	98	100	100	99	90	100	100	97
Prowl + Sinbar	2 + .75	0	0	0	0	90	90	100	93	98	98	100	98	98	100	100	99	95	100	85	93
Sinbar + Surflan	1 + 1	0	0	5	2	95	95	100	96	100	100	100	100	95	100	100	97	100	100	100	100
Sinbar + Surflan	1.5 + 1.5	0	0	0	0	95	100	98	97	100	100	100	100	98	98	100	98	100	100	100	100
Sinbar + Surflan	.75 + 1.5	10	10	10	10	98	100	90	96	98	100	100	99	88	90	92	90	100	100	100	100
Surflan	1.0	0	0	0	0	30	35	30	32	25	20	30	30	65	60	70	65	60	50	50	53
Surflan	1.5	0	0	0	0	35	40	40	38	35	40	30	35	75	75	65	71	38	50	55	48
Sinbar + Devrinol	2 + 4	5	5	0	3	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Goal	1.5	0	0	0	0	90	96	95	94	100	100	100	100	10	20	20	17	96	95	100	97
Goal + Devrinol	1.5 + 2	0	5	0	2	100	100	85	95	100	100	100	100	10	10	10	10	100	100	100	100
Dual	4	0	0	0	0	20	25	20	22	20	30	20	23	35	40	45	40	75	75	80	77
SSH 0860	1.5	0	0	0	0	100	95	95	97	100	100	100	100	95	92	95	93	30	35	40	35
SSH 0860	3	15	15	35	22	100	100	100	100	100	100	100	100	100	100	100	100	60	65	80	68
CP 55097	.25	0	0	0	0	80	50	50	70	15	20	15	16	25	20	20	22	75	55	65	65
CP 55097	.50	0	0	0	0	80	85	80	82	20	25	25	23	35	40	40	38	65	80	75	73
Sinbar	2	0	0	0	0	95	90	85	90	100	100	100	100	100	98	100	99	100	100	100	100
Check	---	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Ratings: 0 = No herbicide effect, 100 = all plants eliminated.

Evaluated: June 21, 1983.

Location: Kenny Naugle, Meridian, Idaho.

Soil Conditions: a. Soil surface wet - but frozen.
b. Clay loam texture.

Application Date: December 2, 1982.

Crop: Scotch Spearmint (five years old).

Irrigation: Furrow.

Plant Conditions: a. Mint was clipped and dormant.
b. Weeds emerged included prickly lettuce and downy Brome.

TABLE 3. Percent weed control and crop injury ratings from herbicides applied in the spring to dormant peppermint. Kenny Naugle, Meridian, Idaho, 1983

Herbicides	Rate	Crop Injury		----- Percent Weed Control -----			
	lbs ai/ac	May 6	June 22	Prickly Lettuce	Blue Mustard	Salisfy	Barnyard Grass
Prowl + Paraquat	2 + .5	4	0	100	100	90	98
Prowl + Paraquat	3 + .5	5	0	100	100	92	98
Prowl + Sinbar + Paraquat	1.5 + .75 + .5	8	0	98	99	90	97
Prowl + Sinbar + Paraquat	1.5 + 1 + .5	8	0	100	100	93	99
Sinbar + Surflan + Paraquat	1 + 1.5 + .5	22	35	100	98	93	98
Surflan + Paraquat	1.5 + .5	15	25	85	95	53	92
Sinbar + Devrinol + Paraquat	2 + 4	10	0	100	98	93	100
Goal + Prowl + Paraquat	.5 + 1.5 + .5	10	0	100	100	96	100
Goal + Prowl + Paraquat	.5 + 3 + .5	10	0	100	100	98	100
Goal + Paraquat	.75 + .5	7	0	100	100	93	75
Dual + Paraquat	4 + .5	5	0	27	33	15	96
Check	---	0	0	0	0	0	0

Ratings: 0 = No herbicide effect, 100 = all plants eliminated.

Evaluated: May 6 and June 22. Crop injury is reported for both dates and percent weed control for June 22.

Plant Conditions:
a. Mint was dormant.
b. Weeds - prickly lettuce and blue mustard emerged with plants with four to six-inch rosettes.

Application Date: March 14, 1983.

Crop: Peppermint (three years old)

Irrigation: Furrow.

Soil Conditions:
a. Soil surface moist.
b. Clay loam texture.

TABLE 4. Percent weed control and crop injury ratings from herbicides applied in December to dormant spearmint. Bob Kido, Ontario, Oregon, 1982-83

Herbicides	Rate lbs ai/ac	Crop Injury	Percent Weed Control: Prickly Lettuce Replications 1	2	3	Avg	Salisfy Replications 1	2	3	Avg	Downy Brome Replications 1	2	3	Avg
Prowl	2	0	70	90	85	82	15	25	45	28	30	50	50	43
Prowl	3	0	98	99	100	99	80	75	85	80	95	99	70	88
Prowl + Sinbar	1 + 1	0	100	100	100	100	100	100	100	100	100	100	100	100
Prowl + Sinbar	1.5 + .75	0	80	100	100	93	90	100	100	98	95	100	100	98
Prowl + Sinbar	2 + .75	0	100	100	100	100	90	100	100	96	98	100	95	97
Sinbar + Surflan	1 + 1	10	100	100	100	100	95	100	100	98	100	100	100	100
Sinbar + Surflan	1.5 + 1.5	10	100	100	100	100	98	100	90	96	100	98	100	99
Sinbar + Surflan	.75 + 1.5	4	98	100	100	99	100	100	100	100	98	100	98	98
Surflan	1.0	10	70	65	70	68	40	40	20	33	50	45	40	45
Surflan	1.5	25	70	80	75	75	40	60	10	37	70	85	85	80
Sinbar + Devrinol	2 + 4	0	100	100	100	100	100	90	100	96	100	100	100	100
Goal + Ag 98	1.5	0	100	100	100	100	100	100	100	100	68	70	60	66
Goal + Devrinol	1.5 + 2	5	100	100	100	100	100	100	100	100	100	100	100	100
Dual	4	8	35	50	35	40	25	25	25	25	100	100	90	96
SSH 0860	1.5	0	100	100	100	100	100	100	100	100	60	70	40	56
SSH 0860	3	18	100	100	100	100	100	100	100	100	60	90	80	76
CP 55097	.25	0	25	25	25	25	35	30	45	36	85	75	75	78
CP 55097	.50	4	25	25	10	20	45	40	30	38	98	98	75	90
Sinbar	2.0	0	100	100	100	100	80	85	80	82	100	100	100	100
Check	---	0	0	0	0	0	0	0	0	0	0	0	0	0

Ratings: 0 = No herbicide effect, 100 = all plants eliminated.

Evaluated: May 6, 1983.

Location: Bob Kido, Ontario, Oregon.

Soil Conditions:
a. Sandy loam textured soil.
b. Existing beds were split with rotary corrugator before the herbicides were applied.
c. Soil surface was frozen when herbicides were applied.

Plant Conditions: a. Mint shoots and weeds were covered by soil from rotary corrugator.

Application Date: December 20, 1982.

Crop: Scotch Spearmint.

Irrigation: Furrow.

TABLE 5. Percent weed control and crop injury ratings from herbicides applied in the spring to spearmint. Owen Frorer, Nyssa, Oregon, 1983

Herbicide	Rate lbs ai/ac	Crop Injury	Percent Weed Control: Kochia	Prickly Lettuce	Hairy Nightshade	Redroot Pigweed	Green Foxtail
Prowl + Paraquat	2 + .5	0	93	86	92	98	98
Prowl + Paraquat	3 + .5	0	98	92	98	98	100
Prowl + Sinbar + Paraquat	1.5 + .75 + .5	0	98	99	100	100	100
Prowl + Sinbar + Paraquat	1.5 + 1 + .5	0	99	100	100	100	100
Sinbar + Surflan + Paraquat	1 + 1.5 + .5	40	92	96	90	94	99
Surflan + Paraquat	1.5 + .5	45	82	82	68	88	95
Goal + Prowl + Paraquat	.5 + 1.5 + .5	0	97	100	100	100	100
Goal + Prowl + Paraquat	.5 + 3 + .5	0	99	100	100	100	100
Goal + Paraquat	.75 + .5	0	75	99	88	80	67
Prefar + Paraquat	4 + .5	0	83	67	0	80	98
Prefar + Paraquat	6 + .5	0	91	73	0	93	100
Check	---	0	0	0	0	0	0
Devrinol 50W	4	0	30	0	65	93	98
Devrinol 50DF	4	0	40	0	63	91	95
Devrinol 50W + Sinbar	4 + 2	0	88	96	89	96	99
Devrinol 50DF + Sinbar	4 + 2	0	90	98	90	95	98
Check	---	0	0	0	0	0	0

Ratings: 0 = No herbicide effect, 100 = all plants eliminated.

Evaluated: July 4, 1983.

Location: One mile north of Nyssa, Oregon - Owen Frorer.

Plant Condition:
a. Spearmint shoots one inch of new growth above soil surface.
b. Weeds - prickly lettuce, four to six-inch rosettes; kochia, very small seedlings; pigweed, nightshade, and green foxtail had not yet emerged.

Application Date: March 17, 1983.

Crop: Scotch Spearmint.

Irrigation: Furrow.

Soil Condition:
a. Soil surface moist.
b. Loam textured soil.

TABLE 6. Percent weed control and crop injury ratings from herbicides applied in early spring to peppermint. Owen Frorer, Nyssa, Oregon, 1983

Herbicides	Rate lbs ai/ac	Crop Injury	Percent Weed Control: Prickly Lettuce	Tumbling Mustard	Blue Mustard	Green Foxtail
Goal + Prowl + Paraquat	.5 + 1.5 + .5	0	100	100	100	100
Surflan + Paraquat	1.5 + .5	25	70	88	88	83
Prefar + Paraquat	4 + .5	0	72	88	83	98
Prefar + Paraquat	6 + .5	0	75	80	80	99
Prefar + Prowl + Paraquat	4 + 1.5 + .5	0	90	97	83	100
Sinbar + Surflan + Paraquat	1 + 1.5 + .5	25	98	100	80	98
Devrinol 50wp + Paraquat	4 + .5	0	58	70	80	99
Devrinol 50DF + Paraquat	4 + .5	0	63	73	78	98
Devrinol 50wp + Sinbar + Paraquat	4 + 2 + .5	0	100	100	75	100
Devrinol 50DF + Sinbar + Paraquat	4 + 2 + .5	0	100	100	82	100
Check	---	0	0	0	0	0

Ratings: 0 = No herbicide effect, 100 = all plants eliminated.

Evaluated: July 5, 1983.

Location: Five miles northwest of Nyssa, Oregon - Owen Frorer.

Plant Conditions:
a. Peppermint was starting spring regrowth.
b. Winter annual had emerged and ranged in size from new seedling to plants with rosettes six inches in diameter.

Application Date: March 21, 1983.

Crop: Peppermint.

Irrigation: Furrow.

Soil Condition:
a. Soil surface dry - subsurface moist.
b. Silt loam texture.

TABLE 7. Percent weed control and crop tolerance ratings from mechanical incorporated herbicides applied in the spring to fall planted spearmint and peppermint. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicides	Rate lbs ai/ac	Crop Injury	Percent Weed Control: Wild Oats	Lambs-quarters	Redroot Pigweed	Barnyard Grass
Sinbar + Oil[1]	1.0	0	99	90	88	93
Sinbar + Oil	2.0	0	100	97	95	98
Devrinol wp	2.0	0	0	85	86	97
Devrinol wp	4.0	0	0	88	93	98
Devrinol DF	2.0	0	0	70	75	83
Devrinol DF	4.0	0	0	92	93	95
Devrinol wp + Sinbar + Oil	2 + 1	0	100	98	98	100
Devrinol DF + Sinbar + Oil	2 + 1	0	100	98	95	97
Sinbar + Prowl + Oil	1 + 1.5	10	100	98	98	99
Prowl	2	20	0	98	96	99
Prefar	4	0	0	70	82	93
Prefar + Sinbar + Oil	4 + 1	0	100	98	97	99
Dual	4	22	0	93	94	99
Surflan	1.5	45	0	85	88	90
Sonalan	1.5	10	0	98	95	98
Check	---	0	0	0	0	0

[1]Activated oil was added with all Sinbar treatments at a rate of one quart per acre.

Ratings: 0 = No herbicide effect, 100 = all plants eliminated. Evaluated: July 10, 1983.

Crop: Spearmint and peppermint, planted late November 1982. Application Date: April 29, 1983.

Soil Condition:
a. Original planting beds harrowed-off then the field was recorrugated in the spring with a rotary corrugator before the herbicides were applied.
b. Herbicides were incorporated with a rotary hoe. The rotary hoe was run over the field twice at a tractor speed of four miles per hour. The second pass was in a direction opposite the first.
c. Soil surface was dry. Field was furrow irrigated the day after the herbicides were incorporated.

Plant Condition:
a. Wild oats three to five leaves.
b. Others - those emerged were killed with the rotary hoe during herbicide incorporation.

TABLE 8. Percent weed control and crop injury ratings from herbicides applied to spearmint as post-harvest applications. Stuart Batt, Oregon Slope, Oregon, 1983

Herbicides	Rate lbs ai/ac	Crop Injury	Percent Weed Control: Redroot Pigweed	Percent Weed Control: Barnyard Grass	Percent Weed Control: Green Foxtail
Goal + Oil[1]	1/3	15	88	25	30
Goal + Oil	2/3	30	99	40	45
Goal + Oil	1	50	100	65	68
Goal + Paraquat + Oil	1 + 1/4	65	100	85	82
Prowl + Paraquat + Oil	2 + 1/4	35	85	70	65
Prowl + Goal + Oil	2 + 1	45	100	88	70
Prowl + Goal + Paraquat	2 + 1 + 1/2	48	100	95	85
Sinbar + Paraquat	1 + 1/4	20	100	80	83
Goal + Fusilade + Oil	1 + 1/4	50	100	99	65
Goal + Poast + Oil	1 + 1/4	45	100	98	98
Prowl + Oil	2	28	80	75	72
Goal + Hoelon + Oil	1/2 + 1.5	18	95	83	88
Goal + Poast + Oil	1/2 + 1/4	20	95	99	97
Goal + Fusilade + Oil	1/2 + 1/4	15	95	99	60
Goal + SC 1084 + Oil	1/2 + 1/4	18	95	96	96
Prowl + Poast + Oil	2 + 1/4	25	83	98	98
Check	---	0	0	0	0

[1]Mor Ac Oil applied at a rate of one quart per acre.

Ratings: 0 = No herbicide effect, 100 = all plants eliminated.

Application Dates: August 1 and 9, 1983.

Evaluated: September 5, 1983.

Crop: Scotch Spearmint.

Harvested: July 21, 1983.

Soil Conditions:
a. Soil surface moist following post-harvest irrigation.
b. Clay-loam texture.

Plant Conditions:
a. Spearmint; two to five inches tall
b. Pigweed; one to five inches tall
c. Grass; regrowth from oil plants four to five inches tall. New emerging one to three inches tall.

ONION VARIETY TEST RESULTS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1983

The onions were planted on April 19, 1983, in silt loam textured soil with 1.3 percent organic matter and a pH of 7.3. Stephens wheat was grown in the field for two years before planting the onion trial. The field was plowed, disced, harrowed, and fall bedded. One-hundred units of phosphorus and 60 units of nitrogen were plowed down. An additional 150 units of nitrogen per acre were sidedressed on June 23.

A total of 47 entries were included in the trial. Each entry was replicated five times. Each plot was two rows wide and 25 feet long. Onion seed was planted at a rate of 12 seeds per linear foot of row and hand-thinned when the onions had two to three leaves to a final stand of four plants per foot of row.

Herbicides applied for weed control included a tank-mix of Dacthal and Ramrod, each applied at a rate of four pounds active ingredient per acre. The herbicide mixture was applied as band treatments over the center of the beds after the beds had been pulled down. The herbicides were soil incorporated using a spike-tooth harrow just before planting. Roundup was applied at onion emergence to control volunteer wheat and other emerged weeds. Prowl was applied on June 30 at a rate of 2.0 pounds active ingredient per acre as a lay-by treatment.

The onions were watered by furrow-irrigation with a water furrow between each row of onions. The onions were watered in alternate rows until mid-June. Thereafter, every furrow received water each irrigation.

Maturity ratings were taken on August 22 and 30, and September 7 and 14. The ratings were expressed as percentages based on the number of plants with tops fallen over within each plot. The number of bulbs with seed heads were counted on September 14 and recorded on a percentage basis.

The bulbs were lifted on September 15 and hand-topped on September 22. Eighteen feet of each 25-foot row was harvested and the bulbs were placed in slatted wooden celery boxes for storage. A total of 10 crates of each variety was stored in a building equipped with forced air ventilation.

On January 9, the onions were removed from storage and graded to determine bulb size, bulb yield, and percent bulbs with storage rot. The amount of neckrot is reported as an average and as rot potential. Average neckrot is calculated as an average for the amount of neckrot occurring in all 10 boxes. Potential neckrot is calculated from the amount of neckrot occurring from a single box containing onions with the most rot. This figure originated because of the variation that occurs in the amount of rot occurring between individual boxes.

Fifty onion bulbs of each yellow variety were taken for laboratory analysis to determine total solids, ring thickness, number of rings, and number of internal hearts.

A second variety trial was conducted with nine onion varieties to determine the effect of a delayed harvest on bulb yield and storage quality. Cultural practices in the delayed harvest trial were the same as those described for the regular harvest, except the late harvest received one extra irrigation and was lifted on October 3, and topped on October 6.

TABLE 1. Results of the 1983 onion variety trial. Malheur Experiment Station, Ontario, Oregon, 1983

Company	Variety	Total	Average Neckrot	Potential Neckrot	+ 4 inch		3-4 inch		2½-3 inch		2's		Maturity Ratings				Bolters
		cwt/ac	%	%	cwt/ac	%	cwt/ac	%	cwt/ac	%	cwt/ac	%	8/22	8/30	9/7	9/14	%
Asgrow	Armada	770	47	71	480	62	263	34	13	2	12	2	5	35	43	58	3.33
	Vega	716	34	45	395	55	285	39	24	4	11	2	9	40	55	70	2.80
	Yula	668	22	26	262	39	288	43	42	6	75	12	90	96	98	99	0.27
	XPH-739	596	28	34	169	28	337	56	56	10	31	5	78	90	95	95	0.53
Crookham	H-78	816	61	69	627	77	169	21	9	1	10	1	2	10	20	25	2.00
	W-13[3]	794	41	56	525	67	210	26	21	3	35	4	1	12	18	25	7.46
	N-76[4]	786	38	46	490	62	252	33	27	3	17	2	12	48	78	85	1.20
	Ringmaker[4]	782	43	53	408	53	304	39	11	1	55	7	10	30	52	68	2.93
	Bronze Wonder	772	47	60	438	57	251	32	15	2	68	9	6	25	30	40	1.86
	Dai Maru	759	31	52	443	59	269	36	22	3	18	2	2	8	18	32	7.47
	Autumn Surprise	732	30	31	340	47	287	39	18	2	87	12	11	36	45	65	3.20
	Big Mac	692	23	26	339	49	278	40	25	4	49	7	3	33	46	65	0.80
	Autumn Beauty	690	25	36	227	33	342	50	26	4	93	13	9	34	52	65	0.53
	Early Shipper	670	29	37	249	37	325	49	19	3	76	11	5	25	43	58	0.67
	Golden Treasure	648	27	32	195	30	354	55	38	6	59	9	5	12	37	46	0.40
	White Delight[3]	579	39	57	118	21	359	62	42	7	57	10	6	28	39	52	0.40
	Challenger "80"	571	17	21	84	16	393	69	53	9	37	6	15	32	65	80	0.27
	White Keeper[3]	568	46	49	97	17	384	68	61	11	25	4	22	43	62	70	0.80
	W-156[2]	564	26	30	78	15	389	69	53	9	40	7	6	11	18	30	0.0
Dessert	Monarch	832	38	38	518	62	263	32	16	2	32	4	2	12	32	50	3.33
	Valdez	820	49	55	577	71	229	28	12	1	2	-	2	6	16	30	1.87
	DEXP 479-3	785	21	22	520	66	255	33	8	1	2	-	2	28	43	62	2.67
	Durango	777	45	61	430	55	288	37	21	3	37	5	2	22	28	35	2.27
	Avalanche[3]	701	50	65	333	47	340	48	21	4	6	1	5	15	22	38	1.20
	Golden Cascade	687	10	13	276	40	362	53	37	5	12	2	82	90	96	99	2.00
	Bullring	680	37	36	269	39	358	53	18	3	32	5	6	22	52	78	1.60
	Magnum	676	22	25	227	34	404	60	34	5	9	1	75	88	93	96	1.20
	Blanco Duro[3]	665	60	62	291	44	328	49	34	5	10	2	2	15	28	35	2.80
	DEXP 592-P	603	22	26	124	20	408	68	59	10	10	2	18	45	78	89	4.00
	DEXP 110-4[2]	586	10	14	95	16	419	72	40	7	32	5	8	40	60	82	0.27
	Carmen[2]	510	17	23	31	6	329	65	102	21	41	8	6	38	62	80	0.0
	DEXP 490-2[1]	827	42	48	645	78	159	19	16	2	7	1	5	15	35	55	0.33
Ferry Morse	X70W6	812	48	63	626	78	181	22	2	-	4	-	22	48	65	83	1.20
	X70W14	790	64	70	584	74	193	25	4	-	9	1	2	14	35	60	0.40
	Spanish Main	716	50	56	334	47	229	32	14	2	139	19	2	15	30	35	1.73
	4PR1[2]	643	15	22	168	26	368	58	47	7	57	9	22	45	65	85	0.13
	X219W6	642	36	42	257	40	345	54	33	5	8	1	7	15	30	45	1.87
Great Western	Colorado No. 6	733	50	58	501	68	201	27	20	3	11	2	-	2	5	12	12.00
	MSC-14	665	23	27	185	28	385	58	25	4	69	10	5	30	45	65	3.60
	White Sweet Spanish	662	62	69	312	47	286	43	31	5	31	5	1	12	16	23	5.20
	WSS (storage strain)[3]	596	19	27	91	15	403	69	43	7	56	9	5	12	18	30	2.13
	MSC-24	565	15	23	55	10	441	78	55	10	12	2	20	65	85	98	1.20
	Early White Globe[3]	491	35	43	22	4	298	62	83	17	82	17	15	28	45	72	0.0
	Southport White Globe[3]	473	22	29	10	2	309	66	93	20	56	12	25	48	78	93	0.0
Moran	MOX 1008	683	41	51	278	41	324	48	22	3	56	8	4	30	52	65	20.50
Quali Sel	Day Brothers (8001)	758	43	56	400	53	282	37	27	4	48	6	3	18	24	38	4.00
Sun Seeds	Cima	634	25	27	197	31	354	57	41	6	40	6	8	38	68	82	0.0
	Mean	681	--	--	290	--	303	--	33	--	36	--	--	--	--	--	---
	LSD (.05)	50	--	--	79	--	52	--	23	--	26	--	--	--	--	--	---
	LSD (.01)	66	--	--	105	--	66	--	31	--	39	--	--	--	--	--	---
	CV (%)	6	--	--	22	--	15	--	21	--	32	--	--	--	--	--	---

[1]Only enough seed to plant two replications. Data for two replications.
[2]Red Bulbs
[3]White Bulbs
[4]Tops fell over quite early but the tops remained green.

