Malheur Agricultural Experiment Station Research

Special Report 748 August 1985

Agricultural Experiment Station
Oregon State University, Corvallis

INTRODUCTION

The Malheur Experiment Station of Oregon State University conducts crop research to serve intensive cropping areas in Eastern Oregon. The experiment station was established because of producer and community interest in the 1940s. Research is focused on crops of major significance to the Treasure Valley: onions, potatoes, sugar beets, alfalfa, and small grains. Work is also conducted on alfalfa seed, corn for grain and silage, peppermint, spearmint, and alternative crops. Experiments are designed to provide useful information to growers.

The Malheur Experiment Station enjoys wide support from growers' associations and contributions of companies. Associations that support research include:

Idaho-Eastern Oregon Onion Committee
Nyssa Nampa Beet Growers Association
Oregon Potato Committee
Oregon Wheat Commission
Mint Growers Association
Eastern Oregon Dairymen's Association

The successful completion of research can be credited in a major way to the associations and companies that contribute financially to the Station.

Funds allocated by Oregon for the station budget represent the majority of resources to conduct research. The public money is a reinvestment of state and federal taxes to continue agricultural development in this region.

The Malheur Experiment Station participates in cooperative research with members of the faculty of the University of Idaho, the Extension Service of Oregon State University, and workers of Oregon State University at Corvallis. The contributions of researchers outside the station's staff increase the scope of work achievable by the station. Their contributions to this special report are particularly appreciated.

Clint Shock

Clinton Shock,
Superintendent

COVER: Charles Burnett, Station research assistant, checks growth of dwarf wheat, part of the Station's small grains research.

CONTRIBUTORS

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CONTENTS

WEATHER REPORTAGE

Chuck Burnett
Malheur Experiment Station - Ontario, Oregon, 1984

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.

The recent trend of above average precipitation was broken in 1984, with precipitation totaling 9.49 inches (Table 1). Heavy snowfall in November and December of 1983 more than compensated for low precipitation during the other winter months to yield an above average winter precipitation total of 7.28 inches (Table 2). Precipitation was above the 30-year average from March through June, and below the 30-year average from July through October of 1984.

Wind milage during the 1984 irrigation season was 1,855 miles greater than the previous record of 1982 (Table 3). Evaporation also reached a new high, exceeding last year's record by .81 inches. Wind and evaporation have increased during the 37-year period in which they have been monitored at Malheur Experiment Station.

The 1984 frost-free growing season lasted 140 days (Table 4). Temperatures for the year ranged from -11°F on January 18, 19, and 20 to 103°F on July 26 (Table 5). Mean soil temperatures at 4 inches remained below average through June (Table 6). A summary of air and soil temperatures and precipitation for 1984, compared with 10-year averages, is presented in Figure 1.

TABLE 1. Daily and monthly precipitation at the Malheur Experiment Station, Ontario, Oregon, 1984

Day	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1	T	T	T	T	.32				.02			.03
2			.10		.11							
3	.05				.13			.03			.07	
4	.08	T				T		T				
5	.02	T			T	.19				T		
6	T			.09	.01	.39	T	T	T		.02	
7	T	T				.07	T				T	
8		T		.08		T			T		.10	
9				.27	.03						.12	
10		.14	.04	T	T					T	.42	.07
11	.01		.02	.03	.19	.02				.08	.02	.33
12		T	.07	.03	.08	.06		T		.18	.14	.08
13	.05	.29		T		T		T		.05	.01	
14	T	.03	.25		.01					.01	.08	
15		.01	.06		.23					T		T
16	T	.13	.37		.02	.12		.12				.10
17	T	T	.16					T				
18	T			.07							.22	
19	T			.18			T				T	
20				.03	T	.31	T		T		T	T
21	T	.11	.10			.14			T		.07	.07
22	.03	T	.01			T			T			
23	.11				T			T	T			
24	.23		T		.05		T		.02		.25	
25		.01	T								T	
26	T		.16		.01					T	T	
27										.30	T	
28	T						T			T	.03	.05
29	T		.02	T			.01			.01	T	
30	T				T		.01	.02			.04	.11
31	T				T			.27				
Total Monthly	.58	.72	1.36	.78	1.19	1.30	.02	.44	.04	.63	1.59	.84
Yearly Total	(9.49)											
10 Year Monthly Average	1.36	1.35	1.27	.97	.87	.81	.41	.67	.61	.71	1.27	1.78
10 Year Average	(12.07)											
30 Year Monthly Average	1.40	.98	.96	.76	.93	.76	.21	.50	.46	.76	1.20	1.46
30 Year Average	(10.52)											

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

Month	1974 -75	1975 -76	1976 -77	1977 -78	1978 -79	1979 -80	1980 -81	1981 -82	1982 -83	1983 -84	30 Year Average
October	.65	1.46	.09	.18	.01	1.21	.17	.93	2.06	.33	.76
November	.71	.65	.19	1.85	.61	1.18	.84	2.76	.91	2.08	1.22
December	1.37	1.45	.12	1.81	.72	.97	1.73	3.53	3.08	3.57	1.47
January	.86	1.39	.93	2.33	1.93	1.28	1.07	1.73	1.46	.58	1.40
February	1.82	.97	.27	1.70	1.82	1.50	1.35	1.83	1.48	.72	.98
Total	5.41	5.92	1.60	7.87	5.09	6.14	5.16	10.78	8.99	7.28	5.84
March	1.19	.49	.46	.53	.85	1.54	1.85	.68	3.73	1.36	.96
Total	6.60	6.41	2.06	8.40	5.94	7.68	7.01	11.46	12.72	8.64	6.81

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 1975-1984. Malheur Experiment Station, Ontario, Oregon, 1984

Month		1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	37 Year Average
April	W[1]		2867		1856	1806	2808	2634	3164	3030	4405	2032
	E[2]		5.71		4.03	6.20	6.90	5.95	6.19	5.46	7.14	5.28
May	W	2399	2020	1342	3444	2826	2693	3523	3632	3073	3425	1755
	E	6.99	8.75	5.11	7.61	*	6.56	8.64	9.85	8.99	7.61	7.13
June	W	1455	1571	1256	1173	2180	2153	2250	2275	2707	2985	1367
	E	7.35	8.47	9.67	8.90	*	8.40	8.31	9.32	10.23	9.64	8.21
July	W	1187	1150	1110	1909	1934	2130	1976	2092	2284	2152	1280
	E	10.89	9.46	11.16	11.51	11.44	10.64	11.76	9.74	10.60	11.69	10.82
August	W	1226	1201	694	1918	1476	2687	1859	2005	1829	2147	1143
	E	8.26	6.99	9.07	9.25	9.09	11.45	11.87	10.56	9.55	11.39	9.16
September	W	1217	1024	645	1593	1853	1749	1855	2488	2717	2351	1097
	E	6.90	5.18	5.46	5.23	8.82	5.59	7.77	6.68	8.59	7.13	5.83
October	W	1380	1026	796	1601	2468	1998	1907	2244	2102	2290	1110
	E	2.58	2.49	2.54	3.94	4.04	3.80	3.31	4.05	4.26	3.89	2.73
Total	W	8864**	10859	5843**	13494	14543	16218	16004	17900	17742	19755	9620
	E	42.97**	47.05	43.01**	50.47		53.34	57.61	56.39	57.68	58.49	48.53

*Evaporation pan being repaired

**Totals do not include April

[1]W = Wind (mileage per month)

[2]E = Evaporation (inches per month)

TABLE 4. Dates of latest frosts in the spring and the earliest frosts in the fall at the Malheur Experiment Station, Ontario, Oregon, 1955-84

Year	Latest Frost in Spring		First Frost in Fall		Frost-Free Period
	Date	Temp-°F	Date	Temp-°F	
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
1984	May 7	31	Sept 25	26	140
30 Yr Avg	May 2	30	Oct 7	29	157

*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.

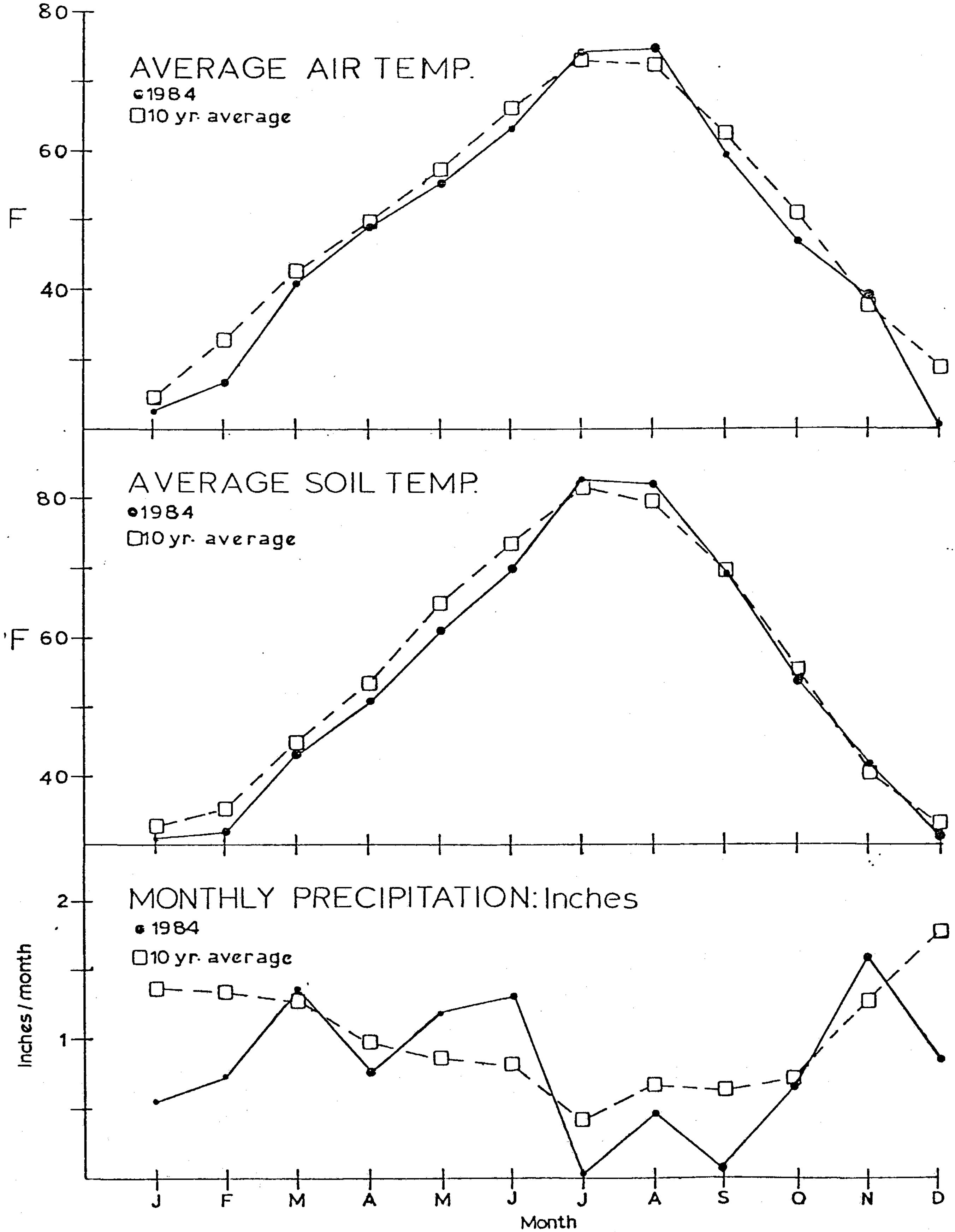
TABLE 5. Summary of weather recorded at the Malheur Experiment Station, Ontario, Oregon 1980-1984

Event	1980	1981	1982	1983	1984
Total Precipitation (inches)	12.26	15.58	13.79	16.87	9.49
Total Snowfall (inches)	12.50	14.50	32.70	35.10	12.5
First Snow in Fall	Nov 23	Nov 27	Nov 9	Nov 22	Nov 27
Coldest Day of the Year	Jan 30 & 31 -5°F	Dec 31 0°F	Jan 8 -14°F	Dec 23, 24, & 25 -10°F	Jan 18, 19, & 20 -11°F
Hottest Day of the Year	July 23 102°F	Aug 8 & 12 101°F	July 31 Aug 7, 8, & 23 99°F	Aug 8 104°F	July 26 103°F
Days 0°F or Below	4	1	18	8	10
Days 32°F or Below	108	130	161	94	160
Days 100°F or Above	2	5	0	3	2
Days 90°F or Above	29	51	41	33	51
Last Killing Frost in Spring	Apr 13 32°F	Apr 14 27°F	May 5 30°F	Apr 27 31°F	May 7 31°F
First Killing Frost in Fall	Oct 17 28°F	Oct 4 30°F	Oct 5 32°F	Sept 20 29°F	Sept 25 26°F
Days Frost-Free Growing Season	186	172	152	146	140
Number of Clear Days	103	125	134	114	119
Number of Partly Cloudy Days	128	168	182	175	167
Number of Cloudy Days	135	71	49	75	80
Greatest Amount of Snow on the Ground at One Time (date & inches)	3" Jan 27	8" Dec 30	18" Jan 1 & 3	15" Dec 31	11" Jan 1
Dates of Severe Wind Storms	Aug 3 & 15	None	None	None	May 30

TABLE 6. Average maximum, average minimum, and mean air and 4 inch soil temperatures for 1984, and multi-year mean air and soil temperatures

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	------------- Average Monthly Air Temperatures, °F -------------											
Maximum	29.5	34.8	51.1	60.2	68.5	76.6	90.9	91.9	75.8	60.8	47.4	30.4
Minimum	15.1	18.6	31.9	37.0	42.2	49.9	57.9	57.3	43.3	32.6	30.4	10.7
1984 Mean	22.3	26.7	41.5	48.6	55.4	63.3	74.4	74.6	59.6	46.7	38.9	20.6
10 Year Mean	24.8	32.7	42.7	49.8	57.8	66.2	73.7	72.3	62.5	50.7	37.5	28.5
42 Year Mean	27.1	34.8	42.3	50.4	58.9	66.7	74.7	72.6	62.8	50.8	38.2	30.1
	------------- Average Monthly Soil Temperatures, °F -------------											
Maximum	31.1	31.9	47.9	57.2	68.4	78.5	90.3	89.3	75.7	58.8	43.9	31.7
Minimum	30.8	31.6	38.7	43.8	52.8	60.8	74.5	74.6	62.0	48.6	38.8	30.7
1984 Mean	31.0	31.8	43.3	50.5	60.6	69.7	82.4	82.0	68.9	53.7	41.4	31.2
10 Year Mean	32.6	35.3	45.0	53.8	64.5	73.3	81.7	79.6	69.4	55.5	40.1	33.3
18 Year Mean	32.3	36.0	45.2	54.0	66.0	74.8	82.5	81.1	70.2	55.1	40.9	33.5

IGURE 1. Summary of air and four inch soil temperatures and precipitation for 1984 compared with 10-year averages. Malheur Experiment Station, Ontario, Oregon



ALFALFA SEED PESTICIDE RESEARCH

Ben Simko and Wayne Carlson

Introduction

Several experiments were established in the Ontario area to investigate pest control efficacy and bee visitation suppression by selected alfalfa seed insecticides. Two new synthetic pyrethroids, fluvalinate (Spur) and permethrin (Ambush), were tested for suppression of lygus bug, alfalfa weevil larvae, pea aphid, spotted alfalfa aphid, and two-spotted spider mite. Metasystox-R and Thiodan treatments were also included for local standard comparisons. Observations were made on the effect of Metasystox-R and Ambush treated bloom on leafcutting bee foraging behavior, specifically bee visitation suppression. Ambush and Spur are experimental insecticides and are currently not registered for use on alfalfa. Their registration and commercial availability for alfalfa seed are pending.

Methods

Experiments to determine insecticide pest efficacy contained four replications in a completely randomized block design. Treatments were applied on small plots either 18 feet by 25 feet or 6 feet by 25 feet. The insecticides were applied using a backpack sprayer with a six-foot boom calibrated to deliver 50-70 gallons per acre of water at 40 pounds per square inch.

Alfalfa weevil, pea aphid, lygus bug, and spotted alfalfa aphid were sampled using a standard sweepnet covering a 90 degree arc of foliage. Spider mite were counted by collecting five trifoliate leaves each from the lower, middle, and top levels of the plant canopy, 15 trifoliates per sample unit, and all motile mites counted. Alfalfa pest populations were counted 3, 7, and 14 to 15 days after insecticide applications.

The bee visitation suppression (repellency) study was conducted in a Wrangler alfalfa field in full bloom. Plots 36 feet by 50 feet in the area were treated with Metasystox-R at 0.5 pound active ingredient per acre and Ambush at 0.2 pound active ingredient per acre. The treated plots plus a flagged untreated control area were equidistant (50 feet) from an active bee domicile. The leafcutting bees were from 14 to 21 days old. The plots were sprayed between 9:30 and 10:30 p.m. and observations of flower visitation were taken at 10 a.m. (12 hours), 1 p.m. (15 hours), 4 p.m. (18 hours) the next day and at 1 p.m. (40 hours) the second day. The treated plots were divided into four quadrants and from each quadrant levels of bee activity were measured using a five sweep sample of the tops of the blooming alfalfa. At the 40-hour post treatment sampling, three, 3-minute timed observations were made in each treated area and the number of bees landing on flowers recorded.

RESULTS AND DISCUSSION

Table 1 indicates all treatments significantly reduced lygus adult and nymph levels relative to the check after three days; however, at seven days no mean separation could be detected. Predators were present and possibly further suppressed lygus levels over all treatments and plots. At the 15-day count, a hatch of lygus was observed with the majority of the counts representing first through third instar nymphs. Because of the short residual activity of Spur and Ambush, no suppression of nymphs occurred. The Metasystox-R did appear to have some residual control even after 15 days, barely missing statistical significance at the five percent level. Alfalfa weevil levels were generally low over the plot area and did not offer a good test for the materials. The high rate of Spur and Ambush did show some activity against weevil larvae. Pea aphid populations were at crop damaging levels. Metasystox-R and the higher rates of Spur and Ambush significantly reduced aphid populations.

All treatments significantly reduced levels of spotted alfalfa aphid at three and seven days (Table 2). Conspicuously high counts of green lacewing and ladybird beetles also contributed to the suppression of spotted alfalfa aphid over the entire plot area, particularly in the check plots. The decline of aphids in the check plot from three to seven days is attributed in part to beneficial insect activity.

The impact of the materials on two-spotted spider mite is shown in Tables 3 and 4. The higher rates of Spur did significantly reduce spider mite levels at the Fujishin site at the 3- and 14-day counts. Mite suppression by Spur was not observed at the Malheur Experiment Station. A mite outbreak in plots treated via Ambush was observed in alfalfa at the Fujishin plots with the seven-day Ambush counts being significantly higher than the untreated control. Ambush has been reported to aggravate mite outbreaks in other crops, particularly tree fruits.

The results of the insect and mite control experiments with Ambush, Spur, and the local standards Thiodan and MSR provide some indication of the potential use of these pyrethroids in a total alfalfa seed pest management program. The relative bee safety of both Ambush and Spur has been documented in other studies, and could help them to be useful insecticide treatments during flowering. The possible uses of these pyrethroids appear as a rescue treatment for late outbreaks of pea aphid after bee emergence and as an alternative to thiodan to suppress infestations of spotted alfalfa aphid. The effective control of lygus below economic threshold levels is still uncertain and further studies of Ambush and Spur are needed. Ambush is at a disadvantage because of its observed tendency to aggravate mite problems. Spur appears to have a benign or even a slight suppressive effect on spider mite populations.

The observations from the bee flower visitation study with sprays of Metasystox-R and Ambush during flowering did not produce any strong evidence of bee visitation suppression (Table 5). The experimental design and results do not provide a confident conclusion so further studies of bee foraging behavior interactions with insecticide are needed.

TABLE 1. Control of lygus, alfalfa weevil larvae, and pea aphids on alfalfa seed 3, 7, and 15, days after insecticide applications. Malheur Experiment Station, Ontario, Oregon, 1984

		Days Post Treatment								
Treatment	Rate lbs ai/ac	3	7	15	3	7	15	3	7	15
		Total Lygus			Weevil Larvae			Pea Aphids		
		Mean Number of Insects Per Three (90 degree) Sweeps[1]								
Spur 2F	0.05	6.3a	8.0	28.0	11.3	2.25ab	--	628a	781b	2,540
Spur 2F	0.10	3.0a	8.0	24.8	0.5	0.22a	--	136a	142a	310
Spur 2F	0.15	1.4a	5.3	18.8	0.5	0.25a	--	79a	69a	150
MSR 2E	0.50	1.3a	3.5	7.5	10.8	6.25c	--	38a	90a	260
Ambush 2E	0.10	2.3a	3.5	21.8	14.5	5.50bc	--	271ab	217a	830
Ambush 2E	0.20	1.8a	6.3	17.2	6.0	1.50a	--	115a	142a	490
Untreated Control		12.3b	8.0	29.5	13.5	3.75abc	--	718b	828b	2,920

[1]Means within a column followed by the same letters are not significantly different at the five percent level.

Established on June 27, 1984.

TABLE 2. Control of spotted alfalfa aphid in alfalfa seed, Geertson Farm, Adrian, Oregon, 1984

Treatment	Rate lbs ai/ac	Days Post Treatment 3	7
		Counts of spotted alfalfa aphid[1]	
Spur 22EW	0.05	49a[2]	18a
Spur 22EW	0.10	26a	12a
Spur 22EW	0.15	26a	7a
Ambush 2E	0.20	18a	5a
Thiodan 3E	0.50	19a	3a
Untreated Control	--	261b	51b

[1]Mean number of spotted alfalfa aphid per three sweeps of 90 degrees.

[2]Means in the same column followed by the same letter are not significantly different at the five percent level.

Established on July 30, 1984.

TABLE 3. Control of two-spotted spider mite in alfalfa seed. Fujishin Farm, Adrian, Oregon, 1984

Treatment	Rate lbs ai/ac	Days Post Treatment 3	7	14
		Mean number of mites per 15 trifoliates		
Spur 22EW	0.05	204ab[1]	221a	124a
Spur 22EW	0.10	62a	146a	47a
Spur 22EW	0.15	90a	178a	73a
Ambush 2E	0.20	303b	484b	389c
Untreated Control	--	288b	290a	269bc

[1]Means in the same column followed by the same letters are not significantly different at the five percent level.

Established on July 30, 1984.

TABLE 4. Control of two-spotted spider mite in alfalfa seed, Malheur Experiment Station, Ontario, Oregon, 1984

Treatment	Rate	Days Post Treatment 7	Days Post Treatment 14
	lbs ai/ac	Mean number of mites per 15 trifoliates	
Spur 22EW	0.15	73	85
Untreated Check	--	78	89

Established on August 2, 1984.

TABLE 5. Alfalfa leafcutting bee flower visitation on treated bloom. Derie Farm, Fruitland, Idaho

Treatment	Rate	Hours Post Treatment 12	15	18	40	Total	Bees Landing on Flowers at 40 hours
	lbs ai/ac	Mean number of bees captured in five sweeps					
Ambush 2E	0.2	2.25	3.25	2.00	2.25	9.75	7.6
Metasystox-R	0.5	2.00	2.00	3.25	2.00	11.25	10.3
Untreated Control		3.00	2.50	2.00	2.75	10.25	7.6

Established on July 24, 1984.

PERFORMANCE OF ALFALFA VARIETIES DURING 1984

Chuck Burnett, Ben Simko, and Clint Shock
Malheur Experiment Station - Ontario, Oregon

Yield performance, variety quality, and the incidence of spotted alfalfa aphid and stem nematode are reported for 1984. Second year total alfalfa yields varied from 8.9 to 11.5 tons per acre per year based on four cuttings. Varieties showed widely different susceptibility to the spotted alfalfa aphid. Stem nematodes did not influence all plots of each variety uniformly. Forage quality analyses indicate that the varieties planted have good to excellent quality.

Procedures

A trial was established on September 14, 1982. Before planting, 500 pounds per acre of P_2O_5 and 60 pounds per acre of nitrogen were plowed down along with straw from the preceding wheat crop. After seedbed preparation, the trial was hand seeded. Individual plots are 5 X 20 feet, and each of the 21 public and nine private varieties are replicated four times in a complete block randomized design. On March 10, 1983, all four replications of the Emeraude variety and one replication of the Armor variety were replanted.

Nineteen eighty-four was the second season for the trial, which is scheduled to run for five years. On March 7, Velpar was broadcast sprayed at the rate of one pound active ingredient per acre for weed control. The trial was irrigated immediately after each harvest. For the first, second, and fourth harvests, the entire plots were mowed and weighed to determine yields.

An effort to quantify the influence of border effects on yields was undertaken at the third harvest. This entailed harvesting and weighing the center three feet of each plot separately from the outer one foot on each side of the plot. Yields per area were calculated from both the center three-foot strips and the entire plots. For each plot, the yield per area from the center strip was expressed as a percent of the yield per area from the entire plot. These percentages were consistent for each variety, ranging from 64% to 84%, and averaging 71%. Yields from all cuttings were modified according to these percentages. Samples taken from each plot were oven-dried to determine moisture percentage.

Yields presented in Table 1 are reported as total dry matter production adjusted to 12% moisture. Table 1 also includes observations of stem nematode and spotted alfalfa aphid infestations. Table 2 presents non-replicated quality analysis data for selected varieties. Information on disease and insect resistance and winter hardiness is presented in Table 3.

TABLE 1. Alfalfa forage yields at 12% moisture for four harvests during 1984 and observations of spotted alfalfa aphid and stem nematode. Malheur Experiment Station, Oregon State University, Ontario, Oregon

Variety	HARVEST DATE: June 1 Tons/Acre	July 5 Tons/Acre	August 6 Tons/Acre	September 13 Tons/Acre	Total Tons/Acre	INFESTATION: Spotted Alfalfa Aphid[1] 1-5	Stem Nematode[2] % area
Greenway 360 II	5.4	2.7	1.7	1.7	11.5	3	0.1
WL 316	5.2	2.5	1.9	1.6	11.2	2	
Seagull	5.2	2.4	2.0	1.7	11.2	1	
Riley	5.4	2.3	1.8	1.5	11.0	1	
Pioneer 545	5.1	2.3	1.9	1.7	10.9	1	0.4
Hi-phy	5.0	2.5	1.6	1.7	10.7	3	0.4
Dekalb 120	5.7	2.5	1.2	1.3	10.6	5	0.1
Pioneer 532	5.1	2.3	1.8	1.5	10.6	1	1.7
Classic	5.1	2.4	1.5	1.6	10.6	3	
Pioneer 526	4.9	2.5	1.7	1.5	10.6	1	0.9
Lahontan	4.6	2.3	2.0	1.7	10.6	1	
Apollo II	5.1	2.3	1.6	1.5	10.5	2	
H-103	4.8	2.3	1.8	1.6	10.5	1	
WL 314	4.8	2.2	1.8	1.6	10.4	1	
Trumpetor	5.4	2.4	1.2	1.3	10.4	4	
GT-55 (IH-101)	4.4	2.4	1.9	1.7	10.4	1	
Wrangler (NS 79)	4.9	2.2	1.8	1.5	10.4	1	
Emeraude	5.4	2.7	1.2	1.1	10.4	5	
Vernema	5.1	2.4	1.5	1.4	10.3	3	0.1
Baker	5.2	2.1	1.6	1.4	10.3	1	14.1
NS 82	5.0	2.1	1.7	1.5	10.3	1	
RS 209	4.9	2.2	1.5	1.5	10.2	2	
Armor	5.0	2.3	1.5	1.4	10.2	3	0.2
IOSG 8010	5.3	2.3	1.3	1.3	10.2	5	0.3
WL 312	4.6	2.1	1.7	1.5	9.9	1	0.8
Perry	5.0	2.2	1.3	1.4	9.8	3	0.3
IOSG 8020	5.0	2.4	1.1	1.1	9.6	5	
Vancor	4.8	2.3	1.2	1.3	9.6	4	
Agate	4.7	2.1	1.1	1.2	9.2	5	1.2
W-37	4.9	2.3	0.8	0.9	8.9	5	
Mean	5.0	2.3	1.6	1.4	10.4		
LSD (.05)	0.3	0.2	0.2	0.1	0.6		
CV (%)	4.7	5.5	7.0	5.5	4.1		

[1]Observed 8/3/84, 1=low, 5=severe

[2]Measured 6/18/84, % area = infested area ÷ total plot area for each variety.

POSTEMERGENCE APPLICATION OF HERBICIDES FOR BROADLEAF WEED CONTROL IN SEEDLING ALFALFA

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1984

Purpose

The following herbicides were evaluated for weed control and seedling alfalfa tolerance: ME4 Brominal, AXF-1240, ME4 Brominal plus Butyrac 200, Butyrac 200, and Racer (R40244). Each herbicide except Racer was applied at two different times when air temperatures were 50°F (cool) and 75°-80°F (warm). Treatments applied at each temperature were compared for crop safety.

Procedure

Vernal alfalfa was seeded during mid-September of 1983. The alfalfa was seeded in rows 22 inches apart at the rate of three pounds of seed per acre. The planter used to seed the alfalfa was a Beck shoe type drill, one like those normally used in this area to plant onions and sugar beets. After planting, the trial area was corrugated and water was applied by furrow irrigation to enhance seed germination and seedling growth.

Herbicides were not applied before planting so Brominal plus Fusilade were applied on October 19 to control broadleaf and grass weeds which emerged with the alfalfa. The herbicide rates were one-half pound per acre of Brominal and one-fourth pound per acre of Fusilade. Mor-Act crop oil was added to the mixture at the rate of one quart per acre.

Individual plots were four rows (7.3 feet) wide and 25 feet long. Each treatment was replicated four times. The cool and warm temperature treatments were in the same trial and arranged at random in a complete randomized block experimental design.

Herbicide treatments were applied with a single wheel bicycle plot sprayer. The seven and one-half foot boom had nozzles spaced at 10-inch intervals and herbicides were applied as double overlap broadcast applications. Fan nozzles were teejet size 8003. Spray pressure was 40 pounds per square inch and the water carrier was applied at the rate of 42 gallons per acre.

Soils in the site area are silt loam with 1.1 percent organic matter and a pH of 7.1.

On April 13, 1984, between 4 p.m. and 6 p.m. the cool season postemergence treatments were applied. Air temperature was 50°F, the skies were clear, and wind was out of the northwest at about two to three miles per hour. The alfalfa was two to four inches tall with three to four sets of trifoliate leaves. Weed species were all winter annuals and included shepherds purse, tumbling mustard, prickly lettuce, tansy mustard, and seedling mallow.

The temperatures remained cool for more than a month and warm temperature treatments were not applied until May 17. Air temperature was 78 F when applied but a cooling trend for several days followed within a day after the herbicide treatments were applied. The alfalfa had grown to eight to 12 inches tall. Rosettes of shepherds purse were four to six inches in diameter. Prickly lettuce and tumbling mustard were elongating and up to eight inches tall. Dense stands of mallow varied in size from seedlings to plants with stems branching four inches long.

The cool season applied treatments were evaluated on April 25 when the alfalfa was six inches tall. The warm season applied treatments were evaluated on May 28.

Results

Herbicides evaluated were two formulations of bromoxynil (ME4 Brominal and AXF-1240), 2,4DB (Butyrac), MCPB (Thistrol), and R40244 (Racer). Seedling alfalfa was very tolerant to cool season treatments of ME4 Brominal, AXF-1240, Butyrac and Thistrol as single applied treatments of ME4 Brominal, AXF-1240 and to combination treatments of ME4 Brominal plus Butyrac. The length of alfalfa stem growth was not changed by Racer but many of the leaves, especially the upper leaves, were very chloratic with some necrosis. The alfalfa plants treated with Racer continued to grow and remained as tall as alfalfa in other plots. By three weeks, the alfalfa treated with Racer had turned green and appeared normal. Weed control in cool temperature treatments was excellent with Racer, ME4 Brominal, AXF-1240, and ME4 Brominal plus Butyrac. Thistrol did not control weeds well but had excellent alfalfa tolerance. Racer was most active on mallow and was phytotoxic to many small plants. ME4 Brominal caused necrosis to many mallow leaves but most plants recovered and continued to grow.

Ratings for the warm temperature treatments were not possible because of the size of both the weeds and alfalfa when the treatments were applied. The alfalfa foliage was injured but it was large and recovered. Smaller alfalfa plants may not survive the more active warm season treatments. The weeds were much too large for bomoxynil and phenoxy materials to control.

Further studies of crop tolerance and weed control may require two planting dates to catch the alfalfa and weeds in the proper stage of growth for good application data.