Dates: Planted 4-19-83
Last Irrigation 10-3-83
Lifted 10-15-83
Topped 10-22-83
Out of Storage 1-9-84

TABLE 2. Yield and storage quality of late harvested Sweet Spanish Onions. Malheur Experiment Station, Ontario, Oregon, 1983

Variety	Total Yield	Average Neckrot		Potential Neckrot		+ 4 inch		3-4 inch		2½-3 inch		2's	
	cwt/ac	cwt/ac	%	cwt/ac	%	cwt/ac	%	cwt/ac	%	cwt/ac	%	cwt/ac	%
W-133	927	613	66	663	72	732	79	148	16	15	2	32	4
Valdez	775	670	86	704	90	691	89	59	8	1	-	24	3
Durango	859	532	62	574	67	734	85	88	10	5	-	31	4
Dai Maru	861	484	56	522	61	642	74	188	22	4	-	27	3
Vega	852	421	49	448	52	689	81	140	16	8	1	15	2
Golden Treasure	812	410	50	446	55	520	64	213	26	18	2	61	7
Golden Cascade	706	283	40	316	45	397	56	292	41	8	1	9	1
White Delight	546	434	79	447	82	264	48	231	42	29	5	18	3
Cima	614	185	30	227	37	236	38	315	51	40	6	22	4
LSD (.05)	89	150	--	163	--	108	--	72	--	15	-	NS	--
LSD (.01)	120	198	--	207	--	145	--	97	--	22	-	NS	--
CV (%)	9	13	--	16	--	10	--	17	--	18	-	--	--

Lifted October 3, 1983.

Topped October 6, 1983.

Out of Storage January 10, 1984.

TABLE 3. Three year average from onion variety trials (1981, 1982, and 1983). Malheur Experiment Station, Ontario, Oregon, 1983

Company	Variety	Total Yield	Average Neckrot		Potential Neckrot		+ 4 inch		3-4 inch		2¼-3 inch		2's		Maturity Ratings				Bolters
		cwt/ac	cwt/ac	%	cwt/ac	%	cwt/ac	%	cwt/ac	%	cwt/ac	%	cwt/ac	%	1	2	3	4	%
Asgrow	Vega	795	139	17	200	25	504	63	265	33	18	2	7	1	6	23	53	75	0.67
	Yula	656	90	14	128	20	220	34	350	53	46	7	41	6	79	91	96	97	0.19
Crookham	Dai Maru	852	130	15	229	27	534	63	287	34	16	2	13	2	1	6	22	50	3.83
	W-133	852	168	19	433	51	586	69	224	26	13	2	28	3	1	11	25	54	3.19
	Ringmaker	776	141	18	194	25	376	48	345	44	17	2	38	5	12	34	69	83	1.01
	Big Mac	774	96	12	169	22	438	56	279	36	17	2	40	5	3	19	53	74	0.30
	Early Shipper	751	100	13	174	23	404	54	290	38	16	2	40	5	4	20	56	73	0.34
	Golden Treasure	713	80	11	122	17	253	35	391	55	33	5	36	5	3	22	55	71	0.21
	Autumn Beauty	698	80	12	133	19	277	39	335	48	30	4	55	8	9	28	60	76	0.25
	White Delight	623	100	16	151	24	163	26	390	63	40	6	28	5	8	17	46	68	0.37
	White Keeper	560	155	27	188	34	100	18	393	70	34	6	13	2	16	36	66	80	0.40
Dessert	Monarch	884	182	20	228	26	567	64	266	30	17	2	32	4	3	12	32	54	2.50
	Valdez	875	233	27	284	32	631	72	227	26	10	2	6	1	1	3	13	31	1.09
	Durango	842	176	21	254	30	540	64	260	31	18	2	23	3	1	11	26	46	1.60
	Magnum	775	81	10	100	13	444	57	301	39	20	2	9	1	35	61	86	95	0.47
	Golden Cascade	743	54	7	96	13	394	53	315	42	28	4	6	1	68	89	97	98	0.85
	Bullring	741	125	17	174	23	404	54	297	40	24	3	16	2	6	21	62	84	1.20
	Avalanche	726	230	32	349	48	451	62	249	34	15	2	10	1	2	5	16	38	1.49
	Blanco Duro	662	256	39	322	49	284	43	227	34	30	4	6	1	1	7	35	54	2.14
Sun Seed	Cima	715	72	10	95	13	298	42	346	48	32	4	38	5	11	41	74	87	0.0
Moran	MOX 1008	727	124	17	178	24	342	47	334	46	20	3	31	4	3	25	62	78	8.8

TABLE 4. Two-year average from onion variety trials (1982 - 1983). Malheur Experiment Station, Ontario, Oregon, 1983

Company	Variety	Total Yield	Average Neckrot		Potential Neckrot		+ 4 inch		3-4 inch		2¼-3 inch		2's		Maturity Ratings				Bolters
		cwt/ac	cwt/ac	%	cwt/ac	%	cwt/ac	%	cwt/ac	%	cwt/ac	%	cwt/ac	%	1	2	3	4	%
Asgrow	Armada	810	239	29	416	51	506	62	278	34	12	2	13	2	3	24	56	76	2.46
	Vega	766	156	20	231	30	409	53	324	42	23	3	9	1	7	25	53	73	2.25
	Yula	656	90	14	128	20	220	34	350	53	46	7	41	6	79	91	96	97	0.19
	XPH-739	633	104	16	152	24	172	27	397	63	45	7	17	3	51	78	94	95	0.26
Crookham	Dai Maru	850	168	20	304	36	473	55	343	40	20	2	11	1	1	5	20	45	5.38
	W-133	848	210	25	358	42	525	62	268	32	18	2	36	4	1	7	24	48	9.05
	Ringmaker	790	181	23	234	30	350	44	374	47	24	3	40	5	14	34	64	79	1.46
	Big Mac	744	114	15	218	29	354	48	330	44	24	3	36	5	3	19	40	67	0.45
	Early Shipper	724	124	17	214	30	320	44	335	46	22	3	46	6	3	18	54	70	0.51
	Golden Treasure	685	98	14	148	22	224	33	377	55	43	6	41	6	4	10	48	64	0.25
	Autumn Beauty	680	99	14	156	23	209	31	368	54	38	6	63	9	7	25	58	74	0.38
	White Delight	603	133	22	201	33	134	22	384	63	49	8	34	5	5	18	50	68	0.37
	White Keeper	560	155	27	188	34	100	18	393	70	34	6	13	2	16	36	66	80	0.40
Dessert	Monarch	892	225	25	274	31	524	58	318	35	22	2	26	3	1	7	27	49	2.92
	Valdez	850	261	31	309	36	552	65	280	33	10	1	8	1	1	3	15	35	1.62
	Durango	831	220	26	318	38	441	53	338	41	23	3	28	3	1	11	22	39	1.93
	Avalanche	740	248	34	364	49	388	52	325	44	18	2	8	1	2	8	21	48	1.56
	Magnum	732	92	12	110	15	324	44	370	50	27	4	9	1	43	56	84	94	0.65
	Golden Cascade	722	54	7	95	13	292	40	388	54	37	5	6	1	72	87	96	98	1.23
	Bullring	718	154	21	198	27	285	39	383	53	28	4	20	3	6	21	62	83	1.20
	Blanco Duro	662	256	39	322	48	284	43	227	34	30	4	6	1	1	7	34	54	2.14
Sun Seeds	Cima	676	92	14	112	16	238	35	366	54	40	6	31	4	7	32	69	84	0.0
Moran	MOX 1008	702	164	23	235	33	258	37	379	54	25	4	38	5	4	23	60	75	12.7

AN EVALUATION OF HERBICIDES APPLIED IN THE FALL FOR SELECTIVE WEED CONTROL IN SPRING SEEDED SWEET SPANISH ONIONS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1983

Purpose

Prefar herbicide is registered to be applied in the fall for weed control in spring-seeded onions. Prefar is active on summer grasses and redroot pigweed, but does not adequately control many species of annual broadleaf weeds that are a problem in the production of bulb onions. The objective of this trial was to evaluate several herbicides with soil persistence for control of both broadleaf and grass species of weeds and for onion tolerance.

Procedure

Prefar, Prowl, Dual, Pyramin, and Hoelon were applied as band and broadcast treatments on November 16, to land prepared for fall bedding. The sprayed band was 11 inches wide and placed in the center between rows spaced 22 inches apart. The spray was applied on the surface of level soil and the soil on each side of the sprayed band (furrow) was thrown over the banded area leaving the herbicide in a layer at the base of the hilled bed. Two broadcast treatments were evaluated. One broadcast treatment was sprayed on the surface of level soil, then the sprayed area was bedded. The herbicide in the second broadcast treatment was mechanically incorporated to a depth of three inches with a power roto-tiller and then the treated soil was bedded. All beds were single hills spaced 22 inches apart. The soil was thrown to form a peak over the center of each bed. The beds were left in this condition until spring.

The trial was conducted in a field where winter wheat had been grown for two years before initiating this trial. The soil texture was silt loam with a pH of 7.3 and a 1.3 percent organic matter. The land was prepared for bedding by plowing, discing, and harrowing with a spike-tooth harrow to firm and level the soil surface. Each individual plot was four rows wide and 25 feet long and each treatment was replicated three times and arranged at random in a complete block experimental design.

On April 16, the beds were partially leveled with a specially built tool for working down beds. It consisted of a steel beam mounted in front of a heavily constructed steel spike-tooth harrow with furrowing shovels mounted behind the harrow to mark the furrow area so the crop could be planted in the center of each bed. The tool was carried on a three-point hitch and the depth the tool worked was controlled by the tractor's hydraulic system. The bar in front of the harrow removes the soil in the beds leaving them about one-fourth their original height. The teeth of the harrow incorporates the layered herbicide as it tills the soil in preparation of the seed bed for planting.

Bronze Marvel Cultivar of Sweet Spanish Onions was planted on April 18 and the plot area was furrow-irrigated on April 20, and again on April 28. The onions emerged well in check plots and in those plots where the herbicides were not toxic.

The treatments were evaluated on June 3, and June 22, for weed control and crop tolerance. Weed species in the trial area included barnyard grass, green foxtail, redroot pigweed, lambsquarters, and hairy nightshade. Herbicides were applied with a bicycle-wheel plot sprayer equipped with 8003 teejet fan nozzles. Spray pressure was 35 pounds per square inch and water, as the carrier, was applied at a rate of 42 gallons per acre.

The onion bulbs were harvested from the treated plots on September 26 to determine the effects of herbicide treatments on bulb yields and the size of the bulbs.

Results

Herbicides that persisted over winter to control susceptible weed species satisfactorily included Prefar, Nortron, Prowl, Dual, and Hoelon. Ramrod had very little weed control activity in the spring when fall applied. Dacthal was considerably more active than Ramrod, but still did not control weeds at a high enough percentage to be an acceptable treatment fall applied.

Herbicides with both onion tolerance and weed control activity included Prefar, Nortron, and Hoelon. Onions did not have tolerance to Prowl or Dual applied preplant and stands were severely reduced with both herbicides. Prefar was most active on barnyard grass and green foxtail. Prefar gave 85-90 percent control of pigweed and lambsquarters, but did not have any activity on hairy nightshade. Nortron plus Pyramin resulted in 90-plus percent control of each broadleaf weed species at rates of one-plus-three and one-plus-four pounds active ingredient per acre. This combination did not adequately control the grass species. Hoelon persisted to give excellent control of both grass species with excellent onion tolerance. Pyramin alone did not have the herbicidial activity expected. The flowable formulation is suspected to not have the activity that has been observed from the wettable powder formulation.

The onions emerged quicker and the seedlings were slightly larger on the date of evaluation in the plots where Prefar was banded compared to the broadcast applied plots. This temporary effect was probably a result of concentrating a broadcast rate into the bedded row. Incorporating the herbicide before bedding reduced the initial injury symptoms compared to the broadcast soil-surface treatments.

Bulb yields were reduced in the Dual and Prowl plots because of reduced stands. Yields were also reduced in the Ramrod and check plots probably because of early competition from weed growth before the weeds were removed by hand-weeding. The higher bulb yields occurred in the Prefar, Nortron plus Pyramin; Pyramin plus Hoelon; and Prefar plus Pyramin treatments.

In 1984, Nortron, Pyramin, and Hoelon will be evaluated further using different rates of tank-mix combinations. Wettable powder formulation of Pyramin will be used instead of the flowable formulation.

TABLE 1. Percent weed control and crop tolerance ratings from plots treated with herbicides applied in the fall as both band and broadcast treatments on land to be bedded. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicides	Rate	Crop Injury			Pigweed			Lambsquarters			Hairy Nightshade			Barnyard Grass			Green Foxtail		
	lbs ai/ac	B_1	B_2	B_3	B_1	B_2	B_3	B_1	B_2	B_3	B_1	B_2	B_3	B_1	B_2	B_3	B_1	B_2	B_3
Prefar	6	0	13	7	91	94	92	85	93	90	0	0	0	93	98	100	95	98	100
Prefar + Pyramin	3 + 3	0	0	0	83	85	83	85	83	88	30	40	35	75	88	93	82	85	85
Prefar + Pyramin	4 + 4	0	0	0	85	100	92	85	100	100	38	45	45	90	98	98	86	92	92
Nortron + Pyramin	1 + 2	0	0	0	88	88	90	83	89	92	83	88	90	40	82	80	52	80	83
Nortron + Pyramin	1 + 3	0	0	0	92	90	93	88	95	95	92	95	95	62	80	82	60	83	85
Nortron + Pyramin	1 + 4	0	5	3	95	95	96	90	97	98	95	98	96	70	75	75	65	78	80
Prowl	1.5	20	40	28	96	100	98	98	99	100	90	98	100	98	100	100	96	98	99
Prowl	2	42	68	58	100	100	100	100	100	100	96	100	100	99	100	100	98	100	100
Prowl	3	88	85	83	98	100	100	100	100	100	98	100	100	100	100	100	100	100	100
Dual	3	83	98	88	100	100	100	98	100	100	98	100	100	100	100	100	99	100	100
Dual	4	92	100	96	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Pyramin + Hoelon	3 + 1.5	0	0	0	68	72	72	63	66	68	55	62	65	98	100	100	98	100	100
Pyramin + Hoelon	4 + 1.5	0	0	0	75	78	79	72	75	75	65	71	75	96	100	100	98	100	100
Ramrod	9	0	0	0	20	30	35	0	20	20	0	8	10	0	15	18	0	20	25
Ramrod	12	0	0	0	25	40	45	0	28	30	0	12	15	0	20	25	0	23	28
Dacthal	9	0	0	0	72	75	75	70	82	85	68	72	76	68	85	85	63	70	75
Dacthal	12	0	0	0	86	88	90	80	86	89	75	79	82	73	82	85	68	80	83
Control	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Results from June 22 evaluation - Ratings: 0 = no herbicide effect, 100 = plants killed.

B_1 = band applied treatment

B_2 = broadcast surface applied

B_3 = broadcast applied and mechanical incorporated

TABLE 2. The effects of banded and broadcast applications of fall-applied herbicides on bulb yields and size of Yellow Sweet Spanish Onions. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicides	Rates	Bulb Yields and Yield of Bulbs at Various Diameter Size: Total Yield			>3 Inch			2¼-3 Inch			1½-2¼ Inch			2's			<1½ Inch		
	lbs ai/ac	cwt/ac			Percent			Percent			Percent			Percent			Percent		
		B_1	B_2	B_3	B_1	B_2	B_3	B_1	B_2	B_3	B_1	B_2	B_3	B_1	B_2	B_3	B_1	B_2	B_3
Prefar	6	776	743	761	86	82	88	8	10	7	2	3	2	4	5	3	0	0	0
Prefar + Pyramin	3 + 3	759	737	747	82	85	83	11	8	9	1	2	2	6	5	6	0	0	0
Prefar + Pyramin	4 + 4	765	748	759	87	83	85	9	12	10	2	1	2	2	4	3	0	0	0
Nortron + Pyramin	1 + 2	786	768	773	82	84	86	11	9	7	2	2	1	5	5	6	0	0	0
Nortron + Pyramin	1 + 3	792	776	776	85	82	87	9	12	8	1	2	2	5	4	3	0	0	0
Nortron + Pyramin	1 + 4	783	764	772	87	83	86	7	11	9	2	1	1	4	5	4	0	0	0
Prowl	1.5	72	49	56	23	18	21	64	68	65	8	7	9	3	4	3	2	3	2
Prowl	2	51	37	42	20	16	18	62	58	60	12	10	11	3	6	4	3	10	7
Prowl	3	18	13	17	15	12	14	54	50	52	23	21	24	3	8	4	5	9	6
Dual	3	23	16	19	18	16	17	56	52	54	20	21	23	3	6	5	3	5	5
Dual	4	16	12	15	12	10	12	49	45	47	32	30	34	3	6	4	4	9	3
Pyramin + Hoelon	3 + 1.5	748	742	752	86	83	84	9	11	10	2	2	1	3	4	5	0	0	0
Pyramin + Hoelon	4 + 1.5	756	750	761	84	82	86	11	13	8	4	3	3	1	2	3	0	0	0
Ramrod	9	648	678	668	72	78	79	18	15	12	6	5	5	4	2	4	0	0	0
Ramrod	12	667	683	674	74	76	79	20	18	16	5	4	4	1	2	1	0	0	0
Dacthal	9	694	728	714	80	84	83	13	11	12	3	2	3	4	3	2	0	0	0
Dacthal	12	713	733	722	82	85	84	12	10	9	2	3	2	4	2	5	0	0	0
Control	---	619	601	613	76	74	75	16	18	17	5	5	5	2	2	1	1	1	2

B_1 = band applied treatments

B_2 = broadcast surface applied

B_3 = broadcast applied and mechanical incorporated

Bulbs lifted September 16, 1983

Topped September 26, 1983

Harvested area - two rows 22 feet long.

HERBICIDES EVALUATED FOR ONION TOLERANCE AND WEED CONTROL WHEN APPLIED AS PREPLANT AND POSTPLANT MECHANICALLY INCORPORATED TREATMENTS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon

Purpose

To compare herbicidal activity of several herbicides for onion tolerance and weed control when mechanically incorporated as pre- and postplant applications in Yellow Sweet Spanish Onions.

Procedures

Ramrod, Dacthal, and Prefar were applied singly and as tank-mix combinations before and after onions were planted in April 1983. The soil at the experimental site was plowed, disced, harrowed, and bedded during November of 1982. Stephen's variety of winter wheat had been grown on the site for two years before establishing this trail. On April 19, 1983, the fall beds were harrowed, leveling the tops of the beds to approximately one-quarter their original height. The soil on top of the beds was firm and of good seedbed tilth. The preplant treatments were applied in 10-inch bands over the center of the beds. These herbicides were then shallowly incorporated using a spike-tooth harrow. The teeth on the harrow were sloped at about a 45-degree angle, stirring the soil about two inches deep and incorporating the herbicide to a depth of approximately one inch. Special efforts were taken to not pull soil from the herbicide banded area into the furrow during incorporation. After the soil surface was dry (following harrowing), the field was cultipacked to firm the soil surface to conserve soil moisture and prepare the seedbed for planting.

Raw seed of Bronze Marvel variety of Sweet Spanish Onions was seeded on April 20.

The postplant herbicide treatments were applied after planting on April 20, and incorporated in the soil above the planted seed. The onions were planted to a depth of about one inch using a Beck shoe-type drill.

The onions were irrigated in furrows on April 21, to assure enough moisture for onion and weed seed germination and to activate the herbicide.

Rain showers occurred at frequent intervals for the next several days and on May 4, we received 1.37 inches of rain. This amount of rain increased the herbicide activity and definitely affected the weed control obtained from the postplant treatments. Unless rain is received, weed control from postplant treatments is usually not satisfactory.

The treatment effects were evaluated for weed control and crop tolerance on June 2. The onions were hand-weeded and thinned to a spacing of four plants per linear foot of row. The onions were kept free of weeds during the remainder of the growing season.

The onion bulbs were lifted on September 15, and hand-topped on September 26 and 27. The bulbs from each plot were weighed and graded for bulb size and shape to determine the herbicide effects on bulb yield and size.

Each plot was four rows wide and 25 feet long. Each treatment was replicated three times and treatments were randomized in a block-type experimental design. The herbicide treatments were sprayed with a bicycle plot sprayer equipped with a four-nozzle boom. The nozzles were spaced on the boom to be centered over each row. The rows were spaced 22 inches apart.

Results

Onions were tolerant to all herbicides. Onion stands and onion emergence were normal in all plots. Onions in the check plots were stressed because of severe competition from dense populations of broadleaf and grassy-type weeds.

Both preplant and postplant methods of application resulted in excellent weed control. The percent weed control from postplant treatments was enhanced by the amount of rainfall which occurred after the herbicide was applied. Rain is not predictable and generally the more thorough incorporated preplant treatments result in consistent weed control.

Combination tank-mix treatments were superior to herbicides applied singly. Prefar alone was most active on barnyard grass, green foxtail, and pigweed. It controlled 70 to 75 percent of the lambsquarters, but had very little activity on hairy nightshade. Ramrod controlled the grasses, pigweed, and lambsquarters, but did not control hairy nightshade as well as Dacthal. Of the single herbicide treatments, Dacthal was most active on all weed species. Ramrod and Dacthal combinations were better for control of all weed species than were combinations of Prefar plus Ramrod.

Herbicide treatments did not reduce onion yields or bulb sizes. Bulb yields were slightly less in the check plot. This was probably measured as a result of the injury from weed populations in these plots and the mechanical damage done to the onions when the weeds were removed during hand-weeding.

TABEL 1. Percent weed control and crop tolerance to onions from herbicides applied as preplant and postplant mechanical incorporated treatments. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicide	Rate	Crop Injury		Percent Weed Control[1]									
				Hairy Nightshade		Pigweed		Lambs-quarters		Barnyard Grass		Green Foxtail	
	lbs ai/ac	pre	post	pre	post	pre	post	pre	post	pre	post	pre	post
Prefar	6	4	3	20	15	90	88	78	75	96	94	97	93
Ramrod	9	0	0	62	60	86	84	82	80	92	91	94	92
Dacthal	9	3	2	80	78	89	87	86	85	89	90	92	94
Ramrod + Prefar	4 + 4	0	0	83	78	91	82	91	82	89	87	89	86
Ramrod + Prefar	6 + 6	5	3	88	83	96	94	93	88	96	96	98	98
Ramrod + Dacthal	4 + 4	3	2	86	85	93	94	96	97	96	98	97	98
Ramrod + Dacthal	6 + 6	7	3	97	98	98	98	97	97	98	98	98	98
Check	---	0	0	0	0	0	0	0	0	0	0	0	0

Pre = preplant incorporated

Post = postplant incorporated

Evaluated June 2, 1983

[1] Ratings: 0 = no herbicide effect, 100 = all plants killed.

TABLE 2. Bulb yields and bulb sizes from herbicides applied as preplant and postplant mechanical incorporated treatments. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicides	Rate	Total Yield		- Total Bulb Yields and Yield of Various Size Bulbs (cwt/ac)- 4 Inch		3-4 Inch		$2\frac{1}{4}$-3 Inch		$1\frac{1}{2}$-$2\frac{1}{4}$ Inch		2's	
	lbs ai/ac	pre	post	pre	post	pre	post	pre	post	pre	post	pre	post
Prefar	6	778	788	126	132	456	475	166	142	22	27	8	12
Ramrod	9	801	791	137	129	472	464	149	160	32	29	11	9
Dacthal	9	792	798	152	137	468	471	127	151	35	31	10	8
Ramrod + Prefar	4 + 4	784	794	140	131	461	458	147	172	27	22	9	11
Ramrod + Prefar	6 + 6	796	788	146	140	468	472	144	138	26	29	12	9
Ramrod + Dacthal	4 + 4	779	783	139	135	449	454	149	150	31	34	11	10
Ramron + Dacthal	6 + 6	788	779	136	138	457	451	152	154	30	27	13	9
Check	---	701	692	56	65	376	362	186	171	68	76	15	18
LSD (.05)		46	44	29	27	52	56	21	24	19	21	6	8
CV (%)		6.1	6.3	14.2	13.6	11.8	12.2	17.2	16.8	18.8	17.9	21.4	22.2

Bronze Wonder Variety

Pre = preplant incorporated

Post = postplant incorporated

Harvested: Two rows 25 feet long (two center rows of each four-row plot).

HERBICIDES EVALUATED AS POSTEMERGENCE TREATMENTS FOR WEED CONTROL IN SEEDLING ONIONS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon - 1983

Purpose

Three separate trials were conducted. The first trial consisted of two different formulations of Goal and Goal as tank-mix combinations with Ag 98, crop oil, and Dithane. The second trial compared Fusilade, Poast, DPX-6202, Hoe 581, and RE-36290 for grass control. The third trial evaluated Ronstar, Brominal, and Goal for weed control and crop safety when each was tank-mixed with Poast and Fusilade. The third trial also included both formulations of Goal in combination with Ag 98, crop oil, and Dithane.

Procedure

The herbicide treatments were applied on May 26 and 27. The first true leaf on all onions was fully developed and the second true leaf on most onion plants was showing at the base of the first leaf. The onions appeared healthy and were making normal growth. Weed species present were hairy nightshade, redroot pigweed, lambsquarters, and barnyard grass. When the herbicides were sprayed, the height of the largest weeds of each broadleaf species was about two inches. Individual barnyard grass plants ranged from one to three leaves. Air temperature when treatments were applied was 76° and 79°F, respectively, for each day, but the high for both days was 88°F. The soils were moist from an irrigation three days before the herbicides were applied. The onions were not irrigated again until June 2, five and six days following herbicide application. Goal and Goal combinations in experiment number one (Table 1) and the grass herbicides in experiment number two (Table 2) were only applied once. Each of the herbicide treatments in experiment number three (Table 3) were applied twice (repeat treatments). The second application of these repeat treatments (Table 3) was applied on June 6. The onions had developed the second leaf, with the third leaf starting on about 10 percent of the plants. When the second application was applied most of the weeds in several plots had been eliminated by the first herbicide application. These were primarily those plots previously treated with a combination of Poast or Fusilade tank-mixed with Brominal. Nightshade was remaining in the plots previously treated with Ronstar and Goal. It was also noted that Basagran controlled hairy nightshade very well, but was less effective on pigweed and lambsquarters and also caused injury to the onions, resulting in some loss of onion stand.

Individual plots were four rows wide and 25 feet long. Distance between rows was 22 inches. All treatments were replicated three times and treatments within each trial were randomized in blocks and tested in a complete randomized block-type experimental design.

Spray equipment used was a bicycle-wheel plot sprayer equipped with a boom long enough to cover four rows. Four nozzles were on the boom and spaced such that a nozzle was directly over the center of each row in the four-row plots. Spray nozzles used were fan teejects, size 8006. Spray pressure was 35 pounds per square inch. Water, as the herbicide carrier, was applied at a rate of 42 gallons per acre.

Soils were of a silt loam texture with a pH of 7.3 and a cation exchange capacity of 19.8.

Results

Experiment number one - Goal and Goal combinations: Onions were tolerant to both the 1.6 and 2-pound formulations of Goal. Onion tolerance was not affected when Goal was tank-mixed and applied with Ag 98, crop oil, or Dithane. Weed control ratings show that the 2-pound formulation of Goal was slightly more active than the 1.6-pound formulation. This effect was further substantiated with repeat applications of Goal and Goal plus additives in experiment number three. Weed control was not exceptional with any Goal treatment in this trial. Ag 98 enhanced the weed control activity of Goal more than crop oil. Dithane was compatible with Goal, as a spray mixture, but some antagonism occurred and was measured by a reduction in percent weed control. Goal was most active on pigweed and hairy nightshade. It was not effective on lambsquarters, barnyard grass, and green foxtail. Poast and Fusilade were both compatible with Goal and when used as a tank-mix, grass control was significantly increased. In this trial, as in each of the three experiments, it was noted that Fusilade does not have as much activity on green foxtail as Poast. Both Poast and Fusilade were comparable for control of barnyard grass.

Experiment number two - Grass herbicides: Herbicides evaluated for grass control in onions were Fusilade, Poast, DuPont-6202, American Hoechst 581 (33171), and Chevron 36290. Each was evaluated using at least two different rates. Activated crop oil was added to all treatments, except one treatment of Hoe 581. Crop oil was applied at a rate of one quart per acre. Broadleaf weed control was obtained by spraying the plot area with Goal (¼ pound per acre) on May 27, and again on June 4, with Brominal (2/3 pounds per acre). The broadleaf weeds were not controlled by the May 27 application of Goal.

The onions were tolerant to each of the grass herbicides. Chevron's 36290 was very impressive in this trial, resulting in 100 percent control of both barnyard grass and green foxtail. Poast was also an effective treatment for the control of both species of grasses. Fusilade controlled barnyard grass, but was much less active on green foxtail. DuPont-6202 showed equal activity on both barnyard grass and green foxtail, but there were escapes of both grass species. The rates of DuPont-6202 were very low compared to the rates of the other herbicides evaluated. Higher rates of DuPont-6202 need to be evaluated to determine dosages needed for adequate control of these grass species.

Experiment number three - Repeat application of herbicides: Tank-mix combinations of Brominal and Poast gave excellent control of both broadleaf and grassy weeds when applied as repeat treatments. Poast was superior to Fusilade because it controlled green foxtail better. Barnyard grass was controlled equally well with both Poast and Fusilade. Poast and Fusilade may have reduced the activity of Brominal some, but tank-mix combinations were still very effective.

Ronstar was also compatible with both Poast and Fusilade. Ronstar was very active on pigweed and lambsquarters, but hairy nightshade was more difficult to control. Hairy nightshade plants larger than those having four true leaves when the treatments were applied were injured but recovered later and became problem weeds. Ronstar has very little activity on grasses and must be used in combination with a grass herbicide to control grassy weeds. Both Poast and Fusilade gave excellent control of barnyard grass when mixed with Ronstar. As previously observed, Fusilade showed less activity on green foxtail than did Poast.

Goal did not control hairy nightshade or lambsquarters as well as Brominal. It was very active on pigweed and had some activity on the small grasses. As with Brominal and Ronstar, grass control was adequate when either Poast or Fusilade was mixed with Goal. Green foxtail, again, showed tolerance to Fusilade in combination with Goal.

Basagran very effectively controlled hairy nightshade, but did not adequately control the other broadleaf or grassy weeds. Also, permanent onion injury was sustained.

Onions showed good tolerance to Brominal, Ronstar, Goal, Poast, and Fusilade. Some leaf chlorosis and drooping of leaves were noted to onions treated with Brominal. Ronstar and Goal caused tip burn and some necrotic spotting to the tissue of onion leaves. In all cases, the symptoms observed were only of a short duration and were of no consequence to onion bulb production.

TABLE 1. Percent weed control and crop tolerance of Yellow Sweet Spanish Onions treated with Goal and Goal plus additives as postemergence applications. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicides*	Rate lbs ai/ac	Crop Injury	Percent Weed Control: Pigweed	Hairy Nightshade	Lambs-quarters	Barnyard Grass	Green Foxtail
Goal (2)	1/8	0	77	86	63	35	40
Goal (2)	1/4	0	95	91	65	55	63
Goal (1.6)	1/8	0	78	79	40	40	45
Goal (1.6)	1/4	0	90	83	43	35	40
Goal + Ag 98 (1.6)	1/4 + 1/4**	0	93	84	33	63	70
Goal + Crop Oil (1.6)	1/4 + 1 quart	0	88	81	35	48	53
Goal + Dithane (1.6)	1/4 + 2	0	82	82	48	43	50
Goal + Poast (1.6)	1/4 + 1/4	0	87	82	48	87	92
Goal + Fusilade (1.6)	1/4 + 1/4	0	88	80	69	90	47
Brominal (4)	1/2	0	89	100	100	0	0
Ronstar (2)	1.0	0	99	81	100	40	50
Control	---	0	0	0	0	0	0

Evaluated on June 28, 1983.

Ratings: 0 = no herbicide effect, 100 = all plants eliminated.

*Formulated as an emulsifiable concentrate.

** Percent volume to volume.

TABLE 2. Percent grass control and crop injury ratings from herbicides applied to Yellow Sweet Spanish Onions as postemergence applications. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicides	Rate lbs ai/ac	Crop Injury	Percent Weed Control - Barnyard Grass Rep 1	Rep 2	Rep 3	Avg	Green Foxtail Rep 1	Rep 2	Rep 3	Avg
Fusilade	1/8	0	70	70	80	73	10	10	15	12
Fusilade	1/4	0	96	93	90	93	35	30	40	35
Fusilade	3/8	0	100	100	99	99	50	40	40	43
Fusilade	1/2	0	98	99	100	99	50	50	40	47
Poast	1/8	0	93	96	90	93	90	95	80	88
Poast	1/4	0	99	98	99	98	100	100	98	99
Poast	3/8	0	100	100	100	100	100	100	100	100
Poast	1/2	0	100	100	100	100	100	100	100	100
DPX-6202	1/32	0	75	60	90	75	80	60	60	73
DPX-6202	1/16	0	85	85	80	83	90	90	85	88
Hoe 581	1/5	0	80	95	85	87	80	95	85	87
Hoe 581	1/5*	0	85	95	95	92	80	95	95	90
RE-36290	1/4	0	100	100	100	100	100	100	100	100
RE-36290	1/2	0	100	100	100	100	100	100	100	100
Check	---	0	0	0	0	0	0	0	0	0

Evaluated June 28, 1983.

Ratings: 0 = no herbicide effect, 100 = plants all eliminated.

*Activated crop oil was added to all treatments, except this one, at a rate of one quart per acre.

TABLE 3. Percent weed control and crop injury ratings from herbicides applied to Yellow Sweet Spanish Onions as postemergence treatments. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicides*	Rate lbs ai/ac	Crop Injury	Percent Weed Control Pigweed	Hairy Nightshade	Lambs-quarters	Barnyard Grass	Green Foxtail
Ronstar	3/4	0	100	68	100	35	40
Ronstar + Poast	3/4 + 1/5	0	100	66	100	100	100
Ronstar + Fusilade	3/4 + 1/5	0	100	67	100	98	65
Brominal (2)	1/2	0	95	98	100	0	0
Brominal (2) + Poast	1/2 + 1/5	0	94	100	100	98	98
Brominal (2) + Fusilade	1/2 + 1/5	0	95	100	100	97	50
Brominal (4)	1/2	0	93	100	100	0	0
Goal (2) + Ag 98	1/4 + 1/4**	0	95	82	54	82	80
Goal (2) + Crop Oil	1/4 + 1 quart	0	95	78	63	77	78
Goal (2) + Dithane	1/4 + 2	0	86	73	60	50	56
Goal (2) + Poast	1/4 + 1/5	0	93	78	57	98	96
Goal (2) + Fusilade	1/4 + 1/5	0	95	82	72	98	58
Goal (1.6) + Ag 98	1/4 + 1/4**	0	95	86	68	82	83
Goal (1.6) + Crop Oil	1/4 + 1 quart	0	96	80	65	67	72
Goal (1.6) + Dithane	1/4 + 2	0	85	68	40	50	60
Goal (1.6) + Poast	1/4 + 1/5	0	93	65	57	98	96
Goal (1.6) + Fusilade	1/4 + 1/5	0	93	67	60	96	45
Basagran + Crop Oil	1.0	22	47	100	60	0	0
Check	---	0	0	0	0	0	0

Evaluated July 1, 1983.

Ratings: 0 = no herbicide effect, 100 = all plants eliminated.

* Formulated as an emulsifiable concentrate.

** Percent volume to volume

ANNUAL GRASS CONTROL IN YELLOW SWEET SPANISH ONIONS FROM HERBICIDES APPLIED AS POSTEMERGENCE TREATMENTS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon - 1983

Purpose

Barnyard grass (Echinochloa crusgalli) and green foxtail (Setaria viridis) are serious weed problems in onions grown for bulbs. The purpose of this study was to evaluate several grass herbicides for onion tolerance and grass control when applied as postemergence treatments to seedling onions.

Procedure

Bronze Marvel variety of Yellow Sweet Spanish Onion was seeded on April 20 in rows spaced 22 inches apart. The onions were treated with Amaze insecticide at planting time for thrip and root maggot control but did not receive applications of soil active herbicides.

The onions were treated on May 27 with 1/4 lb ai/ac of Goal (Oxyfluorfen), and again on June 6 with 1/2 lb ai/ac of Brominal (Bromoxynil), for control of broadleaf weeds. The grass herbicide treatments were applied on June 4. On this date most of the onions had two true leaves. The size of the grass varied from plants with two leaves to plants having as many as three tillers. All plants were growing vigorously. Some broadleaf weeds were not controlled with Goal and were present when the grass herbicides were applied. One quart of oil concentrate per acre was applied with all grass herbicides except one treatment of Hoe 33171. The treatments were applied with a single-wheel-bicycle plot sprayer. The plots were four rows wide and 25 feet long. A four nozzle boom with a nozzle over the center of each row was used in applying the herbicide treatments. Nozzles used were teejet size 8002. The boom was high enough so the herbicides were applied as broadcast treatments. Water, as the herbicide carrier, was applied at a volume of 26 gallons per acre, using a spray pressure of 40 psi.

The treatments were evaluated on June 24 and July 16 for percent control of each species of grass and for onion tolerance. The data are summarized in an attached table.

Results

Onion tolerance was excellent with each of the herbicides tested. Grass control was better with some herbicides than others. RE 36290 was particularly impressive, resulting in 100 percent control of both green foxtail and barnyard grass. RE 37290 was just as effective at the 1/4 lb rate as at the higher 1/2 lb rate. Poast was also active on both grass species but required higher rates (0.375 lbs ai/ac) than RE 37290 to give equal control. Fusilade was active on barnyard grass and gave nearly 100 percent control at 0.375 lbs ai/ac but was much less effective in controlling green foxtail. Grass control with DPX 6202 was not as complete in this trial as in other trials conducted on the station. Rates may have been too low for control of the larger grassy plants in the trial. Grass control was less effective with Hoe 33171, but Hoe 33171 was only tested at one rate which was lower than the most effective rate of other herbicides evaluated. The addition of oil concentrate with Hoe 33171 did not enhance herbicide activity. The percent grass control with Hoe 33171 was comparable with and without the addition of an activated oil.

TABLE 1. The percent control of grassy weeds and crop injury ratings from herbicides applied as post emergence treatments to seedling Yellow Sweet Spanish Onions. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicides	Rate lbs ai/ac	Crop Injury	Percent Weed Control[1]							
			Barnyard Grass				Green Foxtail			
			Rep 1	Rep 2	Rep 3	Avg	Rep 1	Rep 2	Rep 3	Avg
Fusilade	0.125	0	70	70	80	73	10	10	15	12
Fusilade	0.25	0	96	93	90	93	35	30	40	35
Fusilade	0.375	0	100	100	99	99	50	40	40	43
Fusilade	0.50	0	98	99	100	99	50	50	40	47
Poast	0.125	0	93	96	90	93	90	95	80	88
Poast	0.25	0	99	98	99	98	100	100	98	99
Poast	0.375	0	100	100	100	100	100	100	100	100
Poast	0.5	0	100	100	100	100	100	100	100	100
DPX 6202	0.032	0	75	60	90	75	80	60	60	67
DPX 6202	0.064	0	85	85	80	83	90	90	85	88
Hoe 33171	0.20	0	80	95	85	87	80	95	85	87
Hoe 33171 w/o Oil	0.20	0	85	95	95	92	80	95	95	90
RE 36290	0.25	0	100	100	100	100	100	100	100	100
RE 36290	0.50	0	100	100	100	100	100	100	100	100
Check	---	0	0	0	0	0	0	0	0	0

[1]Ratings: 0 = no herbicide effect, 100 = all plants eliminated.

[2]Data for final evaluation were recorded on July 16.

POTATO VARIETY TRIALS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1983

Purpose

Several experimental lines of potatoes were evaluated for yield, shape, and processing quality when harvested as early varieties. Experimental lines were compared with Norgold and Russet Burbank which are varieties grown for commercial production in this area. The lines evaluated were received from Dr. Joe Pavek's potato breeding program at Aberdeen, Idaho. Processing quality characteristics were evaluated by Ore-Ida Food's research personnel.

Procedure

The potatoes were planted in a field where wheat had been grown for two years before planting potatoes. Each year, the crop residue from the wheat was returned to the soil. The potato seed bed was prepared in the fall by shredding the wheat stubble, discing, moldboard plowing, and bedding. One-hundred units of P_2O_5 and 60 units of N as NH_4NO_3 were applied before plowing. In the spring, the beds were harrowed and the centers of the beds where the potato seed pieces were planted were chiseled to a depth of approximately 16 inches before planting. Size of individual plots varied between the advanced and preliminary trials. Entries in the advanced trial have been previously tested for five years at two locations. Entries in the preliminary trial were only tested for three years at one location. Individual plots in both trials were single row. The plots in the advanced trial were 35 hills long and each entry was replicated four times. Entries in the preliminary trial were 25 hills long and replicated three times.

Lasso was the herbicide used to control weeds. Temik was sidedressed at planting time for insect control. An additional 100 units of nitrogen were sidedressed after potato emergence. The potatoes were watered by furrow-irrigation.

The vines were removed on August 6, one week before harvest, by using a flail beater.

The yield responses and internal defects were recorded at harvest and reported in Tables 1 and 2.

TABLE 1. Tuber yields from advanced early harvest potato variety trials. Malheur Experiment Station, Ontario, Oregon 1983

Entry	U.S. No. 1's 10 oz cwt/ac	%	U.S. No. 1's 6-10 oz cwt/ac	%	U.S. No. 1's 4-6 oz cwt/ac	%	No. 2's 4 oz cwt/ac	Culls 4 oz cwt/ac	Total Yield cwt/ac	Defects[1] Internal	Defects[1] H. H.
1 - A76147-2	240	51	118	25	44	9	40	30	473	1	0
2 - A76260-16	182	41	137	31	49	11	38	33	440	0	3
3 - A77155-4	252	58	71	16	26	6	52	24	434	1	2
4 - NDA 8694-3	129	26	169	34	65	13	88	41	492	2 (pink)	0
5 - Lemhi	206	43	159	33	55	11	32	28	479	3	1
6 - Norgold	149	35	133	31	68	16	20	58	428	0	6
7 - Russet Burbank	42	10	87	22	106	27	49	111	397	1	0
8 - Pioneer (old)	188	43	115	26	45	10	41	44	434	7	0
9 - Pioneer (new)	184	37	167	33	74	15	28	49	501	11	2
LSD (.05) =	46	--	42	--	27	--	28	28	81	--	--
CV (%) =	18	--	22	--	32	--	43	41	12	--	--

[1]Number per 40 tubers.

Planted on April 27, 1983.

Harvested on August 11, 1983.

Fertilizer: P_2O_5 - 100 units plowed down in fall 1982

Nitrogen - 60 units plowed down in fall 1982.

140 units sidedressed at planting time.

Herbicide: Prowl - 2 lbs. ai/ac - preplant incorporated.

TABLE 2. Tuber yields from preliminary early harvest variety trials. Malheur Experiment Station, Ontario, Oregon, 1983

Entry	U.S. No. 1's > 10 oz cwt/ac	%	U.S. No. 1's 6-10 oz cwt/ac	%	U.S. No. 1's 4-6 oz cwt/ac	%	No. 2's > 4 oz cwt/ac	Culls < 4 oz cwt/ac	Total Yield cwt/ac	Defects[1] Internal	Defects[1] H. H.
A - 75478-3	87	34	118	45	58	22	2	26	259	10	5
A - 7683-16	72	21	108	32	84	25	13	58	335	1	0
A - 7742-6	56	16	97	28	76	22	77	35	342	4	4
A - 77230-5	36	19	58	30	48	25	13	35	190	0	0
A - 77262-2	80	30	58	21	40	15	76	17	271	0	4
A - 78102-5	199	54	101	28	33	9	14	18	365	0	1
NDA 1242-2	56	15	170	46	87	23	22	39	373	0	0
TXA 528-5	159	35	155	34	70	15	29	39	453	0	0
A - 74114-4	157	42	87	23	56	15	8	34	378	2	2
Lemhi	173	38	151	33	76	17	22	29	451	0	6
Norgold	137	29	178	38	75	16	29	53	470	1	4
Russet Burbank	10	2	80	18	149	34	12	188	438	0	0
A. Gassiz	18	5	183	48	104	27	6	72	384	0	0
Eric	160	33	207	43	54	11	34	29	485	0	0
LSD (.05) =	45	--	38	--	35	--	43	29	65	--	--
CV (%) =	27	--	18	--	29	--	39	31	10	--	--

[1]Number per 40 tubers.

Planted on April 27, 1983.

Harvested on August 11, 1983.

Fertilizer: P_2O_5 - 100 units plowed down in fall 1982.
Nitrogen - 60 units plowed down in fall 1982.
140 units sidedressed at planting.

Herbicide: Prowl - 2 lbs. ai/ac - preplant incorporated.

FALL APPLICATION OF HERBICIDES FOR WEED CONTROL IN FURROW-IRRIGATED POTATOES

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon

Purpose

To evaluate soil-active herbicides for weed control and selectivity to Russet Burbank potatoes when the herbicides are applied in the fall to the surface of bedded ground.

Procedures

This trial was started in October 1982. The experimental site was on land which had been in Stephens wheat for two consecutive years. After grain harvest, the straw was shredded then the field was disced, corrugated, and irrigated. The irrigation-germinated wheat seed was left on the field during harvest and provided soil moisture for fall tillage. Fall tillage consisted of subsoiling, moldboard plowing, reworking the soil after plowing, and bedding. The beds were formed on 36-inch centers and enough soil was moved with hilling shovels to bring the soil to a peak in the center of the beds. By making the beds large enough to form a peak it assured that the furrows were deep and cultivations during the growing season would not get below the herbicide layer in the water furrow. The herbicides were applied as double-overlap applications over the bedded land on October 28, 1982. Individual plots were nine feet wide and 30 feet long. Two beds 36 inches apart were in the center of each plot. This design leaves a three-foot buffer between adjacent plots. There was a total of 16 herbicide treatments and each treatment was replicated four times and arranged at random in a complete block type experimental design.

The herbicides were left on the soil surface to be activated by winter moisture and received no mechanical tillage for incorporation until planting time in the spring.