TABLE 1. Percent weed control and crop injury ratings from herbicides applied during cool temperatures (50°F) and warm temperatures (75°-80°F) to seedling alfalfa. Malheur Experiment Station, Ontario, Oregon

Herbicide	Rate	Percent Crop Injury		PERCENT WEED CONTROL[1] Shepherds Purse		Mallow		Tumbling Mustard		Prickly Lettuce	
	lbs ai/ac	cool	warm	cool	warm	cool	warm	cool	warm	cool	warm
ME4 Brominal	0.25	0	9	98	65	43	27	99	77	98	48
ME4 Brominal	0.375	0	15	100	72	47	32	100	86	98	55
ME4 Brominal	0.50	0	25	100	78	60	45	100	92	100	63
AXF-1240	0.50	3	8	96	50	20	13	96	53	98	36
ME4 Brominal + Butyrac	0.25 + 0.25	0	9	99	85	10	42	99	83	97	68
Butyrac	0.50	5	34	93	60	15	28	92	55	94	57
Racer	0.125	9	--	100	--	65	--	100	--	98	--
Racer	0.25	15	--	100	--	73	--	100	--	100	--
Thistrol	0.50	0	7	62	45	8	18	63	47	60	44
Check	--	0	0	0	0	0	0	0	0	0	0

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

Cool season treatments applied April 13 and evaluated April 25.

Warm season treatments applied May 17 and evaluated May 28.

TABLE 2. Quality analysis of selected varieties from the alfalfa variety trial. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1984

Variety	Laboratory Values: Crude Protein	Laboratory Values: Acid Detergent Fiber	Estimated Values: Available Protein	Estimated Values: Digestible Protein	Estimated Values: Total Digestible Nutrients	Estimated Values: Feeding Value Factor[1]
1st Cutting						
Apollo II	17.6	39.1	17.6	13.2	55.9	.95
Armor	18.2	39.3	18.2	13.8	56.3	.96
WL 316	17.4	39.6	17.4	13.0	55.6	.94
Pioneer 526	18.6	41.1	18.6	14.2	56.1	.95
Pioneer 545	15.7	41.7	15.7	11.3	53.8	.91
RS 209	18.1	41.8	18.1	13.7	55.5	.94
Dekalb 120	18.7	41.7	18.7	14.3	56.0	.95
IOSG 8010	17.7	39.7	17.7	13.3	55.8	.95
IOSG 8020	19.3	36.8	19.3	14.9	57.9	.99
Trumpetor	17.9	41.0	17.9	13.5	55.6	.94
Perry	17.3	41.7	17.3	12.9	55.0	.93
Riley	17.9	39.7	17.9	13.5	55.9	.95
NS 82	17.5	38.9	17.5	13.1	55.9	.95
Vernema	17.5	36.6	17.5	13.1	56.6	.96
W-37	17.3	41.8	17.3	12.9	54.9	.93
Average	17.8	40.0	17.8	13.4	55.8	.95
2nd Cutting						
WL 314	19.7	40.3	19.7	15.3	57.1	.97
Pioneer 532	18.6	40.5	18.6	14.2	56.2	.96
Pioneer 526	19.5	39.5	19.5	15.1	57.2	.97
Pioneer 545	18.9	39.5	18.9	14.5	56.7	.96
RS 209	18.4	41.1	18.4	14.0	55.9	.95
Dekalb 120	18.4	41.2	18.4	14.0	55.9	.95
IOSG 8020	20.2	43.1	20.2	15.8	56.7	.96
Emeraude	17.5	39.9	17.5	13.1	55.6	.94
Vancor	17.8	39.9	17.8	13.4	55.9	.95
Trumpetor	18.8	40.5	18.8	14.4	56.4	.96
Greenway 360	18.6	42.7	18.6	14.2	55.6	.94
Lahontan	24.2	34.2	24.2	19.8	62.2	1.07
Baker	19.7	37.4	19.7	15.3	58.0	.99
Wrangler (NS 79)	19.7	37.9	19.7	15.3	57.8	.98
NS 82	19.0	38.9	19.0	14.6	57.0	.97
Average	19.3	39.8	19.3	14.9	56.9	.97
3rd Cutting						
Apollo II	18.9	35.9	18.9	14.5	57.8	.98
Armor	15.9	41.8	15.9	11.5	53.9	.91
IH-101	17.8	39.0	17.8	13.4	56.1	.95
WL 316	18.5	39.3	18.5	14.1	56.5	.96
Pioneer 526	17.1	41.0	17.1	12.7	55.0	.93
Dekalb 120	17.1	38.5	17.1	12.7	55.7	.95
IOSG 8010	18.3	38.1	18.3	13.9	56.7	.96
IOSG 8020	15.1	42.8	15.1	10.7	53.0	.90
Greenway 360 II	16.9	37.8	16.9	12.5	55.8	.95
Vernema	19.3	33.6	19.3	14.9	58.8	1.00
W-37	17.3	38.1	17.3	12.9	57.5	.98
Average	17.5	38.3	17.5	13.1	56.1	.95

[1]The feeding value represents, on a moisture free basis, the estimated feeding value of the hay to a milking cow.

TABLE 3. Alfalfa variety trial at the Malheur Experiment Station, Ontario, Oregon, 1984

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	R	S	LR	LR							S	LR		
FFR Coop.	Hi-phy	76	H	HR	HR	S	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)

1984 HYBRID CORN PERFORMANCE TRIALS

Charles R. Burnett
Malheur Experiment Station - Ontario, Oregon, 1984

Procedures

The trials were conducted in the west half of field D-2. The previous crop in the silage corn trial area was seed onions, and small grains preceded the grain corn trial. In October 1983, 100 pounds per acre of phosphate and 60 pounds per acre of nitrogen were plowed down, a seed bed was prepared, and winter wheat was planted. The wheat was disced during corn ground preparation the following spring.

On April 20, a combination of ammonium sulfate and ammonium phosphate was applied to bring soil levels of nitrogen up to 250 pounds per acre in the top 12 inches. The fertilizer included 234 pounds per acre of nitrogen, 100 pounds per acre of phosphate, and 242 pounds per acre of sulfur. Three pounds of zinc per acre were also applied to increase soil levels to eight pounds available zinc in the top 12 inches. On the same day, Lasso was broadcast sprayed at the rate of one gallon per acre and incorporated by discing and harrowing. The trial area was worked with a triple-K and harrow and bedded on April 21.

The trial was planted on April 24, using a John Deere Flexi-planter with Almaco cone seeders to plant test plots of four 30-inch rows 25 feet long. A one-plot border was planted around the perimeter of both the silage and grain trials. The trial was irrigated on April 26 to provide adequate moisture for germination, and was cultivated on May 21.

On June 8 and 9, the plots were hand thinned where plant stands exceeded the desired populations and three-foot alleys were cut perpendicular to the rows between all plots. Disyston at the rate of 1.6 pounds per acre was sidedressed on June 19 for mite control. The trial was furrow-irrigated 11 times during the growing season.

Weather Summary

Table 1 provides a brief summary of weather conditions during the corn-growing period. The temperature and rainfall data are recorded from an N.O.A.A. weather station at the Malheur Experiment Station. The average monthly temperatures were below the 30-year average except during August. Precipitation was almost equal to the 30-year average from May through September. The column headed "Degree Days" records accumulated heat units per month. Heat units were calculated from daily temperatures using a maximum cut off of 86^{o}F, a minimum cut off of 50^{o}F, and a base of 50^{o}F.

Severe winds on May 30 caused minimal damage. A killing frost of 26° occurred on September 25. Accumulated degree days from April 24 until the frost on September 25 were 2,411.0.

TABLE 1. Weather summary at the Malheur Experiment Station during the 1984 hybrid corn trials

Month	Average Temperature °F	Deviation from 30-year Average °F	Degree Days AccDD$_{50}$	Precipitation inches	Deviation from 30-year Average inches
April 24-	45.2	---	22.5	T	---
May	55.4	-3.4	285.5	1.19	+0.26
June	63.3	-4.2	420.0	1.30	+0.54
July	74.4	-0.3	675.5	0.02	-0.19
August	74.6	+1.8	669.5	0.44	-0.06
September	59.6	-3.0	383.0	0.04	-0.51
-October 15	54.6	---	157.5	0.32	---
TOTAL			2613.5	3.31	

[1]Degree days were calculated as being equal to [daily maximum temperature ($\leq$86°F) + daily minimum temperature ($\geq$50°F)] ÷ 2 - 50.

[2]Degree day total for silage corn (4/24 - 9/17) = 2319.5 AccDD$_{50}$. Degree day total up to the killing frost on September 25 = 2411.0 AccDD$_{50}$.

Grain Trial

The 1984 hybrid grain corn trial included 45 hybrids submitted by 11 companies. Four standard check varieties were also included. The check varieties have relative maturities ranging from 90 to 120 days, and are included every year to allow comparisons among trials grown in different years. Each hybrid was replicated five times in a complete block randomized design.

The two center rows of each plot were hand picked and weighed. 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. Because of poor emergence, many of the plot populations were below those requested. Therefore, a linear regression of plot yield on plot population was used to modify observed yields.

A 10-ear sample from each plot was weighed to determine average ear weight, shelled to determine shelling percentage, weighed in an Ohaus scale to determine test weight, and oven dried to determine percent moisture at harvest. The reported values are the average of five replications for each variety. Average ear weight, shelling percentage, and test weight were not adjusted to a uniform moisture percentage.

Plant populations reported are the populations requested by the company entering each variety. Silking dates were recorded for one replication and indicate when 50% of the plants in a plot showed silk. Lodging of plants was minor in this year's trial. The percentages reported are an average of all replications for each variety.

Multi-year yield averages are reported for those varieties for which they are available in Table 3.

Silage Trial

Twenty-one hybrid silage corn varieties from 10 companies were tested in 1984. In addition, one standard check variety is included every year to allow comparisons among trials grown in different years.

The two center rows of each plot were harvested with a two-row forage chopper and weighed. A sample from each plot was oven dried to determine the percent moisture.

The results of the silage trial are presented in Table 3. Yields are reported in tons per acre adjusted to 70% moisture. Because of poor emergence, many of the plot populations were below those requested. Therefore, a linear regression of plot yield on plot population was used to modify observed yields.

The percentages of moisture reported are the average of five replications for each variety. Plant populations reported are the populations requested by the company entering each variety. Silking dates were recorded for one replication and indicate when 50% of the plants in a plot showed silk.

Multi-year yield averages are reported for those varieties for which they are available in Table 5.

TABLE 2. Summary information for hybrid grain corn trial at the Malheur Experiment Station, Ontario, Oregon, 1984

Company	Hybrid	Yield[1] Shelled Corn T/A	% Moisture[2] at Harvest	Test[3] Weight lbs/bu	Shelling[3] %	Avg Ear[3] Weight lbs	Plant Population 1000/A	Silking Date	Lodging[2] %
120 Day Check	NK PX 74	5.8	27.9	51	82.9	.71	26	7/30	0
Keltgen	KS 1150	5.8	28.6	52	82.0	.65	28	7/29	0
Crookham	SS 70	5.8	29.4	51	82.4	.75	26	7/30	0
Dekalb-Pfizer	DK 656	5.6	29.0	52	82.5	.69	27	7/28	0
Keltgen	KS 1090	5.6	19.5	55	85.0	.54	28	7/26	0
Paymaster	7990	5.5	30.0	50	82.7	.71	26	7/29	0
PAG	SX 241	5.4	18.9	55	86.6	.58	26	7/25	0
Dekalb-Pfizer	DK 556	5.4	19.8	54	82.3	.54	27	7/27	0
Cargill	874	5.4	18.1	54	84.0	.53	26	7/24	0
Cargill	889	5.3	18.9	53	83.6	.55	26	7/27	0
Keltgen	KS 1050	5.3	20.6	54	81.8	.52	28	7/26	0
Dekalb-Pfizer	T 1100	5.2	25.0	51	82.0	.60	27	7/29	0
Cenex	2096	5.2	13.7	58	86.8	.45	30	7/20	1
Stauffer	S 5340	5.2	20.9	54	84.3	.56	26	7/26	0
PAG	SX 275	5.2	21.8	52	84.1	.58	26	7/25	1
Dairyland	DX 1094	5.2	14.2	58	86.1	.46	30	7/21	0
Dairyland	DX 1012	5.2	20.5	52	83.8	.54	30	7/27	0
Stauffer	S 5650	5.1	18.2	55	83.5	.54	26	7/26	1
Dekalb-Pfizer	DK 587	5.1	24.2	52	82.1	.55	27	7/24	0
Keltgen	KS 115	5.1	28.6	51	81.8	.64	28	7/30	0
Ferry-Morse	GT 1822	5.1	18.4	55	82.9	.55	32	7/21	0
Keltgen	KT 1150	5.1	27.2	51	82.3	.61	28	7/30	0
PAG	SX 193	5.0	15.4	56	86.9	.50	26	7/23	0
Germains	Funks G 4342	5.0	19.6	55	82.5	.57	26	7/22	3
Stauffer	EX 4502	5.0	17.2	56	83.9	.52	26	7/24	0
Cenex	2098 A	5.0	15.8	55	85.5	.53	26	7/24	2
Dairyland	DX 1096	5.0	14.0	55	86.5	.49	28	7/21	7
Dekalb-Pfizer	DK 505	5.0	17.2	56	84.7	.47	27	7/24	0
Stauffer	EX 6210	5.0	21.4	54	81.6	.57	26	7/27	0
PAG	SX 267	5.0	22.0	55	80.6	.59	26	7/27	0
Cenex	2108 A	4.9	17.8	55	84.6	.53	26	7/25	1
Cargill	861	4.9	17.5	55	84.1	.51	26	7/25	0
Paymaster	4790	4.9	20.4	52	84.1	.58	26	7/27	0
Dekalb-Pfizer	DK 484	4.9	15.7	56	85.6	.48	27	7/23	0
Crookham	SS 61	4.9	19.4	53	84.3	.55	26	7/25	2
Cenex	2106	4.9	15.3	57	82.9	.50	26	7/24	0
110 Day Check	NK PX 9415	4.9	13.1	55	82.9	.55	26	7/25	0
PAG	SX 239	4.9	18.7	53	82.8	.53	26	7/23	0
Keltgen	KD 89	4.8	15.5	56	85.5	.44	28	7/21	0
Stauffer	EX 3303	4.8	13.7	59	84.9	.45	26	7/23	0
Cenex	2098	4.7	18.6	54	82.2	.52	28	7/21	1
Keltgen	KS 95	4.7	16.3	56	83.0	.47	28	7/24	0
Ferry-Morse	GT C04	4.7	24.8	54	79.6	.55	30	7/27	0
Cargill	829	4.7	14.2	58	83.4	.46	26	7/20	0
Crookham	SS 43	4.6	17.3	56	83.3	.55	26	7/22	2
Germains	Funks G 4143	4.6	15.1	55	83.6	.55	26	7/22	2
Keltgen	KS 1030	4.6	19.0	54	82.8	.48	28	7/25	0
100 Day Check	NK PX 20	4.6	13.1	57	87.7	.48	26	7/19	0
90 Day Check	NK PX 9144	4.4	12.1	57	85.6	.43	26	7/16	0
	Average	5.1	19.6	54	83.7	.54			
	CV (%)	8.7	1.8	1.5	0.9	7.4			
	LSD (.05)	0.5	1.8	1.0	1.0	.05			

Variety differences in grain yield, percent moisture, test weight, shelling percentage, and average ear weight are highly significant.
Planted April 24, 1984.
Harvested October 15, 1984.

[1] Average of five replications adjusted to 15.5% moisture.

[2] Average of five replications.

[3] Average of five replications, not adjusted to uniform percent moisture.

TABLE 3. Grain corn multi-year yield averages (tons per acre) at the Malheur Experiment Station, Ontario, Oregon, 1984

Company	Hybrid	2-Year Average 1983-84 T/A	3-Year Average 1983-84 T/A
120 Day Check	NK PX 74	6.0	6.1
Crookham	SS 70	6.2	6.0
Stauffer	5340	5.7	5.8
Germains	Funks G 4342	5.8	5.8
Dairyland	DX 1096	5.9	5.7
PAG	SX 239	5.4	5.6
PAG	SX 275	5.5	5.6
Dairyland	DX 1094	5.7	5.6
Dekalb-Pfizer	T 1100	5.5	5.5
Keltgen	KS 95	5.2	5.2
Keltgen	KS 1030	5.4	5.2
Dairyland	DX 1012	5.7	---
Ferry-Morse	GT 1822	5.6	---
PAG	SX 193	5.5	---
Cenex	2096	5.4	---
Cenex	2106	5.1	---
Cargill	861	5.1	---
Keltgen	KS 89	5.1	---

TABLE 4. Summary information for hybrid corn silage trial at the Malheur Experiment Station, Ontario, Oregon, 1984

Company	Hybrid	Silage[1] Yield Tons/Acre	% Moisture[2] at Harvest %	Plant Population 1000/Acre	Silking Date
Ferry-Morse	GT 3020	38.7	69.4	30	7/30
PAG	SX 352	38.4	71.2	28	7/29
Germains	Funks G 4657	38.1	70.9	28	7/29
Dairyland	DX 1017	37.9	71.2	28	7/29
Paymaster	8951	37.2	71.7	28	8/1
Keltgen	KS 115	37.1	69.9	28	7/29
120 Day Check	NK PX 74	36.7	71.5	28	7/30
Stauffer	EX 8505	36.7	73.1	30	8/2
Ferry-Morse	GT 4693	35.8	72.4	25	8/2
Keltgen	KS 1150	35.5	71.9	28	7/30
Crookham	SS 70	35.5	74.7	33	8/1
Dekalb-Pfizer	DK 656	34.8	72.0	29	7/30
Cenex	2115	34.6	72.3	28	7/30
Cenex	2124	33.8	73.1	28	8/2
Keltgen	KF 115	33.3	71.2	28	7/30
Dairyland	DX 1020	33.2	72.6	28	7/29
PAG	SX 351	33.1	72.0	28	7/30
Germains	Funks G 4430	32.3	70.3	28	7/28
Keltgen	KT 1150	32.1	72.7	28	7/31
Crookham	SS 605	32.0	72.8	26	8/1
Dairyland	DX 1012	31.3	66.6	28	7/28
Crookham	SS 65	27.3	63.6	26	7/27
	Average	34.8	71.2		
	CV (%)	10.1	4.1		
	LSD (.05)	4.4	3.7		

Variety differences in silage yield and % moisture are highly significant.
Planted 4/24/84
Harvested 9/17/84
[1]Average of five replications adjusted to 70% moisture.
[2]Average of five replications.

TABLE 5. Silage corn multi-year yield averages (tons per acre) at the Malheur Experiment Station, Ontario, Oregon, 1984

Company	Hybrid	2-Year Average 1983-84 T/A	3-Year Average 1983-84 T/A
Dairyland	DX 1017	38.1	39.4
Germains	Funks G 4657	37.7	38.8
PAG	SX 351	36.7	38.8
120 Day Check	NK PX 74	36.6	38.5
Crookham	SS 70	35.6	37.5
Crookham	SS 605	33.1	35.7
Keltgen	KS 1150	38.1	--
Ferry-Morse	GT 4693	36.7	--
Cenex	2115	36.1	--
Cenex	2124	35.3	--

POSTEMERGENCE HERBICIDES FOR WEED CONTROL IN FIELD CORN

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1984

Purpose

Two formulations of bromoxynil were evaluated singly or as tank-mix combinations with atrazine or atrazine and oil for crop tolerance and weed control. Crop tolerance ratings were taken for two varieties of field corn (Crookham CS 02051 and Keltgen 1030). Herbicide activity was determined on four weed species (pigweed, lambsquarters, barnyardgrass, and green foxtail).

Procedures

The corn was planted on May 18 using a John Deere model 71 flexi-planter. Corn was seeded at a rate to give a spacing of about four inches between seeds or three seeds per linear foot of row. Four rows were planted at a time and two rows were seeded to each of the two varieties.

After planting, the rows were corrugated and watered by furrow irrigation to germinate the corn and weed seed and help to assure uniform emergence and seedling growth.

Individual plots were four rows wide and 30 feet long. The herbicide treatments were applied on June 4. The corn plants had four to six leaves and were growing rapidly. The pigweed and lambsquarters varied in size from cotyledon stage to plants four to five inches tall. Most of the grassy weeds had three leaves but a few were starting to tiller. A bicycle wheel plot sprayer was used to apply the herbicides. The spray boom was 10 feet long, with four nozzles spaced 30 inches apart so a nozzle was centered over each row in the plot. The nozzles were teejet fan nozzles size 8003. Spray pressure was 35 pounds per square inch and water applied as the carrier at the rate of 30 gallons per acre.

The soil surface was moist, the skies were overcast, and the air temperature was 74°F when the treatments were applied. The air temperatures remained cool for a few days then warmed to the mid 80s.

The soils were silt loam with a pH of 7.1 and an organic matter content of 1.1 percent.

The treatments were evaluated for crop tolerance and weed control on June 22, July 5, and August 27.

Results

Nine different herbicide treatments were applied. Bromoxynil formulation ME4 Brominal was compared with AXF 1240 for weed control and corn tolerance. Atrazine and Atrazine plus crop oil were also evaluated as tank-mixes with the two bromoxynil formulations. Generally, the ME4 Brominal material was more active than AXF 1240. Weed control with ME4 Brominal at 0.375 pounds active ingredient per acre was comparable with AXF 1240 at 0.5 pounds active ingredient per acre (Table 1). ME4 Brominal initially caused necrosis to corn leaves. No leaf injury was noted with AXF 1240. Atrazine added to the bromoxynil materials gave grass control, increased broadleaf weed control at the lower bromoxynil rates, and gave persistence to weed control. Crop oil added to the two-way bromoxynil and atrazine mixture increased the injury to the corn and was not needed for weed control in this study.

Atrazine plus oil added to ME4 Brominal and AXF 1240 caused necrosis and death to the corn leaves present when the treatments were applied. The corn plants rapidly developed new leaves and final corn growth and maturity did not appear to differ from the check treatments.

The best treatment, considering both crop tolerance and weed control, was the combination of AXF 1240 plus atrazine at 0.5 and 1.0 pounds active ingredients per acre respectively.

TABLE 1. Crop injury and weed control ratings from herbicides applied postemergence to field corn. Malheur Experiment Station, Ontario, Oregon, 1984

Herbicide	Rate	Percent Crop Injury			Percent Weed Control[1] Pigweed			Lambsquarters			Barnyardgrass			Green Foxtail		
	lbs ai/ac	6/22	7/5	8/27	6/22	7/5	8/27	6/22	7/5	8/27	6/22	7/5	8/27	6/22	7/5	8/27
ME4 Brominal	0.375	0	0	0	92	79	91	98	87	93	0	0	0	0	0	0
ME4 Brominal	0.50	5	0	0	100	98	98	100	99	99	0	0	0	0	0	0
ME4 Brominal + Atrazine	0.375 + 1.0	8	0	0	100	98	100	100	99	100	60	83	95	65	80	96
ME4 Brominal + Atrazine	0.5 + 1.0	12	0	0	100	98	100	100	99	100	35	70	98	60	83	98
ME4 Brominal + Atrazine + Crop Oil	0.375 + 0.75 + 0.5%	30	9	0	100	98	100	100	99	100	63	85	98	65	87	98
AXF 1240	0.375	0	0	0	82	68	80	96	78	84	0	0	0	0	0	0
AXF 1240	0.50	0	0	0	92	85	90	100	92	91	0	0	0	0	0	0
AXF 1240 + Atrazine	0.5 + 1.0	0	0	0	100	97	100	100	99	100	67	83	98	63	83	98
AXF 1240 + Atrzaine + Crop Oil	0.5 + 0.75 + 0.5%	22	0	0	100	98	100	100	99	100	63	86	98	67	87	98
Check	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

[1]Rating: 0 = No effect, 100 = all weeds killed.

Observations on dates of ratings:

6/22: AXF 1240 - Corn more tolerant to AXF 1240 than to ME4 Brominal.
AXF 1240 + Atrazine - Very nice treatment, good weed control and corn tolerance.
ME4 Brominal - Alone caused some leaf burn but injury was slight.
ME4 Brominal + Atrazine + oil - Corn which was most severely burned is now growing vigorously and new leaves are green and normal. Burned leaves still present at base of plant.
Corn is about 10 to 14 inches tall in both varieties.

7/5: Oil with Atrazine - Increased barnyardgrass and foxtail grass control significantly.
AXF 1240 - 1/2 pound + Atrazine + oil - Is a nice treatment, good weed control and crop tolerance. More crop tolerance (pound per pound) than ME4.

8/27: Corn looks excellent, maturing normally, herbicide treatments do not appear to have altered the date of maturity of either variety.

Oil is not needed with Atrazine + ME4 Brominal or AXF 1240 to give good weed control by harvest time.

SOIL ACTIVE HERBICIDES EVALUATED FOR WEED CONTROL IN SWEET CORN

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon 1984

Purpose

A flowable formulation of Lasso was compared with emulsifiable concentrate Lasso for herbicide activity and sweet corn tolerance. Stauffer's SC-1102 was evaluated as a postplant soil surface non-incorporated treatment. Dual and Ro-Neet were used in the trial as standards for comparison.

Procedures

Preparation for establishing the corn herbicide trial was begun in the fall of 1983. The field had grown winter wheat during 1982 and 1983. After the 1983 wheat crop was harvested, the wheat stubble was cut and shredded. The field was disced, corrugated, and irrigated twice. On October 29, the field was redisced and fertilized with 100 pounds per acre of phosphate and 60 pounds per acre of nitrogen. The field was moldboard plowed and left until spring.

On April 21, 150 pounds per acre of nitrogen were broadcast and disced into the upper four to six inches of soil. The seed bed was prepared on May 18 and the preplant herbicides applied and incorporated with a triple-K cultivator and trailing harrow. Two passes were made with the triple-K and harrow to incorporate the herbicides approximately three inches deep. The soils were an Owyhee silt loam texture. The organic matter content was 1.1 and the soil pH 7.3.

Individual plots were 10 feet wide (four rows) and 30 feet long. The herbicides were applied using a single bicycle wheel plot sprayer. The boom was 10 feet long with nozzles spaced 10 inches apart applying the herbicides as double overlap broadcast applications. The spray pressure was 35 pounds per square inch and water, as the herbicide carrier, was applied at the rate of 32 gallons per acre through 8003 teejet nozzles. The soil was dry on the surface when the preplant treatments were applied. In preparation for planting, the soil surface was smoothed with a nailboard and the rows were marked.

Two varieties of sweet corn (Jubilee and Miracle) were planted on May 19, with a four-row John Deere flexi planter. Two rows of each variety were planted in all plots. The seeding rate was set to space corn seed four inches apart or three seeds per linear foot of row. After planting, irrigation furrows were made between the corn rows. The soil surface treatments of SC-1102 were applied using the same spraying procedure as described for the preplant treatments. The area was watered by furrow irrigation to add moisture for seed germination and seedling emergence and growth.

The effect of the herbicides on the emergence of corn was evaluated at emergence and seedling stage of growth. Weed control ratings and additional corn injury ratings were taken on June 22. Ears from the Jubilee variety were harvested from all plots on August 12 and compared for ear shape and size.

Results

Lasso flowable formulation was compared with Lasso emulsifiable concentrate for herbicide activity and crop tolerance. Both formulations gave excellent control of pigweed, lambsquarters, barnyardgrass, and green foxtail. Both formulations were comparable in activity in this trial. Dual and Ro-Neet also gave excellent weed control. Ro-Neet continues to look good for use in corn. SC-1102 surface applied did not have as much herbicide activity on broadleaf weeds as the other materials tested as preplant incorporated herbicides.

SC-1102 did have excellent activity on barnyardgrass and green foxtail in this trial. But it needs to be emphasized that in this trial the corn was irrigated after planting. During the irrigations the soil surface across the area was blackened with moisture. This would tend to increase the activity of surface applied herbicides. In commercial plantings it is not a common practice to blacken the soil surface when irrigating corn for emergence by furrow irrigation. SC-1102 left on dry soil would normally not be expected to result in good weed control. Poor weed control was observed with SC-1102 in potato trials where the hills were never blackened with moisture during an irrigation.

TABLE 1. Corn tolerance and percent weed control from herbicides applied as preplant and postplant preemergence surface applications. Malheur Experiment Station, Ontario, Oregon, 1984

Herbicides	Rate lbs ai/ac	Method Applied	Corn Injury	Percent Weed Control: Pigweed	Lambsquarters	Barnyard-grass	Green Foxtail
Lasso (ec)	3	PPI	0	100	100	100	100
Lasso (ec)	4	PPI	4	100	100	100	100
Lasso (fl)	3	PPI	0	100	100	100	100
Lasso (fl)	4	PPI	0	100	100	100	100
SC-1102	1.5	PES	0	82	78	100	100
SC-1102	3	PES	0	94	94	100	100
Dual	4	PPI	0	100	100	100	100
Ro-Neet	4	PPI	0	99	99	100	100
Ro-Neet	6	PPI	10	100	100	100	100
Check	--	---	0	0	0	0	0

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

TABLE 2. Number of curved ears from 25 ears sampled from Jubilee sweet corn plots treated with herbicides applied as preplant and postplant preemergence surface applications. Malheur Experiment Station, Ontario, Oregon 1984

Herbicides	Rate lbs ai/ac	Method Applied	Curved ears and length of ears from (25 samples per replication) Jubilee Variety							
			Replication 1		Replication 2		Replication 3		Average	
			curved	length (inches)[1]	curved	length (inches)	curved	length (inches)	curved	length
Lasso (ec)	3	PPI	2	13.5	3	14.0	1	13.0	2.0	13.5
Lasso (ec)	4	PPI	3	14.0	1	13.5	3	14.0	2.3	13.8
Lasso (fl)	3	PPI	1	13.5	2	13.5	2	13.5	1.7	13.5
Lasso (fl)	4	PPI	2	14.0	2	14.0	1	14.0	1.7	14.0
SC-1102	1.5	PES	0	12.5	2	12.5	2	12.0	1.3	12.3
SC-1102	3	PES	2	13.0	1	13.0	3	12.5	2.0	12.8
Dual	4	PPI	3	14.0	1	14.5	1	14.0	1.7	14.2
Ro-Neet	4	PPI	2	14.0	1	13.5	2	14.0	1.7	14.2
Ro-Neet	6	PPI	2	14.5	2	14.0	2	14.5	2.0	14.3
Check	---	---	3	12.5	2	12.0	3	12.0	2.7	12.2
Mean			2.0	13.6	1.7	13.4	2.0	13.4	1.91	13.5

[1]Length of ear with good full kernels. Quite a few of the ears did not have kernels to the tips of the ears in 1984. Poor ear fill was not associated with any particular treatment.

AN EVALUATION OF HERBICIDE TREATMENTS FOR WEED CONTROL AND CROP TOLERANCE IN PEPPERMINT AND SPEARMINT GROWN UNDER FURROW IRRIGATION

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1984

Objective

Mint oil yields and quality can be improved by eliminating annual and perennial weeds in peppermint and spearmint. Experiments were conducted to identify superior herbicide treatments that are effective yet economical for grower usage.

Because most of the mint is grown by furrow irrigation, soil active herbicides were evaluated as fall and early spring treatments when the chances are highest for rain to activate herbicides applied on the soil surface. Postemergence herbicides were applied to identify superior treatments for control of field bindweed (*Convolvulus aruensis*) and Canada thistle (*Cirsium arvense*).

Procedures Used in Conducting Research

Herbicides were applied at seven locations during November 1983. Four trials were on peppermint and three trials on Scotch spearmint. The mints were established fields (one and two years old) at all locations and the crops were in a semi-dormant state when the treatments were applied. The fields had been corrugated in the fall for subsequent summer irrigation before the herbicides were applied. Very little plant residue from the previous crops was present when the herbicides were applied. A second cutting had been taken from the spearmint fields and the foliage regrowth in the peppermint fields had been clipped before the soil was corrugated. The soil suface at each location was firm, free of clods, and in good condition for herbicide application. Three trials were located in Oregon and four trials in Idaho. Refer to Tables 1-7 for grower cooperator names, location, and application information.

The spring soil active herbicide treatments were applied during early March of 1984 as soon as the soil surface was dry. In most cases the herbicide treatments were applied before new mint growth was showing at the soil surface. Spring treatments were applied at two locations on spearmint and three locations on peppermint (see Tables 6, 7, and 8 listing location and treatments for spring applications). Herbicides for control of field bindweed and Canada thistle were evaluated at a single location for each weed species (see Tables 9 and 10). Specific information concerning the application of herbicides in these studies is included with the individual tables.

The plots at fall and spring locations were nine feet wide and 30 feet long and each treatment was replicated three times. All the soil active treatments were applied with a bicycle wheel plot sprayer. Nozzles were spaced 10 inches apart on a nine-foot boom and all treatments were sprayed as double overlap applications. Soil on the sides of the irrigation furrows was well covered with herbicides when broadcast treatments were applied by overlap applications. Spray pressure was 40 pounds per square inch and water as the carrier was used at a rate of 32 gallons per acre. Mor-Act oil was mixed with all treatments applied in the spring to soil surface treatments to increase foliar herbicide activity on emerged weeds.

Each treatment at all sites was evaluated twice for weed control and crop tolerance before harvest. Grass herbicides with extended soil persistence were also evaluated for grass control after the crop was removed and grass had time to regrow.

An experimental site at Stuart Batts was treated in early August after harvest to evaluate the activity of postemergence treatments for control of annual and broadleaf weeds growing with the crop as it recovered after harvest.