On April 22 and again on April 29, 1983, the beds were harrowed with a spike-tooth harrow in preparation for planting Russet Burbank variety of potatoes on May 5. The beds were not harrowed flat and enough of the original furrows remained to serve as markers for tractor wheels so the potato seed pieces were planted in the center of the harrowed-off beds. After planting, the planted beds were rehilled with furrowing shovels mounted in front of and behind a Lilliston rolling cultivator. During the rehilling process the herbicides were incorporated with the soil used to rehill the planted potato rows. The potatoes were layed-by at this time and received no further cultivations.

The soils at the experimental site are classified as Owyhee silt loam with 1.3 percent organic matter, a pH of 7.3, and a cation exchange capacity of 19.3. The herbicides were sprayed with a bicycle plot sprayer equipped with a nine-foot boom. Spray nozzles were fan-type teejets size 8003 and the nozzles were spaced 10 inches apart on the boom spraying the herbicides as double-overlap broadcast applications. Spraying pressure was 35 pounds active ingredients per acre and water, as the herbicide carrier, was applied at a rate of 42 gallons per acre.

The treatments were evaluated for weed control and crop injury on June 6 and August 30. The vines had matured by August 30, and because of vine maturity and less potato foliage a new emergence of weeds occurred. This allowed for an evaluation of herbicide persistence and late season weed control.

On September 6, the plots were harvested and tuber yield and tuber quality were measured.

Results

Weed species were redroot pigweed, lambsquarters, hairy nightshade, and barnyard grass. Evaluations for weed control and crop tolerance were taken on June 6 and August 30. The plots were harvested and the tuber yields and tuber quality measured. Numerical data from the results obtained are reported in Tables 1 and 2.

Prowl at 1.5 pounds active ingredient per acre was not enough material to overwinter and give satisfactory control of all weed species. It was most active on pigweed, lambsquarters, and barnyard grass, and least active on hairy nightshade at this rate. Prowl at 2.0 and 3.0 pounds active ingredient per acre did persist to give good control of all weed species at the time of the June 6 rating and also satisfactory control of all weed species as late as the August 30 evaluation. It was weakest on hairy nightshade, but still was one of the better treatments for the control of this weed species. Dual and Lasso persisted to give good control of all weed species at the June 6 evaluation date, but control declined and ratings were considerably lower at the August 30 evaluation date. Prowl plus Sencor was an excellent treatment when Prowl was used at 2.0 pounds active ingredient per acre in combination with Sencor at 0.5 pound active ingredient per acre. This combination was much less effective when the Prowl rate was reduced to 1.0 pound in combination with Sencor at 0.5 pound. Sonalan shows promise as a fall-applied treatment and resulted in good control of pigweed, lambsquarters, and barnyard grass, at 1.5 pounds active ingredients per acre. It did not control hairy nightshade as well as was expected. It was also evaluated at 3.0 pounds active ingredient per acre and at the higher rate did give better late season control than the lower 1.5 pound rate. Sencor at 0.75 pound active ingredient per acre did not give good weed control. Weed control with Sencor at 1.0 pound was much better. It was most active on pigweed and lambsquarters, with only partial control of hairy nightshade and barnyard grass. It should be used in combination with a herbicide that is effective for control of these two weed species.

Russet Burbank potatoes were tolerant to all herbicide treatments and injury was not noted to either foliage or in reduced tuber yield and quality when compared to hand-weeded control. The lower tuber yields in the weedy control plot and from treatments with reduced weed control were probably because of competition from the existing weeds.

TABLE 1. Percent weed control and crop injury ratings from herbicides applied in the fall to bedded ground for weed control in spring planted furrow-irrigated potatoes. Malheur Experiment Station, Ontario, Oregon, 1982-83

				Percent Weed Control									
Herbicides	Rate	Crop Injury		Pigweed		Lambsquarters		Hairy Nightshade		Barnyard Grass			
	lbs ai/ac	June 6	August 30	June 6	August 30	June 6	August 30	June 6	August 30	June 6	August 30		
Prowl	1.5	0	0	95	88	95	86	73	65	98	90		
Prowl	2.0	0	0	98	95	98	93	95	82	99	95		
Prowl	3.0	0	0	100	100	100	100	98	94	100	100		
Sencor	0.75	0	0	90	82	83	75	60	50	70	55		
Sencor	1.0	0	0	100	95	98	88	80	65	85	83		
Dual	4.0	0	0	96	80	85	74	90	70	98	93		
Dual	6.0	0	0	100	88	93	80	95	78	100	98		
Lasso	4.0	0	0	94	72	80	68	88	65	95	88		
Lasso	6.0	0	0	98	80	85	76	93	72	100	96		
Prowl + Sencor	1 + 0.5	0	0	95	80	95	76	78	65	98	93		
Prowl + Sencor	2 + 0.5	0	0	100	99	100	98	98	88	100	99		
Prowl + Dual	1.5 + 3	0	0	100	99	93	85	95	82	100	95		
Prowl + Lasso	1.5 + 3	0	0	100	95	90	80	92	80	100	95		
Sonalan	1.5	0	0	98	90	95	92	80	65	99	95		
Sonalan	3.0	0	0	100	99	100	97	93	75	100	98		
Control	---	0	0	0	0	0	0	0	0	0	0		

Evaluations: June 6 and August 30, 1983.

Ratings: 0 = No herbicide effect, 100 = all plants eliminated.

TABLE 2. Tuber yields from Russet Burbank potatoes treated with herbicides applied in the fall to bedded land. Malheur Experiment Station, Ontario, Oregon, 1982-83

Herbicides	Rate lbs ai/ac	----- U.S. No. 1's ----- 4-6 oz. cwt/ac	6-10 oz. cwt/ac	≥ 10 oz. cwt/ac	Total No. 1's cwt/ac	U.S.[1] No. 2's cwt/ac	Culls[2] cwt/ac	Total Yield cwt/ac
Prowl	1.5	69	190	121	379	27	21	427
Prowl	2.0	64	185	128	377	28	21	426
Prowl	3.0	68	192	117	377	30	21	428
Sencor	0.75	49	169	84	302	38	39	379
Sencor	1.0	55	169	96	320	33	44	397
Dual	4.0	52	192	100	344	31	41	416
Dual	6.0	48	200	117	365	32	33	430
Lasso	4.0	40	179	90	309	45	41	395
Lasso	6.0	61	185	110	356	37	40	433
Prowl + Sencor	1 + 0.5	69	187	126	382	25	21	428
Prowl + Sencor	2 + 0.5	65	189	131	385	29	21	435
Prowl + Dual	1.5 + 3.0	84	182	114	380	34	21	435
Prowl + Lasso	1.5 + 3.0	68	187	120	374	32	20	426
Sonalan	1.5	68	199	109	375	34	21	430
Sonalan	3.0	68	185	124	377	31	20	428
Hand-weeded check	---	63	176	102	341	47	38	426
Weedy check	---	35	157	61	254	52	68	374
Mean		60	184	109	353	34	31	418
CV (%)		12.2	8.6	9.7	7.5	18.0	10.4	6.4
LSD (.05)		18	26	32	41	18	23	46

[1]U.S. No. 2's - Tubers larger than 4 oz. and with growth cracks and knobs that limit them as number 1's, but not rough enough to be culls.

[2]Culls - Tubers less than 4 oz. size and roughness limiting them as number 1's or 2's.

AN EVALUATION OF INCORPORATED AND SURFACE APPLIED NON-INCORPORATED HERBICIDES FOR WEED CONTROL IN FURROW IRRIGATED POTATOES

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon

Purpose

Several herbicides were applied as preplant incorporated, postplant preemergence incorporated, and as postplant surface applied treatments. Each herbicide and application method was evaluated for weed control and crop tolerance. The potatoes were harvested and tuber yield, size, and quality were determined.

Procedures

Stephens variety of wheat was grown for two consecutive years on the experimental site before this trial was established. After the 1982 wheat harvest, the grain stubble was shredded and the field was then disced, corrugated, and irrigated twice. In early October, 100 pounds of P_2O_5 and sixty pounds of nitrogen were broadcast applied and the field was moldboard plowed. After plowing, the field was tilled and bedded. Row spacing was 36 inches apart and the beds were shaped so that the soil in the center of the beds was thrown high enough to form a peak. The trial area was left in this condition over the winter months.

On April 30, the preplant herbicides were applied as broadcast double-overlap treatments over the top of the shaped beds. The beds were then harrowed with a spike-tooth harrow, flattening the tops of the beds in preparation for planting.

Russet Burbank variety of potato was planted on May 2, and the planted beds rehilled using furrowing shovels mounted in front of and behind a Lilliston cultivator. The preplant treatments were incorporated when the beds were harrowed and rehilled. Individual plots were two rows wide and 30 feet long. A three foot wide buffer area was maintained between adjacent plots to prevent contamination between adjacent plots of herbicides during applications and subsequent tillage operations. Spacing of seed pieces during planting varied between rows. In one row of each plot the seed pieces were approximately nine inches apart; the spacing in the second row was 18 inches. The wider spacing allowed for less shading by potato foliage and a better opportunity for weeds to emerge which allows for a better evaluation of herbicides with soil persistence to control late weed emergence.

The postplant preemergence incorporated treatments were applied on May 25, over the soil surface of rehilled beds. The beds were high and the furrows deep before the herbicides were applied to prevent contaminating the bed tops and bottoms of the furrows with untreated soil during subsequent cultivations. The postplant preemergence incorporated treatments were mechanically incorporated by making two passes with a Lilliston cultivator. The second pass was made in a direction opposite to the first. Tractor speed was four miles per hour and the rolling teeth on the Lilliston were set to run at full depth.

The non-incorporated preemergence treatments were applied on the soil surface of rehilled beds on May 25.

All the plots in the herbicide trial were layed-by on May 25 and received no further cultivations.

The herbicides were applied using a bicycle plot sprayer. Spray nozzles, 8003 teejet, were spaced 10 inches apart on an 8½-foot boom. All treatments were applied as double-overlap-broadcast treatments at a spray pressure of 40 pounds per square inch. Water, as the carrier, was applied at a rate of 38 gallons per acre.

Soils were a silt loam texture with a pH of 7.3. Soil surfaces were dry when all treatments were applied. Air temperature on April 30 was 67°F and 90°F on May 25, when the treatments were applied.

All treatments were evaluated for their effectiveness in controlling various species of weeds and for an injury to crop foliage. Tubers were harvested during the fourth week of September and tuber yields and tuber quality were measured. Harvested area was two rows 25 feet long for each treatment.

Results

The weed species included pigweed (*Amaranthus retroflexus*), hairy nightshade (*Solanum sarrachaides*), lambsquarters (*Chenopodium album*), and barnyard grass (*Echinochloa crusgalli*). The herbicides giving the best control of all weed species in this trial included preplant incorporated and preemergence mechanically incorporated treatments of Sonalan, Sonalan plus Eptam, and Prowl. These treatments controlled at least 98% of all weed species. Single treatments of Eptam, Sutan, Dual, R-40244, PPG-844, and PPG-1013 were not effective on all weed species. Eptam and Sutan, preplant incorporated, were quite ineffective treatments in this trial. Even though they were most active on barnyard grass the control was not considered satisfactory. Eptam preemergence incorporated followed with a surface application of R-40244 did result in adequate weed control. R-40244 was effective on early emerging broadleaf weeds but did not persist to control later emerging redroot pigweed. PPG-844 was most active on pigweed and hairy nightshade. It did not control lambsquarters. PPG-1013 controlled lambsquarters and hairy nightshade with some control of pigweed. A tank-mix combination of Dual plus PPG-844 and R-40244 plus Sencor did enhance overall weed control, but weed control from these combinations was still inferior to control received from the better initially listed herbicide treatments in this study.

The Russet Burbank variety of potato showed good tolerance to all herbicide treatments. Tuber yields were lower with some treatments because of inferior weed control and a competitive effect. It was noted that early season vine senescence did occur in plots treated with R-40244 at the rate of three-fourths and one pound per acre, but the early senescence of vines in these plots probably did not reduce tuber yield or affect tuber quality. Injury symptoms on potato vines in these plots did not occur earlier. Tuber yields and tuber quality from the treatments resulting in season long weed control were exceptionally good this year.

TABLE 1. Percent weed control and crop injury ratings to Russet Burbank potatoes treated with herbicides applied as soil incorporated and soil surface non-incorporated treatments. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicides	Rate lbs/ac	Method Applied	Crop Injury				Percent Weed Control[1] Pigweed				Hairy Nightshade				Lambsquarters				Barnyard Grass			
			Replications 1	2	3	Avg	Replications 1	2	3	Avg	Replications 1	2	3	Avg	Replications 1	2	3	Avg	Replications 1	2	3	Avg
Eptam	4	ppi	0	0	0	0	85	85	75	82	65	65	65	65	82	85	80	82	78	80	80	79
Sutan	4	ppi	0	0	0	0	30	60	20	37	20	35	30	28	25	25	25	25	88	85	90	88
Eptam + PPG 844	3 + 0.2	ppi + pes	0	0	0	0	100	100	100	100	85	80	85	83	50	40	50	47	65	70	75	70
Eptam + PPG 844	3 + 0.3	ppi + pes	0	0	0	0	100	98	99	99	85	90	90	88	45	55	60	53	65	50	75	63
Eptam + PPG 844	3 + 0.5	ppi + pes	0	0	0	0	100	100	100	100	93	95	95	94	45	80	80	68	65	70	70	68
Prowl	2	ppi	0	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Eptam + R-40244	3 + 0.5	pei + pes	0	0	0	0	100	100	95	97	100	95	95	96	100	100	98	98	100	95	98	97
Sonalan	1.31	pei	0	0	0	0	100	100	100	100	96	98	100	98	100	100	100	100	100	100	100	100
Sonalan	1.50	pei	0	0	0	0	100	100	100	100	90	98	99	96	100	100	100	100	100	100	100	100
Sonalan + Eptam	0.75 + 2	pei	0	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Prowl	2	pei	0	0	0	0	100	98	100	99	92	95	100	96	100	96	100	98	100	98	100	99
Dual	4	pei	0	0	0	0	90	92	90	91	95	95	95	95	75	83	80	79	92	95	93	93
R-40244	0.5	pes	0	0	0	0	90	98	90	93	90	98	98	95	100	100	100	100	0	30	15	15
R-40244	0.75	pes	0	0	0	0	93	95	90	93	88	95	93	92	100	100	100	100	0	0	0	0
R-40244	1.0	pes	0	0	0	0	95	95	95	95	93	95	95	94	98	100	100	99	0	20	10	10
R-40244 + Sencor	0.5 + 0.5	pes	0	0	0	0	95	85	80	87	100	95	90	95	98	99	95	97	96	98	98	97
PPG 844	0.2	pes	0	0	0	0	92	98	99	96	90	90	93	91	0	0	0	0	0	0	15	5
PPG 844	0.3	pes	0	0	0	0	100	100	100	100	93	96	95	95	0	20	25	15	0	0	0	0
PPG 844	0.5	pes	0	0	0	0	99	100	100	99	98	100	100	99	30	50	45	42	0	0	0	0
PPG 1013	0.1	pes	0	0	0	0	95	92	90	93	99	95	98	97	96	95	95	95	0	0	0	0
PPG 1013	0.3	pes	0	0	0	0	98	96	92	95	99	95	98	97	99	95	100	98	0	0	0	0
PPG 844 + Dual	0.3 + 2	pes	0	0	0	0	100	100	100	100	98	92	96	95	80	85	80	82	95	93	98	95
PPG 844 + Dual	0.5 + 2	pes	0	0	0	0	100	100	100	100	98	99	100	99	80	85	85	82	95	93	99	95
Check	---	---	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Evaluated August 29, 1983.

Ratings: 0 = no herbicide effect, 100 = plant kill.

TABLE 2. Potato tuber yields of Russet Burbank potatoes treated with herbicides applied as soil incorporated and soil surface non-incorporated treatments. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicides	Rate lbs/ac	Method Applied	Potato Tuber Yields (cwt/ac) No. 2's	Culls	6-10 oz	10 oz	Total No. 1's %	Total No. 1's cwt/ac	Total Yield
Eptam	4	ppi	152	24	51	141	52	192	368
Sutan	4	ppi	125	19	46	127	54	173	317
Eptam + PPG 844	3 + 0.2	ppi + pes	144	21	49	138	53	187	352
Eptam + PPG 844	3 + 0.3	ppi + pes	152	16	64	139	55	203	371
Eptam + PPG 844	3 + 0.5	ppi + pes	139	18	62	143	57	205	362
Prowl	2	ppi	170	27	69	158	54	227	424
Eptam + R-40244	3 + 0.5	pei + pes	161	28	72	164	56	236	425
Sonalan	1.31	pei	168	24	70	161	55	231	423
Sonalan	1.50	pei	159	28	65	169	56	234	421
Sonalan + Eptam	0.75 + 2	pei	165	29	68	164	54	232	426
Prowl	2	pei	157	27	73	168	58	241	425
Dual	4	pei	157	24	65	153	55	218	399
R-40244	0.5	pes	164	23	61	145	52	206	393
R-40244	0.75	pes	160	24	62	148	53	210	394
R-40244	1.0	pes	162	26	64	156	54	220	408
R-40244 + Sencor	0.5 + 0.5	pes	166	29	68	169	55	237	432
PPG 844	0.2	pes	145	16	51	140	54	191	352
PPG 844	0.3	pes	151	18	55	146	54	201	370
PPG 844	0.5	pes	149	20	60	144	55	204	373
PPG 1013	0.1	pes	156	20	64	148	55	212	388
PPG 1013	0.3	pes	159	21	63	145	54	208	388
PPG 844 + Dual	0.3 + 2	pes	170	29	65	162	53	227	426
PPG 844 + Dual	0.5 + 2	pes	164	27	68	167	55	235	426
Weeded Check	---	---	156	22	64	158	56	222	400
Weedy Check	---	---	81	15	20	21	30	41	137
LSD (.05)			48	7	23	56	--	66	87
CV (%)			21	17	19	12	--	10	9

SUGAR BEET VARIETY TESTING RESULTS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1983

Purpose

The 1983 variety trial included a total of 43 entries. Because of the large number of entries, two separate trials were initiated. One trial consisted of commercial varieties, the other trial included those varieties classified as semi-commercial. The semi-commercial trial included commercial varieties which were used as standards for comparisons. Seed for testing was received from American Crystal Sugar Company, Betaseed Incorporated, Great Western Sugar Company, Holly Sugar Company, Miller Research, and The Amalgamated Sugar Company. Each entry was evaluated for root yield, percent sucrose, percent extractable sugar, and tolerance to curly top virus. Yields of recoverable sugar were calculated.

Procedure

The trial was conducted at the Malheur Experiment Station. Stephens wheat had been grown on the site for two years before planting the sugar beet variety trial. The field was plowed in the fall of 1982. One hundred pounds of P_2O_5 and 60 pounds of nitrogen per acre were applied as a broadcast treatment and plowed under. In the spring, 140 pounds of nitrogen (NH_4SO_4) per acre was sidedressed after thinning, when the beets had six to eight leaves. A combination of Nortron and Hoelon (2.0 + 1½ pounds active ingredients per acre) was applied in the spring and incorporated with a spike-tooth harrow before planting.

The sugar beets were planted on April 13 and 14. Each variety was replicated eight times in plots which were four rows wide and 28 feet long. The trial was planted with cone seeders which were mounted on John Deere Model 71 flex-planting units. Seed for each row was individually packaged with 200 seeds per packet.

The sugar beets were thinned the second week of May to an eight-inch spacing between plants. In mid-July, Bayleton was applied as a broadcast treatment at a rate of eight ounces active ingredient per acre using a ground sprayer for protection against powdery mildew. On September 6, the sugar beets were aerial sprayed with Orthene to control and protect foliage from injury by army worms. Irrigation was by furrow, and water was applied to each corrugate between every row each irrigation.

The plots were harvested on October 19, 20, and 21. Tops were removed with a rubber flail beater and the crowns were clipped with a scalping knife. The roots from the two center rows of each four-row plot were dug with a single-row lifter-type harvester and weighed to determine yields. A sample of seven beets was taken from each of the two harvested rows to determine percent sucrose and conductivity readings. The coded samples were analyzed at the Amalgamated Sugar Company Research Laboratory in Nyssa, Oregon.

Soil characteristics were a silt loam texture, pH 7.4, and organic matter of 1.3 percent. The data were analyzed as a complete randomized block experimental design.

TABLE 1. Sugar beet harvest date and variety interaction study. Malheur Experiment Station, Ontario, Oregon, 1983

Variety	Root Yield 9/26	Root Yield 10/26	Sucrose 9/26	Sucrose 10/26	Conductivity 9/26	Conductivity 10/26	Extractable Sugar 9/26	Extractable Sugar 10/26	Recoverable Sugar 9/26	Recoverable Sugar 10/26
	T/A		%				%		T/A	
R-103	44.6	46.4	16.03	17.92	999	786	82.6	85.8	5.85	7.06
WS-57	46.0	50.4	16.31	17.82	961	836	83.2	85.1	6.25	7.67
Mono Hy 2017	47.9	51.2	15.04	16.59	955	826	83.0	85.0	6.00	7.22
0295-02	50.3	53.8	15.18	16.85	994	792	82.6	85.6	6.29	7.76
Mono Hy R_1	47.6	51.2	14.93	16.03	914	810	83.6	85.2	5.95	7.01
WS-76	47.6	51.1	15.08	16.63	989	830	82.6	85.0	5.89	7.22
LSD (.05)	2.4	2.3	0.54	0.68	56	NS	NS	NS	NS	0.49
LSD (.01)	3.2	3.2	0.72	0.89	---	---	----	----	----	----
CV (%)	6.3	3.9	4.2	4.9	7.1	9.7	1.1	1.1	6.5	5.6
Grand Mean	47.4	50.6	15.43	16.97	969	813	82.6	85.3	6.03	7.32

Planting Date: April 13 and 14.

Harvest Dates: September 26 and October 26.

TABLE 2. Fungicide treatments for powdery mildew control in sugar beets. Malheur Experiment Station, Ontario, Oregon, 1983

Fungicide	Rate Per Acre	Root Yield T/A	Sucrose %	Conductivity	Extractable Sugar %	Recoverable Sugar T/A
Bayleton (Broadcast	4 ozs.	48.6	16.80	733	86.3	7.04
Bayleton (Broadcast)	8 ozs.	49.0	16.58	790	85.5	6.96
Bayleton (Broadcast)	4 + 4 ozs.	49.4	16.62	754	86.1	7.07
Bayleton (Crown)	8 ozs.	48.3	16.80	723	86.5	7.02
DPX H6573	2 ozs.	49.7	16.65	791	85.6	7.07
DPX H6573	4 ozs.	49.2	16.87	753	86.1	7.15
Powdered Sulfur	40 lbs.	49.2	17.08	712	86.6	7.28
Check	---	49.0	16.52	766	85.8	6.94
LSD (.05)		NS	NS	NS	NS	NS
CV (%)		3.6	2.3	6.4	1.0	4.2

Crown treatment and the first application of broadcast treatments were applied on July 19.

Single applications of the broadcast treatments were applied on August 10.

There was a very low incidence of powdery mildew infection, therefore, the effectiveness of the fungicides for control could not be evaluated.

TABLE 3. Summary of data from sugar beet variety trial (commercial varieties) Malheur Experiment Station, Ontario, Oregon, 1983

Company	Variety	Root Yield T/A	Sugar Content %	Conductivity	Extraction %	Calculated Recoverable Sugar T/A	Curly Top Ratings[1]
American Crystal	ACH-173	46.1	15.48	884	84.1	6.00	1.0
American Crystal	ACH-130	49.4	14.01	1116	80.8	5.60	4.3
American Crystal	ACH-31	47.2	14.42	1016	82.1	5.60	2.7
Betaseed	8654	48.6	15.21	941	83.1	6.13	2.7
Betaseed	9421	49.8	14.44	1079	81.2	5.84	4.7
Betaseed	7463	46.2	14.29	1061	81.4	5.39	4.3
Great Western	R_2	47.4	14.70	929	83.4	5.83	3.3
Great Western	149	46.6	14.75	937	83.1	5.71	2.3
Great Western	CX_2	46.8	14.24	1001	82.1	5.46	3.0
Great Western	R_1	47.3	14.40	936	83.0	5.65	3.0
Great Western	42	44.5	14.06	979	82.5	5.16	3.0
Holly	HH-30	51.2	14.40	1055	81.5	6.00	4.7
Holly	HH-36	45.5	14.05	993	82.4	5.25	3.0
Holly	HH-28	44.3	14.22	954	83.0	5.24	2.7
Holly	HH-37	44.5	14.20	1066	81.4	5.10	3.7
Holly	HH-35	47.2	13.41	1098	80.6	5.10	2.0
Mart	Hybrid 8	46.6	14.83	878	84.0	5.79	1.0
Mart	Mart	46.4	14.99	847	84.5	5.75	1.7
TASCO	WS-88	48.2	15.21	901	83.8	6.13	2.3
TASCO	WS-57	45.1	15.49	972	82.9	5.79	2.7
TASCO	WS-76	46.1	14.98	964	82.9	5.71	2.3
LSD (.05)		2.3	0.61	100	1.08	0.37	---
LSD (.01)		3.1	0.80	131	1.42	0.48	---
CV (%)		5.1	4.27	9.4	1.3	6.72	---
Grand Mean		46.9	14.56	975	82.55	5.62	---

[1]Curly Top readings taken August 24 and 25, 1983.

TABLE 4. Summary of data from sugar beet variety trial (semi-commercial varieties) Malheur Experiment Station, Ontario, Oregon, 1983

Company	Variety	Root Yield T/A	Sugar Content %	Conductivity	Extraction %	Calculated Recoverable Sugar T/A	Curly Top[1] Ratings
American Crystal	ACH-31	48.0	15.20	964	83.0	6.06	2.7
American Crystal	C80-491	50.4	14.81	1100	81.0	6.05	3.0
American Crystal	C80-493	48.5	14.86	1075	81.4	5.86	4.0
American Crystal	C81-272	47.8	14.51	1068	81.4	5.65	1.3
Betaseed	2C0112	52.0	15.93	981	82.8	6.87	5.0
Betaseed	2C0109	49.7	15.66	1071	81.6	6.35	5.5
Betaseed	2A0136	45.5	15.83	1038	82.0	5.90	5.7
Betaseed	9421	47.3	15.96	1102	81.0	5.78	4.7
Great Western	Mono Hy 176	52.6	15.09	930	83.4	6.62	1.0
Great Western	Mono Hy 249	51.2	15.40	947	83.2	6.56	3.0
Great Western	Mono Hy 159	47.9	16.28	915	83.8	6.52	5.3
Great Western	Mono Hy 4545	48.5	15.88	918	83.7	6.44	3.0
Great Western	Mono Hy 220	48.1	15.48	951	83.2	6.29	3.3
Great Western	Mono Hy R_1	47.6	15.13	913	83.6	6.02	3.0
Great Western	Mono Hy 4775	48.1	15.08	1045	81.8	5.92	5.3
Great Western	Mono Hy 1255	48.6	14.16	1131	80.5	5.55	2.0
Holly	7336-03	50.7	15.50	909	83.8	6.59	4.0
TASCO	WS-88	51.0	16.14	876	84.3	6.92	2.3
TASCO	9360-02	47.5	16.39	835	84.9	6.60	2.3
TASCO	9361-02	47.3	16.03	891	84.1	6.37	1.3
TASCO	0299-02	50.4	15.14	1015	82.2	6.31	1.7
TASCO	WS-76	46.5	16.11	914	83.7	6.28	2.3
LSD (.05)		2.1	0.68	92	1.1	0.43	---
LSD (.01)		2.7	0.89	119	1.4	0.56	---
CV (%)		4.3	4.5	6.4	2.0	6.7	---
Grand Mean		48.87	15.43	976	82.74	6.25	---

[1] Curly Top readings taken August 24 and 25, 1983.

TABLE 5. Summary of sugar beet variety trials -- (1981, 1982, and 1983) -- Malheur Experiment Station, Ontario, Oregon, 1983

Company	Variety	Root Yield T/A	Sugar Content %	Conductivity	Extraction %	Calculated Recoverable Sugar T/A	Curly Top Ratings
American Crystal	ACH-130	47.0	15.29	1024	82.2	5.90	4.43
American Crystal	ACH-31	44.6	15.76	919	83.6	5.89	3.38
Betaseed	8654	47.7	15.86	885	84.0	6.37	3.16
Betaseed	9421	47.1	15.46	985	82.7	6.03	5.46
Great Western	149	47.0	15.64	896	84.0	6.21	3.17
Great Western	R_2	45.6	15.67	860	84.5	6.04	3.40
Great Western	CX_2	46.8	15.17	930	83.3	5.94	3.04
Great Western	R_1	45.2	15.48	855	84.4	5.90	3.59
Holly	HH-30	47.6	15.38	990	82.6	6.05	5.01
Holly	HH-28	45.3	15.00	913	83.6	5.71	2.38
Holly	HH-36	44.7	15.09	915	83.6	5.66	3.26
Mart	Hybrid 8	44.3	15.77	810	85.1	5.95	1.41
TASCO	WS-88	48.8	16.12	858	84.6	6.65	2.65
TASCO	9360-02	46.9	16.66	819	85.2	6.65	3.10
TASCO	9361-02	46.7	16.28	859	84.6	6.43	2.21
TASCO	WS-76	45.6	16.05	894	84.0	6.16	3.10

TABLE 6. Two-year summary of sugar beet varieties -- (1982 and 1983) -- Malheur Experiment Station, Ontario, Oregon, 1983

Company	Variety	Root Yield T/A	Sugar Content %	Conductivity	Extraction %	Calculated Recoverable Sugar T/A	Curly Top Ratings
American Crystal	ACH-130	46.5	14.80	1070	81.5	5.60	4.82
American Crystal	ACH-31	43.2	15.19	968	82.9	5.42	3.52
Betaseed	8654	46.1	15.48	932	83.4	5.93	3.02
Betaseed	9421	46.3	15.00	1043	81.7	5.67	5.18
Betaseed	7463	43.0	15.28	1018	82.2	5.40	4.82
Great Western	R_2	44.9	15.21	916	83.6	5.72	3.32
Great Western	R_1	43.2	15.08	904	83.6	5.48	3.66
Great Western	149	43.2	15.12	938	83.2	5.42	3.15
Great Western	CX_2	44.2	14.80	974	82.6	5.39	2.84
Holly	HH-30	46.7	14.88	1044	81.8	5.66	5.02
Holly	HH-35	45.5	14.26	1052	81.5	5.26	2.34
Holly	HH-28	43.0	14.55	954	83.1	5.20	2.68
Holly	HH-36	42.6	14.49	966	82.8	5.11	3.34
Mart	Hybrid 8	43.3	15.33	860	84.4	5.58	1.34
TASCO	WS-88	47.6	16.02	891	84.1	6.41	2.82
TASCO	9360-02	45.6	16.50	844	84.8	6.37	3.15
TASCO	9361-02	45.6	16.02	898	84.0	6.14	2.32
TASCO	WS-76	43.4	15.58	946	83.2	5.60	2.98

AN EVALUATION OF HERBICIDES APPLIED IN THE FALL FOR WEED CONTROL IN SPRING PLANTED SUGAR BEETS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon

Purpose

Several herbicides were applied in the fall as band and broadcast treatments as the land was being tilled into beds. The purpose of the trial was to compare each herbicide and method of application for weed control and crop tolerance in spring seeded sugar beets.

Procedure

Herbicides applied on November 8, 1982, to determine if these materials would overwinter in the soil to control weeds in spring-seeded sugar beets included Ro-Neet, Ro-Neet plus Extender, Nortron, Pyramin, Eptam, Eptam plus Extender, and Hoelon. Each herbicide was evaluated by three methods of application. The methods were band, broadcast non-incorporated, and broadcast incorporated.

The band treatments were 11 inches wide and applied on the surface of level soil in the center between furrows spaced 22 inches apart. After the banded herbicides were applied, the soil from the furrow area was used to cover the herbicide and form a peak-shaped bed, leaving the herbicide in a layer at the base of the bed. The two broadcast treatments differed by one being incorporated in the upper two to three inches of soil with a rotary corrugator before being bedded on 22-inch centers and the second broadcast treatment being left on the soil surface and bedded without being tilled before bedding.

Individual plots were four rows wide and 25 feet long. Each treatment was replicated three times and randomly arranged in a block-type experimental design. The treatments were applied with a bicycle plot sprayer. Four nozzles were mounted on a boom and spaced 22 inches apart with a nozzle over the center of each row in the four-row plots. The spray nozzles were teejet size 8004. Spray pressure was 35 pounds per square inch and water, as the carrier, was applied at a rate of 42 gallons per acre.

On April 15, 1983, the beds formed in the fall were pulled down using a steel harrow in preparation for planting. Amalgamated Sugar Company's beet variety WS-76 was planted on April 16, using a John Deere Model 71 flex-planter. The sugar beets were furrow-irrigated after planting to supply an adequate supply of soil moisture for uniform seed germination and seedling emergence.

The treatments were evaluated on June 1, for weed control and crop tolerance. Weed species included hairy nightshade, lambsquarters, pigweed, kochia, and barnyard grass.

The plot area was weeded and the sugar beets thinned to approximately an eight-inch spacing. The plots were then cared for through the growing season and harvested in October to measure root yields and sucrose content.

Results

Nortron overwintered very well at all rates and methods of application to control hairy nightshade, cutleaf nightshade, black medic, pigweed, lambsquarters and kochia. Nightshade control was much better than expected. The control must have been a result of optimum soil moisture and thorough incorporation. Weed control in the rows of band treated plots was as effective as in broadcast treated plots. Present weed control did not differ between broadcast incorporated and non-incorporated treatments, but sugar beets were more tolerant to herbicides in the incorporated treatments when the herbicides were broadcast applied. Ro-Neet also persisted and controlled nightshades, grasses, and pigweed. The extender with Ro-Neet and Eptam did not enhance weed control or chemical persistence in the soil. Ro-Neet was effective at both the three and four pounds active ingredient per acre rates. Eptam did not persist in the soil overwinter. Very little herbicide activity was obtained from Pyramin. The inactivity of Pyramin was contributed to the fact that small precipitates were present in the flowable formulations which were probably the active ingredient. Antor was not active on nightshade, lambsquarters, or kochia, and some grass and pigweed were left in these plots which indicates it may not overwinter to be fully active in the spring. Hoelon did overwinter to give complete grass control.

Weeds emerging with the sugar beets and competing until weeded at thinning time reduced root yields, percent sucrose, and the yield of sugar recovered per acre. All yield factors measured were highest for those treatments resulting in the best percent weed control. These treatments included Ro-Neet, Nortron, and Nortron in tank-mix combinations with Pyramin, Hoelon, or Antor.

TABLE 1. Percent weed control and crop tolerance ratings for herbicides applied in the fall as band and broadcast applications for selective weed control in sugar beets planted the following spring. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicides	Rate	Crop Injury[1]			Percent Weed Control[1]: Hairy Nightshade			Lambsquarters			Pigweed			Kochia			Barnyard Grass		
	lbs ai/ac	B_1	B_2	B_3	B_1	B_2	B_3	B_1	B_2	B_3	B_1	B_2	B_3	B_1	B_2	B_3	B_1	B_2	B_3
Eptam	3	0	0	0	38	50	35	20	25	22	42	44	46	15	18	17	33	36	35
Eptam	4	0	0	0	48	56	53	40	35	40	52	55	55	22	25	24	44	47	45
Eptam + Extender	3	0	0	0	35	46	42	18	22	20	45	43	47	15	15	15	25	33	30
Eptam + Extender	4	0	0	0	52	61	56	40	45	42	50	55	55	25	28	26	50	48	48
Ro-Neet	3	0	7	4	92	96	95	80	82	80	92	90	94	54	57	56	83	86	85
Ro-Neet	4	5	10	8	99	100	99	86	84	83	96	96	96	72	73	73	96	94	97
Ro-Neet + Extender	3	0	8	4	94	94	92	82	84	83	92	90	90	56	60	57	90	93	92
Ro-Neet + Extender	4	6	12	7	97	98	98	86	83	86	97	96	96	80	78	80	97	97	97
Nortron	2	3	5	2	98	100	98	97	98	99	99	99	99	97	93	95	83	83	83
Nortron	3	7	11	9	100	100	99	100	100	100	100	100	100	96	98	98	88	90	85
Pyramin (Fl)	4	0	0	0	22	25	26	20	20	18	38	35	32	35	35	32	0	0	0
Nortron + Pyramin (Fl)	1½ + 1½	2	6	4	95	98	95	86	82	80	86	88	88	78	77	75	67	67	68
Nortron + Pyramin (Fl)	2 + 2	2	10	5	98	95	98	96	97	98	99	98	98	96	95	95	73	72	70
Nortron + Hoelon	2 + 1½	0	4	2	99	97	99	99	99	98	99	98	99	96	97	96	100	100	100
Nortron + Pyramin + Hoelon	1½ + 1½ + 1½	0	5	3	94	90	93	94	94	94	93	93	93	83	80	80	100	100	100
Nortron + Pyramin + Hoelon	2 + 2 + 1½	2	8	4	98	94	98	98	98	97	98	98	99	96	97	97	100	100	100
Antor	4	0	0	0	0	0	0	13	13	16	77	76	77	33	30	33	85	86	83
Nortron + Antor	1½ + 1½	4	18	12	96	95	96	82	82	82	90	88	85	83	82	84	88	90	90
Nortron + Antor	2 + 2	4	22	14	99	98	99	97	97	98	98	97	98	98	97	98	91	93	93
Check	---	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Evaluated June 1, 1983.

Ratings: 0 = no visible herbicide effect, 100 = all plants killed.

[1] B_1 = Herbicides applied as band treatments.

B_2 = Herbicides applied broadcast and not mechanically incorporated before bedding.

B_3 = Herbicides applied broadcast and incorporated two to three inches deep with a power roto-tiller before bedding.

TABLE 2. Root and Sugar yields from spring planted sugar beets treated with soil-active herbicides applied the previous fall as band and broadcast applications. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicides	Rate lbs ai/ac	Root Yields T/A	Sucrose %	Extraction %	Recoverable Sugar T/A
		- - - - - Percent Sucrose, Root, and Sugar Yields - - - -			
Eptam	3	39	15.1	82.4	4.85
Eptam	4	41	15.6	83.1	5.32
Eptam + Extender	3	42	15.4	82.8	5.36
Eptam + Extender	4	43	15.2	83.2	5.44
Ro-Neet	3	41	15.8	82.4	5.34
Ro-Neet	4	44	15.7	82.1	5.67
Ro-Neet + Extender	3	42	15.5	83.4	5.43
Ro-Neet + Extender	4	43	15.8	82.8	5.62
Nortron	2	45	15.6	83.8	5.88
Nortron	3	43	15.2	82.9	5.42
Pyramin (Fl)	4	36	15.0	81.9	4.42
Nortron + Pyramin (Fl)	1½ + 1½	44	15.8	83.2	5.78
Nortron + Pyramin (Fl)	2 + 2	45	15.7	83.3	5.88
Nortron + Hoelon	2 + 1½	45	15.6	83.0	5.83
Nortron + Pyramin + Hoelon	1½ + 1½ + 1½	44	15.7	82.9	5.73
Nortron + Pyramin + Hoelon	2 + 2 + 1½	45	15.8	83.2	5.92
Antor	4	37	15.2	81.6	4.59
Nortron + Antor	1½ + 1½	42	15.4	82.3	5.32
Nortron + Antor	2 + 2	40	15.1	82.6	4.99
Check	---	34	14.9	80.9	4.09
LSD (.05)		6	0.5	NS	1.02
CV (%)		8.2	4.7	6.9	7.8

POSTEMERGENCE APPLICATIONS OF HERBICIDES FOR SELECTIVE WEED CONTROL IN SUGAR BEETS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon - 1983

Purpose

The purpose of this trial was to evaluate the effectiveness of five grass herbicides for control of wheat (Triticum aestivum), barnyard grass (Echinochloa crusgalli), and green foxtail (Setaria viridis) when applied singly and as a tank-mix combination with Betamix to seedling sugar beets (Beta vulgaris).

Procedure

Seed of Stephens wheat, barnyard grass, and green foxtail were broadcast on the soil surface and tilled into the soil as the land was being prepared for planting sugar beets. Great Western sugar beet variety R_1 was seeded on April 25 in single rows spaced 22 inches apart with a John Deere Model 71 flexi-planter. The trial area was irrigated immediately after planting to assure that enough soil moisture was available for seed germination and uniform seedling emergence.

The herbicides were applied on May 31. The sugar beets had two to four true leaves and the grasses ranged in size from one leaf to three tillers. Broadleaf weeds present included hairy nightshade (Solanum sarrachaides), redroot pigweed (Amaranthus retroflexus), and common lambsquarters (Chenopodium album). Broadleaf weeds had from two to six leaves and ranged in height from 2-5 inches. The larger weeds were of the lambsquarters species. The plants were growing vigorously when the herbicides were applied. The treatments were applied during the morning. The skies were clear and air temperature was 84^{o}F when treatments were applied but marked a high of 94^{o}F during that afternoon. The soils were dry at the surface but moist just beneath the surface.

The herbicides were applied as double-overlap broadcast treatments using a bicycle-wheel plot sprayer. Spray pressure was 40 psi, and water, as the carrier, was applied at a rate of 29 gallons per acre, using teejet nozzles, size 8002. Individual plots were four rows wide and 25 feet long. Treatments were replicated three times and arranged in a randomized block experimental design. BASF's concentrated crop oil was added to all treatments at the rate of one quart per acre.

The treatments were evaluated on June 24 for crop injury and weed control efficacy. These data are reported in an attached table.

Results

Sugar beet tolerance was excellent with all single applied and tank-mix combination treatments. In some cases Betamix seemed to decrease the activity of the grass herbicides; this was noted with Hoe 33171 and DPX 6202. Broadleaf weed control was satisfactory in all treatments that included Betamix. The percent control of grasses varied with each herbicide. RE 36290 was very effective in control of wheat, barnyard grass, and green foxtail. Fusilade was effective on wheat but much less active on green foxtail. Poast was less active on wheat than Fusilade, but more active on green foxtail. Both were very effective on barnyard grass. DPX 6202 was effective on all grass species and when applied singly gave adequate control even at the very low rates evaluated. DPX 6202 should be evaluated at higher rates than requested in this study. Hoe 33171 did not control wheat but showed fair activity on barnyard grass and green foxtail when applied alone. It did not control grass as well when mixed with Betamix. This may indicate a possible compatibility problem when Hoe 33171 is tank-mixed with Betamix.

TABLE 1. The percent weed control and crop injury from herbicides applied as postemergence treatments to seedling sugar beets. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicides	Rate lbs ai/ac	Crop Injury	Wheat	Barnyard Grass	Green Foxtail	Redroot Pigweed	Lambs-quarters	Hairy Nightshade
			- - - - - - - - -	- - - -	Percent Weed Control[1]	- - - -	- - - -	- - - -
			%	%	%	%	%	%
Fusilade	0.2	0	86	85	55	0	0	0
Fusilade	0.3	0	96	97	40	0	0	0
Betamix/Fusilade	3/4 + 0.2	0	98	98	50	96	94	88
Betamix/Fusilade	3/4 + 0.3	0	99	98	42	98	96	90
Poast	0.2	0	57	98	94	0	0	0
Poast	0.3	0	76	98	96	0	0	0
Betamix/Poast	3/4 + 0.2	0	89	97	96	94	92	85
Betamix/Poast	3/4 + 0.3	0	95	97	96	96	95	85
DPX 6202	0.032	0	94	98	98	0	0	0
DPX 6202	0.064	0	96	96	97	0	0	0
Betamix/DPX 6202	3/4 + 0.032	0	73	73	72	96	98	90
Betamix/DPX 6202	3/4 + 0.064	0	97	84	84	95	97	90
Hoe 33171	0.2	0	35	92	89	0	0	0
Hoe 33171	0.3	0	58	98	94	0	0	0
Betamix/Hoe 33171	3/4 + 0.2	0	40	87	88	95	96	88
Betamix/Hoe 33171	3/4 + 0.3	0	50	83	83	96	98	88
RE 36290	0.2	0	99	99	99	0	0	0
RE 36290	0.3	0	99	99	99	0	0	0
Betamix/RE 36290	3/4 + 0.2	0	99	95	96	98	96	90
Betamix/RE 36290	3/4 + 0.3	0	98	96	98	96	98	90
Betamix	3/4	0	15	15	15	95	98	86
Betamix	1	0	20	15	18	97	99	89
Check	----	0	0	0	0	0	0	0

[1]Ratings: 0 = no herbicide effect, 100 = all plants eliminated (ratings are based on an average of 3 replications).

HERBICIDES APPLIED AS POSTEMERGENCE TREATMENTS FOR WEED CONTROL IN SUGAR BEETS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon

Purpose

Betamix and several grass herbicides were applied at various rates, spray pressures, and carrier volumes, with and without crop oil, to sugar beets at different stages of growth to evaluate for herbicide compatibility, weed control, and crop tolerance. Spray pressures were 35 and 65 pounds per square inch. Water volumes were 10 and 40 gallons per acre. The 10-gallon per acre carrier volume was applied at the 65 pounds per square inch spray pressure. The higher gallonage was applied at 35 pounds per square inch spraying pressure. Weed species included Stephens wheat, barnyard grass, green foxtail, lambsquarters, pigweed, kochia, and hairy nightshade. The planted variety of sugar beets was Amalgamated's WS-76. Each plot was four rows wide and 25 feet long, and each treatment was replicated three times in a randomized block experimental design.

Procedure

The low-volume high-pressure treatments consisted of Betamix, Betamix plus Fusilade, and Betamix plus Poast combinations. Rates were Betamix at 0.30 pounds active ingredients per acre plus Fusilade or Poast at 0.25 pounds active ingredients per acre. These were applied as repeat treatments, with the first application applied when the sugar beets were cotyledon stage. The repeat application was applied 11 days later. An identical trial was established to evaluate these same herbicides at regular pressure and spray gallonage.