Weed species varied at each location but weed species present and control evaluations were given for prickly lettuce (*Lactuca scariola* L.), blue mustard (*Chorispora tenilla* DC.), shepherds purse (*Capsella bursa-pastoris* L.), tumbling mustard (*Sisymbrium altissimum* L.), redroot pigweed (*Amaranthus retroflexus* L.), lambsquarters (*Chenopodium album* L.), kochia (*Kochia scoparia* L.), hairy nightshade (*Solanum villosum* Mill), barnyardgrass (*Echinochloa crusgalli* L.), and green foxtail (*Setaria viridus* L.). The first six are winter annuals which germinate in the fall and by spring can grow to become too large to be effectively controlled from soil activity spring applied herbicides. The remainder of weed species listed are summer annuals which germinate in the spring and grow with the mint crop. Summer weeds are a particularly serious problem when mint stands are not full. Common postharvest problem weeds include redroot pigweed, barnyard grass, and green foxtail.

The herbicide applications to field bindweed and Canada thistle were made in early June when the mint was about five inches tall and Canada thistle varied in size from four- to six-inch rosettes to plants 10 to 12 inches tall. Field bindweed was treated when the longest vine was 10 to 12 inches long. Mint tolerance is best when treatments are applied before it gets five inches tall. Herbicides for perennial weed control were applied with a CO_2 backpack sprayer equipped with a six-foot boom. Nozzles were fanjet size 8003, water was applied as the carrier at a rate of 28 gallons per acre and the spraying pressure was 35 pounds per square inch. These plots were 12 feet wide and 25 feet long with each treatment replicated four times.

Oil and hay samples were taken from plots where information was needed to support possible herbicide registrations.

Results

A wide spectrum of weed species (winter and summer annuals) were present in mint fields. Tank-mixed combinations applied in the fall to land corrugated and prepared for summer irrigations before herbicides were applied gave good broad spectrum weed control. Single herbicides found to be ineffective on specific weed species were: 1) Sinbar on kochia, salisfy, and blue mustard 2) Goal on marestail, summer grasses, and late emerging summer broadleaf weeds in open mint stands 3) Prowl on most winter annuals including prickly lettuce, blue mustard, tumbling mustard, shepherds purse, and marestail. Sinbar, Goal, and Prowl combined in tank-mixes gave good control of all weed species including winter and summer annuals. When a single herbicide was removed from the tank-mix, certain species of weeds became escapees. In winter applied treatments, Prefar was consistently more effective than Devrinol on barnyardgrass and green foxtail and had a wider safety margin for crop tolerance. Prefar was compatible tank-mixed with both Sinbar and Goal. Prefar's activity on grass appeared to be antagonized when combined with Racer in spring treatments. Fall applied Nortron gave excellent summer control of lambsquarters, pigweed, hairy nightshade, and partial control of barnyardgrass and green foxtail, but crop tolerance was marginal. Hoelon soil applied in the fall persisted to control downy brome, barnyardgrass, and green foxtail. Plots treated with Hoelon were free of grass one month after harvest. Several of these herbicides are not registered for use in mint but are registered in other crops grown in this area and are good candidates for future registration in spearmint and peppermint.

Many of the same herbicides applied as fall treatments were applied as early in the spring as soil conditions would allow. Compared to fall treatments, spring applied treatments were less effective because of reduced weed control and early injury to the emerging mint plants. To be most effective as spring treatments herbicides must have both foliar and soil activity. Moisture after application (as rain or snow) is needed to activate the herbicide in the soil. Herbicides applied earlier in the spring are more effective than herbicides applied later in the spring because chances are greater for rain to activate the herbicides, weeds are smaller and more susceptible to herbicide activity, and mint is semi-dormant and less sensitive to effects of herbicides. The better spring treatments consisted of Goal or Sinbar in combination with Prowl or Prefar. Paraquat and Mor-Act were added to increase foliar activity on emerged weeds.

Injury associated with spring treatments resulted in a delay of early growth. Goal at the soil surface burned the buds of the emerging mint plants. Healthy stands of mint overcame the injury and outgrew the effects of Goal. Old stands with less healthy rhizomes and marginal vigor were injured more permanently, suffering stand losses. Both peppermint and spearmint are more tolerant to fall applications of Goal. Winter moisture may reduce herbicide concentrations at the soil surface even though the water solubility of Goal is very low.

Weeds need to be small for non-mechanical incorporated spring applications of Racer to be effective. This is particularily true for prickly lettuce and most often prickly lettuce will be too large in the spring for control by Racer. Flixweed, blue mustard, shepherds purse, and tumbling mustard are more susceptible to Racer activity. Racer, spring applied to the surface of the soil, did persist to control a high percentage of kochia, pigweed, lambsquarters, and hairy nightshade but had no activity on grasses. Prefar in combination with Racer gave adequate grass control but Racer activity on broadleaf weeds appeared to be reduced by the combination treatment.

Each of the spring applied soil active mechanically incorporated treatments were effective at the intermediate rates evaluated. Devrinol mechanically incorporated was clearly more active, giving better weed control than when not incorporated. Herbicide treatments that were effective when incorporated included Prowl (2.0 pounds active ingredient per acre), Sonalan (1.5 pounds active ingredient per acre), and the combination of Prowl plus Goal (1.5 plus 0.75 pounds active ingredient per acre). Sinbar did not adequately control kochia. Goal in combination with Prefar would be unsatisfactory for lambsquarters control. Sonalan plus Sinbar was exceptionally good for control of hairy nightshade in this trial.

Dowco 290 was very active on Canada thistle at the 0.25 pound active ingredient per acre rate. All the Canada thistle was eliminated in the growing mint without any thistle regrowth after harvest. Injury caused by the higher rates was evident to only the leaves of established mint plants. The stems were normal but the leaves were smaller and shapes distorted. The mint plants recovered after harvest and the new growth appeared normal in all treated plots. Basagran plus Mor-Act caused severe necrosis to Canada thistle, but nearly all the thistle recovered and regrew after harvest. Thistrol (MCPB) stopped thistle growth which increased the growth of peppermint from reduced competition but control was only temporary. The mint was not injured by either Basagran or MCPB. The rest of the commercial field had been treated with Thistrol and showed a definite benefit by increased oil yields. Dowco 290 treatments will be applied in the spring of 1985 at rates varying from 0.125 to 0.25 pounds active ingredient per acre and evaluated for control of Canada thistle, salisfy, marestail, western goldenrod, and other weeds.

MCPB (Thistrol or Cantrol) continues to be the best treatment to suppress field bindweed growth in peppermint. MCPB was applied at three rates to bindweed when the first vines reached 10 to 12 inches long and mint was four to six inches tall. MCPB stopped mint growth for about one week after application but growth resumed and final mint growth was much better in the treated than non-treated plots. The non-treated plots were completely grown over with bindweed by harvest time. MCPB at rates varying from 1/3 to 2/3 pound active ingredient per acre suppressed the growth of field bindweed from 90 to 100 percent and plots were free of any bindweed growth at harvest. After harvest, field bindweed resumed growth in most plots but in some cases the density of bindweed had been significantly reduced compared to control plots.

Further weed control studies will be conducted in 1984-85 to further evaluate new herbicides as soil and foliar applications. Efforts will be extended to interest chemical companies to register promising herbicides for use in mint. Research efforts will be accelerated to obtain more efficacy and residue data on Dowco 290 (Lontrel) and stimulate interest in an IR-4 registration.

TABLE 1. Percent weed control and crop injury ratings from herbicide treatments applied to dormant peppermint in November 1983. Malheur Experiment Station, Ontario, Oregon

Herbicide	Rate lbs ai/ac	Percent Crop Injury 5/10	6/20	Prickly Lettuce 5/10	6/20	Blue Mustard 5/10	6/20	Tumbling Mustard 5/10	6/20	Sheperds Purse 5/10	6/20	Lambsquarters 5/10	6/20	Pigweed 5/10	6/20	Barnyard grass 5/10	6/20
				PERCENT WEED CONTROL[1]													
Goal	1.5	15	0	100	92	100	98	100	98	82	64	78	55	94	88	62	43
Prefar	4.0	0	0	0	0	0	0	0	0	0	22	62	42	92	86	98	94
Prefar	6.0	0	0	0	0	0	0	0	0	0	33	74	62	96	92	100	98
Nortron + Hoelon + Goal	2 + 1.5 + 1	60	48	100	90	96	85	100	98	100	97	92	85	98	92	100	98
Nortron + Hoelon	2 + 1.5	35	17	78	66	42	30	82	68	78	62	94	90	98	90	100	99
Sinbar + Prefar	1 + 4	0	0	98	92	30	20	100	96	100	92	82	77	99	85	100	98
Sinbar + Prefar	2 + 4	0	0	100	93	23	20	100	98	100	95	96	93	100	96	100	98
Prowl	2.0	5	0	55	38	10	20	65	48	60	40	100	100	100	99	100	97
Prowl	3.0	8	0	84	65	40	35	100	76	100	68	100	100	100	100	100	100
Sinbar	2.0	0	0	100	94	42	30	100	98	100	83	94	83	90	82	95	82
Goal + Prefar	1 + 4	10	0	100	95	100	95	100	96	85	72	86	72	97	88	100	95
Goal + Prefar	1 + 6	10	0	100	98	100	97	100	97	87	70	92	84	99	85	100	98
Goal + Prowl	1 + 2	12	0	100	100	100	98	100	94	92	80	100	99	100	100	100	100
Goal + Prowl	1 + 3	15	0	100	100	100	98	100	96	94	83	100	100	100	100	100	100
Goal + Sinbar	1 + 1	10	0	100	99	100	98	100	98	98	89	100	92	100	90	100	82
Goal + Sinbar	1 + 2	10	0	100	99	100	98	100	98	99	92	100	96	100	94	100	86
Goal + Devrinol (wp)	1 + 3	12	0	100	92	100	96	100	95	78	64	82	69	93	82	96	90
Sinbar + Devrinol (wp)	2 + 3	0	0	100	94	20	20	100	93	100	85	90	78	96	85	95	91
Control	---	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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

Treatments evaluated on May 10 and June 20.

Treatments applied on November 1, 1983.

Soil Texture: Silt loam

Crop: Mitcham peppermint (second year).

Irrigation: Furrow.

TABLE 2. Percent weed control and crop injury ratings from herbicide treatments applied to dormant Scotch spearmint in November 1983. Malheur Experiment Station, Ontario, Oregon

Herbicide	Rate	Percent Crop Injury		PERCENT WEED CONTROL[1] Prickly Lettuce		Blue Mustard		Tumbling Mustard		Kochia		Pigweed		Barnyard grass		Green Foxtail	
	lbs ai/ac	5/10	6/20	5/10	6/20	5/10	6/20	5/10	6/20	5/10	6/20	5/10	6/20	5/10	6/20	5/10	6/20
Goal	1.5	18	0	99	90	100	96	100	96	60	43	94	78	53	48	62	47
Prefar	4.0	0	0	0	0	0	0	0	0	43	30	85	69	99	99	100	100
Prefar	6.0	0	0	0	0	0	0	0	0	60	60	96	82	100	100	100	100
Nortron + Hoelon + Goal	2 + 1.5 + 1	62	0	98	92	98	95	92	85	92	95	93	89	100	100	100	98
Nortron + Hoelon	2 + 1.5	43	0	72	64	48	40	76	60	98	92	90	88	100	100	100	100
Sinbar + Prefar	1 + 4	0	0	95	86	36	25	98	92	90	74	88	75	99	100	100	98
Sinbar + Prefar	2 + 4	0	0	98	93	44	25	100	95	93	79	92	84	99	100	100	99
Prowl	2.0	0	0	62	46	62	48	75	70	98	95	99	97	98	99	98	96
Prowl	3.0	0	0	78	62	69	52	90	83	100	98	100	100	100	100	100	100
Sinbar	2.0	0	0	100	94	35	20	98	94	79	62	80	72	70	64	89	74
Goal + Prefar	1 + 4	10	0	100	90	98	95	99	95	74	80	88	70	96	98	100	98
Goal + Prefar	1 + 6	12	0	100	90	100	95	98	93	79	85	94	76	99	100	100	100
Goal + Prowl	1 + 2	15	0	100	96	99	96	100	96	99	97	99	100	99	99	99	99
Goal + Prowl	1 + 3	15	0	100	96	100	95	100	98	100	100	99	100	100	100	100	100
Goal + Sinbar	1 + 1	15	0	100	99	100	95	100	98	69	53	94	80	78	69	92	82
Goal + Sinbar	1 + 2	15	0	100	100	99	97	100	98	75	52	98	80	85	70	94	85
Goal + Devrinol (wp)	1 + 3	10	0	100	88	96	93	96	94	73	60	82	68	92	90	96	90
Sinbar + Devrinol (wp)	2 + 3	0	0	96	90	26	20	95	92	68	53	88	72	94	92	98	90
Control	---	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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

Treatments evaluated on May 10 and June 20.

Treatments applied on November 2, 1983.

Soil Texture: Clay loam.

Crop: Scotch spearmint (second year).

Irrigation: Furrow.

TABLE 3. Percent weed control and crop injury ratings from herbicide treatments applied to dormant peppermint in November 1983. Owen Froerer Nyssa, Oregon

Herbicide	Rate	Percent Crop Injury		PERCENT WEED CONTROL[1]											
				Prickly Lettuce		Salisfy		Kochia		Pigweed		Downy Brome		Green Foxtail	
	lbs ai/ac	5/3	6/20	5/3	6/21	5/3	6/21	5/3	6/21	5/3	6/21	5/3	6/21	5/3	6/21
Prefar + Goal	4 + 1	8	0	98	95	78	65	45	30	98	98	62	53	99	99
Devrinol (fl) + Goal	3 + 1	12	0	96	98	72	65	70	50	95	92	78	64	94	90
Goal	1.5	15	0	100	100	88	76	78	70	98	80	48	40	65	55
Sinbar	2	0	0	96	92	30	18	35	25	93	80	99	99	78	73
Sinbar + Prefar	1 + 4	0	0	93	90	20	15	65	55	98	94	100	100	100	100
Sinbar + Prefar	1.5 + 4	0	0	98	95	28	20	65	50	99	96	100	100	100	100
Sinbar + Goal	1 + 1	10	0	100	100	85	80	78	70	93	86	100	100	78	70
Sinbar + Goal	1.5 + 1	12	0	100	100	85	80	75	68	96	90	100	100	84	76
Prowl + Goal	1.5 + 1	8	0	99	96	92	90	99	96	100	100	98	95	100	100
Prowl + Goal	2 + 1	10	0	99	98	90	90	100	98	100	100	98	95	100	100
Prowl + Sinbar	2 + 1	0	0	100	100	60	48	100	96	100	100	100	100	100	100
Prowl + Sinbar	2 + 1.5	0	0	100	100	68	56	100	96	100	100	100	100	100	100
Sinbar + Devrinol (fl)	1.5 + 3	0	0	96	93	30	20	65	60	93	84	100	100	92	86
Check	---	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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

Treatments evaluated on May 3 and June 21.

Treatments applied on November 16, 1983.

Soil Texture: Clay loam.

Crop: Mitcham peppermint (third year).

Irrigation: Furrow.

TABLE 4. Percent weed control and crop injury ratings from herbicide treatments applied to dormant peppermint in November 1983. Lewis McKellip, Nampa, Idaho

Herbicide	Rate lbs ai/ac	Percent Crop Injury 5/12	Percent Crop Injury 7/12	PERCENT WEED CONTROL[1]: Salisfy 5/12	Salisfy 7/12	Prickly Lettuce 5/12	Prickly Lettuce 7/12	Flixweed 5/12	Flixweed 7/12	Kochia 5/12	Kochia 7/12	Green Foxtail 5/12	Green Foxtail 7/12
Prefar + Goal	4 + 1	5	0	95	87	99	95	85	72	82	70	99	98
Devrinol + Goal	4 + 1	8	0	80	73	100	95	85	70	92	84	92	86
Goal	1.5	12	0	99	99	100	100	88	74	80	70	78	55
Sinbar	2	0	0	64	48	92	84	96	90	62	48	84	79
Sinbar + Prefar	1.5 + 4	0	0	60	45	96	90	98	92	78	69	100	100
Sinbar + Devrinol	1.5 + 4	0	0	67	52	95	90	95	89	75	70	96	92
Prowl + Goal	1.5 + 1	5	0	92	85	99	99	100	100	100	100	100	100
Prowl + Goal	2 + 1	8	0	95	88	100	100	100	100	100	100	100	100
Prowl + Sinbar	1.5 + 1	0	0	68	56	99	99	100	100	100	100	100	100
Check	---	0	0	0	0	0	0	0	0	0	0	0	0

[1]Ratings: 0 = no effect, 100 = all plants killed. Ratings are reported as an average from plots at two locations on different peppermint fields owned by Lewis McKellip.

Treatments applied on November 10, 1983.

Soil texture is silt loam.

Crop: Mitcham peppermint (two- and three-year-old fields).

TABLE 5. Percent weed control and crop injury ratings from herbicide treatments applied to dormant Scotch spearmint in November 1983. Lewis McKellip, Nampa, Idaho

Herbicide	Rate	Percent Crop Injury		PERCENT WEED CONTROL[1] Blue Mustard		Prickly Lettuce		Tansy Mustard		Kochia		Green Foxtail	
	lbs ai/ac	5/12	7/12	5/12	7/12	5/12	7/12	5/12	7/12	5/12	7/12	5/12	7/12
Prefar + Goal	4 + 1	8	0	100	100	98	95	88	90	76	73	99	98
Devrinol + Goal	4 + 1	12	0	100	100	98	95	90	93	88	85	88	90
Goal	1.5	15	0	100	100	95	95	85	80	78	72	72	60
Sinbar	2	0	0	35	20	97	97	98	99	42	55	88	84
Sinbar + Prefar	1.5 + 4	0	0	40	25	99	99	98	99	59	65	98	98
Sinbar + Devrinol	1.5 + 4	0	0	55	35	97	95	98	98	55	65	94	96
Prowl + Goal	1.5 + 1	10	0	100	100	99	99	92	95	100	100	99	100
Prowl + Goal	2 + 1	10	0	100	100	99	100	95	98	100	100	100	100
Prowl + Sinbar	1.5 + 1	0	0	65	45	100	100	100	100	98	98	100	100
Check	---	0	0	0	0	0	0	0	0	0	0	0	0

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

Treatments applied on November 10, 1983.

Soil texture is clay loam.

Crop: Scotch Spearmint.

TABLE 6. Percent weed control and crop injury ratings from herbicide treatments applied in early spring before peppermint plants emerged. Lewis McKellip, Nampa, Idaho, 1984

Herbicide	Rate	Percent Crop Injury		PERCENT WEED CONTROL[1] Prickly Lettuce		Flixweed		Salisfy		Blue Mustard		Green Foxtail	
	lbs ai/ac	5/12	7/12	5/12	7/12	5/12	7/12	5/12	7/12	5/12	7/12	5/12	7/12
Racer	0.5	0	0	68	45	98	95	65	55	95	90	20	10
Racer	1.0	0	0	87	65	99	100	85	68	98	95	30	10
Racer + Prefar	0.5 + 4	0	0	65	30	70	75	63	50	75	80	83	85
Racer + Prefar	1 + 4	0	0	80	40	83	88	63	55	85	85	88	90
Goal + Paraquat	0.75 + 0.25	5	0	97	92	100	98	95	90	98	100	65	40
Goal + Prowl + Paraquat	0.5 + 1.5 + 0.25	5	0	95	98	100	100	93	88	100	100	98	99
Goal + Prowl	0.5 + 1.5	5	0	95	98	100	100	93	90	98	100	98	100
Prowl + Paraquat	1.5 + 0.25	0	0	57	72	78	85	42	23	88	78	96	98
Prowl + Paraquat	2 + 0.25	0	0	59	85	68	88	42	28	93	90	100	100
Sinbar + Paraquat	1.5 + 0.25	0	0	98	99	100	100	93	81	82	75	80	70
Sinbar + Devrinol	1.5 + 3	0	0	99	98	100	100	33	22	43	50	92	85
Goal + Prefar	0.75 + 4	5	0	98	96	100	100	98	90	98	98	98	98
Sinbar + Prefar	1.5 + 4	0	0	96	94	100	100	25	20	55	50	99	98
Check	---	0	0	0	0	0	0	0	0	0	0	0	0

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

Weed species and size of weeds when the treatments were applied:
- Prickly lettuce - rosettes four to six inches
- Flixweed - rosettes three to four inches
- Salisfy - rosettes three to four inches
- Blue mustard - rosettes four to six inches, a few plants were flowering
- Green foxtail - not emerged when treatments were applied

Evaluated on May 12 and July 12.

Herbicides applied on March 8.

Field corrugated the previous fall.

Soil texture was clay loam.

TABLE 7. Percent weed control and crop injury ratings from herbicide treatments applied in early spring at the time peppermint plants emerged. Lewis McKellip, Meridian, Idaho, 1984

Herbicide	Rate lbs ai/ac	Percent Crop Injury 5/12	Percent Crop Injury 7/12	PERCENT WEED CONTROL[1] Prickly Lettuce 5/12	Prickly Lettuce 7/12	Blue Mustard 5/12	Blue Mustard 7/12	Kochia 5/12	Kochia 7/12	Pigweed 5/12	Pigweed 7/12	Barnyard grass 5/12	Barnyard grass 7/12
Racer	0.5	0	0	82	70	93	95	89	72	90	83	15	10
Racer	1.0	0	0	90	80	98	98	94	78	96	92	20	15
Racer + Prefar	0.5 + 4	0	0	63	40	90	95	85	65	85	80	95	95
Racer + Prefar	1 + 4	0	0	70	48	96	98	90	83	90	85	98	98
Goal + Paraquat	0.75 + 0.25	15	0	98	92	100	100	73	65	78	60	68	60
Goal + Prowl + Paraquat	0.5 + 1.5 + 0.25	15	0	98	95	100	100	100	100	100	100	100	100
Goal + Prowl	0.5 + 1.5	8	0	97	95	100	100	100	100	100	100	100	100
Prowl + Paraquat	1.5 + 0.25	10	0	94	88	100	100	99	96	100	100	100	100
Prowl + Paraquat	2 + 0.25	10	0	96	88	100	95	100	100	100	100	100	100
Sinbar + Paraquat	1.5 + 0.25	10	0	100	99	83	70	68	40	83	78	82	80
Sinbar + Devrinol	1.5 + 3	0	0	96	94	20	30	82	80	88	90	88	85
Goal + Prefar	0.75 + 4	10	0	92	88	98	93	95	95	80	88	95	92
Sinbar + Prefar	1.5 + 4	0	0	96	92	20	35	85	90	83	85	98	95
Check	---	0	0	0	0	0	0	0	0	0	0	0	0

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

Weed species and size of weeds when the treatments were applied:
- Prickly lettuce - rosettes one- to three-inch rosettes (small for springtime)
- Blue mustard - mostly three- to five-inch rosettes, few plants with flowers
- Kochia - had not emerged
- Pigweed: had not emerged
- Barnyardgrass - had not emerged

Evaluated on May 12 and July 12.

Herbicides applied on March 8.

Field corrugated the previous fall.

Soil texture was sandy loam.

TABLE 8. Spring applied mechanically incorporated and non-mechanically incorporated herbicides for percent weed control in spearmint and peppermint. Malheur Experiment Station, Ontario, Oregon 1984

Herbicide	Rate lbs ai/ac	Mechanically Incorporated	Percent Crop Injury 5/5	Percent Crop Injury 7/15	Hairy Nightshade 5/5	Hairy Nightshade 7/15	Kochia 5/5	Kochia 7/15	Lambsquarters 5/5	Lambsquarters 7/15	Pigweed 5/5	Pigweed 7/15	Barnyard-grass 5/5	Barnyard-grass 7/15	Green Foxtail 5/5	Green Foxtail 7/15
					PERCENT WEED CONTROL[1]											
Prowl	1.0	Yes	0	0	60	55	90	94	85	90	92	90	90	83	85	80
Prowl	1.5	Yes	0	0	70	75	95	98	90	93	98	95	98	95	95	92
Prowl	2.0	Yes	0	0	85	92	100	100	100	100	100	100	100	100	100	100
Prowl	3.0	Yes	5	5	98	100	100	100	100	100	100	100	100	100	100	100
Sonalan	1.0	Yes	0	0	85	95	88	83	78	73	85	80	88	83	85	80
Sonalan	1.5	Yes	5	5	98	100	98	92	92	85	98	95	100	100	100	100
Sonalan	2.0	Yes	10	10	100	100	100	98	100	100	100	98	100	100	100	100
Devrinol	2.0	Yes	0	0	10	15	80	72	82	75	85	78	85	78	72	70
Devrinol	4.0	Yes	0	0	25	30	88	89	93	90	95	88	92	85	85	85
Prefar + Sinbar	4 + 0.75	Yes	0	0	95	98	86	92	83	80	88	92	98	98	98	99
Treflan	0.75	Yes	0	0	10	5	83	80	82	84	90	90	92	90	92	95
Goal + Prefar	0.75 + 4	Yes	20	20	73	80	96	93	88	90	92	95	98	96	98	100
Sinbar	1.0	Yes	0	0	98	100	65	48	78	80	85	78	85	80	85	75
Prowl + Goal	1.5 + 0.75	Yes	20	20	88	90	98	100	99	100	100	100	100	100	100	100
Devrinol	2.0	No	0	0	10	5	64	55	60	55	63	58	65	60	65	60
Devrinol	4.0	No	0	0	15	10	78	72	72	70	75	70	78	72	75	70
Control	---	---	0	0	0	0	0	0	0	0	0	0	0	0	0	0

[1]Ratings: 0 = no effect, 100 = all plants killed. Evaluated May 5 and July 15.

Applied: mechanically incorporated treatments and incorporated with rolling harrow on March 27.

Applied: non-incorporated Devrinol treatments on April 4.

Existing winter annual weed species were treated with Goal (1/4 pound active ingredient per acre) plus Paraquat (1/3 pound active ingredient per acre). This combination controlled about 75 percent of existing prickly lettuce, flixweed, blue mustard, tumbling mustard, and shepherds purse. Prickly lettuce and flixweed species of weeds which did show severe injury from Goal and Paraquat recovered by new growth from the center of the rosettes. These weeds were removed by handweeding.

TABLE 9. Percent weed control and crop injury to peppermint treated with Dowco 290 for Canada thistle control. Bob Friday Farm, Meridian, Idaho, 1984

Herbicide	Rate lbs ai/ac	Percent Crop Injury July 12	Percent Crop Injury August 2	Percent Crop Injury October 5[2]	Percent Canada Thistle Control[1] July 12	Percent Canada Thistle Control[1] August 2	Percent Canada Thistle Control[1] October 5
Dowco 290	0.25	5	0	0	99	100	100
Dowco 290	0.50	15	5	0	100	100	100
Dowco 290	0.75	25	15	0	100	100	100
Dowco 290	1.00	40	20	0	100	100	100
Basagran + Mor-Act	1.00	0	0	0	75	60	50
Basagran + Mor-Act	2.00	0	0	0	85	70	60
Thistrol	1.00	10	0	0	85	70	20
Check	--	0	0	0	0	0	0

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

[2]October 5 ratings were taken on growth recovery of mint after harvest.

A. Treatments applied on June 3, 1984
   Plant growth
   1. peppermint - six to eight inches tall
   2. Canada thistle - three to 14 inches tall

B. Herbicide applications:
   1. plot size 12 feet wide 25 feet long
   2. Sprayer - CO_2 backpack - 35 pounds per square inch - six-foot boom - four nozzles on boom - nozzle size 8004 teejet fan.
   3. Water as the carrier was used at the rate of 32 gallons per acre

C. Crop - Mitcham peppermint, excellent stand and good growth

TABLE 10. Percent control of field bindweed and tolerance of peppermint from applications of MCPB. Rod Frahm Farm, Nyssa, Oregon 1984

Herbicide	Rate lbs ai/ac	Crop Tolerance 6/29	8/1	Percent Suppression[1] Before Harvest 6/29	8/1	Postharvest[2] Control 10/15
MCPB[3]	1/3	12	0	92	90	30
MCPB	1/2	20	0	100	96	45
MCPB	2/3	25	0	100	100	60
MCPB	1.0	30	0	100	100	70
Control[4]	---	60	85	0	0	0

[1]Percent reduction in field bindweed growth in growing mint before harvest.

[2]Percent control - dead bindweed plants residue present but no new growth evident in treated plots.

[3]MCPB applied on May 20.

[4]Reduction of peppermint growth because of competition from dense bindweed cover.

A STUDY OF ARTIFICIAL DRYING OF ONIONS TO LOWER STORAGE LOSSES

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1984

Purpose

Data from onion variety trials continue to show that varities differ significantly in maturity date. Tops of early maturing varieties begin to lay-over in early August, whereas tops of late maturing lines will remain green and erect until lifted in late September. Harvest and variety interaction studies show that late maturing varieties produce larger, higher yielding bulbs but losses to *Botrytis* during storage generally counter any increase in yield. The object of this study was to determine if storage losses could be reduced in late maturing varieties by drying the bulbs with artificial heat before storage.

Procedure

Eight varieties of yellow and two varieties of white sweet spanish onions were evaluated to determine if neckrot occurring during bulb storage could be reduced by drying the bulbs with artificial heat before they were put in storage. The varieties tested included early, intermediate, and late maturing lines. Golden Cascade matures early, Cima, Ringmaker, and White Keeper are intermediate in maturity and Foxy, Vega, Armada, Dai Maru, Monarch, and Avalanche are late maturing. The late lines have high yield potential but are more susceptible to *Botrytis* neckrot in storage.

The onions were planted on April 11 and lifted on September 18. On September 18, about 95 percent of the tops in Golden Cascade and Cima plots had laid over. About 65 percent of the tops were down in the White Keeper, Vega, and Ringmaker plots but 60-65 percent of the tops in the Monarch, Foxy, Armada, Dai Maru, and Avalanche plots were still green and were upright when the onion bulbs were lifted. The onions were topped on September 28 and left to field cure for 10 days before storing. After field curing, one-half of the bulbs from each plot was put directly into a forced air storage shed. The remaining half was placed in a drier for 24 hours. The temperature in the drier ranged from 80-90°F. The heat source was electric and air was continuously circulated with a high velocity fan mounted in the heating units. After drying, the onions were put in the storage shed with the air dried bulbs. The air dried and heat dried samples were randomized by location in storage so placement was not a factor in the results. The onions were well aerated during storage by a large fan which forced air underneath each pallet which contained the samples.

The onions were removed from storage on January 10 and graded to determine bulb yields and storage quality for each treatment. The yields are reported by bulb diameters (2 1/4-3 inch, 3-4 inch, and >4 inch). Storage quality ratings were determined by weighing the bulbs infected with *Botrytic* neckrot.

Results

The results show that heat drying was very effective in controlling *Botrytis* infection during storage. Susceptibility of field dried onions to infection varied between varieties and ranged from a high of 47.2 percent neckrot in Avalanche to a low of 3.7 percent in Cima. Heat treatments reduced the occurrence of neckrot in all varieties regardless of bulb yield or maturity date. Calculated means of percent neckrot over all varieties show that only 4.1 percent of the bulbs were lost to infection when heat treated compared to 16.5 percent when air dried. This represents a savings of about 12.4 percent of the harvested crop when the onions are dried by heat before being placed in storage. Avalanche (white bulb) was most susceptible to infection during storage. The harvested yield from Avalanche was 722 hundredweight per acre. Storages in air dried conditions would amount to a loss of 341 hundredweight per acre or nearly 50 percent of the crop. When heat dried, the storage losses with this variety were only 103 hundredweight per acre or a savings of about 237 hundredweight per acre. Average storage losses for all varieties were reduced from 119 to 30 hundredweight per acre by heat drying.

It was also observed that the onion bulbs dried by artificial heat were more attractive. The bulbs were firmer, the skins were drier and had a brighter more uniform color.

The study will be continued in 1985 to determine if similar results are obtained next year.

TABLE 1. The effect of artificial drying on Botrytis infections in storage of 10 different varieties of sweet spanish onions. Malheur Experiment Station, Ontario, Oregon, 1984

Variety	Bulb Yields cwt/ac				Storage Loss to Percent Botrytis		Comparison of Storage Losses cwt/ac	
	2 1/4-3	3-4	$\geq$4	Total	Air	Heat	Air	Heat
Cima	37	331	166	534	3.7	1.2	19.8	6.4
Golden Cascade	16	349	320	685	8.6	3.7	58.9	25.3
Foxy	29	348	210	587	13.0	1.9	76.3	11.1
Vega	12	290	449	751	6.4	3.0	48.0	22.5
Armada	19	412	353	784	15.6	4.4	122.3	34.5
Dai Maru	10	241	541	792	21.8	3.6	172.6	28.5
Ringmaker	13	319	381	713	11.2	2.3	79.8	16.3
Monarch	12	284	518	814	25.5	6.7	207.6	54.5
White Keeper	45	368	114	527	12.4	0.5	65.3	2.6
Avalanche	11	276	435	722	47.2	14.3	340.8	103.2
LSD (.05)	11	90	98	58	17.4	4.9	--	--
Means	20	322	349	691	16.5	4.1	119.0	30.4
CV (%)	42	21	22	6	82	92	--	--

AN EVALUATION OF GRASS HERBICIDES FOR SELECTIVE WEED CONTROL IN SWEET SPANISH ONIONS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1984

Purpose

Brominal and Goal are registered in yellow sweet spanish onions as postemergence treatments. Neither herbicide will control weedy grass species. The purpose of this trial was to evaluate several herbicides with activity on grasses when applied as postemergence treatments and to determine their compatibility when tank-mixed with broadleaf herbicides and applied to seedling onions.