Two other trials were established to evaluate Betamix and Betamix in combination with several grass herbicides. One trial included treatments suggested by Nor-Am Chemical Company. Treatments in this trial were Betamix at 1.0 pound, Betamix plus Fusilade, and Betamix plus Poast at rates of 1.0 pound of Betamix and 0.375 pounds of Fusilade or Poast. These treatments were single applied when the sugar beets had two to four true leaves. Betamix plus Fusilade or Poast were also applied as repeat treatments at rates of 0.5 pounds Betamix and 0.25 pounds Fusilade or Poast. The first application of the repeat treatments was applied when the majority of the sugar beets had two true leaves, the second application followed 10 days after the initial application. The second trial included the following grass herbicides alone and in combination with Betamix: Fusilade, Poast, DPX 6202, Hoe 33171, and RE-36290. Rates of the grass herbicides varied between chemicals. Rates are included in the data tables. Activated crop oil (Mor Ac) was included at the rate of one quart per acre in all the treatments in the second trial. Spray pressure in these trials was 35 pounds per square inch and water, as the carrier, was applied at 40 gallons per acre. Air temperatures were extremely warm (90°F) on May 31, when these treatments were applied. This temperature is higher than normal for that time of year. Soil texture was silt loam with a pH of 7.3. The surface of the soil was dry but moist below. Weed size when treatments were applied is as follows: wheat, four to five leaves; pigweed, two to four leaves; lambsquarters, four to

TABLE 1. Percent weed control and crop injury ratings to sugar beets treated with herbicides at two spray pressures and two volumes of herbicide carriers. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicides	Rate	Spray Pressure	Volume Water	Crop Injury	Percent Weed Control: Stephens Wheat	Barnyard Grass	Green Foxtail	Pig-Weed	Lambs-quarters	Kochia	Hairy Nightshade
	lbs ai/ac	psi	gal/ac								
Betamix	0.3	65	10	0	0	20	25	99	100	100	93
Betamix + Fusilade	0.3 + 0.25	65	10	0	99	98	45	99	100	100	95
Betamix + Poast	0.3 + 0.25	65	10	0	85	98	97	99	100	100	94
Betamix	0.3	35	40	0	0	0	20	94	95	95	85
Betamix + Fusilade	0.3 + 0.25	35	40	0	90	98	60	93	96	95	88
Betamix + Poast	0.3 + 0.25	35	40	0	50	98	98	95	95	94	87
Check	---	--	--	20	0	0	0	0	0	0	0

Ratings: 0 = no herbicide effect, 100 = plants eliminated

Evaluated on June 24, 1983.

TABLE 2. Percent weed control and crop injury ratings to sugar beets treated with Betamix and combinations of Betamix, Fusilade, and Poast. Applied as single and repeat postemergence treatments. Malheur Experiment Station, Ontario, Oregon, 1983.

Herbicides	Rate lbs ai/ac	Applied	Crop Injury	- - - - - - - - - - Percent Stephens Wheat	Weed Barnyard Grass	Control Green Foxtail	Pig-Weed	Lambs-quarters	Kochia	- - - - - - - - - - Hairy Nightshade
Betamix	1.0	Single	0	0	20	20	86	92	90	73
Betamix + Fusilade	1.0 + 0.375	Single	0	98	98	45	88	90	90	75
Betamix + Poast	1.0 + 0.375	Single	0	80	93	96	85	93	92	73
Betamix	0.75	Repeat	0	40	23	30	96	99	99	90
Betamix + Fusilade	0.5 + 0.25	Repeat	0	100	100	63	98	99	100	88
Betamix + Fusilade	0.75 + 0.25	Repeat	0	100	100	63	98	98	99	92
Betamix + Poast	0.5 + 0.25	Repeat	0	95	100	99	98	98	99	90
Betamix + Poast	0.75 + 0.25	Repeat	0	95	100	99	98	99	99	92
Check	---		20	0	0	0	0	0	0	0

Ratings: 0 = no herbicide effect, 100 = plant elimination.

Evaluated June 24, 1983.

TABLE 3. Percent weed control and crop tolerance ratings from herbicides applied to sugar beets as post-emergence treatments. Malheur Experiment Station, Ontario, Oregon, 1983

Herbicides	Rate lbs ai/ac	Crop Injury	Percent Weed Control Stephens Wheat	Barnyard Grass	Green Foxtail	Pigweed	Lambs-quarters
Fusilade	0.2	0	86	84	45	0	0
Fusilade	0.3	0	96	97	48	0	0
Betamix + Fusilade	0.75 + 0.2	0	98	96	58	90	96
Betamix + Fusilade	0.75 + 0.3	0	99	97	43	90	98
Poast	0.2	0	58	98	95	0	0
Poast	0.3	0	77	98	96	0	0
Betamix + Poast	0.75 + 0.2	0	89	97	96	93	97
Betamix + Poast	0.75 + 0.3	0	95	97	96	90	99
DPX 6202	0.032	0	93	98	98	0	0
DPX 6202	0.064	3	97	96	96	0	0
Betamix + DPX 6202	0.75 + 0.032	0	70	75	73	92	96
Betamix + DPX 6202	0.75 + 0.064	0	96	84	83	90	98
Hoe 33171	0.2	0	35	88	90	0	0
Hoe 33171	0.3	0	57	98	94	0	0
Betamix + Hoe 33171	0.75 + 0.2	0	40	89	88	94	95
Betamix + Hoe 33171	0.75 + 0.3	0	48	86	82	92	98
RE-36290	0.2	0	98	99	98	0	0
RE-36290	0.3	0	99	99	99	0	0
Betamix + RE-36290	0.75 + 0.2	3	99	95	97	93	98
Betamix + RE-36290	0.75 + 0.3	10	98	96	98	91	98
Betamix	0.75	0	18	15	15	92	92
Betamix	0.10	0	20	18	15	95	98
Check	---	25	0	0	0	0	0

Ratings: 0 = no herbicide effect, 100 = plant elimination

Evaluated June 24, 1983.

CEREAL CULTIVAR IMPROVEMENT IN OREGON'S TREASURE VALLEY

Mathias F. Kolding - Oris C. Rudd - Charles R. Burnett
Malheur Experiment Station - Ontario, Oregon, 1983

Growers are usually interested in new varieties, since these varieties may have an economic benefit for them. In a sense, the development of new cultivars is a never ending treadmill powered by changing agronomic practices, increased grower skills, and new markets. Cereal straw strength, for example, becomes redefined. Resilient stems stiff enough to hold up heads in former less intensive cultivation are now considered weak. As growers enter the computer age and analyze water use, efficient varieties are needed for fine tuned water application rates. When urea and legume supplies are scarce, cereals are turned to for protein. A dynamic cereal crop production system requires a changing array of available cultivars.

Cereal improvement at the Malheur Station is a joint effort which tests groups of small grain selections from various breeding programs. These selections come from the large program at Corvallis, from the irrigated cereal breeding source at Hermiston, and as introductions in regional trials.

This report will summarize data gathered from the cereal testing trials at the Malheur Agricultural Experiment Station.

Purpose

Cereal selection and performance trials evaluate the adaptation of new wheat, barley, and triticale cultivars and identify varieties to offer to local growers.

Procedures

New cultivars are entered into appropriate yield performance trials. Those cultivars considered adapted to the Treasure Valley production area are retained and evaluated for several years to ascertain their desirability.

Yield trials are usually planted as near to the middle of October and the last half of March as practical. Fertilizer applications are usually in amounts (near 140 to 160 pounds of actual nitrogen per acre) required to maximize grain production. Pesticides are applied as needed.

Research trials are usually a randomized complete block style with four to six replications in four row 4 X 15 foot plots. Each plot is bordered and divided by a V-shaped rill and has two 14 inch raised beds with two rows planted 10 inches apart.

Plots are seeded with a four-row double-disc opener research drill mounted on a small tractor. The V-shape rills (furrows) are cleaned and reopened by a set of "slicks" mounted on the drill.

Notes are recorded by the station personnel.

Harvesting is done with a plot combine.

Regional Small Grain Nurseries

One method of discovering whether a variety which is better than contemporary adapted cultivars is the testing of introduced germplasm. The small grain regional nursery is a systematic method used by cereal breeders to exchange and evaluate each other's more promising selections.

Several regional nurseries are grown at the Malheur Agricultural Experiment Station and are reported in this section.

Western Regional White Winter Wheat Nursery. This nursery (Table 1) is probably the most meaningful cereal nursery grown on the Treasure Valley Station since most cereal acreage is white winter wheat. This nursery has both club and common wheats. The club wheats have never gained popularity in the Treasure Valley. The older varieties usually were too tall and weak strawed; the newer ones, though stiffer strawed, yield at least 8 to 10 percent less than the common types. Though 'Stephens' is the best long-term tested named variety in this nursery, in 1983 it ranked eleventh at 134 bushels per acre. A very promising cultivar, OR CW8113, a Stephens/2/63189/Bezostaia cross, placed number one at 169 bushels per acre. OR CW8113 is accumulating an outstanding yield record, but some questions remain about its baking and milling quality. The new Oregon release 'Hill 81' has a lower four-year yield average than Stephens, (130 vs 136 bushels per acre), but it did better than Stephens three years of the four. Bushel weights ranged from 53 to 63 pounds per bushel. Some of the low weights are probably caused by stem rust (*Puccinia graminis* Pers. f. sp. *tritici* Eriks. & Henn.), head scab, (*Fusarium* sp.), or because they are clubs. Lodging was consistent within and between entries so valid comparisons were made for differential lodging. Most cultivars were resistant to the stripe rust (*Puccinia striiformis* West) races prevalent in 1983. Stem rust infections were too late to cause notable yield losses.

Western Regional Spring Wheat Nursery. The spring wheat nursery (Table 2) included 31 entries from breeders in Oregon, Washington, Idaho, and Utah. At Ontario, six other lines of local interest were added. Yields ranged from 'Federation', low at 76 bushels per acre to a high of 123 bushels per acre, for two new soft white types WA 7073 and WA 7074. The highest yielding hard red was Idaho's new selection number 0258. Bushel weights were very good. There was no lodging. Stripe rust was prevalent in the plot area. The higher yielding cultivars previously mentioned were resistant. The susceptible infections of the cultivars 'McKay', 'Owens', 'Fielder', and 'Fieldwin' reduce their usefulness in the Treasure Valley.

Western Regional Winter Barley Nursery. One of the Principal reasons barley fails to yield and find favor with growers is its weak straw. The trial area in the Malheur Station gives breeders an opportunity to observe barley growing in a very productive area where rains and sprinkler irrigation are not the predominate cause of lodging. Average yields in the regional winter barley nursery (Table 3) range from a low of 122 bushels per acre for 'Luther' to Idaho's 79 AB812 at 156 bushels per acre. In 1983, an Oregon entry, FB75075-01, yielded the most at 162 bushels per acre. "Wintermalt' is the only available winter malting type. It has an excellent yield capacity, matures early, but is very weak strawed. Lodging percents were high in the plot area. Though lodging probably contributed to low bushel weight it did not appear to affect kernel plumpness.

Western Regional Spring Barley Nursery. Thirty varieties were tested in this nursery. Yields were satisfactory and no lodging occurred. There are both two and six row cultivars entered. This is in one of two regional cereal nurseries where both public and private plant breeders are cooperators. Yields ranged from 'Trebi' at 74 bushels per acre to NK 560 at 136 bushels per acre. Bushel weights were low in several six-row types, but kernel plumpness was very high and uniform.

Cereal Selections From Corvallis

Another source of cereal germplasm tested at Ontario comes from the extensive plant breeding program at Corvallis. The selections received from Corvallis are tested for several years before entering trials at Ontario. Previously they were evaluated for diseases, agronomic type, and preliminary quality factors.

Corvallis Elite White Winter. The experimental lines in this yield trial (Table 5) are from a very broad base set of germplasm. New selections from worldwide collections (the concentrated effort of converging spring and winter wheats) and the normal soft white cultivar improvement program are the most common sources. Grain yields which range from 'Faro' at 125 bushels per acre to OWW 72339...-OS at 178 bushels per acre reflect the stepwise progression of yield efficiency and enhancement made possible by using a hugh germplasm base. Bushel weights were a little low. Lodging was at a minimum.

Corvallis Spring Wheat Nursery. Twenty-one spring wheat selections from the spring wheat program at Corvallis were tested in 1983. One line, MPC 770062, at 124 bushels per acre, yielded as well as the adapted 'Owens' at 122 bushels per acre. Bushel weights were very good. Most test weights were more than 60 pounds per bushel. Rusts were not found in the nursery. No lodging occurred.

Winter Barley Elite Malting. Oregon's relatively mild winters, cool springs, and dry warm summers offer an ideal setting for winter malting barley production. Only one winter barley cultivar, Wintermalt, however, is approved for malting in the United States. Consequently, the malting quality must be transferred from the spring types, thus also transferring spring tenderness to winter types. European winter malting barleys offer another malt quality source, but not necessarily compatible with United States maltsters' needs. A third source is possibly from the national winter barley collection, but quality factors are known in only a small percent of that collection. Except for the first five check entries (Table 7) the remaining 25 in this trial meet some very desirable malting standards and offer parent lines for crosses; this nursery is grown in irrigated trials at Hermiston as well as Ontario. The lower yields and test weights at Hermiston reflect yield reductions from Barley Yellow Dwarf Virus.

Malting Barley Elite Spring. Those few entries reported (Table 8) here represent a small sample of the malting barley effort in Oregon. These yields on a high production site give an estimate yield potential. The most significant advance is that combinations of straw stiffness and shortness are contributing to very desirable plant types which have promising malting quality.

Cereal Feed Grains

Cereal research and improvement, as far as feed grain are concerned, are a statewide effort working with wheat, barley, triticale, oats, and sorghums. Cereal selections brought to Ontario are run through several growing seasons at the irrigated research site at Hermiston. The research center at Hermiston provides an excellent site to screen for foliage and root diseases associated with overhead irrigation. Weak strawed types are discarded. When cold weather arrives, the sand cools rapidly so tender lines are distinguished. The better lines, or crosses, are then grown at Ontario to measure optimum yields.

Eastern Oregon Winter Wheat. Thirty advanced selections were tested in the Eastern Oregon Winter Wheat (Table 9) Yield Trial at Ontario in 1983. This trial has soft white and hard red wheats. Some are from the breeding effort at Hermiston; others are picked from the Corvallis program because of their exceptional performance. Yields ranged from 123 bushels per acre to 177 bushels per acre. Eleven yielded as good, or better than Stephens. A more complete summary is given in Table 10 comparing the four check varieties, Stephens, 'McDermid', 'Daws', and Hill 81, with 12 experimental selections put in the 1984 trials. Bushel weights were low (Table 9) in 1983. The lack of extensive lodging at these high yield levels points to advances made in wheat straw strength. In Table 10, eight experimental lines had total grain yields better than Stephens.

Eastern Oregon Winter Barley. Winter barleys have high yield potential. The best yield at Ontario in the feed grain trial was FB74506-06 at 203 bushels per acre in 1982 (number 10 in Tables 11 and 12). Yields in bushels per acre were equivalent to wheat bushels, but by weight the yield values are 20 percent less. Bushel weights were low in 1983. The tendency to lodge in this trial is less than the winter barleys in the regional trial.

Eastern Oregon Spring Barley. Twenty-one selections were tested in the Eastern Oregon Spring Barley (Table 13) Yield Trial at Ontario. There was no severe lodging in this trial so yields were near optimum, or at least yield loss, if any, was not caused by lodging. Steptoe ranked eleventh in 1983. The newly released 'Andre' from Washington ranked first. Andre may soon be approved as a malting type. 'Karla' and 'Kris', replacements for 'Karl' and 'Klages' from Idaho, respectively placed second and fourth. 'Clark' a two-row type from Montana, placed third.

Spring Barley Seeding Rate. Steptoe is traditionally the better yielder in many locations in the Western United States. Very few barley varieties have accumulated such impressive yearly yield records across such diverse environments. It is very weak strawed. It has some undesirable feeding characteristics. Some reports indicate that its brittle kernel is difficult to roll. Other reports say its proteins maybe tied up in the undigestible portions of the kernel. Feed barley 'M-3' is a shorter stiff-strawed, mid-late maturing selection which has high yields when grown in a well-tended irrigated field. Its yield record in the regional nurseries points to its specific adaptation versus general adaptation for Steptoe. To determine if it could be more acceptable than Steptoe in the Treasure Valley, a seeding rate trial (Table 14) was started at the station in 1981. The results indicate that M-3 yielded from 105 to 112 percent better than Steptoe at five seeding rates for three years and 115 to 113 percent, respectively, at 160 and 200 pounds per acre seeding rates in 1983.

Miscellaneous Trials. A preliminary winter and several spring barley trials not summarized in this report were grown in 1983. Information from these trials help to determine the entries for the next year's trials. A winter triticale trial with 40 semi-dwarf triticale was conducted; however, these triticale yielded 10-20 percent less than the wheat checks. Spring triticales have poor seed set and unsatisfactory grain yields. In 1984, a few semi-dwarf winter ryes are being grown for seed increase. A grant from the Oregon Wheat Commission is funding a three-year hard red winter wheat genotype irrigated cultural practice study. One trial with 24 entries (Table 15) was grown at Ontario in 1983. Grain yields were very good. However, no quality factors were evaluated at the writing of this report. Eleven varieties were kept for 1984.

Discussion

Cereal improvement work in the Treasure Valley is the cooperative effort of many programs. The cereal breeding efforts at Corvallis and Hermiston provide most entries tested at the Malheur Station. Other varieties come from adjacent states, or may also come from distant states, or had evaluations performed in several other countries. The proximity of the Treasure Valley appears to isolate the small grains from many disease epidemics. Untreated seed could lead to smut problems. A rust epidemic to the northwest could spread to the Treasure Valley if winds tended to come from those epidemic areas. Barley Yellow Dwarf Virus carried by aphids could become more serious if a tendency towards early September seeding develops. The cereal improvement work endeavors to discover several cultivars from more than one cereal species which are economically beneficial to growers. The present trend to plant a large percent of the cereal acreage to Stephens is courting disaster since it presents a narrow gene base of disease resistance across a large acreage.

TABLE 1. Western Regional White Winter Wheat Nursery. A four-year grain yield summary, and the 1983 observations for bushel weight, relative maturity, plant height, percent lodged, plot rating, stripe rust (*Puccinia striiformis*, West), and stem rust (*Puccinia graminis* Pers. f. sp. *tritici*) Eriks. & Henn. Malheur Experiment Station, Ontario, Oregon, 1983

Selection	Pedigree	Bushels Per Acre 1980	1981	1982	1983	Avg	Percent Stephens[1]	1983 Rank	Bushel Weight pounds	Relative Maturity	Plant Height inches	Lodge Percent	Plot Rate 6/17[2]	Stripe Rust 6/17[3]	Stem Rust
CI 1442	Kharkoff	65	81	83	91	80	58	32	60	ME	48	90	3	30-S	0
CI 11755	Elgin (Club)	64	98	90	97	87	64	31	56	ME	52	90	3	60-S	0
CI 13740	Moro (Club)	78	107	102	141	107	79	8	51	ME	48	90	3	R	5R
CI 13968	Nugaines	110	135	117	120	121	89	2	54	M	35	20	5	R	80S
CI 17596	Stephens	146	142	121	134	136	100	11	60	M	40	10	6	R	90S
CI 17590	Faro (Club)	106	141	112	128	122	90	15	53	M	40	80	5	R	0
CI 17954	Hill 81	117	143	119	139	130	96	10	60	M	42	10	6	R	40S
ID 745318	WA4765/Burt/P1178383	96	130	94	117	109	80	25	57	M	40	10	5	R	90S
CI 17951	Crew (Club)			125	121	123	96	22	55	M	38	20	5	R	20S
CI 17773	Tyee (Club)	128	130	109	117	121	89	23	55	M	36	30	5	R	0
OR 7794	Rew/Luke, Sel. 305	105	129	117	122	118	87	19	58	ME	46	10	5+	R	60S
OR 7907	CI 14482/Moro, Sel. E109 (Club)	114	132	127	112	121	89	27	59	ME	41	10	3	tr	30S
WA 6696	Daws/WA5829,Vho79141		131	112	112	118	89	28	58	ME	39	10	5+	R	30S
WA 6698	SW92/6*0/3/T.SP/CTL//3*0 (Club)		131	117	121	123	93	20	56	ML	40	30	5	R	90S
WA 6813	Luke/VH76375		117	106	126	116	88	16	55	ML	39	20	5	R	40S
OR 7792	Paha/OR6857. Sel. 204 (Club)			99	129	114	99	13	61	ML	44	80	4	R	20S
WA 6819	CJPCLUB/Sprague				121	121	90	21	60	M	40	20	5	R	60S
WA 6914	SCT/101//3469/PI 178383/S1,AM07974				130	130	97	12	59	M	39	10	5	R	80S
WA 6910	Maris Huntsman/VH74521,VH08490				123	123	92	17	62	ME	48	20	4	R	80S
WA 6911	WA6240/Norco,JV080129				128	128	96	14	55	ME	40	10	5	R	5MS
WA 6912	BVR/CI 15923/Ngs, VH074575				156	156	116	2	58	ME	42	10	5+	R	5MR
OR CW8110	1523 DRC Dwf/Ymh, CI 17956			116	101	108	84	29	57	ML	40	10	4	R	5M
OR CW8113	Spn/63189/Bez, CI 17956			132	169	151	118	1	60	M	41	10	5+	R	20MR
OR CP04	1523 Drc/Rbs			105	98	101	79	30	58	ML	36	10	5	R	Tr-R
OR 835	1523 Drc/Rbs			117	141	129	101	7	59	ML	41	10	4	R	Tr-R
WA 6915	Sprague/Luke//498,B77-136				148	148	110	4	61	MF	47	50	3	R	70S
OR 7996	Hys/Yayla//WA4995/3/Cerc,W-1980				151	151	113	3	57	M	44	40	3	R	5MR
OR 7956	Drc/68-23,OWW68109-1M6,R24				117	117	87	26	53	ML	46	80	3	R	80S
WA 7050	PI173467/Gns,Sel.292-1//Moro 77261 (Club)				123	123	92	18	53	M	41	90	2	R	R
WA 7047	Norco/VH72297,VH080717				144	144	107	5	59	ML	36	30	4	R	20R
OR 8188	Hys/Norco//Cama///SM4,A1358				143	143	107	6	56	ME	41	30	4	R	80S
UC WW33	Phoenix, WW33				139	139	104	9	63	E	36	10	5	R	5R

[1]Percent Stephens. Percent of Stephens for same years grown. 1980-83 = 136 bushels per acre, 1981-83 = 132 bushels per acre, 1982-83 = 127 bushels per acre, 1983 = 134 bushels per acre.

[2]Plot rate. An overall subjective rating where 1 = not acceptable to 9 = "ideal".

[3]Stripe rust. Percent leaf area and pustule type.

[4]Stem rust. Percent stem covered and pustule infection type.

TABLE 2. Western Regional Spring Wheat Nursery, Ontario, Oregon; a two-year yield summary, and the 1983 observations for bushel weight, heading date, plant height, stripe rust (Puccinia striiformia, West), and grain class

Selection	Pedigree	-Bushels Per Acre- 1982	1983	Avg	Percent[1] Federation	Bushel Weight pounds	Heading Date	Plant Height inches	Stripe[2] Rust	Class
CI 17903	McKay	90	92	91	121	61	6/12	37	5	HR
UT 541774	Bannock/738-274-1	94	98	96	128	62	6/10	37	2	HR
WA6831	Potam 70/WA6021,K7905209	98	100	99	132	60	6/14	35	2	SW
CI 4734	Federation	73	76	75	100	60	6/15	43	0	SW
CI 17904	Owens	90	89	89	119	62	6/12	36	5	SW
CI 17911	Waverly	93	97	95	127	62	6/13	37	2	SW
ID 0236	Fbr/5/Bb11/4/7*SF1/3/As/Fr//A63167S-A-1-C50-45-5	103	98	100	133	61	6/12	37	0	SW
ID 238	Borah/3/Mrn//Pj Sib/Gb55,A744165-24-1	95	83	89	119	62	6/10	32	5	HR
ID 0247	Tzpp/An3//B61-136Ab sel 1/3/11-60-157/Mcc/Mrn,A755205-31-1	85	94	89	119	59	6/17	37	0	HR
ID 0227	ID0067*2/BB/5/Resel., A73341S-23-4	88	84	86	115	58	6/15	33	2	SW
ID 0246	BB11/4/7*SF1/3/As/Fr//A63167S-A-1-50-45-5/C5/...GB55	93	100	96	128	60	6/12	35	2	SW
WA6916	Potam 70/WA6021,K7905130	92	96	94	125	62	6/12	35	2	SW
WA6917	Potam 70/WA6021,K7905130	98	104	101	135	62	6/13	33	0	SW
WA6918	Potam 70/WA6021,K7905130	85	101	93	124	62	6/13	34	2	SW
WA6919	Potam 70/WA6021,K7905130	92	113	97	129	62	6/13	35	2	SW
WA6920	Potam 70/WA6021,K7905130	106	109	107	143	62	6/13	35	2	SW
UT 0209	Utah W498-259/Prospur	101	107	104	139	61	6/13	40	0	HR
UT 2746	Utah W498-165/Borah	84	82	83	111	61	6/13	37	2	HR
UT 541815	Bannock/738-274-1		104	104	137	60	6/10	37	2	HR
UT 541842	Bannock/738-274-1		95	95	125	62	6/10	38	0	HR
UT 541954	Bannock/738-274-1		95	95	125	59	6/11	37	8	SW
ID 0248	Aberdeen selection		104	104	137	61	6/15	34	5	SW
ID 0249	Aberdeen selection		91	91	120	61	6/16	37	5	SW
ID 0250	Aberdeen selection		104	104	137	60	6/16	37	5	SW
ID 0174	Aberdeen selection		111	111	146	60	6/12	38	8	SW
ID 0258	Aberdeen selection		110	110	145	61	6/13	36	0	HR
ID 0262	Aberdeen selection		84	84	110	61	6/13	36	2	HR
ID 0263	Aberdeen selection		87	87	114	63	6/13	38	0	HR
ORS 06558	ST5958/Arana		106	106	139	60	6/10	34	5	HR
ORS 06367	Ctk/Cno/Emu		93	93	122	60	6/17	36	2	HR
OR 750573	Ctk/Cno/Emu		99	99	130	61	6/17	41	0	HR
OR 791432	Hork/Ymh/Ka//Bb		100	100	132	61	6/13	34	2	SW
ORS 44421	Hork/Ymh/Ka//Bb		105	105	138	61	6/13	36	2	SW
WA 007073	Pim70/WA6021,Brons/Koel2-7941,570-5		123	123	162	62	6/14	40	0	SW
WA 007074	Pim70/WA6021,Brons/Koel2-7941,570-5		123	123	162	62	6/13	36	2	SW
WA 007075	K73579/Borah		104	104	137	61	6/10	36	5	HR
WA 007076	K74153/WA6096//At L66/Nap Hal-34		95	95	125	62	6/13	36	2	HR
ID 0172	Hyslop/Fielder	103	76	89	119	61	6/16	36	0	SW
ID 0232		81	103	92	123	59	6/12	34	2	SW
CI 17268	Fielder	101	91	96	128	62	6/14	37	5	SW
CI 17425	Fieldwin	102	90	96	128	62	6/17	38	5	SW
CI 14588	Twin		112	112	147	58	6/14	34	2	SW
CI 17267	Borah		84	84	110	62	----	--	-	HR

[1] Percent Federation. Percent of Federation for same years grown, 1982-83 = 75 bushels per acre, 1983 = 76 bushels per acre.

[2] Stripe rust rate. 2-5-8 as in Compendium of Wheat Disease (July 7, 1983 by Oris Rudd), 2 = resistance, 8 = very susceptible.

TABLE 3. Western Regional Winter Barley Nursery; Ontario, Oregon; a four-year grain yield summary, and the 1983 observations for bushel weight, relative maturity, plant height, percent lodging, percent plump, and winter survival. Malheur Experiment Station, Ontario, Oregon, 1983

Selection	---- Bushel Per Acre ---- 1980	1981	1982	1983	Avg	Percent Boyer[1]	Bushel Weight pounds	Relative Maturity[2]	Plant Height inches	Lodge percent	Percent Plump[3]	Survival percent
Luther	119	83	109	137	112	90	45	L	38	60	82	100
Kamiak	126	124	138	150	134	108	46	M	41	70	90	100
Schuyler	155	117	148	139	140	113	49	ML	38	90	81	100
Boyer	110	128	134	124	124	100	44	ML	37	80	83	100
Wintermalt	112	160	162	153	147	118	47	E	39	90	94	100
Hesk	129	130	143	157	140	113	46	M	37	80	86	100
Mal	99	111	128	135	118	95	43	ML	37	70	80	100
WA 2378-75	95	141	142	108	121	98	49	M	35	60	95	100
WA 1623-75	97	132	133	137	125	101	47	M	37	60	94	100
Scio	128	152	133	149	140	113	44	M	37	50	81	100
79AB812		143	171	153	156	121	46	M	34	90	87	100
E804	108	143	138	150	135	109	48	ME	39	40	94	100
OR-FB-73637-235		98	144	151	131	101	41	L	35	40	82	100
OR-FB-73130W-10			130	132	131	101	44	L	33	30	84	100
OWB 710428-1H-OH			141	157	149	115	47	ML	32	10	96	100
WA 2905-75			123	126	124	96	41	ML	30	70	74	100
FB 75075-01				162	162	131	43	M	35	80	85	100
79AB278				156	156	126	47	L	35	20	86	100
OK 77422				128	128	103	47	E	38	80	98	100
OK 82850				125	125	101	47	ME	37	10	72	100

[1]Percent Boyer. Percent of Boyer for same year grown. 1980-83 = 124 bushels per acre, 1981-83 = 129 bushels per acre, 1982-83 = 129 bushels per acre, 1983 = 124 bushels per acre.

[2]Relative maturity. E = early, ME = mid-early, M = Medium, ML = Mid-late, L = Late.

[3]Percent plump. Percent of sample remaining on 6/64" x 1/2" slotted screen.

TABLE 4. Western Regional Spring Barley Nursery; a three-year grain yield summary, and the 1983 observations for bushel weight, heading date, and percent plump. Malheur Experiment Station, Ontario, Oregon, 1983

Selection	Pedigree	- - Bushel Per Acre- - - 1981	1982	1983	Avg	Percent[1] Steptoe	Bushel Weight pounds	Heading Date	Percent[2] Plump
CI 936	Trebi	47	82	74	68	92	40	6/15	99
CI 15229	Steptoe	47	97	89	74	100	46	6/9	97
CI 15478	Klages	48	96	115	86	116	48	6/7	98
CI 15773	Morex	54	80	102	79	107	47	6/4	98
Ca 75790	60AB1810/61AB4965		98	107	102	110	51	6/12	98
OR 73343	Mn 66-85/Calaya		96	119	107	115	42	6/12	98
Sk 76333	Harrington		99	109	104	112	49	6/13	98
UT 1427	WA 641566/Purcell		105	61	83	89	47	6/6	99
ID 786871	Columbia/Klages		108	100	104	112	48	6/8	97
ID 789009	Karla/NK1265		107	102	105	113	46	6/11	97
WA 145837	Beacon/WA7136-62/WA6773-71		113	124	118	127	45	6/9	98
WA 854378	Morex/WA11302-73		99	102	101	109	46	6/4	98
WA 106987	Klages/WA8189-69		98	109	104	112	47	6/11	97
WA 112967	Klages *2/WA8537-68		116	116	116	125	49	6/8	96
CI 15856	Lewis			102	102	115	50	6/8	98
MT 41918	Fld/Hcr/Kgs			122	122	137	49	6/11	99
MT 731286	Klages/Summit			120	120	135	49	6/14	98
NA 18	2B78-471			131	131	147	50	6/7	98
BA 26	6B78-10			116	116	130	45	6/12	98
NK 550	Sunbar 550			87	87	98	47	6/8	98
NK 560	Sunbar 560			136	136	153	48	6/9	97
OR 74352	Julia/Kgs//Kgs-9			122	122	137	50	6/9	97
OR 339041	WV/CI1237//Robur			113	113	127	44	6/9	98
OR 763128	M21/Harlan//Wv			102	102	115	41	6/7	98
UT 1422	M27/UT73B1-1009			129	129	145	47	6/8	98
UT 1423	M27/UT73B1-1009			135	135	152	47	6/16	98
UT 246980	M25/UT73B1-1009			102	102	115	47	6/10	97
WA 889278	Klages *2/8537-68			83	83	93	49	6/9	97
VD 3	Minuet			120	120	135	50	6/9	98
VD 22872	Piston			118	118	133	50	6/7	98

[1]Percent of Steptoe. Percent of Steptoe for the same years grown. 1981-83 = 68 bushels per acre, 1982-83 = 93 bushels per acre, 1983 = 74 bushels per acre.

[2]Percent plump. Percent of the barley sample remaining on a 6/64" x 1/2" slotted screen.

TABLE 5. Corvallis Elite White Wheat; grain yield, bushel weight, percent lodging, plant height, and agronomic ratings of selections tested in 1983. Malheur Experiment Station, Ontario, Oregon, 1983

Selection	Pedigree	Yield bushel	Bushel Weight pounds	Lodge percent	Plant Height inches	Rating[1]
CI 17954	Hill	163	60	10	41	5
CP04	1523 Drc/Rbs	150	58	10	35	5
CI 17596	Stephens	167	61	20	39	4
CI 17590	Faro	125	56	90	40	4
OWW71439....82W4	Norteno 1-67/6720/2/Nug	144	59	30	36	3
OWW72339...-OS	65-116-Mbw/2/63-189-66-7/Bz	178	61	10	39	5
OWW72341...OP	65-116-Mbw/2/Aurora/Ymh	158	59	10	38	4
OWW71214...12W4	1523.Drc.Dwf/Hys	165	60	10	40	4
OWW70094-07W5	Mds/3/Ymh/2/Rb/WA4995	162	59	10	38	5
SWH72053...P	7C/Cno//Cal/3/Ymh	154	61	10	42	5
OWW71730-82W4	61-1228-6-706/2/69-148/Nug	149	57	30	42	4
SWH72434...P	58-182/Drc/2/Spn	138	58	10	42	5
OWW72435...H	Norteno M-67/6720/2/6720/68-5/3/Ymh	143	58	10	42	4
OWW74337C...OH	1523Dc/Rb/2/WA5989/3/WA5989	145	61	10	42	4
SW0730979C...OP	Kvz/3/Hd/On/2/Bb/4/Ypopf/3/Rb 55-1744/2/Suw/Gns	159	59	10	39	3
OWW74295C...OH	Ymh/Bqn/2/M.B	141	61	20	44	5
Ymh Dwf		140	57	10	36	4
SW071340...OP	P101/Anza	160	60	10	37	5
OWW750144...OH	Ndd/P101/2/V6400-6-2-33	174	61	10	39	3
OWW74220F...OP	Hys/Yayla/2/63-112-66-4/3/Hys Sf,F1/4Ndd/1*CI 13438	156	59	10	41	5+
OWW74348...OH	Spn-2/Rbs	161	59	20	44	5+
MON753684	Cleo/Pchu	139	60	20	46	4
OWW71443...OP	Nor/Ymh//6720-13	159	61	20	38	5
SWM754324*...OH	1879/3/My54/Cd//Pchu/4/Torim	143	56	20	41	3
SWM754666*...OP	Nd/P101/2/Bb/G11	136	62	20	41	4+
SWM754666*...OH	Nd/P101/2/Bb/G11	147	58	10	38	5
SWM754666*...OP	Nd/P101/2/Bb/G11	164	58	20	38	5-
SWM754671*...OH	Nd/P101/2/70	169	60	20	41	5+
SWM7546925...OH	Ofn/4/Yy54/3/N10B/Lr/2/Mfo/5/Dj/6/Pchu/7/Cndr	154	62	10	45	4+
CI 17909	Lewjain	134	60	60	40	4

[1] Rating: 1 = unacceptable, 9 = "ideal". An overall subjective rating of a selections adaptation to area.

TABLE 6. Corvallis Spring Wheat Nursery; Grain yields and bushel weights of selections tested in 1983. Malheur Experiment Station, Ontario, Oregon, 1983

Selection	Pedigree	Average Yield bushel per acre	Bushel Weight pounds
CI 17911	Waverly	118	61
Waid	Durum	92	61
CI 17904	Owens	122	63
CI 17745	Dirkwin	107	58
MPC 770062		124	64
MPC 770928		117	61
SWM6253...-OK	Hbgn/Ret//Can	115	60
SWM6367...-OK	Ctk/Cno//Em4	107	58
KBWN750020	Pv18A/Cno	107	63
MPC 770302		106	63
PC790501	Cm37705,F6 Mnv S	110	64
Bobwhite S		109	62
Cm30098-F8	Pato(R) / Cal/3/7C//Bb/Cno/4/Pavon	116	63
Buck Buck S		105	61
MPC 77039		98	63
PC790508	Cm37760,F6 Jup73/4/7C/Pato R/3/LR64/Inia//Cn/Bb/5/Ana 75	118	63
PC791423	CM37760,F7 Jup73/4/7C/Pato R/3/LR64/Inia//Cn/Bb/5/Ana 75	111	62
Pavon 76		117	62
Cm 7806-F6		103	65
CI 14588	Twin	110	58
879/4	Novi Sad sel.	114	60

TABLE 7. Winter Barley Elite Malting; grain yield and bushel weight from Hermiston and Ontario, heading date, plant height, percent lodge, and plot rating for selections tested in 1983. Malheur Experiment Station, Ontario, Oregon, 1983

Selection	Pedigree	- Bushels Per Acre - Hermiston	Ontario	-Pounds Per Bushel - Hermiston	Ontario	Heading Date	Plant Height inches	Lodge percent	Plot Rate 7/5/83
CI 15863	Scio	134	127	42	47	6/1	36	10	5+
CI 15559	Boyer	120	134	41	45	6/1	38	20	5
NY6005-18	Wintermalt	112	142	40	47	5/29	37	60	3
CI 15197	Kamiak	96	120	44	46	5/27	40	60	3
E-804	L1/Kmi	99	133	42	48	5/27	40	60	3
OWB71035..OOH	WA2116-67/B67-1623	94	139	39	45	6/3	29	30	4
OWB71035..OOH	WA2116-67/B67-1623	115	139	43	44	6/4	36	20	5
OWB71081...OH	WA1094-67/Ack 989//WA1094-67	121	134	45	44	5/30	35	30	4+
FB75075-01 H4		108	134	39	42	6/13	35	40	4
FB75075-01 H1		123	164	42	46	5/27	40	40	4
OWB763168A..3	Sta II/WA1245-68//FB73596D04	108	142	41	47	5/27	32	30	4
SWB763150*.OH	Car/RM1508//CsK	116	151	44	48	5/26	32	30	4+
OWB753296B.OH	OAC WB 74-23/2/WA 1245-68	102	133	41	42	5/28	30	40	4
OWB763080*..1	Robur/Luther	106	145	42	45	5/27	39	40	4
OWB763080*..1	Robur/Luther	89	124	40	45	5/28	36	60	3
OWB753328A..3	WA 2196-68/NY6005-18/2/S-1	86	149	37	47	5/26	24	30	2
OWB74148*..33	OAC-WB-74-23/WA 1245-68	121	152	38	48	6/2	34	60	3
OWB773160*..H	Robur/WA 2196-68	93	138	41	49	5/28	36	30	4
OWB783144 H33	OWB763181-Vip5,F2/OWB 70173-2H-OH	121	154	41	47	5/29	36	50	4
OWB783144 H34	OWB 763181-Vip5,F2/OWB 70173-2H-OH	125	156	46	47	5/29	38	40	3
FB73607-28..1	DR68-1285/Astrix	110	144	38	45	5/29	36	30	4
OWB763002*..3	72AB89/WA 1245-68	124	156	47	48	6/2	36	30	4+
OWB763002*..7	72AB89/WA 1245-68	113	157	41	43	6/13	37	20	5
OWB71072..H31	Perga/S.W.//Wa 1094-67	98	131	42	43	6/14	36	30	4
OWB71081..32H	Ack 989/2*Boyer	99	155	40	47	6/12	35	10	4
FB73607D28..3	DR68-1285/Astrix	104	107	42	47	6/13	38	30	4+
FB73607D28..3	DR68-1285/Astrix	108	144	42	47	6/11	39	40	4
FB75075-01 H5		105	152	41	42	5/28	34	20	4
FB73607-001	DR68-1285/Astrix	100	139	36	41	6/11	32	20	4+
FB73130EEB	Ione/Lth	110	124	45	48	6/3	35	20	4

TABLE 8. Malting Barley Elite Spring; grain yield and bushel weights of selections grown in 1983. Malheur Experiment Station, Ontario, Oregon, 1983

Selection	Average Yield bushels	Bushel Weight pounds
Klages	140	48
Advance	107	44
Morex	109	46
OSB74352..-5	121	47
OSB74352..-OK	134	50
PSB763270P.OK	115	48
OSB763387..OK	129	47
OSB763130..OK	128	45
OSB74350..-75	142	-
OSB753315..OM	115	47
OSB783043.K31	146	47
OSB783052.K35	124	50
OSB783016M.35	150	48
OSB783016M.36	136	48
OSB783012.K31	127	49
OSB783012.K32	130	49
OSB783012.K35	129	48
OSB783015.K32	139	53
OSB753309A.K2	142	-
OSB753314D.K2	118	51
OSB74034..-OK	138	47

TABLE 9. Eastern Oregon Winter Wheat; grain yield, bushel weight, plant height, lodging percent, and plot rating observations of selections grown in 1983. Malheur Experiment Station, Ontario, Oregon, 1983

Selection	Pedigree	Average Yield bushels	Bushel Weight pounds	Plant Height inches	Percent Lodging 6/17/83	Percent Lodging 6/9/83	Plot[1] Rate 6/17/83	1984 Trials
CI 17596	Stephens	163	59	39	10	10	5	EOWW-1
CI 14565	McDermid	129	58	41	20	60	4+	EOWW-2
CI 17419	Daws	124	56	44	30	40	4	EOWW-3
FW73577-715	WA4995/Hyslop	134	54	40	10	30	5+	EOWW-4
FW73830-826	1523-Dc/Rb	139	58	37	10	10	4	PWFW
FW73830-835	1523-Dc/Rb	152	58	40	10	10	4+	EOWW-5
FW741037-87	65-116/Mdm/2/Cama/3/FW72001/ISRN-1342	163	53	38	10	20	4	EORW-5
FW79405	T.t./2*P-101	154	57	43	10	40	5	FPWW
FW73830-CP04	Rb/1523-Dc	141	57	38	10	10	4+	Disc.
FW74938-705	Yh/NE68513/2/Yh/At-66	165	59	40	10	30	4+	EOWW-6
FW771651G	Cama/JJG/2/FW-127	160	59	40	10	40	4+	Disc.
FW771595G03	67109/Froid/2/P-101/FW72001	161	57	34	10	10	4+	EOWW-7
FW771595G13	67109/Froid/2/P-101/FW72001	177	58	34	10	10	5	EOWW-8
FW771595G18	67109/Froid/2/P-101/FW72001	174	59	36	10	10	5+	EOWW-9
FW71595G26	67109/Froid/2/P-101/FW72001	169	58	36	10	10	5	Disc.
FW741037002	65116/Mdm/2/Cama/3/FW72001/ISRN-1342	171	59	34	10	10	5	EORW-6
FW741037003	65116/Mdm/2/Cama/3/FW72001/ISRN-1342	164	59	34	10	10	5	EORW-7
FW75361-117	Yh/Yy/249/..378,FW74660/3/Yh/Hys/2/Hys/Yy	147	58	42	10	20	4+	Disc.
FW75336-103	Yh/Mdm/2/Ts/3/S/R/4/Ne/Hys/2/Backa	123	54	40	10	10	6	Disc.
FW73830-34	1523-Dc-Rb	136	56	37	10	10	4+	Disc.
CW72339-05	65116/2/63189-607/Bz	167	60	40	10	10	6	Disc.
FW73830-29	1523-Dc/Rb	139	57	38	10	10	4+	Disc.
FW73830-005	1533-Dc/Rb	134	55	37	10	10	4+	Disc.
CI 17954	Hill 81	163	59	44	10	10	4+	EOWW-10
SWH72053..P	7C/CNO/2/Cal/3/Ymh	161	59	41	10	10	5	Disc.
OWW71448	Sway 55	155	59	41	10	10	5+	Disc.
SWH72434..OH	S8-182/Dc/2/65-116	166	59	39	10	20	5	Disc.
OWW73210C..OP	Sway 61	149	59	41	10	50	5	Disc.
CI 17956	OR843 Spn/63189-2/2/Bz	159	57	42	10	70	5+	EOWW-11
Hyslop	Al. tolerant sel.	159	58	38	10	70	5+	EOWW-12

[1]Plot rating. A subjective evaluation of a selections adaptation to the area where 1 to 9 were: 1 = undesirable, 9 = "ideal".