Procedure

Golden Cascade yellow sweet spanish onions were planted on April 10 to land plowed in the fall and bedded in the spring. Winter wheat had been grown in the field for two years before this trial. Before plowing, 100 pounds per acre of phosphate and 60 pounds per acre of nitrogen were broadcast. The field was left overwinter as plowed. In the spring, 150 pounds per acre of nitrogen ($(NH_4)_2SO_4$) were broadcast before the field was tilled with a triple-K and spike-tooth harrow in preparation for bedding and planting. Raw onion seed was planted with a Beck shoe type drill at a rate of two pounds per acre in single rows spaced 22 inches apart. Individual plots were four rows wide and 25 feet long. The soil was silt loam with 1.2 percent organic matter and had a pH of 7.3. The field was furrow irrigated after planting to assure uniform soil moisture conditions for seed germination and seedling emergence. Seeds of green foxtail, barnyardgrass, and redroot pigweed were broadcast on the soil surface and mixed with the soil by the triple-K and harrow as the seed bed was prepared. Seed of wild oats and lambsquarters was not sown and plants present were from seed naturally infesting the soil within the experiment plot area.

The trial area did not receive any herbicide treatments other than the postemergence treatments evaluated in this study. Either Brominal or Goal was applied as repeat treatments. The first application of these herbicides was on May 22 and 23. The onions were in the late flag and early one-leaf stage of development. The broadleaf weeds ranged in size from cotyledon to four true leaves. On May 30, grass herbicides were applied in combination with Brominal or Goal. Mor-Act (crop oil) was added to the tank-mix treatments and applied at a rate of one quart per acre. At the time that the grass herbicides were applied the onions had recovered from the first Brominal or Goal treatments and had grown to the one and two leaf stage. Brominal had eliminated all the broadleaf weeds but grassy weeds were growing vigorously.

Goal had been very effective on pigweed but had not effectively controlled lambsquarters. Grasses in the Goal-treated plots were injured by the Goal treatments and were more susceptible to the effects of the grass herbicides than was the grass in the Brominal-treated plots.

The herbicides treatments were applied with a bicycle wheel plot sprayer equipped with a 7 1/2 foot boom. Four teejet nozzles size 8003 were spaced 22 inches apart with one nozzle over the center of each row in the four-row plots. Spray pressure was 40 pounds per square inch and water was applied as the carrier at the rate of 27 gallons per acre. Air temperatures reached a high of 92°F during each of the days the grass herbicides were applied. The plots were irrigated by furrow two days after the herbicide treatments were applied.

The plots were evaluated on June 10 and 21 for weed control and crop injury. The herbicide efficacy data from the June 21 rating are included in Table 1. After herbicide evaluations, weeds were removed by hand and the onions were thinned to a final plant stand of approximately four plants per linear foot of row. The onions were grown for the remainder of the summer to measure the competitive effects of the early weeds and herbicide treatments on bulb yield and bulb size.

The onion bulbs were lifted on September 21 and hand-topped on September 28. They were put in storage on October 11 and left until January 7 before grading to obtain yield and storage quality data. Yield data are reported in Table 2. Data include yields for bulbs with diameters 2 1/4 to three, three to four, and greater than four inches. The percent of bulbs over four inches in diameter is also reported.

Results

Brominal very effectively controlled both redroot pigweed and lambsquarters. Brominal was probably more effective on the pigweed in this trial than normal because of the repeat treatments and small size of the pigweed at the first application. Brominal had no herbicidal effect on the weedy grass species. Goal was very effective on redroot pigweed, but did not control all the lambsquarters. It caused injury to the seedling grasses which resulted in better control of grasses at lower grass herbicide rates. Onions treated with Brominal showed more initial foliar herbicide injury symptoms than those treated with Goal. This effect was only noticed for a short period of time and bulb yield and size were not statistically different at harvest between the two herbicides. Both Selectone and Assure were effective on the three species of grasses present in this trial. PP005 was very active on barnyardgrass at rates of 0.125 pound active ingredient per acre and higher. It was only effective on green foxtail and wild oats at 0.25 pound active ingredient per acre and higher. Poast showed good activity on barnyardgrass and green foxtail at 0.2 pound per acre but control of wild oats was improved at the 0.3 pound active ingredient per acre rate. The lowest use rate for Assure appears to be 0.125 pound active ingredient per acre. The lower rate (.063 pound active ingredient per acre) did not adequately control green foxtail or wild oats. SC-1084 was least active of the grass herbicides evaluated. It was most active when used at one-half pound active ingredient per acre in combination with Goal. It was less effective when used in combination with Brominal. Each of the grass herbicides was compatible with either Brominal or Goal and good onion tolerance was obtained even with the addition of activated oil in the tank-mix treatments (Table 1).

Bulb yields and bulb size were best in those treatments where grass control was highest (Table 2). Yields from the handweeded treatments were less than in those treatments giving the higher percent control of grasses. Early grass populations competed with onions and apparently reduced bulb yields. Comparing bulb yields from plots treated with only Goal or Brominal shows yields were higher in the Goal-treated plots. This yield difference does not reflect crop injury from Brominal, but rather shows improved yields because of some grass herbicidal activity from Goal.

These data show that postemergence treatments can control annual grass and broadleaf weeds in onions. Successful postemergence treatments are tank-mix combinations of Goal or Brominal with certain grass herbicides. This trial shows that onion yields are increased when grassy plant species are eliminated from onion plantings and not allowed to compete during seedling growth.

TABLE 1. A comparison of crop injury and weed control in yellow sweet spanish onions treated with Brominal and Goal in combination with several postemergence grass herbicides. Malheur Experiment Station, Ontario, Oregon, 1984

Herbicide	Rate lbs ai/ac	PERCENT CROP INJURY AND WEED CONTROL RATINGS: Crop Injury Goal	Crop Injury Brominal	Pigweed Goal	Pigweed Brominal	Lambsquarters Goal	Lambsquarters Brominal	Green Foxtail Goal	Green Foxtail Brominal	Barnyardgrass Goal	Barnyardgrass Brominal	Wild Oats Goal	Wild Oats Brominal
Check	0.38	0	0	--	100	--	100	--	0	--	0	--	0
Check	0.25	0	0	100	--	85	--	40	--	43	--	35	--
PP005	0.063	0	0	100	100	88	100	95	60	99	87	85	60
PP005	0.125	0	0	100	100	85	100	100	80	100	98	98	82
PP005	0.25	0	0	100	100	86	100	100	99	100	99	100	99
PP005	0.50	0	0	100	100	85	100	100	100	100	100	100	100
Selectone	0.25	0	0	100	100	85	100	100	100	100	100	98	97
Selectone	0.375	0	0	100	100	85	100	100	100	100	100	99	97
Selectone	0.50	0	0	100	100	86	100	100	100	100	100	99	100
Poast	0.20	0	0	100	100	85	100	96	95	96	98	91	93
Poast	0.30	0	0	100	100	85	100	100	98	100	99	98	96
Poast	0.50	0	0	100	100	85	100	100	100	100	100	100	97
Assure	0.063	0	0	100	100	85	100	88	92	88	95	80	92
Assure	0.125	0	0	100	100	85	100	100	98	100	100	100	96
Assure	0.1875	0	0	100	100	85	100	100	100	100	100	100	100
Assure	0.25	0	0	100	100	85	100	100	100	100	100	100	98
SC-1084	0.125	0	0	100	100	85	100	80	45	85	55	68	45
SC-1084	0.25	0	0	100	100	85	100	86	65	92	72	88	65
SC-1084	0.50	0	0	100	100	85	100	98	78	98	90	96	75
Hoelon	1.50	0	0	100	100	85	100	99	95	99	98	99	96
Handweeded Check	--	12	15	92	90	86	92	90	88	92	88	82	85

Evaluated June 21, 1984.

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

TABLE 2. A comparison of bulb yields from yellow sweet spanish onions treated with Brominal and Goal in combination with several postemergence applied grass herbicides. Malheur Experiment Station, Ontario, Oregon, 1984

Herbicide[1]	Rate	BULB YIELDS (cwt/ac) 2 1/4 - 3 inch		3 - 4 inch		≥ 4 inch		Total Yield		Percent ≥ 4 inch	
	lbs ai/ac	Goal	Brominal	Goal	Brominal	Goal	Brominal	Goal	Brominal	Goal	Brominal
Check	0.38	--	91	--	287	--	78	--	456	--	17
Check	0.25	21	--	387	--	188	--	596	--	31	--
PP005	0.063	30	40	402	260	182	156	614	457	30	34
PP005	0.125	24	38	398	321	185	115	607	473	30	24
PP005	0.25	14	23	359	362	234	238	608	622	38	38
PP005	0.50	22	25	402	326	155	206	578	558	27	37
Selectone	0.25	21	20	394	352	173	219	589	591	29	37
Selectone	0.375	22	33	436	357	111	138	568	527	20	26
Selectone	0.50	9	28	360	317	207	218	575	563	36	39
Poast	0.20	26	18	388	380	173	215	586	622	30	34
Poast	0.30	24	24	393	354	177	198	593	576	30	34
Poast	0.50	30	28	409	328	155	158	594	514	26	31
Assure	0.063	25	14	381	347	195	241	601	602	32	40
Assure	0.125	18	17	394	353	170	251	583	621	29	40
Assure	0.185	25	45	427	364	141	168	594	577	24	29
Assure	0.25	19	29	421	332	201	154	642	516	31	30
SC-1084	0.125	27	78	383	317	126	112	537	507	24	22
SC-1084	0.25	25	55	356	294	149	133	530	482	28	28
SC-1084	0.50	22	29	416	348	166	176	605	554	27	32
Hoelon	1.50	23	26	365	350	190	209	578	585	33	36
Handweeded Check	--	32	30	362	321	142	156	536	507	26	31
LSD (.05)		NS	7	NS	NS	NS	100	NS	110	--	--
Mean		23	34	393	334	172	178	588	547	31	33
CV (%)		48	61	8	12	33	33	9	12	--	--

[1]Bulbs harvested September 24 - stored in forced air ventilated shed from October 4 to January 3. Graded for bulb size and yield on January 3, 4, and 5.

AN EVALUATION OF SEEDLING ONION TOLERANCE TO DIFFERENT FORMULATIONS OF BROMOXYNIL

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1984

Purpose

Bromoxynil, ME4 Brominal, and AXF-1240 were compared for weed control and seedling onion tolerance when used as postemergence treatments.

Procedure

ME4 Brominal (ec) and AXF-1240 (fl) formulations of bromoxynil were applied on June 8 when the onions had one or two true leaves. Golden Cascade yellow sweet spanish onions were planted on April 16 in silt loam textured soil. The onions were watered after planting by furrow irrigation for seed germination and seedling emergence and growth. The plots were four rows wide and 50 feet long. Each of the treatments was replicated three times. The different treatments were arranged at random in a complete block experimental design. The herbicides were sprayed with a bicycle wheel plot sprayer. Four nozzles were spaced on the 7 1/2-foot boom with a nozzle over the center of each row in the four row plots. Fan teejet nozzles size 8006 were used to apply the herbicides in water applied at the rate of 45 gallons per acre. Spray pressure was 35 pounds per square inch. Air temperature was 65^{O}F when treatments were applied. Clouds were heavy and partly broken. Wind was out of the northwest at five to six miles per hour. Broadleaf weed species were shepherdspurse, lambsquarters, and redroot pigweed. Rosettes of shepherdspurse were two to four inches in diameter and a few were starting to flower. The largest pigweed and lambsquarters plants were about four inches tall.

The treatments were evaluated on June 26 for weed control and tolerance of the seedling onions to the herbicides.

Results

ME4 Brominal was much more active than AXF-1240 bromoxynil. ME4 Brominal caused the onion leaves to wilt and to show some chlorosis. The onions continued to grow and after one week appeared normal. ME4 Brominal at 0.5 pound active ingredient per acre gave good weed control. It was most active on lambsquarters and least active on pigweed. AXF-1240 showed little activity on weeds or onions at the rates evaluated in this study.

TABLE 1. Percent weed control and crop injury ratings to seedling onions from postemergence applications of two formulations of bromoxynil. Malheur Experiment Station, Ontario, Oregon, 1984

Herbicides	Rate lbs ai/ac	Percent Crop Injury Replicates 1	2	3	Avg	PERCENT WEED CONTROL: Shepherdspurse Replicates 1	2	3	Avg	Lambsquarters Replicates 1	2	3	Avg	Pigweed Replicates 1	2	3	Avg
ME4 Brominal	0.375	5	10	5	7	85	80	85	83	95	98	98	97	70	75	70	72
ME4 Brominal	0.50	10	15	15	13	95	95	98	96	100	100	100	100	85	90	90	88
AXF-1240	0.375	0	0	0	0	30	35	35	33	30	35	35	33	25	30	30	28
AXF-1240	0.50	5	5	5	5	50	50	45	48	55	50	40	48	40	40	35	38
Check	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Evaluated June 26, 1984

INSECTICIDES FOR ONION THRIP CONTROL IN DRY BULB ONIONS

Lynn Jensen
Malheur Experiment Station, Ontario, Oregon, 1984

Purpose

A combination of parathion and toxaphene has been the standard onion thrip control in Malheur County for a number of years. Because of a local potato processor's prohibition of toxaphene from being used on fields in a rotation with potatoes and the subsequent decision by the EPA to rescind toxaphene registration, onion growers need to know what products are most effective on thrips. This trial evaluated registered and non-registered products and rates for thrip control.

Procedures

The spanish type hybrid onion, Golden Cascade, was planted on April 13 in rows 22 inches apart. Ramrod and Dacthal were applied for weed control and trithion for onion maggot. After emergence, plants were hand thinned to uniform population. Soil type is Owyhee silt loam with an organic matter content of 1.3 and a pH of 7.3.

Plots were four rows wide, 25 feet long, and replicated four times in a complete randomized block design. The insecticides were applied with a backpack type plot sprayer equipped with a six-foot boom, 6002 LP nozzles at 20 gallons per acre, and 30 pounds per square inch. LI-700, a penetrating surfactant, was applied at a rate of two pints per 100 gallons of water, and water was used as the carrier. The spray mixtures were buffered with a buffering agent at two pints per 100 gallons of water.

Normally, onion fields are first sprayed when the plants average 10 to 15 thrips per plant and applications are usually made by air. Since ground applications are generally more effective than air applications, thrip populations in the plots were allowed to increase higher than normal to simulate the control observed from aerial applications. An arbitrary number of 50 thrips per plant average was chosen as the threshhold to spray.

Spraying was done on the morning of July 11, 1984. Air temperature was 80°F, with no wind or cloud cover. Plants were at the nine-leaf stage of growth. Readings of thrip populations were taken six days later on July 17. Subsequent spot checks indicated that no information would be gained from additional readings.

Results

A combination of methyl parathion and toxaphene were used as the standard and performed as expected from experience, controlling 93 percent of the thrips (Table 1). Surprisingly, the methyl parathion by itself performed as well as the standard, suggesting that perhaps toxaphene was not always contributing to the combination. The methyl parathion used alone was two times the rate of the methyl parathion in the combination.

All treatments except the pydrin treatment were significantly better than the check (Table 1). The treatment that provided the best thrip control in this experiment was a combination of methyl parathion and Penncap M, an encapsulated form of methyl parathion. This combination gave a methyl parathion rate equal to the methyl parathion treatment by itself, but gave significantly better thrip control than any other treatment. Combinations with Penncap M must be used very carefully because of the potential hazard to bees.

Spur is a new synthetic pyrethroid that is being investigated for possible use on onions. In this test, Spur's control appeared marginal, although it did perform significantly better than the synthetic pyrethroid, Pydrin. Pydrin enhanced the activity of Vydate, so there is the possibility that Spur plus Vydate might be a very effective combination. This combination should be examined next year.

Other combinations that look good are Penncap M plus Guthion and methyl parathion plus Guthion. These combinations enable the grower to keep the parathion rates low and still get good thrip control.

Amaze has been used in the past in granular form for onion maggot control and has appeared to give some thrip suppression. Amaze used alone as a six-pound emulsifiable concentrate formulation gave some thrip suppression in this trial. Amaze may give better control in combination with other materials.

Vydate has shown erratic control under field conditions, and did not provide adequate thrip control in these trials.

Thrip populations had a negative impact on onion yields (Table 1). The correlation between the index of thrips population and onion yields was -.77 and was very highly significant. In the four treatments where thrip control averaged 95 percent or better, the onions produced 391 hundredweight per acre. Onions in the check treatment produced only 248 hundredweight per acre, an average loss of 143 hundredweight per acre. Moderately effective thrip insecticide treatments had intermediate onion yields.

TABLE 1. Effects of various insecticides on onion thrip (*Thrips tabaci* Lindeman) control. Malheur Experiment Station, Ontario, Oregon, 1984

Treatment	Rate lbs ai/ac	Average Number Thrips/plant	Control %	Thrip[2] Population Log_{10}[1]	Yield cwt/ac[1]
Methyl Parathion + Pencap M	.5 + .5	0.4	99	1.0a	386a-c
Penncap M + Guthion	.5 + .75	2.5	97	1.7b	365a-d
Methyl Parathion	1.0	3.7	95	1.9b-d	400a-b
Methyl Parathion + Guthion	.5 + .75	3.8	95	1.8b-c	411a
Methyl Parathion + Toxaphene	.5 + 2.0	5.3	93	2.1c-e	339b-d
Amaze	1.0	6.9	90	2.2d-f	333c-d
Penncap M	.5	7.6	90	2.2d-f	377a-d
Methyl Parathion + Vydate	.5 + .5	8.2	89	2.3e-g	356a-d
Pydrin + Vydate	.15 + .5	10.8	85	2.4e-h	354a-d
Spur	.15	14.6	80	2.5f-i	346b-d
Spur	.1	17.4	76	2.6g-i	323d-e
Vydate	.5	23.8	67	2.7h-i	347b-d
Spur	.075	24.0	67	2.8i	362a-d
Pydrin	.1	68.7	4	3.2j	269e-f
Check	--	71.8	0	3.2j	248f
LSD (.05)				0.3	62.

[1]Ratings with the same letter are not significantly different at the 5% level using Fisher's LSD test.

[2]The thrips population index was calculated by taking the Log_{10} of the mean number of thrips per 25 plants. Hartley's test for homogenity of population variances was used to determine whether to transform the data to a log_{10}. The extreme variations in population means made this type of analysis necessary to show true treatment differences.

ONION PREPLANT SOIL INCORPORATED AND NON-INCORPORATED PREEMERGENCE HERBICIDE TRIALS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1984

Purpose

Several soil active herbicides were evaluated for weed control and crop tolerance when applied in the spring. Herbicides evaluated as preplant treatments were incorporated in bedded land. Preemergence herbicides were applied to the soil surface after planting and left without tillage for incorporation. Different rates, combinations, and formulations were tested in this study.

Procedures

The soil at the experimental site is classified as an Owyhee silt loam with a pH of 7.1 and a organic matter content of 1.2 percent. The previous crop in the field was Russet Burbank potatoes. After potato harvest in the fall of 1983, the field was disced and fertilized with 100 pounds per acre of phosphate and 60 pounds per acre of nitrogen. The field was moldboard plowed and left overwinter without further tillage.

In the spring, the plowed field was triple-K'ed and harrowed. The plots were staked and the preplant incorporated herbicides applied as double overlap broadcast treatments over flat level soil on April 23. Within one hour after the herbicides were applied the trials area was bedded. Individual beds were spaced 22 inches apart and each treated plot was four rows wide and 25 feet long.

On May 12, the beds were harrowed with special equipment designed to work-down bedded land. The soil on the top half of the beds was pulled into the furrows by a bar-beam mounted in front of a heavy ridged-built spike-tooth harrow. The teeth of the harrow stirred the soil at the base of the beds and incorporated the herbicides. Herbicides were applied on dry soil. All applications were broadcast using a double overlap boom with teejet fan nozzles, size 8002. Spray pressure was 35 pounds per square inch and one quart of water carrier was applied per plot (48 gallons per acre). Winds were calm and skies clear during the time all applications were applied. Air temperatures were 68°F and soil temperature was 52°F when the preplant treatments were incorporated. The harrow was taken over the field twice. The direction of travel during the second pass was opposite to that of the first time over.

ARCO Golden Cascade variety of onion seed was planted on May 12. The soil surface non-incorporated treatments were applied after planting and the trial area was furrow irrigated on May 13 and again on May 20 to germinate seed and add moisture for seedling emergence and growth.

The treatments were evaluated on June 12 by visual evaluations for weed control and crop tolerance.

Results

Seven herbicides were evaluated in the trial. They included Dacthal, Ramrod, Nortron, Pyramin, Hoelon, Racer, and Prefar. Dacthal, Ramrod, Nortron, Pyramin, and Racer were evaluated alone and in combination with other herbicides. Racer was compared for weed control and crop tolerance as preplant incorporated and preemergence surface applied treatments. Each of the other herbicide treatments was preplant incorporated applications.

The weed species in the plots included pigweed, lambsquarters, kochia, and barnyardgrass.

Racer and Racer in combination treatments were the only herbicides that caused crop injury. The onions emerged but were killed after emergence. More injury and stand kill occurred in the preplant Racer plots, but severe injury also occurred in the surface applied plots. Better treatments included a combination of Ramrod and Dacthal, Ramrod, and Nortron plus Pyramin plus Hoelon plots. Ramrod plus Dacthal and Ramrod treatments control all broadleaf and grassy weed species. Some grass escaped the Nortron plus Pyramin treatments when Hoelon was left out of the combination treatments. Dacthal caused some injury to emerging onions and, in addition, lambsquarters to kochia were escape weeds. Nortron and Pyramin did not give adequate control as single applied treatments at rates with onion tolerance. Prefar could only be evaluated for grass control and not for onion tolerance because of the low tolerance of onions to Racer and the known inactivity of Racer on grass species. Prefar did control barnyardgrass in Racer plots.

Ramrod was used in 1984 under a Section 18 emergency use permit. Ramrod is not registered for use on the 1985 commercial crop. Dacthal is the only registered material for use in onions tested in this trial.

TABLE 1. Percent weed control and crop injury ratings to seedling onions treated with herbicides applied as preplant incorporated and preemergence non-incorporated applications. Malheur Experiment Station, Ontario, Oregon, 1984

Herbicides	Rates lbs ai/ac	Application	Crop Injury %	Percent Weed Control: Pigweed	Lambsquarters	Kochia	Barnyardgrass
Dacthal	9	PPI	15	96	78	82	92
Ramrod	6	PPI	0	94	85	88	90
Ramrod	9	PPI	0	98	92	94	96
Ramrod + Dacthal	4 + 4	PPI	0	100	98	98	100
Ramrod + Dacthal	6 + 6	PPI	0	100	100	100	100
Nortron	1.5	PPI	0	87	84	92	76
Pyramin (wp)	4	PPI	0	88	93	93	10
Nortron + Pyramin (wp)	1 + 2	PPI	0	96	96	98	80
Nortron + Pyramin (wp)	1 + 3	PPI	0	98	99	100	80
Nortron + Pyramin (wp)	1.5 + 1.5	PPI	0	99	100	100	84
Nortron + Pyramin + Hoelon	1 + 2 + 1	PPI	0	99	100	100	98
Nortron + Pyramin + Hoelon	1 + 3 + 1	PPI	0	100	100	100	99
Racer	0.5	PPI	75	100	100	100	0
Racer	0.5	PES	60	100	100	100	0
Racer + Prefar	0.5 + 4	PPI	75	100	100	100	99
Racer + Prefar	1.0 + 4	PPI	95	100	100	100	99
Check	---	PPI	0	0	0	0	0

Rating: 0 = no herbicide effect, 100 = all plants killed.
PPI = preplant incorporated, PES = preemergence surface non-incorporated.

ONION VARIETY TEST RESULTS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1984

Purpose

Commercial and semi-commercial varieties of yellow, white, and red onions were compared for maturity, bulb yields, bulb size, and neckrot developing during storage. Seed was received for testing from 10 seed companies, ARCO, Asgrow, Crookham, Ferry Morse, Great Western, Harris, Moran, Quali-Sel, Scott, and Sun Seeds. The trials were financially supported by onion grower associations of Oregon and Idaho and the seed companies listed above.

Procedures

The onions were planted on April 18 in silt loam soil with 1.1 percent organic matter and a pH of 7.3. The field had grown Stephens wheat for two consecutive years before the onion trial was planted. The grain stubble was shredded and the field ripped, disced, irrigated, and moldboard plowed in the fall. Fertilizer (100 pounds per acre phosphorus and 60 pounds per acre nitrogen) was broadcast before plowing. The field was not tilled in the fall after plowing.

In the spring an additional 150 pounds per acre of nitrogen [$(NH_4)_2SO_4$] was broadcast and tilled into the soil by a triple-K and spike-tooth harrow. For weed control, Ramrod (four pounds active ingredient per acre) and Hoelon (1 1/2 pounds active ingredient per acre) were broadcast and incorporated at a shallow depth by a spike-tooth harrow before planting. The trial area was marked out at 22-inch row spacing and planted using a cone-seeder mounted on John Deere Model 71 Flexi-planters. Individual plots were two rows wide and 25 feet long and each variety was replicated five times using a complete randomized block experimental design. The seed was planted at a rate of about 12 viable seeds per linear foot of row. The plants were hand-thinned to a final stand of four onions per foot when the onions had three to four true leaves. The onions were watered by furrow irrigation. Water furrows were formed between each onion row. Early irrigations were applied in alternate rows but after mid-season all furrows were watered each irrigation. On May 27 and June 10, 25 pounds per acre of nitrogen (anhydrous ammonia) were added to the soil in the irrigation water.

Maturity ratings were taken on August 14 and 22 and September 4 and 16. The ratings were expressed as percentages based on the number of plants with tops fallen over within each plot (Table 1).

The bulbs were lifted on September 16 and hand-topped on September 24, 25, and 26. Onions from individual plots were put in burlap bags. On October 9, the onions in burlap bags were removed from the field and placed in onion crib boxes (12 per box) and put in the storage shed equipped with fans forcing air underneath each of the boxes which were stacked across the onion shed in rows six deep and four high. Temperature in storage ranged from 32 to 35°F and relative humidity was approximately 62%.

The onions remained in storage until January 21 when they were removed and graded to determine yields and storage quality for each variety. The onions were graded according to the diameter of the bulbs. Size classes were 2 1/4-3 inch, 3-4 inch, and 4 inch and larger. Split bulbs were classed as number two's. The bulbs infected by *Botrytis* were weighed to determine percent storage rot and then sized and weights for each category were used to calculate total onion yields. The storage rot data are reported as average neckrot and potential neckrot. The average neckrot data are reported as an average amount of rot for all five replications. Potential rot is the greatest amount of rot which occurred in a single replication.

Results

The results are reported in Table 1. Forty-four yellow, eight white, and six red varieties were evaluated. Bulb yields of all varieties were less this year when compared to previous years' data. Spring growth was slower than normal, but maturity date was close to normal for most varieties. These trends may be important factors accounting for the reduction in yield and bulb size compared to other years. The onions stored very well with less storage rot this year than any year since initiation of the variety trials. Normal maturity date, smaller bulbs, and excellent fall weather for field curing were factors contributing to improve storage quality. Several varieties of white bulbs also stored very well with less than four percent losses because of storage rots. Avalanche variety was the exception which had storage losses exceeding 10 percent.

The varieties for each seed company are ranked according to total bulb yield as listed in Column 1, Table 1. Average bulb yield for all yellow varieties in the trial was 605 hundredweight per acre. White varieties averaged 546 hundredweight per acre and red varieties averaged 402 hundredweight per acre. The yield for Southport White Globe was not included in yield calculations for the white onions. Varieties which were early maturing included Golden Cascade, DEXP 479-3, Bullring, Yula, Ringmaker, Foxy, Early Shipper "75", QS 1681, Norstar, and Eskimo. More than 70 percent of the tops for these varieties had fallen over by August 14. Varieties which were very late included Valdez, Avalanche, N-128, Target, and MOX-1031. Tops of these varieties remained green and at least 30 percent of the tops were still standing when the bulbs were lifted on September 16. The maturity ratings for other varieties tested in this trial were all considered to be intermediate in maturity.

Statistical data are included in the table and should be used when making comparisons between varieties. Differences equal to or greater than the LSD values at the five and one percent level should exist before one variety could be considered superior to another in this trial.

TABLE 1. Results of the 1984 onion variety trial. Malheur Experiment Station, Ontario, Oregon, 1984

Company	Variety	Total	Average Neckrot	Potential[3] Neckrot	+4 Inch		3-4 Inch		2 1/4-3 Inch		2's	Maturity Ratings			
		cwt/ac	%	%	cwt/ac	%	cwt/ac	%	cwt/ac	%	cwt/ac	8/14	8/22	9/4	9/16
ARCO	Valdez	699	4.5	11.4	477	68.2	206	29.5	10	1.4	6	6	12	56	69
	Durango	695	1.9	5.7	424	61.0	254	36.5	12	1.7	5	17	41	67	76
	Winner	657	0.4	1.3	338	51.4	288	43.8	15	2.3	2	57	67	79	83
	Avalanche[1]	654	10.6	31.8	327	50.0	310	47.4	15	2.3	10	6	17	53	62
	Monarch	648	11.8	27.2	382	58.9	256	39.5	11	1.7	28	27	61	71	83
	Golden Cascade	595	2.4	5.9	261	43.9	320	53.8	12	2.0	3	73	79	87	93
	Glacier[1]	576	1.3	3.8	215	37.3	345	59.9	15	2.6	6	54	71	80	80
	Blanco Duro[1]	564	1.7	5.0	229	40.6	306	54.2	26	4.6	7	33	55	73	76
	Magnum	522	4.5	12.4	224	42.9	267	51.1	27	5.2	6	56	80	84	96
	DEXP 549-2	510	0.3	0.8	80	15.7	401	78.6	27	5.3	3	59	83	89	92
	Valiant	504	0.2	0.9	151	30.0	320	63.5	32	6.3	2	46	66	85	92
	DEXP 479-3	492	0.5	1.6	132	26.8	330	67.0	27	5.5	0	84	85	92	93
	Bullring	475	3.2	10.5	143	30.1	305	64.2	24	5.0	0	76	84	90	92
	DEXP 5007-3[2]	432	0.9	3.8	85	19.7	322	74.5	25	5.8	5	53	80	92	93
	Carmen[2]	375	1.2	2.7	39	10.4	275	73.3	56	14.9	8	29	50	84	95
	Tango[2]	343	0.5	1.8	125	36.4	201	58.6	15	4.4	0	20	54	77	92
Asgrow	Armada	674	0.6	1.1	319	47.3	340	50.4	14	2.1	16	38	55	80	82
	Vega	632	0.9	1.3	299	47.3	316	50.0	16	2.5	3	61	74	85	88
	XPH-739	509	0.5	1.2	212	41.6	278	54.6	17	3.3	12	44	75	83	90
	Yula	476	1.8	3.2	173	36.3	275	57.8	25	5.2	23	86	93	94	96
	XPH-3224[2]	398	0.5	1.6	19	4.8	311	78.1	64	16.1	6	65	86	92	95
Crookham	N-128	715	1.3	3.9	520	72.7	184	25.7	10	1.4	11	10	29	50	71
	Dai Maru	702	2.4	9.8	401	57.1	290	41.3	10	1.4	9	35	51	72	77
	Celebrity (W-133)	682	2.3	8.0	448	65.7	223	32.7	10	1.5	6	11	17	58	77
	Big Mac	681	1.2	2.3	371	54.5	298	43.8	12	1.8	14	24	46	71	78
	Ringmaker	668	0.5	2.5	306	45.8	347	51.9	14	2.1	5	74	82	86	87
	Challenger "80"	630	1.1	2.5	298	47.3	306	48.6	22	3.5	8	55	71	76	80
	Autumn Surprise	586	0.5	0.8	250	42.7	315	53.8	19	3.2	31	31	67	75	83
	N-76	585	0.8	1.5	226	38.6	331	56.6	26	4.4	7	50	62	73	82
	Bronze Wonder	584	3.3	12.7	329	56.3	277	47.4	13	2.2	16	23	55	65	77
	Autumn Beauty	568	2.6	12.1	289	50.9	264	46.5	14	2.5	27	28	50	75	80
	Foxy (N-62)	553	0.7	3.0	177	32.0	352	63.6	22	4.0	3	72	79	84	83
	Bronze Marvel	532	3.6	12.2	183	34.4	334	62.8	13	2.4	19	20	41	73	80
	Golden Treasure	531	0.7	2.2	190	35.8	324	61.0	16	3.0	13	22	58	83	87
	White Delight[1]	514	2.2	7.5	128	24.9	342	66.5	40	7.8	14	42	65	78	82
	Early Shipper "75"	491	0.5	1.0	196	39.9	270	54.9	24	4.9	15	79	83	88	89
	White Keeper[1]	475	0	0	104	21.9	335	70.5	32	6.7	9	41	63	75	79
	Red Delite[2]	413	1.6	3.6	76	18.4	290	70.2	46	11.1	6	27	33	82	89
Ferry Morse	FMX70W6	570	1.8	5.3	391	68.6	161	28.2	17	3.0	4	12	33	67	87
	X121W6	569	1.9	2.4	364	64.0	193	33.9	12	2.1	1	9	23	67	83
	Spanish Maine	555	0.8	1.7	238	42.9	299	53.9	14	2.5	28	30	46	77	84
	4PHDR-1[2]	449	1.6	4.5	89	19.8	321	71.5	37	8.2	6	46	73	85	89
Great Western	Target	720	1.1	2.0	492	68.3	221	30.7	7	1.0	9	0	5	13	46
	MSC 5	640	17.4	30.4	304	47.5	319	49.8	16	2.5	3	16	33	65	79
	White Sweet Spanish[1]	564	3.7	11.8	305	54.1	243	43.1	14	2.5	43	18	47	60	77
	MSC 14	553	5.3	15.6	258	46.7	275	49.7	19	3.4	6	31	54	82	84
	MSC 18	504	18.1	46.6	123	24.4	343	68.0	35	6.9	6	25	52	77	83
	WSS (Storage)[1]	480	0.5	1.5	112	23.3	337	70.2	29	6.0	10	21	45	64	80
	Southport White Globe[1]	332	0.2	0.5	9	2.7	242	72.9	78	23.5	18	53	84	92	96
Harris	1624-D55SS	480	0.4	2.3	111	23.1	304	63.3	58	12.1	11	16	39	72	83
Moran	MOX 1031[1]	649	2.1	5.6	420	64.7	212	32.7	15	2.3	7	4	14	38	70
	MOX 1029	626	1.4	4.8	352	56.2	264	42.2	10	1.6	7	26	58	76	79
Quali-Sel	Day Bros.	703	6.5	17.3	476	67.7	218	31.0	8	1.1	10	10	28	55	75
	QS 1681	404	1.5	5.2	92	22.8	267	66.1	41	10.1	20	76	88	92	96
Scott Seed	Norstar	371	0.2	0.9	19	5.1	287	77.4	62	16.7	0	95	99	100	99
	Eskimo	312	0	0	0	0	243	77.9	68	21.8	5	94	99	98	99
Sun Seeds	AVX 1241	529	0.8	1.2	212	40.1	314	59.4	21	4.0	33	57	78	82	82
	Cima	427	0.5	1.7	104	24.4	276	64.6	44	10.0	8	62	83	88	90
	LSD (.05)	53	5	--	59	--	43	--	16	--	9				
	LSD (.01)	69	7	--	78	--	56	--	21	--	12				
	Mean	547	2.4	6.1	234	39.9	289	54.7	24	5.1	10				
	CV (%)	7	36	--	12	--	8	--	23	--	33				

[1]White bulbs
[2]Red bulbs
[3]Highest percent of neckrot observed for this variety in January 1985.

TABLE 2. Two-year averages from onion variety trial (1983-1984). Malheur Experiment Station, Ontario, Oregon

Company	Variety	Total Yield cwt/ac	Average Neckrot %	Potential Neckrot %	+4 Inch cwt/ac	+4 Inch %	3-4 Inch cwt/ac	3-4 Inch %	2 1/4-3 Inch cwt/ac	2 1/4-3 Inch %	2's cwt/ac	Maturity Ratings 8/14	8/22	9/4	9/16
ARCO	Valdez	760	27	39	527	69	218	29	10	1	4	4	9	36	50
	Monarch	740	25	32	450	61	260	35	14	2	30	15	36	52	67
	Durango	736	24	34	427	58	271	37	16	2	21	10	32	48	56
	Avalanche	678	30	49	330	48	325	48	18	3	8	5	16	38	50
	Golden Cascade	641	7	9	268	42	341	53	24	4	8	78	84	92	96
	DEXP 479-3	638	11	12	326	51	292	45	18	3	1	43	56	68	78
	Blanco Duro	614	31	38	260	42	317	52	30	5	8	17	35	50	55
	Magnum	599	14	19	225	38	336	56	30	5	8	65	84	88	96
	Bullring	576	19	19	206	36	332	58	21	4	16	41	53	71	85
	Tango	564	6	8	110	20	310	55	27	5	16	14	47	68	87
	Valiant	554	12	14	138	25	364	66	46	8	6	32	55	82	91
	Carmen	442	10	13	35	8	302	68	79	18	25	17	44	73	88
Asgrow	Armada	722	24	37	399	55	302	42	13	2	14	22	45	62	70
	Vega	674	18	24	347	51	300	44	20	3	7	35	57	70	79
	Yula	572	12	15	218	38	281	49	34	6	49	88	95	96	98
	XPH-739	552	15	18	191	35	308	56	36	7	22	60	83	89	93
Crookham	Celebrity	738	22	32	486	66	216	29	15	2	21	6	15	38	53
	Dai Maru	730	17	31	422	58	280	38	16	2	14	19	29	45	55
	Ringmaker	725	22	28	357	49	325	45	12	2	30	42	56	69	78
	Big Mac	686	13	15	355	52	288	42	19	3	32	14	40	59	72
	N-76	685	20	24	358	52	292	43	26	4	12	31	55	75	83
	Bronze Wonder	678	25	36	383	56	264	39	14	2	42	15	38	43	58
	Autumn Surprise	659	16	17	295	45	301	46	18	3	54	21	52	60	74
	Autumn Beauty	629	14	24	258	41	303	48	20	3	60	19	42	64	73
	Challenger "80"	600	9	12	191	32	350	58	38	6	22	35	52	71	80
	Golden Treasure	589	14	17	193	33	339	58	27	4	36	14	35	60	67
	White Delight	546	21	38	123	22	350	64	41	8	36	24	47	59	63
	White Keeper	521	23	25	101	19	360	69	46	9	17	32	53	68	75
Ferry Morse	FMX70W6	691	24	35	508	74	171	24	10	1	4	17	41	68	85
	Spanish Maine	636	26	29	286	45	264	42	14	2	83	16	30	53	62
	4PHDR-1	546	9	14	128	23	344	63	42	8	32	34	59	75	87
Great Western	White Sweet Spanish	613	33	40	308	50	264	43	22	4	37	10	31	38	50
	MSC-14	609	15	22	222	36	330	54	22	4	38	18	42	64	75
	WSS (Storage)	538	10	15	102	19	370	69	36	7	33	13	29	41	55
	Southport White Globe	402	12	16	10	3	276	69	86	21	37	34	56	67	84
Quali Sel	Day Bros.	730	25	37	438	60	250	34	18	2	29	6	23	40	56
Sun Seeds	Cima	530	13	15	150	28	315	59	43	8	24	35	60	78	86
	LSD (.05)	52	--	--	69	--	47	--	19	--	18	--			
	LSD (.01)	67	--	--	92	--	61	--	26	--	26	--			
	Mean	614	--	--	262	--	296	--	29	--	23	--			
	CV (%)	7	--	--	17	--	12	--	22	--	32	--			

TABLE 3. Three-year averages from onion variety trial (1982-1983-1984). Malheur Experiment Station, Ontario, Oregon

Company	Variety	Total Yield cwt/ac	Average Neckrot %	Potential Neckrot %	+4 Inch cwt/ac	+4 Inch %	3-4 Inch cwt/ac	3-4 Inch %	2 1/4-3 Inch cwt/ac	2 1/4-3 Inch %	2's cwt/ac	Maturity Ratings 8/14	Maturity Ratings 8/22	Maturity Ratings 9/4	Maturity Ratings 9/16
ARCO	Valdez	814	24	31	617	75	186	23	11	2	5	3	6	26	41
	Monarch	782	21	27	518	66	228	29	11	2	35	11	31	48	66
	Durango	779	19	27	531	68	215	28	14	2	18	6	24	43	57
	Golden Cascade	689	7	10	379	55	284	41	19	3	7	72	87	94	97
	Magnum	687	9	16	378	55	278	40	23	4	8	50	79	89	96
	Avalanche	685	30	48	412	60	249	36	15	2	10	4	11	27	40
	Bullring	648	16	18	351	54	262	40	19	3	13	29	42	67	86
	Carmen	516	9	12	121	23	305	59	58	11	30	12	30	51	75
Asgrow	Armada	758	20	30	482	64	255	34	10	2	15	16	40	64	75
	Vega	734	16	21	463	63	249	34	16	2	6	25	45	65	79
Crookham	Celebrity	779	18	27	560	72	190	24	11	2	18	4	16	35	56
	Dai Maru	772	14	24	500	65	245	32	13	2	15	12	21	38	56
	Big Mac	736	11	13	439	60	250	34	14	2	37	10	33	65	77
	Ringmaker	733	17	24	380	52	313	43	9	1	31	30	49	73	82
	Bronze Wonder	716	21	30	468	65	223	31	11	2	31	10	31	52	64
	Golden Treasure	649	12	15	232	36	366	56	22	4	32	9	38	63	72
Sun Seeds	Cima	617	10	12	239	39	312	50	34	6	33	30	60	80	89
	LSD (.05)	56	--	--	65	--	39	--	--	--	11				
	LSD (.01)	73	--	--	86	--	53	--	--	--	20				
	CV (%)	7	--	--	14	--	11	--	--	--	19				

AN EVALUATION OF POSTEMERGENCE APPLIED HERBICIDES FOR CONTROL OF ANNUAL WEEDS IN FURROW IRRIGATED RUSSET BURBANK POTATOES

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1984

Purpose

The efficacy and compatibility of metribuzin were evaluated as tank-mix combinations with PP005, Assure, Poast, and SC-1084 when applied as postemergence treatments for annual broadleaf and grassy weeds in Russet Burbank potatoes.

Procedure

The experimental site was in a field which had been planted to wheat during 1982 and 1983 before planting the potatoes in 1984. After the 1983 grain harvest, the straw stubble was shredded and the field irrigated and moldboard plowed. Fertilizer consisting of 100 pounds per acre of phosphorus and 60 pounds per acre of nitrogen was broadcast over the field before plowing. After plowing, the field was not tilled until the seed bed was prepared for planting in the spring of 1984. In the spring, an additional 150 pounds per acre of nitrogen ($(NH_4)_2SO_4$) was broadcast. The field was tilled with a triple-K and trailing harrow then bedded on 36-inch row centers in preparation for planting. The potatoes were planted on May 12. Each plot was nine feet wide and 30 feet long. Two rows of potatoes were planted in the center of the nine-foot wide plots thus leaving three-foot wide unplanted border areas between adjacent plots throughout the trial area. Seed piece spacing varied between rows. In one row, seed pieces were spaced nine inches apart (normal spacing in commercial fields); in the second row, seed pieces were spaced 18 inches apart. The 18-inch spacing gave fewer potato plants thus less foliage so better readings could be recorded on herbicide persistence and weed control. The potato rows were hilled after planting and received no further tillage.

The herbicide treatments were applied on June 14. The potato foliage was six to 10 inches tall. Pigweed and lambsquarters plants were one to four inches tall and the larger annual grass (barnyardgrass and annual ryegrass) plants were tillering. Air temperatures when spraying were 78^{O}F. Winds were calm and skies were clear. Treatments were applied as double overlap broadcast applications using a nine-foot boom with teejet fan nozzles size 8002 spaced at 10-inch intervals on the boom. A single wheel bicycle plot sprayer was used. Spray pressure was 35 pounds per square inch and water was applied as the carrier at a rate of 32 gallons per acre. Mor-Act crop oil was included in all treatments at the rate of one quart per acre. The potatoes were watered by furrow irrigation two days after the herbicide treatments were applied. The potatoes in the trial area received no other herbicides or cultivation during the growing season.

The potatoes were harvested during the first week of October to determine tuber yield and tuber size data. The yield data were taken from the single row planted with seed pieces spaced nine inches apart.

Results

Percent weed control and crop injury data are recorded in Table 1. Tuber yield by size increment and total tubers are reported in Table 2. Lexone appeared to be compatible in tank-mix combinations with PP005, Assure, Poast, or SC-1084. Lexone at rates of 0.75 and 1.0 pound active ingredient per acre was very effective in controlling pigweed and lambsquarters. It did not effectively control barnyardgrass, green foxtail, or annual ryegrass in this trial. When PP005, Assure, or Poast were combined with Lexone both grass and broadleaf weeds were controlled (PP005 and Assure needed to be used at 0.125 pound active ingredient per acre and higher rate). Neither material was active enough at 0.063 pound active ingredient per acre. Poast was very effective with Lexone at 0.2 and 0.3 pound active ingredient per acre. SC-1084 was the least active grass herbicide even when used at 0.5 pound active ingredient per acre.

Severe chlorosis occurred to potato leaves when Assure was tank-mixed with Lexone. Chlorosis was of short duration but occurred at all rates. Chlorosis was not noted when Assure was applied without Lexone.

A single postemergence combination application was very effective in giving season-long control when the initial weeds were eliminated. Effective weed control also occurred in the row planted with seed pieces spaced 18 inches apart and where potato foliage was less dense.

The highest tuber yields were positively correlated with the herbicide treatments resulting in the best weed control. High tuber yields were associated with the higher rates of herbicide application, thus, indicating excellent crop tolerance. The lowest yield was in the handweeded check, indicating crop damage either from weed competition or from injury to the potato plants by handweeding.

TABLE 1. Percent weed control and crop tolerance to Russet Burbank potatoes treated with herbicides as postemergence applications. Malheur Experiment Station, Ontario, Oregon, 1984

Herbicides[1]	Rate	Crop Injury		Percent Weed Control: Pigweed		Lambsquarters		Barnyard Grass		Green Foxtail		Annual Ryegrass	
	lbs ai/ac	6/28	9/14	6/28	9/14	6/28	9/14	6/28	9/14	6/28	9/14	6/28	9/14
Lexone	0.5	0	0	87	100	89	93	27	38	28	43	30	42
Lexone	0.75	0	0	95	93	99	100	32	47	40	60	30	38
Lexone	1.0	0	0	100	96	100	96	40	56	42	65	50	64
Lexone + PP005	0.5 + 0.063	0	0	93	83	97	89	72	85	65	75	85	90
Lexone + PP005	0.5 + 0.125	0	0	96	93	98	93	88	97	83	92	93	90
Lexone + PP005	0.5 + 0.25	0	0	95	92	98	98	99	98	95	98	93	90
Lexone + SC-1084	0.5 + 0.125	0	0	94	95	96	98	50	65	40	63	70	82
Lexone + SC-1084	0.5 + 0.25	0	0	96	96	98	98	72	85	67	88	83	85
Lexone + SC-1084	0.5 + 0.375	0	0	95	95	98	98	85	90	75	85	93	95
Lexone + Sc-1084	0.5 + 0.5	0	0	92	90	96	100	90	95	83	92	93	90
Lexone + Poast	0.5 + 0.2	0	0	98	98	100	100	100	100	100	100	100	99
Lexone + Poast	0.5 + 0.3	0	0	98	93	98	95	100	100	100	100	100	98
Lexone + Assure	0.5 + 0.063	10	0	98	98	98	100	86	98	83	95	97	95
Lexone + Assure	0.5 + 0.125	10	0	98	95	99	95	98	100	95	100	100	98
Lexone + Assure	0.5 + 0.25	15	0	95	93	95	95	99	100	99	100	99	97
Lexone + Assure	0.5 + 0.5	20	0	98	80	98	85	100	98	100	98	100	98
Lexone + Hoelon	0.5 + 1.0	0	0	99	98	100	100	60	98	60	76	30	38
PP005	0.063	0	0	0	0	0	0	55	65	35	60	70	76
PP005	0.125	0	0	0	0	0	0	90	95	83	90	95	90
PP005	0.25	0	0	0	0	0	0	98	100	87	93	99	96
SC-1084	0.375	0	0	0	0	0	0	78	84	67	82	94	95
SC-1084	0.125	0	0	0	0	0	0	40	65	30	47	50	45
SC-1084	0.25	0	0	0	0	0	0	65	73	55	65	80	86
SC-1084	0.50	0	0	0	0	0	0	91	96	85	88	92	95
Poast	0.20	0	0	0	0	0	0	96	100	97	95	95	98
Poast	0.30	0	0	0	0	0	0	99	100	99	99	100	98
Assure	0.063	0	0	0	0	0	0	93	98	90	94	95	98
Assure	0.125	0	0	0	0	0	0	99	100	99	100	100	98
Assure	0.25	0	0	0	0	0	0	100	100	100	100	100	99
Check	---	0	0	0	0	0	0	0	0	0	0	0	0

[1]Rating: 0 = no effect, 100 = all plants killed. Evaluated June 28 and September 14.

Assure + Lexone caused temporary yellowing to potato leaves. All other treatments showed no effect from combination treatments.
In many cases weed control was better in the September 14 evaluations.
Mor-Act crop oil was added to all treatments at a rate of one quart per acre.

TABLE 2. Tuber yields of Russet Burbank potatoes treated with herbicides applied as post-emergence applications for annual weed control. Malheur Experiment Station, Ontario, Oregon, 1984

Herbicide	Rate lbs ai/ac	------ U.S. No. 1's ----- ≤6 oz cwt/ac	6-10 oz cwt/ac	≥10 oz cwt/ac	Total No. 1's cwt/ac	No. 2's cwt/ac	Total Tuber Yield cwt/ac
Lexone	0.5	84	232	197	513	20	533
Lexone	0.75	68	236	206	511	15	526
Lexone	1.0	73	202	293	569	11	580
Lexone + PP005	0.5 + 0.063	42	244	262	548	21	569
Lexone + PP005	0.5 + 0.125	42	263	294	599	29	628
Lexone + PP005	0.5 + 0.25	46	233	269	548	21	569
Lexone + SC-1084	0.5 + 0.125	68	218	234	521	35	556
Lexone + SC-1084	0.5 + 0.25	34	201	321	557	44	601
Lexone + SC-1084	0.5 + 0.375	70	257	237	264	15	279
Lexone + SC-1084	0.5 + 0.5	36	258	267	561	17	578
Lexone + Poast	0.5 + 0.2	78	226	169	473	34	507
Lexone + Poast	0.5 + 0.3	55	243	291	588	45	633
Lexone + Assure	0.5 + 0.063	53	240	266	559	35	594
Lexone + Assure	0.5 + 0.125	38	193	295	526	72	598
Lexone + Assure	0.5 + 0.25	65	244	249	558	55	613
Lexone + Assure	0.5 + 0.5	46	131	308	485	89	574
Lexone + Hoelon	0.5 + 1.0	43	235	238	516	66	582
PP005	0.063	47	217	155	420	64	484
PP005	0.125	58	238	161	451	27	478
PP005	0.25	87	241	88	416	22	438
SC-1084	0.375	55	258	186	499	38	537
SC-1084	0.125	66	242	164	473	17	490
SC-1084	0.25	53	237	225	516	38	554
SC-1084	0.50	40	232	297	569	46	615
Poast	0.20	74	297	146	518	31	549
Poast	0.30	32	237	190	459	92	551
Assure	0.063	51	258	243	554	64	618
Assure	0.125	44	250	194	488	27	515
Assure	0.25	47	237	185	468	26	494
Handweeded Check		61	230	121	412	45	457
LSD (.05)		31	42	60	75	40	78
LSD (.01)		41	56	79	101	53	104
Mean		55	234	222	513	39	553
CV (%)		34	11	16	9	63	8

INCORPORATING HERBICIDES ON PREBEDDED POTATO LAND FOR WEED CONTROL IN FURROW IRRIGATED POTATOES

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1984

Purpose

The effectiveness of several herbicides was evaluated for weed control in furrow irrigated potatoes when applied in the spring to land previously bedded for planting potatoes.

Procedures

Ten herbicides were applied to bedded land at different rates and combinations to evaluate application and incorporation techniques for weed control in furrow irrigated potatoes. The land was plowed in the fall and bedded in the spring. The beds were 36 inches apart and each plot consisted of two beds, 30 feet long. The beds were shaped, using 18-inch hilling shovels which were large enough to throw the soil to a peak in the center of the bed. The objective was to form high beds so the furrows would be deep when the herbicides were applied, to help avoid later tillage from getting below the herbicide in the furrow and exposing untreated soil. Areas three feet wide on each side of every plot were buffer areas to separate adjacent plots from possible contamination during herbicide application and incorporation.

The herbicide treatments were applied on May 11. The treatments were applied over the tops of the beds. The spray boom was nine feet long and teejet fan nozzles size 8002 were spaced 10 inches apart on the boom so the herbicides were applied as double overlap broadcast treatments. Overlap treatments assured even application of the herbicides on both sides of each bed and the furrow area. The boom was mounted on a single bicycle wheel plot sprayer. Spray pressure was 35 pounds per square inch and water was applied as the carrier at the rate of 32 gallons per acre. The soil was silt loam. The organic matter content was 1.1 percent and the soil pH was 7.1. Each treatment was replicated three times using a randomized complete block experimental design.

The beds were harrowed with a spike-tooth harrow as soon as the herbicides were applied. Harrowing reduced the original height of the beds by about two-thirds and left the tops flat in preparation for planting potatoes. The herbicides on the beds were mixed with the soil as the harrow dragged the soil from the beds into the furrows.

Russet Burbank potatoes were planted on May 12 using a two-row tuber index planter. Potato seed pieces were planted nine inches apart in one row and 18 inches apart in the other, alternating the rows across the trial area so one row of each spacing was in each plot. The rows with the 18-inch seed piece spacing left an area for weeds to emerge during the summer and allowed for ratings of herbicide persistence throughout the growing season. Rows with potato seed pieces nine inches apart were used to calculate relative yields.

After planting and before the potatoes emerged, the potato rows were hilled using a lilliston to move the herbicide-treated soil from the furrow area over the top of the potato rows. Care was taken during the hilling process to prevent the shovels from working below the depth of the herbicide-treated soil in the bottom of the furrow. After hilling, the potatoes received no further tillage and were left to emerge through the herbicide-treated soil.

For comparison, the herbicide SC-1102 was applied as a soil surface post plant preemergence treatment. Herbicides were evaluated for weed control and potato foliar injury on June 28 and September 14. Potato tubers were harvested from October 6 through 8, to determine tuber yield and quality.

Results

Weed species present in the trial included pigweed, lambsquarters, barnyardgrass, and green foxtail. Herbicide activity was excellent when applied and incorporated on bedded land. Several herbicide treatments including Prowl, Prowl plus Lexone, Lasso, Sonalan, Dual, and Eptam plus Treflan controlled essentially all weeds (Table 1). SC-1102 applied as a soil surface postplant preemergence treatment did not control weeds as effectively as the soil incorporated treatments. SC-1102 seemed to have more activity on grasses than the broadleaf weeds in this trial but grass control with this herbicide was still inferior to other treatments.

Potato tolerance was good for all herbicide treatments as shown by the yield data (Table 2). Both Sonalan and Treflan delayed potato emergence but after emergence foliage growth was normal and was soon comparable in size to foliage in other treatments. Tuber yields and size were good in all treatments. Slight reductions in tuber yields occurred in certain treatments including the handweeded check. These reductions in yield were believed to result from weed competition in the less effective herbicide treatments and physical injury caused to potato plants when removing weeds in the handweeding checks.

TABLE 1. Percent weed control and crop injury ratings to Russet Burbank potatoes treated with herbicides in the spring on spring bedded land. Malheur Experiment Station, Ontario, Oregon, 1984

Herbicides	Rate	Crop Injury		Percent Weed Control: Pigweed		Lambsquarters		Barnyardgrass		Green Foxtail	
	lbs ai/ac	6/28	9/14	6/28	9/14	6/28	9/14	6/28	9/14	6/28	9/14
Prowl	1.0	0	0	100	100	100	100	99	100	99	100
Prowl	1.5	5	0	100	100	100	100	100	100	100	100
Prowl	2.0	0	0	100	100	100	100	100	100	100	100
Lexone	0.5	0	0	98	95	98	90	92	96	91	96
Lexone	1.0	0	0	100	100	100	100	95	92	95	100
Prowl + Lexone	1 + 0.5	0	0	100	100	100	100	99	99	100	100
Prowl + Lexone	1.5 + 0.5	0	0	100	100	100	100	100	100	100	100
Lasso (Fl)	3.0	0	0	98	95	96	95	98	96	98	93
Lasso (Fl)	4.0	0	0	99	100	96	98	98	100	98	100
Lasso (Ec)	4.0	0	0	100	100	100	100	100	100	100	100
Sonalan	1.0	6	0	100	100	100	100	100	100	100	100
Sonalan	1.5	8	0	100	100	100	100	100	100	100	100
Dual	4.0	0	0	100	98	100	100	100	100	100	100
Eptam	4.0	0	0	83	90	85	75	98	95	98	95
Eptam + Treflan	2 + 0.5	5	0	100	100	100	100	99	100	99	100
SC-1102	1.5	0	0	48	55	62	60	83	90	83	85
SC-1102	3.0	0	0	70	80	75	85	90	95	92	96
Check	---	0	0	0	0	0	0	0	0	0	0

Ratings: 0 = no effect, 100 = all plants killed. Evaluated June 28 and September 14.
Soil texture: silt loam
Soil pH: 7.1
Organic Matter: 1.1 percent
Treatments were applied on May 11, 1984, to land bedded in November.

TABLE 2. Tuber yields of Russet Burbank potatoes treated with herbicides applied in the spring on spring bedded land. Malheur Experiment Station, Ontario, Oregon, 1984

Herbicide	Rate lbs ai/ac	U.S. No. 1's ≤ 6 oz cwt/ac	U.S. No. 1's 6-10 oz cwt/ac	U.S. No. 1's ≥ 10 oz cwt/ac	Total No. 1's cwt/ac	No. 2's cwt/ac	Total Tubers cwt/ac
Prowl	1.0	45	283	353	740	58	798
Prowl	1.5	39	228	469	778	42	820
Prowl	2.0	74	292	349	795	80	876
Lexone	0.5	52	268	366	746	59	806
Lexone	1.0	49	259	399	748	40	787
Prowl + Lexone	1 + 0.5	56	293	330	747	84	834
Prowl + Lexone	1.5 + 0.5	51	261	335	711	83	794
Lasso (Fl)	3	65	251	366	746	64	810
Lasso (Fl)	1	62	267	427	813	67	882
Lasso (Ec)	4	55	278	419	798	47	845
Sonalan	1	44	250	372	764	97	861
Sonalan	1.5	45	268	376	743	54	798
Dual	4	55	274	356	744	60	804
Eptam	4	67	303	285	706	50	756
Eptam + Treflan	2 + 0.5	46	274	330	705	56	760
SC-1102 (PES)	1.5	55	297	185	537	99	636
SC-1102 (PES)	3	77	257	269	603	76	679
Handweeded Check	---	48	262	298	679	71	750
LSD (.05)		NS	NS	92	79	NS	69
LSD (.01)		NS	NS	122	106	NS	NS
Mean		54	269	359	743	61	805
CV (%)		33	14	15	6	47	7

Harvested - October 6 through 8, 1984.

INSECTICIDE CONTROL OF THE SUGAR BEET WIREWORM ON POTATOES

Guy W. Bishop and Charles E. Stanger
Malheur Experiment Station, Ontario, Oregon, 1984

Purpose

Several insecticides are registered for control of wireworms on potatoes as preplant broadcast applications, in-furrow treatments at planting, and post emergence sidedress applications. These insecticides vary in effectiveness depending upon method of application, crop, and area. The purpose of this research was to compare several unregistered insecticides and insecticide combinations to registered insecticides for the control of the sugar beet wireworm (*Limonius californicus*). A second objective was to assess efficacy of the insecticides when application methods are varied.

Method

The potatoes were planted on May 3 in a field that had been in wheat for two seasons. The stubble was shredded then the field was ripped twice to a depth of 18 inches then plowed. Fertilization consisted of 100 pounds per acre of nitrogen before planting and an additional 150 pounds per acre of nitrogen just before the field was bedded in the spring. Row spacing was 36 inches. The soil was silt loam with a pH of about 7.3 and with about one percent organic matter.

Plots were single rows 20 feet long with seven-foot buffers between plots. The experiment had a randomized complete block design with seven replicates. After emergence, plants and seed pieces were removed from the buffer areas to aid in the identification of individual plots at harvest. To simulate in-furrow treatments, seed pieces were dug four days after planting and evenly spaced in the bottom of the planting furrow. The granular insecticides were distributed as evenly as possible on both sides of the furrow and the seed pieces were covered with the treated soil. For the broadcast treatments, the appropriate amount of granules was mixed into the bed after the seed pieces were removed then a new planting furrow was dug and the seed pieces replaced and covered. Sidedress treatments were applied four weeks after planting by digging a trench about four inches from the young plants on each side. The insecticides were distributed in the trench and covered to reform the hill. All tubers were harvested from each plot on September 20, weighed, and examined for wireworm injuries.

Results

Most treatments resulted in significantly fewer wireworm injuries than the untreated check (Table 1). Exceptions were several treatments with Broot and sidedress treatments of UC 70480. In general, insecticide applications in the furrow provided better control than sidedress applications. The combination treatments of Temik and Carbofuron were among the best treatments. The combination containing 1 1/2 pounds active ingredient per acre of Temik and Carbofuron would seem to be especially promising because of the potential for excellent control of foliar insects as well as suppression of wireworms and nematodes at a competitive cost.

There is some indication that poor distribution of the insecticide granules may have influenced the experiment. The evidence is that treatments with concentrated formulations (15G) tended to be in the poorest one-half of the treatments; treatments with the more dilute granules including the combinations and the 10G formulations were generally superior. The exception was UC 70480 15G in-furrow application where few injuries were noted. It appears that mixing all insecticides with a neutral carrier such as sand could improve the reliability of this type of experiment. Yields did not vary significantly among treatments.

TABLE 1. Control of wireworms with soil applications of insecticides. Malheur Exeriment Station, Ontario, Oregon, 1984

Treatment	Rate lbs ai/ac	Method of Application	Mean No. Injuries per 100 tubers
UC 70480 15G	2.0	Postemergence, sidedress	12.2 a
Broot 15G	2.0	Postemergence, sidedress	9.5 ab
Check	---	--	9.4 ab
ICI 993 1.5G	0.2	Broadcast	9.1 ab
Broot 15G	2.0	In furrow, planting	5.7 bc
Broot 15G	3.0	In furrow, planting	5.6 bc
UC 70480 15G	3.0	Postemergence, sidedress	5.3 bc
Carbofuran 10G (grit)	3.0	In furrow, planting	4.7 c
ICI 993 1.5G	0.1	In furrow, planting	4.6 c
Broot 15G	3.0	Postemergence, sidedress	4.6 c
ICI 993 1.5G	0.4	In furrow, planting	4.4 c
UC 70480 15G	2.0	In furrow, planting	4.4 c
Dyfonate 10G	2.0	In furrow, planting	4.2 c
ICI 993 1.5G	0.3	In furrow, planting	3.5 c
ICI 993 1.5G	0.2	In furrow, planting	3.4 c
Temik 5G + Carbofuran 5G (grit)	1.5 + 1.5	In furrow, planting	3.3 c
ICI 993 1.5G	0.3	Postemergence, sidedress	3.2 c
Temik 5G + Carbofuran 5G (gypsum)	3.0 + 3.0	In furrow, planting	3.2 c
Temik 5G + Carbofuran 5G (gypsum)	1.5 + 1.5	In furrow, planting	3.0 c
Mocap 10G	2.0	In furrow, planting	2.9 c
Temik 5G + Carbofuran 5G (grit)	3.0 + 3.0	In furrow, planting	2.6 c
Temik 10G (grit)	3.0	In furrow, planting	2.4 c
ICI 993 1.5G	0.3	Broadcast	2.1 c
UC 70480 15G	3.0	In furrow, planting	1.8 c

PITTSBURGH PAINT AND GLASS HERBICIDE AND GROWTH REGULATOR TRIAL IN FURROW IRRIGATED POTATOES

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1984

Purpose

The activity of Cobra and PPG-1013 was evaluated for weed control and potato tolerance when applied as a postplant preemergence soil surface application. The effectiveness and compatibility of Cobra and PPG-1013 were compared with preplant incorporated herbicides commonly used for weed control in the production of furrow-irrigated potatoes. The effects of growth regulator PPG-1721 were evaluated on potato tuber yield, size, and quality.

Procedure

The study consisted of 17 treatments. The land for the study was fall plowed and spring bedded. A total of 200 pounds per acre of nitrogen were applied. Sixty pounds per acre of nitrogen were plowed under in the fall and 140 pounds per acre applied in the spring before the land was bedded. All of the phosphate (100 pounds per acre) was plowed under in the fall. Individual plots for the 17 herbicide treatments were two rows wide and 30 feet long. Three-foot wide buffer areas separated plots adjacent to each other for the width of the trial area.

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

Preplant incorporated treatments (Genep and Dual) were applied over the preshaped beds. The herbicide was incorporated as the beds were harrowed before planting and as the planted rows were hilled with a lilliston after planting. All preemergence surface applied treatments were sprayed after the planted potato rows were hilled. None of the potatoes in the experimental area received tillage after the hilling process.

The growth regulator treatments were applied on July 25. The potatoes had started to bloom (early bloom), had excellent foliage growth which nearly covered the furrow area. The treatments were applied over the foliage using a CO_2 backpack sprayer equipped with four nozzles size 8004 on a six-foot boom. Spraying pressure was 38 pounds per square inch and 16 fluid ounces of water were applied per plot (60.5 gallons per acre). Air temperature at the time the treatments were applied (10:00 to 11:00 a.m.) was 82^{o}F. Skies were clear and winds calm.