TABLE 10. Eastern Oregon Winter Wheat; a five year, four location yield summary with bushel weights, heading dates, plant heights, plot ratings, lodging percent, and leaf fire observed in 1983

Selection	Pedigree	Loc.[1]	1979	1980	1981	1982	1983	Avg	Stephens percent	Bushel Weight pounds	Heading Date	Plant Height inches	Plot[2] Rate	Lodge percent		Leaf[3] Fire	1984 Trial
			---- Bushel Per Acre ----														
CI 17596	Stephens	H	53	137	110	114	98	102	100	60	5/22	39	5	20		7	EOWW1
		O	133	135	146	138	163	143	100	59		39	5	10	10		
		P	53	95	82	81	87	80	100								
		U			56			56	100								
		Avg	80	122	99	111	116	106	100								
CI 14565	McDermid	H	60	96	101	104	98	92	90	59	5/22	37	5	20		6	EOWW2
		O	123	120	136	121	129	126	88	58		41	4+	20	60		
		P	56	87	80	71	83	75	94								
		U			64			64	114								
		Avg	80	101	95	99	103	96	91								
CI 17419	Daws	H		128	100	111	90	107	93	59	5/30	40	4+	20		7	EOWW3
		O		118	131	117	124	123	84	56		44	4	30	40		
		P		92	73	74	83	81	94								
		U			62			62	111								
		Avg		113	92	191	99	191	90								
FW73577-715	WA4995-Hys	H	58	140	106	113	112	106	104	58	5/24	37	5	10		7	EOWW4
		O	133	109	136	125	134	127	89	54		40	5+	10	30		
		P	53	80	75	71	96	75	94								
		U			67			67	120								
		Avg	81	110	96	103	114	101	95								
FW73830-826	Rb/1523/Dc	H	80	132	113	117	122	113	111	60	5/27	40	5	20		6	PWFW
		O	125	120	121	121	139	125	88	58		37	4	10	10		
		P	55	98	72	71	84	76	95								
		U			67			67	120								
		Avg	87	117	93	103	115	103	97								
FW73830-835	Rb/1523/Dc	H	61	119	130	123	122	111	109	60	5/29	38	4+	20		6	EOWW5
		O	133	131	119	125	152	132	92	58		40	4+	10	10		
		P	44	101	73	66	83	73	92								
		U			56			56	100								
		Avg	79	117	95	105	119	103	97								
FW741037-87	65-116/Mdm/2/Cama/3/FW72001/Isrn 1342	H		128	112	133	122	124	108	61	5/21	37	4	20		5	EORW5
		O		126	140	130	163	141	97	53		38	4	10	20		
		P		94	85	84	96	90	105								
		U			54			54	96								
		Avg		116	98	116	127	114	102								
FW794C5	T.t./2*P-101	H		112	108	118	117	114	99	61	5/23	36	5+	10		7+	FPWW
		O		94	133	149	154	133	91	57		43	5	10	40		
		P		83	70	86	92	83	97								
		U			55			55	98								
		Avg		96	92	118	121	107	96								
FW74938-705	Yh/NE68-513/2/Yh/At-66	H	57	94	103	121	112	97	95	62	5/23	36	5-	10		6	
		O	122	116	125	136	165	132	93	59		40	4+	10	30		EOWW6
		P	62	83	84	78	101	82	102								
		U			57			57	101								
		Avg	80	98	92	112	126	102	96								

Continued

TABLE 10. Continued

Selection	Pedigree	Loc.[1]	1979	1980	1981	1982	1983	Avg	Stephens percent	Bushel Weight pounds	Heading Date	Plant Height inches	Plot[2] Rate	Lodge percent		Leaf[3] Fire	1984 Trial
FW771595G03	67109/Froid/2/P-101/FW71002	H				124	111	118	111	58	5/18	36	5	10		5	EOWW7
		O				133	161	147	97	57		34	4+	10	10		
		P				86	99	93	111								
		U															
		Avg				114	124	119	105								
FW771595G13	67109/Froid/2/P-101/FW1002	H				125	112	119	112	63	5/18	36	5	10		4	EOWW8
		O				138	177	158	105	58		34	5	10	10		
		P				86	102	94	112								
		U															
		Avg				116	130	123	109								
FW771595G18	67109/Froid/2/P-101/FW71002	H				128	105	117	110	62	5/18	36	4	10		5	EOWW9
		O				132	174	153	101	59		36	5+	10	10		
		P				72	92	82	98								
		U															
		Avg				111	124	118	104								
FW741037002	-87,65116/Mdm/2/Cama/3/FW72001/ Isrn-1342,P01	H				129	122	126	119	63	5/18	36	4	10		4	EORW6
		O				142	171	157	104	59		34	5	10	10		
		P				86	100	93	111								
		U															
		Avg				119	131	125	111								
FW741037003	-87,65116/Mdm/2/Cama/3/FW72001/ Isrn-1342,P01	H				131	125	128	121	62	5/18	35	4+	10		5	EORW7
		O				142	164	153	101	59		34	5	10	10		
		P				81	94	88	105								
		U															
		Avg				118	128	123	109								
CI 17954	Hill 81	H					94	94	96	60	5/23	40	4-	30		5	EORW4
		O					163	163	100	59		44	4+	10	10		
		P					94	94	108								
		U															
		Avg					117	117	101								
CI 17596	OWW 72339-2 OR 8113	H					120	120	122	61	5/21	39	4	30		6	EOWW11
		O					159	159	98	57		42	5+	10	70		
		P					103	103	118								
		U															
		Avg					127	127	109								

[1]Location. H is Hermiston, O is Ontario, P is Pendleton, U is Union.

[2]Plot rate. A subjective overall agronomic rate concerning an entries overall adaptation to the area. 1 to 9 where 1 = unsatisfactory and 9 = "ideal".

[3]Leaf fire. Leaf fire notes were taken at Hermiston and values appear associated with eyespot and root diseases. A 1 to 9 rating system was used where 1 = no leaf fire and 9 = all leaves fired.

TABLE 11. Eastern Oregon Winter Barley; grain yield, bushel weight, percent lodged, and plot rating observations made in 1983. Malheur Experiment Station, Ontario, Oregon, 1983

Selection	Pedigree	Yield bushels	Bushel Weight pounds	Lodge percent	Plot[1] Rate 6/17/83
CI 15559	Boyer	154	48	70	4
CI 15816	Hesk	147	47	70	4
FB73258-915	D28,DR69-735/MLR	174	44	10	5
FB73258-921	D28,DR69-735/MLR	165	46	10	6
FB74506-924	-802,VG/2/DR68-1285/KMI	159	47	10	6
FB73258-901	D24,DR69-735/MLR	156	46	10	6
70075-1M-E20	GI/IL 62-19	168	45	20	6
CI 15817	Mal	162	45	60	5
FB73597-15	Boyer/A 989	175	46	50	4
FB74506-06	V.G./2/DR68-1285/KMI	169	46	10	6
FB73258-916	D28,DR69-735/MLR	156	42	10	6
FB75019HY-B2	DR67-1608/SLR/3/DTO/CCD/2/HPR	140	43	90	4

[1]Plot rate. An overall subjective rating where 1 = not acceptable and 9 = "ideal".

TABLE 12. Eastern Oregon Winter Barley; a five year three location summary with bushel weights, plant heights, lodging percent, heading dates, and plot ratings for 1983

Selection	Pedigree	Loc.[1]	Bushel Per Acre 1979	1980	1981	1982	1983	Avg	Percent[2] Mal	Bushel Weight pounds	Plant Height inches	Percent[3] Lodge	Heading Date	Plot[4] Rate 6/17/83
CI 15559	Boyer	H			132	118	115	122	96	41	36	20	6/1	5+
		O	144	116	126	109	154	130	98	48		70		4
		P	90	118	48		79	84	92					
		Avg	117	117	102	114	116	113	97					
CI 15816	Hesk	H			129		94	112	88	39	36	30	5/30	4
		O	129	106	132	141	147	131	99	47		70		4
		P	93	118	47		98	89	98					
		Avg	111	112	103	141	113	116	99					
FB73258-915	D28,Dr69-735/Mlr	H					114	114	99	40	30	20	6/12	4+
		O					174	174	107	44		10		5
		P					92	92	111					
		Avg					127	127	106					
FB73258-921	D28,Dr69-735/Mlr	H					127	127	110	40	29	70	6/9	3
		O					165	165	107	46		10		6
		P					77	77	97					
		Avg					123	123	106					
FB74506-924	-802,Vg/2/Dr68-1285/Kml	H			165	136	100	134	106	36	29	40	5/29	3
		O			182	130	159	157	112	47		10		6
		P			90		93	92	131					
		Avg			146	133	117	132	112					
FB73258-901	D24,Dr69-735/Mlr	H					102	102	87	39	29	70	6/11	3
		O					156	156	96	46		10		6
		P					88	88	106					
		Avg					115	115	96					
70075-IM-E20	GI/11 62-19	H					80	80	70	38	35	20	5/30	4
		O					168	168	104	45		20		6
		P					102	102	123					
		Avg					117	117	98					
CI 15817	Mal	H			137	129	115	127	100	40	34	30	6/4	5
		O	128	110	147	111	162	132	100	45		60		5
		P	97	126	56		83	91	100					
		Avg	112	118	113	120	120	117	100					
FB73597-15	Boyer/A 989	H			147	131	120	133	105	40	31	40	6/1	4
		O		148	116	156	175	149	113	46		50		4
		P			61		102	82	117					
		Avg		148	108	144	132	133	113					
FB74506-06	V.G./2/Dr68-1285/Kml	H			164	164	84	137	108	39	25	30	6/4	2
		O		135	167	203	169	169	128	46		10		6
		P	96	124	71		95	97	107					
		Avg	96	130	134	184	116	132	113					
FB73258-916	D28/Dr69-735/Mlr	H				135	106	121	99	41	37	40	6/12	3
		O				129	156	143	104	42		10		6
		P					88	88	106					
		Avg				132	117	125	104					
FB75019HY-82	Dr67-1608/Slr/3/Dto/Ccd/2/Hpr	H					142	142	123	37	31	50	5/27	4
		O					140	140	86	43		90		4
		P					93	93	112					
		Avg					125	125	104					

[1]Location. H = Hermiston, O = Ontario, P = Pendleton.

[2]Percent Mal. Percent for same years grown.

[3]Percent lodge. Just before harvest.

[4]Plot Rate. Over all subjective agronomic rating where 1 = undesirable to 9 = "ideal".

TABLE 13. Eastern Oregon Spring Barley; grain yields, bushel weight, plant height, and heading date observations for entries grown in 1983. Malheur Experiment Station, Ontario, Oregon, 1983

Selection	Pedigree	Average Yield bushels	Steptoe percent	Rank	Bushel Weight pounds	Plant Height inches	Heading Date
CI 15229	Steptoe	99	100	11	46	29	6/10
	Andre	126	127	1	48	27	6/12
Breeders	M-1	105	106	7	46	29	6/15
Breeders	M-3	113	114	6	44	24	6/15
FB757175		93	94	19	45	34	6/7
	Karla	116	117	4	50	36	6/5
	Kris	119	120	2	50	30	6/12
	Clark	114	115	3	50	32	6/12
	Kombar	103	104	8	48	28	6/15
	Atlas 74	88	89	20	43	34	6/7
CI 15815	Prato	82	83	21	42	25	6/8
	Paavo	96	97	15	47	30	6/7
	Otal	97	98	14	45	30	6/3
	Columbia	103	104	10	44	25	6/15
FB80512	Rasmussen M76-149	98	99	13	46	27	6/10
FB80516	Cm67-U.Sask 1800/2/Pro Cm6 T/06 70,Sc294,Short	94	95	17	44	19	6/12
FB80519	S.W./Lth/2/Conquest, Stiff, Helm 72-050-005,Can.Int.	113	114	5	45	36	6/9
FB80520	Trl/1038-1/2/11012-2,Stiff,Early S79-80 Cb 17.	96	97	16	45	27	6/7
FB80521	D7-62/Conquest,B73-120-030 U. of Al.	102	103	9	51	29	6/9
FB80522	M65-197/M65-691/2/Mona,S79-80,Cb 60.,Early	94	95	18	43	30	6/7
MB793073-05	79 Pyt-421/Ip2928	98	99	12	45	34	6/3

TABLE 14. Spring barley seeding rate comparing three years of grain yields for the spring barley cultivars 'Steptoe' and 'M-3' at seven rates of seeding near Ontario, Oregon, 1983

Variety	Seeding Rate lbs/ac	1981	1982	1983	Avg	Percent of[1] Steptoe
Steptoe	40	123	103	101	109	100
	60	114	97	112	108	100
	80	131	99	122	117	100
	100	126	99	131	118	100
	120	121	101	127	116	100
	160			129	129	100
	200			123	123	100
FB M-3	40	145	100	119	121	111
	60	148	95	110	117	108
	80	141	108	119	123	105
	100	137	113	137	129	109
	120	142	111	136	130	112
	160			149	149	115
	200			139	139	113

[1]Percent of Steptoe for same seeding rate.

TABLE 15. Ontario Irrigated Red Winter Wheat; grain yield, bushel weight, percent lodge, and plant height observations in 1983 for cultivars kept for further testing. Malheur Experiment Station, Ontario, Oregon, 1983

Selection	Pedigree	Average Yield bushels	Bushel Weight pounds	Percent Lodge 8/9/83	Plant Height inches
Profit 75		153	59	90	36
TSN BYD-2		145	60	70	35
Sturdy		131	61	20	39
HRAY 26	Corvallis Line	154	61	70	38
HRAY 20	Corvallis Line	155	61	30	41
FW741595G06	67109/Froid/2/P-101/FW71002	175	59	10	34
FW741037-06	-87,65116/Mdm/2/Cama/3/FW72001/ISRN-1342	170	59	10	34
FW741037-07	-87,65116/Mdm/2/Cama/3/FW72001/ISRN-1342	144	58	10	36
FW75344-105		162	55	10	38
FW771627G-114	Cama/JJG/2/FW-127	158	61	10	37
FW771651G-107	Cama/JJG/2/FW-127	150	59	30	38

SMALL GRAIN NURSERY

Charles R. Burnett
Malheur Experiment Station - Ontario, Oregon, 1983

Procedure

The trials were conducted in field D-2 at the Malheur Experiment Station. The winter nursery ground received 128 units of phosphate and 77 units of nitrogen per acre on October 6. The plots (4 feet by 15 feet) were planted on October 13, using a small-plot grain drill. The winter nursery was broadcast with 200 units of nitrogen per acre on March 22, 1983, and sprayed with two pints 3x3 Brominal per acre for weed control on April 1. Eighty-six units of phosphate and 52 units of nitrogen per acre were plowed into the spring nursery ground on November 9. Two-hundred units of nitrogen per acre were incorporated into the spring nursery seedbed on April 11, and the spring nursery was planted with a small-plot grain drill on April 13. The spring nursery was sprayed with one pound of Hoelon plus three-fourths pound of Buctril per acre for weed control on May 24. The winter barley was harvested on July 27, and the winter wheat and spring nursery were harvested on August 10 through 13, using a small-plot combine.

TABLE 1. Results of the private spring wheat trial at Malheur Experiment Station, Ontario, Oregon, 1983

Entry	Class	Yield bu/ac	Bushel Weight lbs/ac	Plant Height inches	Heading Date
Pro Brand 751	Hard Red	108	62	34	6/10
Cenex 3963	Soft White	100	--	35	6/11
NK 3940	Hard Red	101	63	32	6/9
Westbred 906R	Hard Red	99	62	36	6/10
Westbred Aim	Hard Red	98	63	38	6/13
NK 4236	Hard Red	93	63	26	6/10
McKay	Hard Red	92	61	37	6/12
Fielder	Soft White	91	62	37	6/14
Fieldwin	Soft White	90	62	38	6/17
Owens	Soft White	89	62	36	6/12
Westbred 803	Duram	86	61	32	6/10
Westbred 881	Duram	80	63	32	6/10
Average =		94			
CV (%) =		9.5			
LSD (.05) =		12.8*			

Lodging was negligible throughout the trial.

Stripe rust infestation was relatively heavy.

*Within this trial a yield difference of 12.8 bushels or more indicates that the higher yielding variety is expected to outyield the other variety 19 times out of 20.

TABLE 2. Results of the private spring barley trial at Malheur Experiment Station, Ontario, Oregon, 1983

Entry	Yield lbs/ac	Plant Height inches	Heading Date
Steptoe	6,504	32	6/6
Weibulls 7010	6,304	31	6/12
Sunbar 560	6,105	29	6/13
Lindy	5,867	31	6/10
Birka	5,851	31	6/13
Roland	5,845	31	6/10
Piston	5,799	32	6/12
Sunbar 425	5,782	28	6/10
Albert	5,657	32	6/14
Minuet	5,601	32	6/10
Harry	5,594	31	6/14
Columbia	5,057	28	6/14
Weibulls 7047	4,935	26	6/12
Poco	4,843	24	6/7
Kombar	4,792	28	6/13
Weibulls 7037	4,734	31	6/10
Sunbar 550	4,711	34	6/10
Average =	5,528		
CV (%) =	10.8		
LSD (.05) =	851.5*		

*Within this trial a yield difference of 851.5 pounds or more indicates that the higher yielding variety is expected to outyield the other variety 19 times out of 20.

Lodging was negligible throughout the trial.

TABLE 3. Private spring wheat multi-year yields (bushels per acre) at Malheur Experiment Station, Ontario, Oregon, 1983

	Year			
Entry	1980	1981	1982	1983
Fielder	---	104	101	91
Fieldwin	66	105	102	90
Owens	99	117	90	89
McKay	109	114	90	92
Pro Brand 751	---	97	87	108
Westbred 906R	105	105	87	99
Westbred Aim	109	---	102	98
Westbred 803	---	---	86	86
Westbred 881	---	---	77	80

Stripe rust infestation was severe in 1980 and 1981 and light in 1982.

BRAVO FUNGICIDE TREATMENTS FOR NECKROT CONTROL IN THREE VARIETIES OF SWEET SPANISH ONIONS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon - 1983

Purpose

Bravo fungicide was applied to the leaves and bulb of neckrot susceptible varieties of Sweet Spanish Onions to determine if it would improve the storage quality of onions by reducing bulb losses from Botrytis neckrot infection.

Procedure

Avalanche, Monarch, and Armada varieties of onions were seeded on April 16. The soil was treated with a tank-mix combination of Dacthal and Ramrod for weed control. Each herbicide was applied at a rate of four pounds active ingredient per acre and incorporated with a spike-tooth harrow. About 100 units of phosphate and 60 units of nitrogen were plowed under in the fall. An additional 120 units of nitrogen were sidedressed on June 10. Each plot was two rows wide and 12 feet long. The distance between rows was 22 inches, and when the onions had three to four leaves, the plants within the row were hand-thinned to a spacing of four inches between plants.

Bravo 200 and Bravo 200 plus DS58335 treatments were applied at rates of two pints per acre. The treatments were applied at two different times. The applications were made 10 days before the bulbs were lifted, and again when the bulbs were lifted. Approximately 80 percent of the onion tops were still standing when the first Bravo treatments were applied. The bulbs were lifted on October 4, and topped and put in storage on October 7.

Bravo treatments were applied with a CO_2 backpack sprayer, using 8006 teejet nozzles and a spray pressure of 40 pounds per square inch. Water was the fungicide carrier and was applied at the rate of two quarts per 720 square feet. All the bulbs within each plot were harvested. Each treatment was replicated three times and approximately 150 pounds of onion bulbs were stored and evaluated for each treatment. The bulbs were stored in slatted celery boxes until January 6, 1984, then graded for storage neckrot. The storage facility was equipped with electric fans for forced-air circulation to help control storage temperature and humidity.

Results

Excessive amounts of storage rots occurred to onion bulbs from all treatments. Armada variety stored best, but still storage rots were in excess of 53% of the total bulb weight.

Storage losses in Monarch and Avalanche were near 80 and 90 percent, respectively. In all cases, there was less percent rot in the treated onions than in the controls, but the difference was not enough to be measured as significant.

Losses that occur from storage rots continue to be a serious problem to commercial onion production. The losses which have occurred during the 1983-84 storage season have been very costly to onion growers because of the particularly high market value of sound onion bulbs this year. On this date (January 6), jumbo size onions (three-inch diameter) are worth $18 per hundred weight to the grower and prices will probably continue to increase because of the demand for the product.

TABLE 1. Bravo Fungicide treatments for Neckrot control in three varieties of onions. Malheur Experiment Station, Ontario, Oregon, 1983

			Pounds of Bulk Onions								
			Rep 1		Rep 2		Rep 3		Mean		%
Variety	Fungicide	Rate	Good	Rot	Good	Rot	Good	Rot	Good	Rot	Rot
Armada	Bravo 500	2 pts	29.0	24.4	18.3	29.2	10.5	44.5	19.3	32.7	63
Armada	Bravo 500 + 58335	2 pts + 1/3%	41.4	14.6	19.0	33.0	9.0	46.1	23.1	31.2	57
Armada	Control	---	8.3	45.3	25.5	35.0	18.8	42.4	17.5	40.9	70
Monarch	Bravo 500	2 pts	23.5	37.5	2.5	54.4	5.1	55.3	10.4	49.1	82
Monarch	Bravo 500 + 58335	2 pts + 1/3%	6.8	52.5	15.6	24.3	11.5	50.3	11.3	42.4	79
Monarch	Control	---	9.0	45.9	1.0	52.5	8.3	49.3	6.1	49.2	89
Avalanche	Bravo 500	2 pts	12.3	35.5	2.0	45.0	1.5	44.0	5.3	41.5	88
Avalanche	Bravo 500 + 58335	2 pts + 1/3%	0.0	46.8	8.8	39.6	1.0	43.0	3.3	43.1	93
Avalanche	Control	---	0.0	44.5	0.0	49.9	0.0	40.2	0.0	44.9	100

POTATO DEFOLIANT TRIAL

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon

Purpose

HOE 39866 and Paraquat were applied as foliar dessicant treatments to evaluate each material for effects on vine kill and stem-end necrosis.

Procedure

HOE 39866 at rates of 0.75 and 1.5 pounds active ingredient per acre and Paraquat+ at 0.375 pounds active ingredient per acre were applied to foliage of Russet Burbank variety of potatoes on August 29. Environmental conditions on the day of application were clear skies, bright sunlight, and air temperature reaching a high of 84°F. The potato foliage was heavy with about 90 percent of the leaves and all stems green. About 10 percent of the lower leaves were beginning to turn yellow.

The treatments were applied with a CO_2 pressurized plot sprayer. Four nozzles on a spray boom sprayed a six-foot swath (two potato rows). The nozzles were teejet fan nozzles, size 8004. Spray pressure was 35 pounds per square inch and water, as the carrier, was applied at a rate of 42 gallons per acre. Each plot was 30 feet long and four potato rows wide. Each treatment was replicated three times and randomized in a block-type experimental design.

The foliar effects of the treatments were evaluated on September 2 and September 7. The evaluations were visual, reporting the percent of vines and leaves that were dry on each date. The tubers were harvested on September 28. Tuber samples were taken for residue analysis and the stem ends of 300 tubers from each treatment were clipped to evaluate for stem-end necrosis. The results are reported in Tables 1 and 2.

Results

Ratings from September 2 evaluations show that about 72 percent of the leaves and stems were dry in the HOE 39866 plots treated at 0.75 pound and 80 percent of the foliage was dry in the 1.5 pound HOE 39866 plots. Paraquat at 0.375 was most active with about 85 percent of the foliage dry in these plots on this day. In all plots the stems were still standing upright and the lower parts of the stems were still green, but most leaves were dry.

By September 7, about 92 percent of the foliage in the HOE 39866 plots at the rate of 0.75 were dry with about 98 percent of the foliage dry in the HOE 39866 and Paraquat+ treated plots. On this date, the stems were all going down and turning brown. The potato foliage in the check plots was still mostly green with not more than 25 percent of the leaves beginning to turn yellow and five percent of the leaves necrotic. HOE 39866 was a nice treatment and probably is a chemical with potential as a potato vine desiccant.

Stem-end necrosis was present in about five percent of the tubers, but differences in the amount of necrosis did not differ in tubers between treated and untreated plots.

TABLE 1. Percent of potato leaves and stems that were dry following foliar applications of HOE 39866 and Paraquat+. Malheur Experiment Station, Ontario, Oregon, 1983

Desiccant	Rate	Percent of Dry Leaves and Stems[1]							
		September 2				September 7			
	lbs ai/ac	Rep 1	Rep 2	Rep 3	Avg	Rep 1	Rep 2	Rep 3	Avg
HOE 39866	0.75	75	70	70	72	90	90	95	92
HOE 39866	1.50	75	75	85	78	98	96	98	97
Paraquat+	0.375	85	80	80	82	98	98	95	97
Check	---	3	5	3	4	5	7	5	6

[1]Visual ratings: 0 = no leaf or vine senescense, 100 = all leaves and vines killed.

TABLE 2. Percent of tubers with stem-end necrosis in potatoes where vines were treated with HOE 39866 and Paraquat+. Malheur Experiment Station, Ontario, Oregon, 1983

Desiccant	Rate	Tubers with Stem-end Necrosis[1]							
		Rep 1		Rep 2		Rep 3		Avg	
	lbs ai/ac	No.	%	No.	%	No.	%	No.	%
HOE 39866	0.75	4	4	5	5	3	3	4.0	4.0
HOE 39866	1.50	3	3	4	4	4	4	3.7	3.7
Paraquat+	0.375	4	4	4	4	5	5	4.3	4.3
Check	---	4	4	5	5	5	5	4.6	4.6

[1]A total of 300 tubers were checked for stem-end necroses from each treatment.