The soils in the trial area are silt loam with 1.1 percent organic matter and a pH of 7.2.

The herbicides were evaluated for weed control and foliar injury on June 28 and again on August 20. Tubers were harvested on October 6, 7, and 8. Tuber yields, size, and quality data are recorded for all treatments in the trial.

Results

Weed species within the trial area included pigweed, lambsquarters, barnyardgrass, and green foxtail. The herbicide treatments which controlled all weed species were (1.) Dual four pounds active ingredient per acre preplant incorporated (2.) combination treatments of Genep two pounds active ingredient per acre preplant with Cobra 0.25 pound active ingredient per acre or PPG-1013 at 0.15 pound active ingredient per acre preemergence surface and (3.) Cobra preemergence surface followed by a postemergence application of PP005 at 0.25 pound active ingredient per acre. Dual surface applied and not incorporated was less effective than when mechanically activated by incorporation (Table 1). Both Cobra and PPG-1013 lacked grass control activity. Both materials were also more active on pigweed than lambsquarters. Genep, as expected, was most active on grasses and less active on lambsquarters than pigweed.

Potato foliage showed symptoms of herbicide injury when emerging through either Cobra or PPG-1013. The foliar symptoms persisted for three to four weeks with less potato vine growth in these plots than with other treatments. Harvested tuber yields were not reduced by PPG-1013, but yields were significantly reduced in three Cobra treatments when Cobra was used in combination with Dual or PP005 (Table 1).

PPG-1721 applied at 50 parts per million increased tuber size and yield (Table 2). PPG-1721 at 50 parts per million was the optimum level. Tuber yields and size declined as PPG-1721 rates increased to 100 and 200 parts per million. PPG-1721 at 200 parts per million significantly reduced tuber yield below that of the 50 parts per million rate.

TABLE 1. Percent weed control and injury rating to foliage from PPG herbicide treatments in furrow irrigated potatoes. Malheur Experiment Station, Ontario, Oregon, 1984

					PERCENT WEED CONTROL							
Herbicide	Rate lbs ai/ac	Application	Crop Injury 6/28	Crop Injury 8/20	Pigweed 6/28	Pigweed 8/20	Lambsquarters 6/28	Lambsquarters 8/20	Barnyardgrass 6/28	Barnyardgrass 8/20	Green Foxtail 6/28	Green Foxtail 8/20
Genep	4	PPI	0	0	92	86	88	82	96	91	98	93
Dual	4	PPI	0	0	99	98	97	100	100	100	100	100
Dual	4	PES	0	0	85	78	70	62	93	88	94	86
Cobra	0.25	PES	10	0	98	93	45	57	15	0	12	0
PPG-1013	0.20	PES	5	0	100	99	85	66	20	0	20	0
Genep + Cobra	2 + 0.25	PPI + PES	10	0	100	100	100	92	100	100	100	100
Genep + PPG-1013	2 + 0.15	PPI + PES	5	0	100	100	100	88	100	100	100	100
Dual + Cobra	2 + 0.25	PES	12	0	97	93	70	65	94	91	92	85
Dual + Cobra	2 + 0.50	PES	23	0	99	92	87	73	95	93	93	93
Dual + PPG-1013	2 + 0.15	PES	6	0	100	100	88	80	96	88	96	86
Cobra + PP005	0.25 + 0.25	PES + POST	10	0	100	100	92	62	100	90	100	75
PPG-1013 + PP005	0.20 + .025	PES + POST	5	0	100	100	82	73	100	94	100	77
Check	---		0	0	0	0	0	0	0	0	0	0

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

TABLE 2. Tuber yields from PPG herbicide trial in furrow-irrigated potatoes. Malheur Experiment Staiton, Ontario, Oregon, 1984

Herbicide	Rate lbs ai/ac	Application	U.S. No. 1's ≤6 oz cwt/ac	U.S. No. 1's 6-10 oz cwt/ac	U.S. No. 1's ≥10 oz cwt/ac	Total No. 1's cwt/ac	No. 2's cwt/ac	Total Tubers cwt/ac
Genep	4	PPI	87	252	257	597	53	649
Dual	4	PPI	54	234	320	607	77	684
Dual	4	PES	60	257	221	537	37	574
Cobra	0.25	PES	60	245	266	572	50	622
PPG-1013	0.20	PES	49	240	259	549	53	602
Genep + Cobra	2 + 0.25	PPI + PES	78	205	265	548	46	595
Genep + PPG-1013	2 + 0.15	PPI + PES	54	212	242	509	65	574
Dual + Cobra	2 + 0.25	PES	57	196	213	466	60	525
Dual + Cobra	2 + 0.50	PES	44	201	204	450	39	489
Dual + PPG-1013	2 + 0.15	PES	62	233	228	524	74	598
Cobra + PP005	0.25 + 0.25	PES + POST	56	242	192	490	44	533
PPG-1013 + PP005	0.20 + 0.25	PES + POST	55	245	313	613	24	637
Handweeded Check	---	---	87	252	230	569	53	622
LSD (.05)			24	NS	NS	95	NS	78
LSD (.01)			33	--	--	129	--	106
Mean			62	232	246	541	52	592
CV (%)			23	16	21	10	47	7

TABLE 3. Tuber yields from Russet Burbank potatoes treated with PPG-1721 as foliar applications. Malheur Experiment Station, Ontario, Oregon, 1984.

Chemical	Rate ppm	- - U.S. No. 1 Tubers - - 4-6 oz cwt/ac	6-10 oz cwt/ac	≥10 oz cwt/ac	Total No. 1's cwt/ac	No. 2's cwt/ac	Total Yield cwt/ac
PPG-1721	25	74	236	270	580	30	610
PPG-1721	50	37	257	346	640	49	689
PPG-1721	100	59	228	280	567	64	631
PPG-1721	200	65	238	237	540	48	588
Check	---	87	253	262	602	52	654
LSD (.05)		NS	NS	61	NS	NS	62
Mean		64	242	279	544	48	589
CV (%)		33	12	11	6	58	5

TABLE 4. Temperatures and rainfall by day of the month. Malheur Experiment Station, Ontario, Oregon, 1984

Date	High Air Temperature °F	Rainfall inches	Date	High Air Temperature °F	Rainfall inches
May 11	65	0.19	June 1	65	0
May 12	67	0.08	June 2	70	0
May 13	73	0	June 3	74	0
May 14	84	0.01	June 4	74	Trace
May 15	55	0.23	June 5	65	0.19
May 16	50	0.02	June 6	68	0.39
May 17	62	0	June 7	63	0.07
May 18	69	0	June 8	64	Trace
May 19	77	0	June 9	63	0
May 20	78	Trace	June 10	64	0
May 21	70	0	June 11	72	0.02
May 22	65	0	June 12	67	0.06
May 23	78	Trace	June 13	71	Trace
May 24	65	0.05	June 14	80	0
May 25	66	0	June 15	83	0
May 26	68	0.01	June 16	87	0.12
May 27	74	0	June 17	81	0
May 28	75	0	June 18	81	0
May 29	83	0	June 19	83	0
May 30	91	Trace	June 20	82	0.31
May 31	91	Trace	June 21	73	0.14
			June 22	66	Trace
			June 23	73	0
			June 24	83	0
			June 25	89	0
			June 26	91	0
			June 27	94	0
			June 28	94	0

Potatoes began emerging about June 16.

POTATO VARIETY TRIALS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1984

Purpose

The purpose of these trials is to evaluate recently developed experimental lines of "russet" type potatoes to find suitable new selections for processing with internal and external qualities superior to Russet Burbank. Russet Burbank variety has been grown in the Northwest for many years. It is essential to develop new varieties with superior qualities for processing if the potato growers in the Northwest are to retain a viable part of the potato industry of the United States.

Procedure

The potatoes were planted on May 2, 3, and 4 on land that was plowed and bedded in November. Before plowing, 100 pounds per acre of phosphate and 60 pounds per acre of nitrogen were broadcast. After planting but before the potatoes were hilled, an additional 150 pounds of nitrogen and three pounds active ingredient per acre of Temik for insect control were sidedressed. A tank-mix combination of Prowl (1.5 pounds active ingredient per acre) and Lexone (0.5 pound active ingredient per acre) were the herbicides used for weed control. The potatoes did not require additional tillage or hand labor for weed control after hilling.

A total of 116 different experimental lines were evaluated in three separate trials. Individual trials were Oregon seed screening entries, Aberdeen advanced and preliminary entries, and the interstate regional entries. The Aberdeen entries included lines for both early and late harvest evaluations. All other entries were late harvest. All entries were planted in single row plots. Individual plot lengths in the advanced and regional trial were 35 hills long. Each entry in these two trials was replicated four times. Entries in the preliminary and Oregon seed trial were replicated three times and planted in 25 hill plots. Spacing between hills was nine inches and distance between rows was 36 inches.

The potatoes were watered by furrow type irrigation. Enough soil moisture was present at planting time for potato sprouting and emergence. The first irrigation was applied on June 5. The potatoes had about six inches of foliage growth when the first water was applied. Water was only applied to alternating furrows during each irrigation and the furrows receiving water were alternated from one irrigation to the next. Length of time of water sets varied from six to 12 hours and frequency between irrigations was four days when consumption use rates were highest.

Early harvest was done on August 13, 14, and 15. Late harvest was on October 15, 16, and 17. Data recorded on the station included measurements of tubers for size and yield of number one's, number two's, and culls. Ten large tubers (>10 ounce) per plot were sliced and evaluated for occurrence of hollow heart and symptoms from internal necrosis. Eight to 10-pound samples of tubers were taken from each Aberdeen variety by Dr. Joe Pavek to evaluate for specific gravity and fry quality. The data included in this report contain only the information collected at the station and do not include Dr. Pavek's findings on specific gravity and fry quality.

Results

Trial results for all experiments are reported in the tables that follow. Yield data are reported in hundredweights per acre. Norgold variety of potato is the standard variety used in the early harvest trial. Russet Burbank is the standard variety for the late harvest. Experimental lines are compared to standard varieties by percent for total yield of number one tubers and for total tuber yield.

Summary of data from the early harvested trials shows that Norgold was still superior to most experimental lines. In the advanced early harvest trial, experimental entry number A76260-16 did quite well, producing 19 percent more number one's and 10 percent more total tuber yield than Norgold (Table 1). The differences were great enough to be statistically significant. In the preliminary early harvest, two experimental lines, NDA8694-3 and NDA1411-2, were better than Norgold (Table 2). Observed internal defects for the three experimental lines mentioned above were equal to or fewer than Norgold. Tuber yields were generally low this year for early varieties because of late planting and cool temperatures early in the growing season.

Results from the late harvest trials show that Russet Burbank is still superior in total tuber yields to most experimental entries evaluated (Tables 3, 4, 5, and 6); however, as in most yield studies, many experimental lines will produce more number one tubers than Russet Burbank. Of the 74 entries tested in the late harvest trial, 30 exceeded Russet Burbank in both total tuber yield and yield of number one tubers. However, 22 of the 30 entries had higher incidence of hollow heart, net necrosis, or both than did Russet Burbank. Considering entries from both early and late harvest trials, 10 of 116 entries had high yields and fewer internal defects. The 10 selections should be tested further if they have suitable specific gravities and other internal qualities suitable for processing.

TABLE 1. Tuber yields and quality of potatoes harvested during mid-August from varieties in the advanced trial. Malheur Experiment Station, Ontario, Oregon, 1984

Entry	U.S. No. 1's 4-6 oz cwt/ac	U.S. No. 1's 6-10 oz cwt/ac	U.S. No. 1's ≥ 10 oz cwt/ac	No. 2's ≥ 4 oz cwt/ac	Culls ≤ 4 oz cwt/ac	Total No. 1's cwt/ac	Total No. 1's %	Total No. 1's % Norgold	Total Yield cwt/ac	Total Yield % Norgold	Internal Defects[1] H.H.[2]	Internal Defects[1] Necrosis
A71991-5	39	87	110	58	36	236	72	81	330	88	1	1
A74114-4	56	115	97	17	40	268	82	92	325	87	3	1
A76147-2	64	165	83	10	42	312	86	107	364	97	0	0
A76260-16	49	134	165	27	36	348	85	119	411	110	1	1
TXA528-5	80	77	37	13	99	194	63	67	306	82	1	0
Norgold	83	120	88	15	69	291	78	100	375	100	2	1
Lemhi	52	62	11	2	54	125	69	43	181	48	2	0
Russet Burbank	71	80	14	76	76	165	52	57	317	84	1	0
LSD (.05)	19	38	44	25	23	66			71			
LSD (.01)	27	55	61	34	32	88			94			
CV (%)	22	26	42	64	28	18			15			

[1] Number per 40 tubers evaluated.

[2] Hollow heart.

TABLE 2. Tuber yields and quality of potatoes harvested during mid-August from varieties entered in the preliminary trial. Malheur Experiment Station, Ontario, Oregon, 1984

Entry	U.S. No. 1's 4-6 oz cwt/ac	U.S. No. 1's 6-10 oz cwt/ac	U.S. No. 1's ≥ 10 oz cwt/ac	No. 2's ≥ 4 oz cwt/ac	Culls ≤ 4 oz cwt/ac	Total No. 1's cwt/ac	Total No. 1's %	Total No. 1's % Norgold	Total Yield cwt/ac	Total Yield % Norgold	Internal Defects[1] H.H.[2]	Internal Defects[1] Necrosis
A77155-4	44	117	103	66	38	264	71	91	368	98	0	0
NDA8694-3	56	163	154	23	38	373	86	128	434	116	0	2
ND388-1	72	121	66	10	60	259	78	89	329	88	1	17
ND534-4	73	118	113	32	53	304	78	104	389	104	0	2
Lemhi	69	52	8	3	69	129	64	44	201	53	3	0
A77188-6	53	37	22	43	53	112	54	38	208	55	0	0
A7946-10	73	80	37	15	67	190	70	65	272	72	0	0
A79126-2	63	72	29	23	71	164	64	56	258	69	1	1
A79135-3	41	81	78	16	32	200	81	69	248	66	0	0
A79172-2	48	44	13	5	56	105	63	36	166	44	0	0
A79172-6	63	87	46	8	61	196	74	67	265	71	0	0
A79172-7	36	42	16	8	57	94	59	32	159	42	1	0
A79196-1	79	92	38	42	88	209	61	72	339	90	4	2
A79212-12	55	101	67	6	58	223	78	77	287	76	11	0
A79239-4	34	44	38	10	69	116	59	40	195	52	0	1
A79239-7	64	105	51	11	56	220	76	76	287	76	1	3
A79252-6	65	92	48	8	70	205	72	70	283	75	0	2
A79368-2	81	75	16	1	112	172	60	59	285	76	0	0
NDA1411-2	66	193	113	62	49	372	77	128	483	129	1	0
NDA1598-1	36	78	77	46	41	191	69	66	278	74	0	0
Norgold	83	120	88	15	69	291	78	100	375	100	2	1
LSD (.05)	24	42	37	24	23	68			75			
LSD (.01)	31	57	49	33	30	90			99			
CV (%)	24	29	39	69	23	20			16			

[1] Number per 30 tubers evaluated.

[2] Hollow heart.

TABLE 3. Tuber yields and quality of potatoes harvested during mid-October from varieties in the advanced trial. Malheur Experiment Station, Ontario, Oregon, 1984

Entry	--- U.S. No. 1's --- 4-6 oz cwt/ac	6-10 oz cwt/ac	≥10 oz cwt/ac	No. 2's ≥4 oz cwt/ac	Culls ≤4 oz cwt/ac	Total No. 1's cwt/ac	%	% Russet Burbank	Total Yield cwt/ac	% Russet Burbank	Internal Defects[1] H.H.[2]	Necrosis
A72685-2	89	239	313	21	58	628	87	165	721	132	1	2
A76147-2	10	118	533	97	13	661	86	174	771	141	1	9
A77182-1	61	118	237	112	32	439	78	115	564	103	12	21
A77236-6	153	162	91	20	115	455	77	120	591	108	7	5
A77255-4	71	117	108	45	81	296	70	78	423	77	9	1
A7829-2	58	97	113	80	62	269	65	71	410	75	12	1
A7896-7	102	200	181	86	51	469	77	123	607	111	0	0
A7888-1	96	112	82	314	79	291	42	76	684	125	2	2
NDA848-3W	61	174	286	56	48	522	83	137	628	115	1	2
TXA657-27	45	114	262	36	33	422	86	111	490	89	2	1
Lemhi R.	69	209	275	17	35	554	91	145	606	111	9	4
Russet Burbank (1)	62	149	168	129	38	380	69	100	547	100	5	1
A7815-7	87	135	117	27	72	339	77	89	439	80	9	2
A7816-14	45	136	352	65	64	534	81	140	662	121	1	1
A7836-28	81	145	122	72	95	348	67	92	516	94	2	1
LSD (.05)	21	29	31	30	20	43			56			
LSD (.01)	29	39	42	41	20	58			74			
CV (%)	20	14	11	27	25	7			7			
Mean	74	149	209	78	60	436			573			

[1]Number of tubers with defects from a total of 40 tubers evaluated.

[2]Hollow heart.

TABLE 4. Tuber yield and quality of potatoes harvested during mid-October from varieties entered in the preliminary trial. Malheur Experiment Station, Ontario, Oregon, 1984

Entry	U.S. No. 1's 4-6 oz cwt/ac	U.S. No. 1's 6-10 oz cwt/ac	U.S. No. 1's ≥ 10 oz cwt/ac	No. 2's ≥ 4 oz cwt/ac	Culls ≤ 4 oz cwt/ac	Total No. 1's cwt/ac	Total No. 1's %	Total No. 1's % Russet Burbank	Total Yield cwt/ac	Total Yield % Russet Burbank	Internal Defects[1] H.H.[2]	Internal Defects[1] Necrosis
A7532-1	55	132	165	117	32	352	70	127	502	114	0	5
A7668-2	53	164	227	99	35	444	77	160	579	131	5	0
A7869-19	25	88	196	60	27	307	80	111	385	87	16	2
A7869-20	81	178	163	13	43	425	88	153	482	109	2	1
A78234-3	139	53	15	95	279	204	35	74	579	131	0	5
ATD 75-2	93	187	142	29	81	422	79	152	532	120	2	3
A77188-1	52	128	231	94	59	413	73	149	567	128	2	2
A77601-3	74	122	138	45	62	333	76	120	441	99	0	17
A7920-10	91	148	84	52	57	323	74	117	433	98	3	4
A7946-15	70	203	179	43	51	449	82	162	544	123	1	6
A7953-4	55	178	281	85	26	514	82	185	625	141	0	0
A7955-2	55	165	230	103	49	451	75	162	602	136	0	0
A7960-8	55	124	173	28	30	352	85	127	411	93	10	0
A7961-1	81	188	239	47	56	512	83	184	615	139	1	1
A7961-5	33	142	289	80	36	465	80	167	582	132	0	10
A7961-19	67	128	75	12	64	270	78	97	346	78	0	0
A7981-8	88	182	170	78	64	442	76	159	584	132	9	18
A7982-6	50	128	263	157	26	443	71	160	626	142	0	0
A7982-18	47	111	211	39	46	370	81	134	454	103	8	1
A7987-14	108	222	291	62	33	624	87	225	719	163	0	4
A7988-12	30	107	167	62	39	306	75	110	406	92	12	1
A7989-5	40	125	207	18	19	374	91	135	409	93	8	4
A7990-6	83	179	226	51	47	488	83	176	587	133	1	3
A7995-1	85	103	165	59	59	353	75	127	472	107	6	2
A79108-3	102	157	87	74	88	372	70	134	534	121	1	7
A79142-1	91	187	188	71	84	467	75	168	623	141	7	1
A79239-4	44	166	258	41	39	495	86	179	574	130	0	0
A79380-8	46	96	277	21	18	420	92	152	457	103	8	0
A79528-3	158	172	68	18	152	398	70	144	568	128	1	0
T-6176	80	197	236	58	42	514	84	185	614	139	5	0
Russet Burbank	44	104	128	132	32	277	63	100	442	100	4	1
LSD (.05)	33	48	56	51	24	73			79			
LSD (.01)	44	64	74	68	32	97			105			
CV (%)	29	20	18	49	26	11			9			
Mean	70	147	188	64	57	405			525			

[1] Number per 30 Tubers.
[2] Hollow heart.

TABLE 5. Evaluation of regional entries in the potato variety trial. Malheur Experiment Station, Ontario, Oregon, 1984

Entry	U.S. No. 1's 4-6 oz cwt/ac	U.S. No. 1's 6-10 oz cwt/ac	U.S. No. 1's ≥ 10 oz cwt/ac	No. 2's ≥ 4 oz cwt/ac	Culls ≤ 4 oz cwt/ac	Total No. 1's cwt/ac	Total No. 1's %	Total No. 1's % Russet Burbank	Total Yield cwt/ac	Total Yield % Russet Burbank	Internal Defects[1] H.H.[2]	Internal Defects[1] Necrosis
TC 2-1	102	204	162	16	70	468	84	93	554	84	5	1
AC 77652-1	29	108	228	38	22	365	86	73	425	64	21	1
Russet Burbank 82UTSC	82	206	213	108	50	501	76	100	659	100	8	0
Lemhi	30	117	298	22	15	444	92	89	481	73	13	1
A69870-10 WAS-3	60	181	319	72	34	561	84	112	667	101	4	14
ND 047-1	41	108	282	40	32	432	86	86	504	76	14	4
78-LC1	66	153	167	9	58	386	85	77	453	69	0	0
NDD277-2	35	125	297	25	19	456	91	91	501	76	0	3
NDA1276-3	27	72	176	10	15	275	92	55	300	46	3	1
A74133-1	40	158	384	40	39	583	88	116	663	101	1	1
ND534-1	64	140	163	14	45	367	86	73	427	65	5	3
A74212-1	36	150	400	59	18	587	88	117	664	101	4	1
A74123-7	60	152	249	67	30	462	83	92	558	85	1	0
LSD (.05)	21	25	42	23	15	49			57			
LSD (.01)	28	33	57	30	20	65			76			
CV (%)	26	12	12	34	28	8			7			
Mean	56	144	247	47	37	448			531			

[1]Number per 40 tubers.

[2]Hollow heart.

TABLE 6. Oregon potato variety trial. Malheur Experiment Station, Ontario, Oregon, 1984

Entry	U.S. No. 1's 4-6 oz cwt/ac	U.S. No. 1's 6-10 oz cwt/ac	U.S. No. 1's ≥ 10 oz cwt/ac	No. 2's ≥ 4 oz cwt/ac	Culls ≤ 4 oz cwt/ac	Total No. 1's cwt/ac	Total No. 1's %	Total No. 1's % Russet Burbank	Total Yield cwt/ac	Total Yield % Russet Burbank	Internal Defects[1] H.H.[2]	Internal Defects[1] Necrosis
A74212-1	30	137	481	97	7	648	85	145	756	134	0	2
A68678-2	50	166	301	61	8	517	88	116	586	104	0	0
A7242-3	25	147	292	64	7	464	87	104	535	95	0	0
A72685-2	46	106	410	36	12	562	92	126	610	108	0	10
C007921-1	43	104	322	48	11	469	89	105	528	93	2	2
C007908-1	68	207	245	76	18	520	85	116	614	109	0	1
A7836-28	54	136	264	45	14	454	88	102	513	91	2	0
A7869-5	34	141	402	109	6	577	83	129	692	122	6	10
A71997-8	16	263	148	17	33	427	90	95	477	84	1	0
A7811-16	37	121	365	39	11	523	91	117	573	101	2	24
A77153-3	21	95	245	42	9	361	87	81	412	73	0	2
NDA1309-6	32	103	421	20	7	556	95	124	583	103	0	8
ND388-1	31	157	298	16	7	486	95	109	509	90	2	0
NDA815-1	65	204	163	25	15	432	92	97	472	83	0	0
NDA1238-2	77	193	159	57	27	429	84	96	513	91	2	0
NDA1242-1	37	221	308	39	6	566	93	127	611	108	0	0
A7532-1	35	143	297	63	6	475	87	106	544	96	1	1
Lemhi	26	136	356	20	6	518	95	116	544	96	0	0
A7814-6	69	230	206	32	12	505	92	113	549	97	0	0
NDA1242-3	52	206	205	11	6	463	96	104	480	85	0	0
Norgold	67	219	205	21	16	491	93	110	528	93	0	0
Russet Burbank	64	217	166	99	19	447	79	110	565	100	0	0
A7279-12	49	143	369	67	18	561	87	126	646	114	2	0
AD79492-2	86	319	295	39	14	700	93	156	753	133	2	8
ND681-3	69	160	212	63	20	441	84	98	524	93	0	0
NDA1246-4	50	197	332	50	4	579	91	129	633	112	1	9
ND678-8	49	167	352	28	13	568	93	127	609	108	0	0
A69870-10	46	200	417	20	5	663	96	148	688	122	0	2
LSD (.05)	30	30	36	41	8	52			69			
LSD (.01)	40	40	48	55	11	70			92			
CV (%)	33	10	8	41	38	7			8			
Mean	56	182	280	61	14	517			580			

[1]Number per 30 tubers evaluated.
[2]Hollow heart.

POTATO VINE DESSICATION STUDY

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1984

Purpose

HOE 39866 applied at four rates was compared with Paraquat as a potato vine dessiccant. Each treatment was evaluated for rate of activity and percent dessication of leaves and stems. Tubers from each treatment were sampled and sent to American Hoechst Chemical Company for evaluation of tuber effects and residues. The trial was at Teramura Farms, Ontario, Oregon.

Procedures

HOE 39866 and Paraquat plus X-77 were applied on September 12 to green foliage of Russet Burbank potatoes. Rates of HOE 39866 were 0.5, 0.63, 0.75, and 1.5 pounds active ingredient per acre. Paraquat was applied at 0.375 pounds active ingredient per acre which is the commercial rate registered as a potato dessicant. Wetting agent (X-77) was added to Paraquat at the rate of 0.5% of water volume. No wetting agent was added to the HOE 39866 treatments. The treatments were applied between 9 a.m. and 11 a.m. The skies were clear and air temperature at the time treatments were applied was just above 80°F. Wind was calm. Individual plots were four rows wide (12 feet) and 30 feet long. Each treatment was replicated three times in a randomized complete block experimental design.

The chemicals were applied with a CO_2 pressurized plot sprayer using 8002 teejet fan nozzles. Four nozzles were used on a six-foot boom. Spray pressure was 35 pounds per square inch and water was applied as the carrier at the rate of 25 gallons per acre.

The potatoes had heavy vine growth and both stems and leaves were green. About 75 percent of the foliage was lodged into the furrows. The potatoes had recently been watered by furrow irrigation but the foliage was mostly dry when the dessicants were applied.

The effectiveness of the treatments as dessicants was evaluated visually 3, 7, and 14 days after the chemicals were applied. The potatoes were harvested on September 27. Twenty medium-sized tubers were taken from each replication of each treatment and evaluated for tuber defects. An additional six tubers were taken from each plot and evaluated for bud sprouting. The tuber samples were shipped to American Hoechst Chemical Company for testing and evaluations. The tuber data are not reported here.

Results

The percent of potato leaves and stems that were dry 3, 7, and 14 days after treatment are recorded in Table 1. At the rates used, HOE 39866 resulted in more rapid dessication of both potato leaf and stem tissue than did Paraquat plus X-77. There were only slight differences in the amount of leaf dessication on a given date between rates of HOE 39866. However, the difference in percent dry stems for each evaluation date varied significantly between rates of HOE 39866. The greatest rate of drying of stems for a given treatment occurred between the 7- and 14-day evaluation, whereas the most rapid drying of the leaves occurred within the first three days after application of the dessicants. At the end of the 14-day period, slightly more than 90 percent of the leaves were dry and 72 percent of the stems were dry for the 0.5, 0.63, and 0.75 pound active ingredient per acre rates of HOE 39866. All of the leaves and 95 percent of the stems were dry after 14 days where HOE 39866 was applied at the 1 1/2 pounds active ingredient per acre rate. Percent dessication of the leaves and stems treated with Paraquat plus X-77 was 72 and 53, respectively. Dessication by Paraquat was considerably less than dessication by the low rate of HOE 39866 in this study.

TABLE 1. The percent of dry leaves and stems on potato foliage 3, 7, and 14 days after the chemicals were applied. Teramura Farms, Ontario, Oregon, 1984

Dessicant	Rate	DAYS AFTER APPLICATION					
		3 Days		7 Days		14 Days	
	lbs ai/ac	Leaves	Stems	Leaves	Stems	Leaves	Stems
		Percent of dry foliage[1]					
HOE 39866	0.5	73	10	92	22	91	72
HOE 39866	0.63	73	15	95	30	88	73
HOE 39866	0.75	75	25	96	35	96	70
HOE 39866	1.50	85	62	100	68	100	95
Paraquat + X-77	0.375	48	5	62	5	72	53
Check	0	0	0	0	0	0	0

[1]Data were calculated as an average of visual observations of three replications for each date.

DEVELOPMENT AND TESTING OF SMALL GRAINS FOR THE TREASURE VALLEY ON THE MALHEUR EXPERIMENT STATION

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Malheur Experiment Station, Ontario, Oregon, 1984

New improved adapted cereal varieties offer a potential economic advantage over older varieties. The advantage is usually higher yields because of some added disease resistance, or other survival characteristics which may stabilize production across years. Others may have better allocation of photosynthates to grain, improved harvest indexes or better water use efficiencies.

PURPOSE

Yield trials at the Malheur Experiment Station are conducted to evaluate the adaptation of promising new wheat, barley, and triticale selections to furrow irrigation in the Treasure Valley. Experimental results are distributed to cooperators and other interested parties. Data are used by the breeders to evaluate the overall performance of new selections and are used by growers to help determine which variety they may include in their farming practices.

PROCEDURES

New selections are received from various breeding programs. Spring and winter habit wheat, barley, and triticale selections or varieties are entered into appropriate evaluation trials.

Usually the fall-seeded trials are planted in mid-October and the spring trials in the later part of March. Research trial designs are randomized complete blocks with three to six replications. Plots are four feet by 15 feet. Plots are bordered and divided by "V" shaped rills and have two 14-inch wide raised beds with two rows planted 10 inches apart on each bed. 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. Harvesting is done with a small plot combine.

Winter Nursery Cultural Practices 1983-84. The winter small grain tests were conducted on the east one-half of field C-3 following an onion crop. On October 11, 1983, an application of 100 pounds of P_2O_5 and 60 pounds of nitrogen per acre was plowed under. On October 14, the nursery was planted. On March 20, an additional 150 pounds of nitrogen per acre were applied to the wheat and an additional 130 pounds of nitrogen per acre were applied to the barley. One and one-half pints of ME 4 Brominal plus two pints of Hoelon per acre were applied April 13 for weed control. Approximately 13 inches and 18 inches of irrigation water were applied to the barley and wheat, respectively. The barley was harvested on July 23, and the wheat on August 14.

Spring Nursery Cultural Practices 1983-84. The spring small grain nursery was conducted on the south one-half of the west one-half of field B-8 which had grown a sugar beet crop in 1983. An application of 100 pounds of P_2O_5 and 60 pounds of nitrogen per acre were plowed under October 26, 1983. On April 2, an application of 187 pounds of nitrogen per acre was incorporated as part of the seedbed preparation. The plots were planted April 3. Two and one-half pints of Buctril plus 2 2/3 pints of Hoelon per acre were applied on May 12 for weed control. Parathion was aerially applied for aphid control on July 19. Approximately 18 inches of irrigation water were applied through the growing season. The nursery was harvested on August 15 and 16.

WINTER REGIONAL SMALL GRAIN NURSERIES

Plant breeders from the Pacific Northwest participate in the regional nurseries. These nurseries are coordinated by staff of the USDA, ARS. The regional nurseries are, in a sense, a vital communication link among plant breeding programs, since participating breeders become knowledgeable about selections from other programs and, in turn, have their advanced breeding lines evaluated by other breeders, interested pathologists, and agronomists.

Two regional winter nurseries are grown at the Malheur Experiment Station.

Western Regional Winter Barley Nursery (Table 1). This nursery is coordinated by Dr. Darrell M. Wesenberg, USDA, ARS Aberdeen, Idaho. The Malheur Station provides a very high fertility regime for testing winter barley. All entries but one line, OK 77422, lodged severely. Ontario does, however, give a good indication of relative straw strength in the usual absence of summer rains and overhead irrigation. Grain yields in 1984 were about normal, ranging from 97 bushels per acre for Luther to 160 bushels for WA 2905-75. The experimental line 79AB812 continues to yield well. Both Hesk and Scio perform equivalently in this trial. Lodging probably contributed to the low test weights and percent plump.

Western Regional White Winter Wheat Nursery (Table 2). Dr. R.E. Allan, USDA, ARS, Pullman, Washington coordinates this wheat nursery. White winter wheat is the predominant cereal planted in the Treasure Valley so the white winter wheat nursery is currently the most meaningful to Treasure Valley growers. Thirty soft white common and club wheats were tested. Stephens has the highest five-year average yield at 135 bushels per acre versus the next best, Tyee, a club type, at 111 bushels per acre.

The very promising line OR 8113, (syn. OWW 72339-2, CI 17596) is a cross of Stephens /2/63189-66-7/ Bezostaja. OR 8113 yielded less than Stephens in 1984, but its three-year average is 142 bushels versus 130 bushels for Stephens. Four experimental entries exceeded Stephens yields in 1984: WA 7164, OI 76-5784, OI 75-4022, and OI 75-4989. Low test weights were probably caused by leaf rust infection and lodging before complete grain filling.

CEREAL SELECTIONS FROM CORVALLIS TESTED AT ONTARIO

Before testing at Ontario, the Corvallis cereal selections had been evaluated for agronomic type, disease resistance, and preliminary quality factors.

Corvallis Elite White Winter Wheat (Table 3). Promising superior selections from this trial are submitted for extensive evaluations in the regional trials. Twenty-four entries were tested. Only four entries, OR 8113, OWW 750144..OH, CW 8425, and CW 8426 were equal to Stephens. OR 8113 is being suggested as a candidate for release to growers. Grain yields were less for OR 8113 than for Stephens in 1984 probably because of high infection rates of leaf rust, (*Puccinia recondita* Rob ex Desm. f. sp. *tritici*). OR 8113 is a high yielding excellent quality type which could insert a desirable hardiness and disease resistance diversity to the Stephens-dominated cereal culture in the Treasure Valley.

Winter Malting Barley Quality Trial (Table 4). A winter habit barley with acceptable malting quality could offer a viable crop option to cereal producers. The high malting quality of tender spring types would have to be genetically transferred through hybridization to cold hardy winter varieties. After spring barley is crossed to winter types, it is necessary to go through a lengthy process of complicated crosses to recover winter hardiness and straw strength. The winter barleys in this trial represent the third and fourth series of crosses attempting to increase winter hardiness and straw strength while preserving malt quality. Most yields in this trial were reasonably competitive to the feed barley checks (Scio, Kamiak, and Boyer). Except for FB 73130W-10, all the malting selections had better grain yields than Wintermalt, the only winter barley accepted for malting in the United States. Test weights and heading dates were within reasonable limits, but most lines have weak straw.

Corvallis Elite Winter Barley (Table 5). Twenty-four lines were tested in the elite trial. Grain yields were fair. Entry 17, MB 763126, at 179 bushels per acre, yielded 23 bushels per acre more than the second highest yielder, MB 773160. Test weights were satisfactory; however, all lines were weak strawed and lodged.

Corvallis Elite Spring Feed Barley (Table 6). Grain yields in this test, as well as the other spring barley tests at the Malheur Station, were very good in 1984. Yields in the Corvallis Elite Spring Feed Barley Trial ranged from 97 bushels per acre to 155 bushels for SF 8421. Twelve lines yielded as well as the highest yielding check, Karla. Test weights were lower than desirable. Only four new lines matured as early as Steptoe and 10 lines did not lodge. Stem rust (*Puccinia* sp.) and leaf rust (*Puccinia* sp.) were the most predominant diseases; however, samples were not taken to determine if they were the same species as in the wheat plots. Neither stem nor leaf rust was observed in the highest yielding line, SF 8421.

Corvallis Elite Spring Malting Barley (Table 7). Grain yields ranged from 112 to 142 bushels per acre. Lines in this test have promising malting characteristics such as desirable kernel plumpness, high extract, high test weight, and a desirable fine-coarse grind ratio. New varieties such as Karla, Kris, and Andre must still face large scale production evaluations over a number of years to determine quality stability and product acceptability. Test weights from this experiment were very good. Four lines did not lodge.

CEREALS FROM THE FEED GRAINS PROJECT

New feed grain selections brought to Ontario for testing were evaluated at the station near Hermiston. Winter types were primarily kept on a basis of their reaction to diseases associated with early fall planting, August 31, (especially barley yellow dwarf virus). Lodging and shattering resistance, grain yield, and reactions to diseases especially associated with irrigation in Oregon receive particular attention in both the spring and winter types.

Eastern Oregon Winter Barley (Table 8). Twenty-four winter barley varieties or selections were tested at six locations. Only nine were retained for further testing. Of those planted five years, or more, FB 74506-06 has the best yield record. Although it is susceptible to leaf scald, it and FB 73597-15 are scheduled for testing in regional trials.

Eastern Oregon Spring Barley (Table 9). Grain yields were good in this trial. They ranged from 83 bushels per acre for the hulless line FB 741206 to 166 bushels per acre for FB 78444-006. Test weights were satisfactory, but lodging was more than desirable.

Screening Spring Feed Barley (Table 10). A sister selection (FB 78444-001) of the highest yielding line (FB 78444-006) in the Eastern Oregon Spring Barley trial was the highest yielder at 167 bushels per acre. Both are very stiff strawed, late maturing types. Columbia, from Germains, was the highest yielding named variety in this trial.

Eastern Oregon White Winter (Table 11). Twenty-four entries were tested in the Eastern Oregon White Winter Wheat trial at six locations. Eleven were retained for further testing. Only two have equaled Stephens' yields at Ontario.

Eastern Oregon Red Winter (Table 12). This test was grown at six locations throughout eastern Oregon. Stephens soft white had the highest grain yield at 158 bushels per acre. Ten lines were kept for further testing. None of the lines met hard red baking and milling quality standards.

Individual Wheat Plant Plots (Table 13). One hundred and forty plant plots from the very stiff strawed cross Rb/1523-Dc/2/Mdm were evaluated for leaf rust resistance, tillering capacity, and short strawed plants with well filled long heads. Both red and white seeded types were kept for the 1985 trials at Ontario and Hermiston.

Eastern Oregon Spring Wheat (Table 14). Twenty-seven red and white seeded experimental lines and checks were tested. Yields ranged from 79 bushels per acre for an experimental line to 122 bushels per acre for Waverly, a soft white wheat. The one durum, Waid, yielded 96 bushels per acre. VT 80011, entry 16, is a spring triticale which yielded 94 bushels per acre. Very few of these experimental lines were retained to include in the 1985 trials.

Eastern Oregon Winter Triticale (Table 15). For some reason triticale does not yield as well as expected in the Treasure Valley. A tall triticale yielded 148 bushels per acre in 1984 as compared to Stephens at 163 bushels. The newly released Flora produced 112 bushels per acre. At other locations, Flora will yield as much or more than Stephens. Flora is well adapted to the Grande Rhonde Valley, Wallowa County, parts of Idaho, and the sandy soils near the Columbia. Flora has shown exceptional tolerance to high sodium soils in yield trials. Entry number one, B82-3319, represents an advance in triticale kernel plumpness and test weight. It is being purefied and increased for extensive yield testing and breeders seed. Flora is an excellent feed source in poultry feeding trials.

Individual Rye Plots (Table 16). Some 90 plus individual rye plant plots were evaluated for yield and plant type. These lines are dwarf types selected from a bulk population developed in Poland. Yields were surprisingly high. The populations segregated tall and mid-tall types probably because of elevation and temperature interactions not present near Hermiston as opposed to height segregates caused strictly by genetic control across environments. These lines have excellent seed set as well as seed type. They will be used as parent material for new triticale and will also be tested in high elevation irrigated sites such as those found in Harney County.

SPRING REGIONAL SMALL GRAIN NURSERIES

The regional spring small grain nurseries provide an opportunity for plant breeders throughout the Northwest to evaluate their own and others' breeding lines and introductions in a variety of environments. The regional nurseries are coordinated by staff of the USDA, ARS. Two regional spring nurseries are grown at the Malheur Agricultural Experiment Station.

Western Regional Spring Barley Nursery (Table 17). This nursery is coordinated by Dr. E. A. Hockett, USDA, ARS, Bozeman, Montana. In 1984, it included 30 two and six row entries from both public and private breeding programs. Yields ranged from 157 bushels per acre for ID 910719 to 88 bushels per acre for Washington's 877178. Lodging was very high and kernel plumpness was low throughout the trial. Stem rust was the prevailing disease and leaf rust, mildew, and loose smut were also observed.

Western Regional Spring Wheat Nursery (Table 18). Dr. R.E. Allen, USDA, ARS, Pullman, Washington coordinates this nursery. In 1984, it included 38 hard red and soft white entries from Oregon, Idaho, Washington, and Utah. Yields ranged from 112 bushels per acre for UT 209 to 87 bushels per acre for ID 271, both of which are hard reds. UT 209 has consistently yielded well for the three years it has been in the trial. The highest yielding soft white wheat was Oregon's entry 8413. Leaf rust was prevalent throughout the trial area and stripe rust, stem rust, mildew, and loose smut were also observed. Most entries exhibited some degree of lodging. Statistics indicate that the yield differences among varieties were not significant.

LOCAL SPRING SMALL GRAIN TRIALS

Malheur Experiment Station conducts its own wheat and barley trials every spring. These trials include commercial varieties and experimental lines entered on a fee basis by seed companies, public selections entered by plant breeders, and varieties commonly grown or showing potential in this area.

Local Spring Barley Trial (Table 19). Commercial entries in 1984 included Cenex's Lindy, Piston, and Menuet, Germain's Columbia, and Northrup King's experimental line 80 W 41558. Yields ranged from 146 bushels per acre for Steptoe to 114 bushels per acre for Piston, a two-row barley. Lodging pressures were high, and leaf rust and stem rust were prevalent in the trial area. Statistics indicate that yield differences among varieties were not significant.

Local Spring Wheat Trial (Table 20). Commercial entries in 1984 included Western Plant Breeder's Westbred 906R, a hard red, Westbred 803 and 881, both durums, and Northrup King's experimental line NK 79S2437-35. Public entries included Idaho's ID 172, which will be released as Bliss and Montana's new variety Pondera. Yields ranged from 117 bushels per acre for McKay and Fieldwin to 93 bushels per acre for Pondera. The trial was exposed to high lodging pressure. Leaf rust and stem rust were both prevalent in the trial area.

TABLE 1. Western Regional Winter Barley Nursery; a five-year grain yield summary and the 1984 observations for test weight, plant height, heading date, percent lodging, and percent plumps at the Malheur Experiment Station, Ontario, Oregon

	YIELD											
Selection	1980 bu/ac	1981 bu/ac	1982 bu/ac	1983 bu/ac	1984 bu/ac	Avg bu/ac	Percent[1] Boyer	Test Weight lbs/bu	Plant Height inches	Date 50% Headed	Lodging percent	Plumps[2] percent
Luther	119	83	109	137	97	109	86	45	36	5/20	100	56
Kamiak	126	124	138	150	119	131	104	47	39	5/16	100	51
Schuyler	155	117	148	139	129	138	109	47	39	5/22	100	52
Boyer	110	128	134	124	136	126	100	45	34	5/21	100	41
Wintermalt	112	160	162	153	131	144	114	47	38	5/14	100	62
Hesk	129	130	143	157	130	138	109	47	36	5/18	100	53
Mal	99	111	128	135	104	115	91	47	35	5/22	100	62
Scio	128	152	133	149	133	139	110	46	35	5/21	100	59
79 AB 812		143	171	153	149	154	118	48	37	5/20	100	60
E 804	108	143	138	150	108	129	102	47	39	5/19	100	40
FB 73130W10			130	132	142	135	103	46	39	5/17	100	53
OWB 710428-IH-OH			141	157	121	140	107	46	38	5/18	100	46
WA 2905-75			123	126	160	136	104	45	41	5/22	100	36
FB 75075-01				162	140	151	116	46	41	5/19	100	56
OK 77422				128	139	133	102	49	42	5/17	20	68
OK 82850				125	109	117	90	48	39	5/17	100	67
WA 3231-77					126	126	93	47	33	5/21	100	59
WA 1430-77					103	103	78	46	37	5/22	100	52
OR 8011					116	116	85	44	40	5/23	100	42
OR 8328					136	136	100	45	37	5/20	100	41
FB 75019HY					94	94	69	40	39	5/23	100	46
FB 508-3MB2					115	115	84	47	37	5/30	100	46
FB 508-3MB3					99	99	73	46	41	5/30	100	47
80 AB 896					126	126	93	47	28	5/16	100	68

[1]Yield comparisons for the same years grown 1980-1984 = 126 bu/ac, 1981-1984 = 130 bu/ac, 1982-1984 = 131 bu/ac, 1983-1984 = 130 bu/ac, 1984 = 136 bu/ac.

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

TABLE 2. Western Regional White Winter Wheat Nursery; a five-year grain yield summary and the 1984 observations for test weight, plant height, heading date, percent lodging, stem rust (*Puccinia graminis* Pers. f. sp. *tritici* Eriks. and Henn.), and leaf rust, (*Puccinia recondita* Rob. ex Desm. f. sp. *tritici*) at the Malheur Experiment Station, Ontario, Oregon

Selection	YIELD 1980 bu/ac	1981 bu/ac	1982 bu/ac	1983 bu/ac	1984 bu/ac	Avg bu/ac	Test Weight lbs/bu	Plant Height inches	Date 50% Headed	Lodging percent	Disease: Stem[1] Rust	Leaf[2] Rust
CI 1442 (Kharkoff)	65	81	83	91	62	76	60	44	5/29	99	60-S	20-S
CI 11755 (Elgin)	64	98	90	97	64	83	54	45	5/29	99	5-MS	90-S
CI 13740 (Moro)	78	107	102	141	81	102	54	45	5/26	99	5-MS	90-S
CI 13968 (Nugaines)	110	135	117	120	65	109	56	37	5/30	10	5-S	90-MS
CI 17596 (Stephens)	146	142	121	134	134	135	58	38	5/26	0	5-S	20-MR
CI 17773 (Tyee)	128	130	109	117	72	111	55	42	5/29	30	5-S	70-S
WA 6698		131	117	121	80	112	55	43	5/28	30	5-S	90-S
WA 6819				121	--	121	--	42	5/29	10	0-	tr-R
WA 6910				123	--	123	--	44	5/29	10	10-S	80-S
WA 6912				156	126	141	57	40	5/29	0	10-S	80-MS
OR 8113			132	169	125	142	57	41	5/29	0	5-MS	80-S
OR 835			117	141	103	120	52	42	6/3	0	--R	---
OR 7996				151	106	128	62	46	5/30	40	5-MS	90-S
WA 7050				123	83	103	52	38	5/29	99	5-MS	90-S
WA 7047				144	119	131	54	40	5/30	99	0-	90-S
OR 8188				143	109	126	55	38	5/30	70	5-MS	90-S
UC WW33 (Phoenix)				139	115	127	60	39	5/20	20	--R	70-MS
OR 8314					127	127	55	41	5/29	0	tr-MR	80-S
OR 8318					130	130	57	43	5/31	40	tr-R	90-S
WA 7167					114	114	57	43	5/30	0	tr-MS	90-S
WA 7168					91	91	54	42	5/31	80	5-S	90-S
WA 7169					--	--	--	39	5/31	30	10-MS	80-S
WA 7170					--	--	--	43	5/30	30	0-	5-MR
WA 7163					125	125	58	43	6/1	0	0-	20-S
WA 7164					136	136	56	41	5/28	10	0-	20-MS
WA 7165					102	102	55	38	5/31	50	10-MS	80-S
WA 7166					82	82	50	43	5/28	0	5-S	tr-R,S
OI 76-5784					141	141	56	41	5/31	30	5-S	90-S
OI 75-4022					144	144	58	40	5/24	0	10-S	20-MS
OI 75-4989					145	145	60	46	5/28	0	5-MR	-R

Stephens: 1980-1984 = 135 bu/ac, 1981-1984 = 133 bu/ac, 1982-1984 = 130 bu/ac, 1983-1984 = 134 bu/ac.

[1]Percent stem area infected and reaction type where 0 = none observed, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.

[2]Percent leaf area infected and reaction type where 0 = none observed, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.

TABLE 3. Corvallis Elite White Winter Wheat; a two-year grain yield summary and the 1984 observations for test weight, plant height, heading date, stripe rust (*Puccinia striiformis* West), and leaf rust (*Puccinia recondita* Rob. ex Desm. f. sp. *tritici*) at the Malheur Experiment Station, Ontario, Oregon

Selection	YIELD 1983 bu/ac	YIELD 1984 bu/ac	YIELD Avg bu/ac	Percent Stephens[1]	Test Weight lbs/bu	Plant Height inches	Date 50% Headed	Disease Stem Rust[2]	Disease Leaf Rust[2]
CI 17596 (Stephens)	167	137	152	100	59	40	5/27	0-	---
CI 14565 (McDermid)		127	127	93	58	38	5/28	0-	90-S
CI 17954 (Hill)	163	118	140	92	56	39	5/29	20-MS	90-S
CI 17909 (Lewjain)	134	148	141	93	59	40	5/27	5-S	60-S
OR 8113	178	126	152	100	57	39	5/29	5-MS	80-S
SWH 72053..P	154	133	143	94	58	40	5/27	5-MS	30-S
OWW 74337C..OH	145	137	141	93	60	41	5/29	10-MS	40-MR
OWW 750144..OH	174	129	151	99	59	44	5/26	60-S	60-MR
OWW 74220F..OP	156	125	140	92	57	44	5/30	80-S	90-S
OWW 74348D..OH	161	124	142	93	58	41	5/30	10-S	80-S
SWM 754666*..OP	136	122	129	85	60	38	5/21	5-S	5-MR
SWM 754666*..OH	147	120	133	87	57	40	5/27	5-MS	10-MR
SWM 754666.04H		122	122	89	57	41	5/28	5-MS	-R
CW 8416		130	130	95	57	43	5/31	5-MS	40-S
CW 8417		115	115	84	60	44	5/29	5-MS	70-S
CW 8418		122	122	89	57	37	5/22	5-S	60-S
CW 8419		97	97	71	60	39	5/26	-R	-R
CW 8420		105	105	77	51	41	5/25	10-S	90-S
CW 8421		126	126	92	58	43	5/30	1-MR	90-S
CW 8422		125	125	91	59	42	5/31	1-R	20-MR
CW 8423		132	132	96	59	42	5/26	10-MS	1-R
CW 8424		123	123	88	58	39	5/29	10-MS	30-MS
CW 8425		141	141	103	58	46	5/27	1-R	1-R
CW 8426		138	138	101	61	48	5/29	1-R	90-S

[1] Yield comparisons for the same years grown.

[2] Percent leaf area infected and reaction type where 0 = none observed, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.

TABLE 4. Winter Malting Barley Quality Trial; grain yields, test weights, plant heights, heading dates, and percent lodging of winter barleys with promising malting characteristics tested in 1984 at the Malheur Experiment Station, Ontario, Oregon, 1984

Selection	Yield bu/ac	Test Weight lbs/bu	Plant Height inches	Date 50% Headed	Lodging percent
SCIO	140	48	35	5/21	70
Wintermalt	129	46	36	5/14	100
Cossack	149	50	35	5/17	70
Pullman-12222	145	50	34	5/19	90
FB 75075-01 H4	128	45	35	5/24	100
MB 763150+..OH	140	51	35	5/16	90
FB 73607-HHH 33	144	48	37	5/22	100
MB 773032*-32	133	51	33	5/18	100
MB 773032*-33	156	52	30	5/18	90
MB 773051*-31	154	52	35	5/21	0
MB 773059*-31	152	50	34	5/24	70
MB 773268A-31	155	47	35	5/21	90
MB 773299A-34	157	49	34	6/1	80
MB 773051*-31	156	54	33	5/23	10
MB 773054*-32	142	51	36	5/17	100
FB 75075-HHH 31	132	49	31	5/23	100
FB 75075-HHH 32	134	47	30	5/22	100
FB 73607-B71	155	47	40	5/22	100
MB 773180* F5H1	131	45	41	5/24	100
FB 73130W-10	124	46	36	5/28	100
FB 73258-904	134	49	38	5/25	80
Boyer	151	47	38	5/22	100
E-804	115	50	41	5/19	100
Kamiak	145	49	41	5/16	100

TABLE 5. Corvallis Elite Winter Barley; grain yields, test weights, plant heights, heading dates, and percent lodging of feed type winter barleys tested in 1984 at the Malheur Experiment Station, Ontario, Oregon, 1984

Selection	Yield bu/ac	Test Weight lbs/bu	Plant Height inches	Date 50% Headed	Lodging percent
Scio	139	44	36	5/21	100
Wintermalt	133	48	40	5/14	100
Boyer	133	47	40	5/22	100
MB 71035	141	44	38	5/21	100
MB 71081	123	45	41	5/23	100
FB 75075-A	154	47	40	5/20	100
MB 753296	129	45	34	5/20	100
MB 753328	137	47	31	5/17	100
MB 773160	156	48	34	5/17	100
MB 783144	139	46	35	5/17	100
MB 763002	126	46	32	5/24	90
MB 71072	144	46	31	5/24	90
MB 71081	135	42	39	5/21	100
FB 75075-B	139	48	35	5/20	100
MB 763080	143	47	35	5/17	100
MB 753402	132	46	31	5/20	100
MB 763126	179	48	37	5/18	90
MB 783144	134	44	35	5/17	100
MB 763074	150	48	32	5/16	100
FB 73600D1	139	47	34	5/22	100
FB 73607D2	128	45	32	5/21	100
FB 73597-1	138	48	32	5/20	100
FB 73607-B	148	48	38	5/21	100
MB 763082	136	47	34	5/22	90

TABLE 6. Corvallis Elite Spring Feed Barley; grain yield, test weight, plant height, heading date, percent lodging, stem rust (*Puccinia* sp.) and leaf rust (*Puccinia* sp.) observations recorded in 1984 at the Malheur Experiment Station, Ontario, Oregon

Selection	Yield bu/ac	Rank	Test Weight lbs/bu	Plant Height inches	Date 50% Headed	Lodging percent	- Disease - Stem[1] Rust	Leaf[2] Rust
Steptoe	128	26	49	35	6/9	70	10-S	1-R
Andre	97	40	51	37	6/17	80	30-S	0-
Karla	136	13	47	41	6/11	60	10-MS	20-MS
Kombar	121	32	44	38	6/15	30	10-S	10-MS
SF 8405	129	24	48	39	6/18	30	70-S	tr-MS
SF 8406	131	20	48	37	6/13	10	20-S	1-MR
SF 8407	140	9	45	36	6/13	70	20-S	tr-MR
SF 8408	130	23	41	40	6/16	5	40-MS	tr-R
SF 8409	147	5	47	40	6/15	5	20-S	5-R
SF 8410	117	33	47	38	6/15	40	20-S	10-MR
SF 8411	140	10	48	40	6/18	5	5-S	5-MR
SF 8412	111	39	46	34	6/18	80	20-S	1-R
SF 8413	135	15	44	34	6/12	80	5-MS	0-
SF 8414	113	37	45	38	6/12	80	5-S	0-
SF 8415	114	35	49	40	6/13	20	20-S	10-MR
SF 8416	121	31	49	35	6/14	60	40-S	0-
SF 8417	111	38	48	34	6/14	60	5-S	tr-MR
SF 8418	154	2	46	38	6/14	5	5-S	10-MR
SF 8419	144	6	48	39	6/13	15	10-S	5-MR
SF 8420	134	19	47	38	6/16	0	5-S	tr-MR
SF 8421	155	1	46	36	6/14	0	0-	0-
SF 8422	135	18	48	40	6/13	0	5-MR	0-
SF 8423	126	27	48	37	6/13	0	60-S	tr-R
SF 8424	136	14	48	37	6/14	0	30-S	5-MR
SF 8425	139	11	47	39	6/13	0	40-S	1-R
SF 8426	117	34	45	34	6/13	0	10-S	1-R
SF 8427	130	22	48	35	6/13	0	5-S	5-M
SF 8428	135	16	47	43	6/15	30	20-MS	1-MR
SF 8429	124	29	46	41	6/16	20	20-S	0-
SF 8430	130	21	46	36	6/15	5	20-S	tr-MR
SF 8431	125	28	45	32	6/15	20	20-S	10-MR
SF 8432	122	30	49	34	6/16	60	20-S	1-R
SF 8433	135	17	43	39	6/17	0	10-S	0-
SF 8434	140	8	45	38	6/13	30	10-S	10-MS
SF 8435	129	25	47	36	6/9	50	10-MS	0-
SF 8436	138	12	47	41	6/13	60	10-S	5-MR
SF 8437	141	7	48	36	6/9	70	20-S	5-MR
SF 8438	152	4	46	33	6/9	80	10-MR	1-R
SF 8439	114	36	45	34	6/9	80	10-S	1-R
SF 8440	153	3	47	37	6/15	0	10-MS	5-MR

[1]Percent stem area infected and reaction type where 0 = none observed, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.

[2]Percent leaf are infected and reaction type where 0 = none observed, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.

TABLE 7. Corvallis Elite Spring Malting Barley; grain yield, test weight, plant height, heading date, percent lodging, stem rust (*Puccinia* sp.) and leaf rust (*Puccinia* sp.) observations recorded in 1984 at the Malheur Experiment Station, Ontario, Oregon

Selection	Yield bu/ac	Test Weight lbs/bu	Plant Height inches	Date 50% Headed	Lodging percent	- Disease - Stem Rust[1]	Leaf Rust[2]
Andre	132	50	36	6/10	70	5-MS	0-
Karla	137	52	38	6/10	60	0-	10-MR
SM 8405	142	50	40	6/10	50	5-S	5-MS
SM 8406	140	52	37	6/10	20	5-S	0-
SM 8407	121	49	34	6/20	70	5-S	10-MS
SM 8408	126	49	35	6/15	60	0-	0-
SM 8409	116	47	34	6/13	80	5-MS	10-MS
SM 8410	119	50	32	6/15	70	20-S	1-MS
SM 8411	125	50	38	6/10	50	10-S	0-
SM 8412	112	50	34	6/16	50	10-S	0-
SM 8413	129	46	33	6/15	30	10-S	0-
SM 8414	132	51	33	6/9	50	40-S	0-
SM 8415	128	52	35	6/16	70	5-S	0-
SM 8416	131	49	36	6/14	5	1-S	1-MS
SM 8417	125	52	32	6/13	40	30-S	1-R
SM 8418	112	51	30	6/13	70	10-S	0-
SM 8419	114	49	28	6/18	30	10-S	0-
SM 8420	136	50	37	6/16	0	5-MS	0-
SM 8421	119	49	34	6/19	0	10-MS	0-
SM 8422	121	50	31	6/18	10	30-S	0-
SM 8423	124	49	33	6/18	60	20-S	1-R
SM 8424	126	51	36	6/10	30	20-S	5-MS
SM 8425	114	51	35	6/13	70	1-MS	0-
SM 8426	133	50	32	6/14	0	0-	0-
SM 8427	131	51	32	6/16	0	0-	0-

[1]Percent stem area infected and reaction type where 0 = none observed, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.

[2]Percent leaf are infected and reaction type where 0 = none observed, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.

TABLE 8. Eastern Oregon Winter Barley; a five-year grain yield summary at five locations in Oregon and test weight, plant height, heading date, plot rating, and percent lodging observations at the same five locations in 1984

Selection	Location[1]	YIELD 1980 bu/ac	1981 bu/ac	1982 bu/ac	1983 bu/ac	1984 bu/ac	Avg bu/ac	Percent[2] Mal	Test Weight lbs/bu	Plant Height inches	Date 50% Headed	Plot[3] Rating	Lodging percent
CI 15817 (Mal)	H		137	129	115	136	129	100	50	33	5/5		
	O	110	147	111	162	131	132	100	46	40	5/22		
	P	126	56		83	144	102	100		47	6/2		80
	JB					149	149	100	45		6/8	5	
	I					106	106	100	45		6/16	5+	
	V					149	149	100	45		5/14	3	70
	AVG	118	113	120	120	136	124	100	46	40	5/26	4	75
CI 15816 (Hesk)	H		129		94	135	119	89	49	33	5/4		
	O	106	132	141	147	151	135	102	47	40	5/21		
	P	118	47		98	130	98	96		47	6/1		100
	JB					168	168	113	45		6/5	5	
	I					125	125	118	45		6/17	5+	
	V					170	170	114	45		5/8	4	70
	AVG	112	103	141	113	146	126	102	46	40	5/25	5	85
CI 15559 (Boyer)	H		132	118	115	124	122	95	48	36	5/5		
	O	116	126	109	154	142	129	98	48	39	5/21		
	P	118	48		79	143	97	95		48	6/1		100
	JB					125	125	84	45		6/9	4	
	I					105	105	99	47		6/18	4	
	V					152	152	102	43		5/6	3	20
	AVG	117	102	114	116	132	119	96	55	41	5/25	4	60
FB 74506-06	H		164	164	84	134	137	106	47	38	5/11		
	O	135	167	203	169	159	167	126	51	37	5/21		
	P	124	71		95	138	107	105		45	5/31		60
	JB					132	132	89	43		6/10	4	
	I					110	110	104	41		6/19	3	
	V					149	149	100	43		5/6	3	10
	AVG	130	134	184	116	137	137	110	45	40	5/27	3	35
FB 73258-901	H				102	144	123	98	45	24	5/11		
	O				156	166	161	110	51	36	5/24		
	P				88	110	99	88		36	6/1		40
	JB					153	153	103	45		6/13	4	
	I					122	122	115	44		6/17	4+	
	V					157	157	105	42		5/14	3-	90
	AVG				115	142	133	102	45	32	5/29	4	65
FB 73258-916	H			135	106	151	131	103	46	25	5/12		
	O			129	156	136	140	104	47	37	5/25		
	P				88	147	118	104		42	5/28		50
	JB					129	129	87	45		6/13	5	
	I					103	103	97	45		6/19	3	
	V					160	160	107	44		5/20	3	10
	AVG			132	117	138	130	105	45	35	5/30	4	30
FB 73258-921	H				127	116	122	101	44	27	5/10		
	O				165	149	157	113	50	34	5/25		
	P				77	122	100	68		47	5/29		80
	JB					142	142	93	44		6/9	4	
	I					93	93	88	46		6/16	3	
	V					145	145	97	44		5/15	4	20
	AVG				123	128	126	97	46	36	5/28	4	50
FB 73597-15	H		147	131	120	125	131	102	44	28	5/5		
	O	148	116	156	175	146	148	112	47	38	5/20		
	P		61		102	130	98	104		48	5/29		100
	JB					93	93	62	44		6/6	5	
	I					124	124	117	44		6/14	5-	
	V					150	150	101	45		5/14	4	30
	AVG	148	108	144	132	128	128	103	45	38	5/25	5	65
FB 74506-917	H					130	130	96	45	20	5/9		
	O					162	162	124	47	31	5/22		
	P					128	128	89		40	6/3		100
	JB					143	143	96	44		6/6	3	
	I					129	129	122	42		6/13	4	
	V					134	134	90	43		5/7	4	20
	AVG					138	138	101	44	30	5/25	4	60

[1] H = Hermiston, O = Ontario, P = Pendleton, JB = J B Sod, Union County, I = Imbler, V = late at Hermiston.

[2] Yield comparison for the same years grown

[3] Overall subjective rating, 0 to 9 where 1 = poor and 9 = "ideal"

TABLE 9. Eastern Oregon Spring Barley; a four-year grain yield summary and test weight, plant height, heading date, and percent lodging observations for entries grown in 1984, at the Malheur Experiment Station, Ontario, Oregon

	- - - - - - - - - YIELD	- - - - - - - - -							
Selection	1981 bu/ac	1982 bu/ac	1983 bu/ac	1984 bu/ac	Avg bu/ac	Test Weight lbs/bu	Plant Height inches	Date 50% Headed	Lodging percent
Steptoe	110	102	99	97	102	50	46	6/10	70
Micah	141	120	113	116	122	47	36	6/15	90
Karla			116	110	113	47	41	6/11	60
Kris			119	93	106	49	37	6/14	90
Kombar		111	102	114	109	49	39	6/14	10
Lindy				145	145	48	41	6/9	90
Prato			82	100	91	49	34	6/8	70
Andre			126	135	130	49	40	6/11	40
Atlas 68				94	94	47	36	6/8	90
Diamant	113	113		118	115	48	37	6/15	80
Columbia				139	139	49	36	6/15	30
MB 793091-06				123	123	50	39	6/14	40
OSB 72289..-OK				127	127	50	37	6/13	30
OSB 763270P.OK				127	127	47	41	6/13	50
FB 80509				125	125	49	40	6/12	30
FB 80511				116	116	49	36	6/12	40
FB 80505				110	110	50	40	6/13	90
FB 741206				83	83	58	37	6/17	90
OSB 783055M.31				104	104	51	39	6/14	80
OSB 72289..-OK				115	115	48	38	6/13	30
OSB 753309A.K2				124	124	51	39	6/16	90
FB 78410-009				139	139	48	37	6/15	10
FB 78444-001				135	135	50	44	6/14	30
FB 78444-006				166	166	47	38	6/16	40

TABLE 10. Screening Spring Feed Barley; grain yield, plant height, heading date, and percent lodging observations for entries grown in 1984 at the Malheur Experiment Station, Ontario, Oregon

Selection	Yield bu/ac	Plant Height inches	Date 50% Headed	Lodging percent
Steptoe	127	39	6/9	70
Andre	121	39	6/11	80
Karla	125	38	6/11	70
Kris	100	39	6/14	90
FB 78427-004	128	41	6/19	60
FB 78427-006	126	37	6/16	60
FB 78444-003	143	38	6/16	50
FB 78444-004	157	40	6/14	0
FB 78444-005	152	37	6/17	20
FB 78475-006	126	37	6/19	60
OSB 763128..OK	138	39	6/15	30
OSB 74012..1K	137	41	6/18	30
OSB 74012..40	137	39	6/18	30
MB 783113-01	130	40	6/14	60
POCO	99	27	6/8	90
CM 72	103	29	6/8	90
PAVO	122	38	6/9	90
FB 757604	145	38	6/9	90
Clark	109	38	6/15	90
Columbia	153	38	6/15	10

TABLE 11. Eastern Oregon White Winter Wheat; a five-year grain yield summary and test weight, plant height, heading date, and percent lodging observations in 1984 for selections retained for further testing at the Malheur Experiment Station, Ontario, Oregon

Selection	YIELD 1980 bu/ac	1981 bu/ac	1982 bu/ac	1983 bu/ac	1984 bu/ac	Avg bu/ac	Percent Stephens[1]	Test Weight lbs/bu	Plant Height inches	Date 50% Headed	Lodging percent
Stephens	135	146	138	163	150	146	100	59	39	5/28	20
McDermid	120	136	121	129	117	125	86	57	40	5/31	60
Daws	118	131	117	124	99	118	81	56	41	5/31	20
FW 73577-715	109	136	125	134	94	120	82	51	40	5/31	40
FW 73830-835	131	119	125	152	145	134	92	57	40	6/5	0
FW 74938-705	116	125	136	165	141	137	94	56	41	5/30	20
FW 71595 G03			133	161	143	146	97	58	40	5/29	0
FW 771595 G13			138	177	153	156	104	58	40	5/29	0
FW 771595 G18			132	174	150	152	101	58	40	5/29	0
Hill 81				163	144	153	98	59	45	6/1	0
OR 8113				159	130	144	92	55	41	5/31	0

[1] Yield comparisons for the same years grown.

TABLE 12. Eastern Oregon Red Winter Wheat; grain yield, test weight, plant height, heading date, maturity type, percent lodging, plot rating, and leaf rust (*Puccinia recondita* Rob. ex Desm. f. sp. *tritici*) observations in 1984 at the Malheur Experiment Station, Ontario, Oregon

Selection	Yield bu/ac	Test Weight lbs/bu	Plant Height inches	Date 50% Headed	Maturity[1] Type	Lodging percent	Plot[2] Rating	Leaf[3] Rust
CI 17596 (Stephens)	158	60	40	5/28	M	0	5	70-S
CI 14565 (McDermid)	134	60	42	5/29	ML	0	3	80-S
CI 17419 (DAWS)	122	57	43	5/30	ML	0	5	40-S
CI 17954 (Hill 81)	129	60	45	6/1	M	10	4	50-S
FW 741037-87	152	60	41	5/29	ML	0	4	40-S
FW 741037-002	151	60	38	5/29	ME	0	4	40-S
FW 741037-003	155	60	39	5/29	ME	0	4	50-S
TSN B-2	134	61	41	5/30	ML	0	4	70-MS
FW 741037-06	154	59	37	5/28	ME	0	4	80-S
FW 75344-104	131	59	39	6/3	L	30	3	80-S
FW 75344-106	122	60	40	6/3	L	20	4	5-S
SWM 731368*	142	60	38	5/25	ME	0	5	30-S
SWM 783787	123	50	28	6/1	L	0	3	30-S
HRELT-9	152	60	45	5/31	ME	0	5	60-S+
HRELT-15 (7142413)	138	63	38	5/23	E	0	5	80-S
FW 73541-010	122	59	39	5/28	ME	0	4	5-MR
FW 771060 G03	133	58	39	5/31	ME	10	5	30-MS
FW 741595 G08	151	60	40	5/30	ML	0	4	20-MS
FW 741595 G02	151	58	39	5/30	ML	0	4	80-S
FW 741595 G11	138	59	39	5/30	ML	0	4	tr-MR
Sturdy	132	59	40	5/22	E	0	4	0-
TSN-B1	142	62	39	5/30	ME	0	5	70-S
HRAY 26	143	60	41	5/23	E	0	5	10-MS
SWM 730865..OP	143	61	43	5/29	ME	10	4	30-MS

[1]Relative time of maturity where E = early, ME = mid-early, M = medium, ML = mid-late, L = late.

[2]Overall subjective rating, 0 to 9 where 1 = poor and 9 = "ideal".

[3]Percent leaf area infected followed by infection type where MR = moderately resistant, MS = moderately susceptible, and S = susceptible.

TABLE 13. Individual Wheat Plant Plots; 1984 yield, plot rating, and grain type observations at the Malheur Experiment Station, Ontario, Oregon

Selection	Yield bu/ac	Plot Rating[1]	Grain Type
FW 79293-311	110	5+	White
FW 79293-317	134	5	White
FW 79293-329	130	6	White
FW 79293-331	92	5+	White
FW 79293-333	115	5	White
FW 79293-340	117	5	White
FW 79293-356	123	5	White
FW 79293-359	95	5	White
FW 79293-374	113	5+	White
FW 79293-377	91	5+	White
FW 79293-392	107	5	White
FW 79293-401	104	5	White
FW 79293-318	135	4+	Red
FW 79293-324	96	5	Red
FW 79293-336	119	5	Red
FW 79293-338	108	5	Red
FW 79293-364	92	5	Red
FW 79293-368	116	6	Red
FW 79293-375	120	5+	Red
FW 79293-382	71	5+	Red
FW 79293-384	134	5+	Red
FW 79293-387	111	5+	Red
FW 79293-388	109	5	Red
FW 79293-390	81	5	Red
FW 79293-398	104	5	Red

[1]Overall subjective rating, 0 = 9 where 1 = poor and 9 = "ideal".

TABLE 14. Eastern Oregon Spring Wheat; 1984 observations for grain yield, test weight, plant height, heading date, percent lodging, and plot rating at the Malheur Experiment Station, Ontario, Oregon

Selection	Yield bu/ac	Test Weight lbs/bu	Plant Height inches	Date 50% Headed	Lodging percent	Plot Rating[1]
CI 17911 (Waverly)	122	57	39	6/17	10	4
Dirkwin	105	56	39	6/16	10	3
CI 14588 (Twin)	108	54	39	6/16	20	4
CI 17904 (Owens)	114	59	40	6/13	20	4
ProBand 751	108	60	35	6/11	50	4
Pavon 76	118	60	38	6/13	0	4
Buck Buck S	112	59	35	6/16	0	4
MPC 770928	110	58	38	6/16	0	4
NOVI SAD Sel.	109	60	41	6/20	20	4
MPC 770302	109	63	39	6/11	10	4
PC 790508	103	61	42	6/14	10	3
WAID	96	60	39	6/16	10	2
Bobwhite S	108	60	40	6/18	0	3
PC 790501	107	61	39	6/15	10	5
KBWN 750020	96	60	40	6/15	50	3
VT 80011	94	50	49	6/23	20	1
PC 791423	107	62	42	6/14	10	4
SWM 6253...-OK	114	59	41	6/19	10	4
MPC 770062	95	61	39	6/15	0	3
SWM 6367...-OK	105	54	38	6/18	0	3
OS 8422	105	62	35	6/12	10	4
OS 8423	106	61	37	6/13	40	4
OS 8424	97	63	42	6/13	0	3
OS 8425	102	62	34	6/13	0	4
OS 8426	79	60	44	6/12	30	3
OS 8427	101	60	39	6/13	0	2
OS 8428	116	61	33	6/14	20	3
OS 8429	103	60	36	6/14	30	3
OS 8430	98	60	36	6/14	0	2

[1]Overall subjective rating, 0 to 9 where 1 = poor and 9 = "ideal".

TABLE 15. Eastern Oregon Winter Triticale; 1984 observations for grain yield, test weight, plant height, heading date, and percent lodging at the Malheur Experiment Station, Ontario, Oregon

Selection	Yield bu/ac	Yield lbs/ac	Test Weight lbs/bu	Plant Height inches	Date 50% Headed	Lodging percent
B82-3319	120	7190	49	39	5/31	0
CI 17596 (Stephens)	163	9772	60	39	5/26	0
6292	115	6881	46	35	5/26	0
Flora	112	6751	47	36	5/26	0
M75-8655-55	118	7074	47	36	5/25	0
M76-7480-76	125	7503	49	36	5/24	0
B79-2709	123	7383	49	37	5/26	0
M81-8046	148	8882	52	49	5/31	0
TA-7B-74-09	119	7127	52	36	5/26	0
TA-7B-72-09	116	6977	49	34	5/24	0
TA-7B-73-01	122	7320	51	34	5/23	0
TA-7B-72-04	121	7290	47	37	5/22	0
TA-7B-72-05	114	6841	48	34	5/26	0
TA-9B-89-02	122	7300	49	35	5/23	0
TA-9B-89-05	117	7025	45	36	5/26	0
FT-79536-107	114	6824	--	39	5/24	0
TA-9B-89-07	114	6824	46	36	5/24	0
FW 741595 G06	159	9561	58	37	5/28	0
TA-7B-73-05	114	6820	47	36	5/22	0
TA-7B-74-02	113	6769	49	35	5/26	0
TA-7B-72-03	120	7184	47	36	5/23	0
TA-76-96A-72	120	7223	48	34	5/26	0
B 82-3359	109	6571	47	37	5/28	0
B 82-2064	138	8280	55	47	5/30	20

TABLE 16. Individual Rye Plots; grain yields and heading dates of dwarf winter rye selections grown in 1984 at the Malheur Experiment Station, Ontario, Oregon

Selection	Yield bu/ac	Yield lbs/ac	Date 50% Headed
FR 8301-301	150	8339	5/15
FR 8301-334	131	7336	5/15
FR 8301-337	133	7473	5/15
FR 8301-346	114	6409	5/15
FR 8301-366	135	7562	5/15
FR 8301-373	122	6815	5/16
FR 8301-377	127	7111	5/15
FR 8301-381	119	6649	5/15
FR 8301-384	142	7942	5/15

TABLE 17. Western Regional Spring Barley Nursery; a three-year yield summary and 1984 observations for test weight, plant height, heading date, percent lodging, percent plumps, stem rust (*Puccinia* sp.) and leaf rust (*Puccinia* sp.) at the Malheur Experiment Station, Ontario, Oregon

Selection	YIELD 1982 bu/ac	YIELD 1983 bu/ac	YIELD 1984 bu/ac	YIELD Avg bu/ac	Percent Steptoe[1]	Test Weight lbs/bu	Plant Height inches	Date 50% Headed	Lodging percent	Plumps[2] percent	Disease Stem[3] Rust	Disease Leaf[4] Rust
CI 936 (Trebi)	82	74	104	87	83	47	35	6/13	90	42	0-	0-
CI 15229 (Steptoe)	97	89	128	105	100	49	36	6/8	70	24	0-	0-
CI 15478 (Klages)	96	115	100	104	99	48	36	6/16	90	59	0-	0-
CI 15773 (Morex)	80	102	111	98	93	51	41	6/7	60	21	0-	0-
ID 786871	108	100	119	109	104	52	35	6/15	90	27	0-	0-
ID 789009	107	102	129	113	108	51	41	6/7	40	13	0-	0-
WA 145837	113	124	120	119	114	52	43	6/12	60	17	0-	0-
CI 15856 (Lewis)		102	103	102	95	51	35	6/11	90	48	0-	0-
MT 41918		122	110	116	107	50	32	6/13	80	34	0-	0-
NA 18		131	108	119	110	50	32	6/16	70	24	0-	0-
NK 560 (Sunbar 560)		136	104	120	111	50	34	6/13	70	30	0-	0-
OR 339041		113	124	119	110	46	33	6/12	40	35	5-S	0-
OR 763128		102	131	116	107	50	36	6/15	20	24	5-S	0-
UT 1422		129	133	131	121	48	35	6/11	80	34	20-S	0-
UT 1423		135	127	131	121	49	31	6/11	70	32	10-S	0-
WA 889278		83	97	90	83	50	35	6/15	70	60	15-S	0-
VD 3 (Minuet)		120	108	114	105	51	35	6/14	70	31	10-MS,S	0-
VD 22872 (Piston)		118	114	116	107	51	37	6/16	70	29	20-S	0-
BA 27939			100	100	78	52	36	6/15	80	22	5-S	0-
BA 679486			132	132	103	48	33	6/7	60	32	1-R	10-MR
ID 910719			157	157	123	51	29	6/7	30	14	10-S	20-MR
MT 4126			112	112	88	--	30	6/11	90	--	10-S	40-MS
MT 312613			124	124	97	51	34	6/10	80	35	0-	0-
PI 483238			101	101	79	50	39	6/10	80	17	0-	5-MS
OR 339062			115	115	90	48	34	6/14	80	36	10-S	0-
OR 722895			122	122	95	49	35	6/16	50	25	5-S	0-
PB 80663			119	119	93	50	40	6/11	90	43	5-MR	0-
UT 1685			128	128	100	50	43	6/10	70	8	10-MR	0-
WA 877178			88	88	69	51	38	6/15	80	38	40-S	0-
WA 890878			112	112	88	51	33	6/16	90	18	10-S	1-MR
Average			116									
CV (%)			9.9									
LSD (.05)			16									

Variety differences are significant at the 1% level.

[1]Yield comparisons for the same years grown.

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

[3]Percent stem area infected and reaction type where 0 = none observed, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.

[4]Percent leaf area infected and reaction type where 0 = none observed, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.

TABLE 18. Western Regional Spring Wheat Nursery; a three-year grain yield summary and the 1984 observations for test weight, percent protein, plant height, heading date, percent lodging, and leaf rust (*Puccinia recondita* Rob. ex Desm. f. sp. *tritici*) at the Malheur Experiment Station, Ontario, Oregon

Selection	Class[1]	YIELD 1982 bu/ac	1983 bu/ac	1984 bu/ac	Avg bu/ac	Percent[2] Federation	Test Weight lbs/bu	Protein[3] percent	Plant Height inches	Date 50% Headed	Lodging percent	Leaf[4] Rust
CI 17903 (McKay)	H	90	92	102	95	118	58	13.5	39	6/15	10	0-
WA 006831	S	98	100	93	97	121	59	12.6	39	6/12	20	20-MS
CI 4734 (Federation)	S	73	76	92	80	100	57	13.8	47	6/16	40	60-S
CI 17904 (Owens)	S	90	89	108	96	120	61	12.5	39	6/12	30	10-MS
CI 17911 (Waverly)	S	93	97	100	97	121	57	12.2	38	6/15	0	7-MS
ID 000238	H	95	83	104	94	117	61	13.6	35	6/11	40	30-MS
ID 000227	S	88	84	98	90	112	54	12.4	36	6/17	0	0-
ID 000246	S	93	100	99	97	121	58	13.0	39	6/12	20	10-MR
WA 006916	S	92	96	104	97	121	61	13.3	40	6/12	10	1-R
WA 006918	S	85	101	101	96	120	57	13.3	39	6/12	60	1-R
WA 006919	S	92	113	101	102	127	60	13.4	38	6/13	50	10-MR
WA 006920	S	106	109	104	106	132	60	13.3	39	6/13	30	0-
UT 000209	H	101	107	112	107	133	57	13.5	40	6/16	20	40-MS
UT 002746	H	84	82	105	90	112	58	13.8	37	6/16	20	0-
ID 000248	S		104	103	104	124	55	12.6	37	6/17	0	5-MS
ID 000249	S		91	98	95	113	56	12.7	41	6/17	30	40-MS,S
ID 000263	H		87	109	98	117	61	14.4	43	6/17	20	20-S
ORS 08411	H			111	111	121	54	12.6	37	6/13	10	10-MS,S
ORS 08412	H			101	101	110	56	14.7	41	6/18	70	1-MR
ORS 08413	S			110	110	120	57	13.3	36	6/16	20	0-
WA 007073	S		123	102	113	135	60	13.7	40	6/13	30	5-MS,S
WA 007074	S		123	107	115	137	60	13.4	39	6/14	30	1-R
WA 007075	H		104	103	104	124	58	14.3	41	6/14	20	7-MS
ID 000269	H			107	107	116	58	13.6	39	6/14	60	10-MS
ID 000271	H			87	87	95	58	14.9	40	6/15	50	60-S
ID 000232	S	81	103	105	96	120	55	13.6	39	6/15	50	1-R
ID 000266	S			97	97	105	59	12.1	42	6/14	20	40-S
ID 000285	S			100	100	109	61	12.6	44	6/11	10	60-S
ID 000286	S			106	106	115	55	13.6	43	6/17	10	5-MR
ORS 08414	H			107	107	116	57	14.0	38	6/16	70	0-
ORS 08415	H			104	104	113	59	14.6	37	6/15	10	1-R
UT 251294	H			109	109	118	59	14.2	41	6/20	20	1-R
UT 251303	H			107	107	116	57	14.3	39	6/18	10	10-MS
UT 001376	H			103	103	112	52	14.3	37	6/21	60	20-MS
UT 001382	H			96	96	104	60	14.4	38	6/20	50	20-MS
WA 007181	H			106	106	115	60	13.6	42	6/16	60	10-MS
WA 007182	H			98	98	107	58	15.0	39	6/15	40	10-MR
WA 007183	S			105	105	114	59	12.9	39	6/16	10	1-R
Average				103								
CV (%)				13.5								
Unprotected LSD (.05)				19								

Variety differences are not significant.

[1]H = hard red, S = soft white

[2]Yield comparisons for the same years grown.

[3]By Donald Sunderman, et al.

[4]Percent leaf area infected and reaction type where 0 = none observed, R = Resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible 7/16 by Warren Kronstad et al.

TABLE 19. Local Spring Barley Trial; a two-year grain yield summary and the 1984 observations for test weight, plant height, heading date, percent lodging, stem rust (*Puccinia* sp.) and leaf rust (*Puccinia* sp.) at the Malheur Experiment Station, Ontario, Oregon

Selection	YIELD 1983 bu/ac	YIELD 1984 bu/ac	YIELD Avg bu/ac	Percent[1] Steptoe	Test Weight lbs/bu	Plant Height inches	Date 50% Headed	Lodging percent	Disease Stem[2] Rust	Disease Leaf[3] Rust
Steptoe	136	146	141	100	50	38	6/9	90	10-MS	1-R
NK 80W41558		137	137	94	47	35	6/10	10	5-S	1-R
Columbia	105	134	120	85	48	37	6/16	10	1-R	1-R
Poco	101	128	114	81	49	23	6/7	100	5-S	-R
Kris		125	125	86	52	35	6/14	90	10-S	1-R
Menuet	117	122	119	85	53	35	6/15	90	5-S	1-R
Lindy	122	120	121	86	49	38	6/9	80	40-S	1-R
Karla		117	117	80	50	33	6/15	90	20-MS	1-MS
Piston	121	114	118	84	52	34	6/17	90	5-S	1-R
Kombar	100	112	106	75	46	37	6/14	80	10-S	1-R
Andre		108	108	74	49	44	6/10	70	5-S	5-MS
Average		124								
CV (%)		17.6								
Unprotected LSD (.05)		32								

Variety differences are not significant.

[1]Yield comparisons for the same years grown.

[2]Percent stem area infected and reaction type where 0 = none observed, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible 7/16 by Warren Kronstad et al.

[3]Percent leaf area infected and reaction type where 0 = none observed, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible 7/16 by Warren Kronstad et al.

TABLE 20. Local Spring Wheat Trial; a five-year grain yield summary and the 1984 observations for test weight, plant height, heading date, percent lodging, stem rust (*Puccinia graminis* Pers. f. sp. *tritici* Eriks. and Henn.), and leaf rust, (*Puccinia recondita* Rob. ex Desm. f. sp. *tritici*) at the Malheur Experiment Station, Ontario, Oregon

		YIELD											Disease	
Selection	Class[1]	1980 bu/ac	1981 bu/ac	1982 bu/ac	1983 bu/ac	1984 bu/ac	Avg bu/ac	Percent[2] Owens	Test Weight lbs/bu	Plant Height inches	Date 50% Headed	Lodging percent	Stem[3] Rust	Leaf[4] Rust
McKay	H	109	114	90	92	117	104	104	59	40	6/16	0	10-MS	-R
Fieldwin	S	66	105	102	90	117	96	96	60	43	6/18	0	-R	40-S
Westbred 881	D			77	80	115	91	96	61	38	6/13	0	10-MS	10-MS
Westbred 803	D			86	86	111	94	99	60	37	6/13	10	-R	20-MS
ID 172 (Bliss)	S					111	111	106	59	41	6/18	10	20-S	20-MS,S
Waverly	S					110	110	105	57	39	6/18	0	-R	40-MS,S
Dirkwin	S					108	108	103	57	41	6/17	20	-R	40-MS
Westbred 906R	H	105	105	87	99	106	100	100	60	38	6/10	0	-R	-R
Owens	S	99	117	90	89	105	100	100	59	39	6/14	60	10-S	30-S
NK 7952437-35	H					102	102	97	61	31	6/13	20	-R	-R
Borah	H					98	98	93	60	37	6/13	70	-R	10-MS
Pondera	H					93	93	89	60	41	6/15	40	-R	10-MS
Average						108								
CV (%)						10.6								
LSD (.10)						13.2								

Variety differences are significant at the 10% level.

[1]H = Hard red, S = soft white, D = durum.

[2]Yield comparisons for the same years grown.

[3]Percent stem area infected and reaction type where 0 = none observed, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible 7/16 by Warren Kronstad et al.

[4]Percent leaf area infected and reaction type where 0 = none observed, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible 7/16 by Warren Kronstad et al.

'MICAH', PI 494144, A NEW SIX-ROW FEED BARLEY

Mathias F. Kolding, Mary Verhoeven, Warren E. Kronstad,
Paul Friedrichsen, and Charles R. Burnett
Malheur Experiment Station, Ontario, Oregon, 1984

'Micah', is a semi-dwarf stiff strawed six-row awned spring feed barley. Micah barley is also known as PI 494144, syn OR M-3, syn OR 73343, and MN 66-85/Celaya.

Micah was selected at the Center for Maize and Wheat Improvement (CIMMYT), Ciudad Obregon, Sonora, Mexico, in 1976 from a plant in row 410, labled MN 66-85/Celaya.

Purpose of Release

Micah is intended to replace Steptoe spring barley in high production areas in Oregon, especially where wheel roll irrigation is used.

Significant Attributes and Area of Adaptation

Steptoe has a remarkedly wide area of adaptation. It continues as one of the top yielders in research trials, as well as, in growers' fields. Steptoe will yield well for the mediocre and skilled farm manager. It does, however, have a weak straw which keeps its yields below its potential when fields lodge. Micah has an excellent record of staying upright until ripe in high yielding situations. It has yielded more than Steptoe when both have not lodged (Table 1).

TABLE 1. A 1983 seeding rate trial at the Malheur Experiment Station near Ontario, Oregon comparing yields of Micah and Steptoe spring barleys when neither barley lost grain yield because of lodging

	Seeding Rate in Pounds Per Acre						
Variety	40 bu/ac	60 bu/ac	80 bu/ac	100 bu/ac	120 bu/ac	160 bu/ac	200 bu/ac
Steptoe	101	112	122	131	127	129	123
Micah	119	110	119	137	136	149	139

In 1984, Micah was compared in a seeding rate trial with two new barley varieties, `Karla', a six-row malting type from Idaho, and `Andre' a two-row multi-purpose variety from Washington (Table 2). Both Karla and Andre lodged in all plots; Micah did not.

TABLE 2. A 1984 seeding rate trial at the Malheur Agricultural Experiment Station comparing Micah, Andre, and Karla spring barleys

	Seeding Rate in Pounds Per Acre					
Variety	40 bu/ac	60 bu/ac	80 bu/ac	100 bu/ac	120 bu/ac	160 bu/ac
Micah	112	120	132	128	129	137
Andre	122	108	111	111	105	107
Karla	119	109	125	123	112	128

Micah heads from four to six days later than Steptoe. It also matures later than Steptoe. It is not considered as adapted to dryland conditions where annual rainfall is less than 16 inches.

Micah is susceptible to Barley Yellow Dwarf Virus and powdery mildew.

Grain yields of Micah were greater than Steptoe during four trial years (Table 3) at the Malheur Experiment Station near Ontario.

TABLE 3. Grain yield, bushel weight, plant height, and heading date of Micah and Steptoe spring barley when grown in the Eastern Oregon Spring Barley trials at the Malheur Experiment Station near Ontario, Oregon

	Yield					Test	Plant	Day 50%
Variety	1981 bu/ac	1982 bu/ac	1983 bu/ac	1984 bu/ac	Avg bu/ac	Weight pounds	Height inches	Headed June
Micah	141	120	113	105	120	47	36	15
Steptoe	110	102	99	97	102	50	46	10

Foundation seed has been produced by the Foundation Seed and Plant Materials Project, Oregon State University, Corvallis, Oregon.

AN EVALUATION OF DUPONT'S HERBICIDES FOR CONTROL OF ANNUAL BROADLEAF WEEDS IN WINTER WHEAT

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1984

Purpose

M-6316 and T-6376 were evaluated for tolerance by wheat and for control of winter and summer annual broadleaf weeds when applied in the spring as postemergence applications.

Procedure

On April 14, herbicides M-6316 and T-6376 were sprayed on plots of Stephens winter wheat. When the treatments were applied the wheat had three to four tillers and was growing rapidly. Winter annual broadleaf weeds in the trial area included flixweed (*Descurainia sophia*) and blue mustard (*Chlorispora tenella*). Counts showed that weed populations averaged three flixweed and two blue mustard plants per square foot. Other weed species scattered through the trial area at rather low populations included tumbling mustard (*Sisymbrium altissimum*), prickly lettuce (*Lactuca serriola*), and shepherdspurse (*Capsells bursa pastoris*). Redroot pigweed (*Amaranthus retroflexus*) and lambsquarters (*Chenopodium album*) emerged in the trial area around borders and check areas after the herbicides were applied.

Individual plots were 10 feet wide and 25 feet long. Each sprayed area was 8 1/2 feet wide and 25 feet long. This left an untreated strip three feet wide between adjacent treated plots to use for comparison to rate the effectiveness of the herbicides for weed control and sensitivity of the crop to the herbicide treatments. Each treatment was replicated three times. The experimental design was a randomized complete block. The herbicide treatments were sprayed with a single bicycle wheeled plot sprayer. Teejet nozzles size 8003 were spaced 10 inches apart on the boom and the herbicides were sprayed as double overlap broadcast applications. Spray pressure was 30 pounds per square inch and water was applied at the rate of 32 gallons per acre. The skies were clear, the wind was calm, and air temperature at the time of spraying was 55^{o}F.

The soil is an Owyhee silt loam with a pH of 7.2 and an organic matter content of 1.1 percent. The wheat was watered by furrow irrigation.

The plots were visually rated for lodging on July 17 and harvested with a Hagie plot harvester on July 18. A strip three feet wide and 25 feet long was harvested from each plot. Grain samples were collected and picked up by Danny Ferguson for residue analysis.

Results

Both M-6316 and T-6376 had good herbicidal activity on flixweed, blue mustard, and pigweed. The control of pigweed came from preemergence activity. The minimum rate for optimum weed control for each material was between 0.5 and 0.75 ounce active ingredient per acre for M-6316 and 0.05 and 0.06 for T-6376 (Table 1). At these rates weed control was essentially complete. Soil residual activity was noted with each material in this trial even though they are not considered to have soil activity.

Visual ratings show that both herbicides did reduce the height of the grain. The height reduction was slight but consistent among replications. Plant height reduction was observed throughout the growing season and maybe negatively correlated to the percent of lodging between treatments. The greatest amount of lodging occurred in the checks and the plots treated with the low herbicide rates. Wheat yields appeared to decrease with increased doses of M-6316, but the differences were not great enough to be significant at the low 10 percent level (Table 2). It does appear, however, that wheat may be slightly more tolerant to T-6376 than M-6361 at the rates evaluated.

TABLE 1. Percent weed control and crop injury ratings from DuPont's herbicides applied in the spring to winter wheat. Malheur Experiment Station, Ontario, Oregon, 1984

Herbicides	Rate	Percent Crop Injury				PERCENT WEED CONTROL Flixweed				Blue Mustard				Redroot Pigweed			
	ozs ai/ac	1	2	3	Avg	1	2	3	Avg	1	2	3	Avg	1	2	3	Avg
M-6316	0.25	0	0	0	0	92	90	90	91	90	85	85	87	100	100	100	100
M-6316	0.50	10	5	10	9	98	98	96	97	95	90	95	93	100	100	100	100
M-6316	0.75	10	6	5	7	100	100	100	100	98	98	100	98	100	100	100	100
M-6316	1.50	10	10	5	9	100	100	100	100	100	100	100	100	100	100	100	100
T-6376	0.04	0	0	0	0	90	90	92	91	85	90	90	88	100	100	100	100
T-6376	0.05	0	0	0	0	95	95	95	95	95	98	95	96	100	100	100	100
T-6376	0.06	5	5	5	5	100	100	100	100	100	100	100	100	100	100	100	100
T-6376	0.12	10	10	10	10	100	100	100	100	100	100	100	100	100	100	100	100
Control	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

X-77 mixed with all herbicides at rate of 0.25% of spray volume.

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

Herbicides were applied on April 14.

Growth stage of plants
- a. wheat - three to four tillers
- b. flixweed - one- to two-inch rosettes
- c. blue mustard - two- to four-inch rosettes, larger plants beginning to flower
- d. redroot pigweed - most had not emerged when treatments were applied

Spray conditions:
- a. skies clear
- b. air temperature 55°F
- c. soil temperature 48°F @ four-inch depth
- d. winds calm

Soil conditions:
- a. soil surface moist
- b. texture - silt loam
- c. pH - 7.2
- d. O.M. 1.2%

TABLE 2. Percent lodging and grain weights by plots from DuPont's herbicide applied in the spring to winter wheat. Malheur Experiment Station, Ontario, Oregon, 1984

Herbicides	Rate	Replications								
		R1		R2		R3		Average		Calculated
	ozs ai/ac	Lodging %	Grain Weight lbs	Lodging %	Grain Weight lbs	Lodging %	Grain Weight lbs	Lodging %	Grain Weight lbs	bu/ac
M-6316	0.25	100	13.7	95	13.5	60	16.0	85	14.4	139
M-6316	0.50	50	13.3	50	13.5	50	14.3	50	13.7	132
M-6316	0.75	30	13.1	60	13.3	90	13.9	60	13.4	129
M-6316	1.50	20	12.9	80	13.1	90	13.2	63	13.1	127
T-6376	0.04	85	15.3	40	15.3	100	12.6	75	14.4	139
T-6376	0.05	90	14.6	80	14.5	90	14.2	87	14.4	139
T-6376	0.06	70	15.2	70	13.3	20	15.7	53	14.7	142
T-6376	0.12	60	14.8	90	14.6	40	14.2	63	14.5	140
Check (weedy)	--	100	14.9	90	15.1	70	14.6	87	14.9	144
LSD (.10)										NS
CV (%)										6.4
Mean									14.2	137

Harvested July 18, 1985. The area harvested was a strip three feet wide by 25 feet long.

AN EVALUATION OF FOLIAR ACTIVE GRASS HERBICIDES FOR CONTROL OF SEVERAL SPECIES OF GRASSES IN SEEDLING SUGAR BEETS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1984

Purpose

The activity of five foliar active grass herbicides was evaluated as postemergence applied treatments for control of green foxtail, barnyardgrass, and wild oats. Herbicides were applied singly and as a tank-mix combination with Betamix in low water volume applications. The combination treatments were evaluated for herbicide compatibility, tolerance to seedling sugar beets, and control of both grasses and broadleaf weeds.

Procedure

WS-88 variety of sugar beets was planted on May 8 in silt loam soil on rows spaced 22 inches apart. The seed was planted with a Beck shoe drill set to space raw seed 2 1/2 inches apart. After planting, the trial area was corrugated and furrow irrigated in alternate rows. The field received two irrigations before the sugar beet seedlings began to emerge. Preplant herbicides were not applied and weeds emerged with the sugar beets.

The first application of Betamix was on May 16 at a rate of 0.33 pound active ingredient per acre using water as the carrier at a rate of 10 gallons per acre. Individual plots were four rows wide and 30 feet long. A four-nozzle boom mounted on a bicycle wheel plot sprayer with a spray nozzle over each plot row was used to apply the treatments. Spray nozzles were teejet fan nozzles size 8001. Spraying pressure was 40 pounds per square inch. Each treatment was replicated three times and treatments were arranged in a randomized complete block experimental design.

The second herbicide applications consisted of grass herbicides either used alone or in mixtures with Betamix as listed in Tables 1 and 2. The second applications were applied on May 29. Application methods were the same as those used to apply the May 16 treatments except Mor-Act crop oil was added to these treatments at the rate of one quart per acre. The size of both sugar beets and weeds at the time of treatment applications is described at the base of each table.

The treatments were evaluated for weed control and crop injury on June 15. The plots were cultivated, irrigated, and observed during the balance of June and July for weed control and crop injury. Cultivating tools included knives, sinner weeders, duckfeet, and furrowing shovels. The sugar beets were irrigated by furrow irrigation.

Results

The data from two separate trials are reported in Tables 1 and 2. Repeat treatments gave excellent weed control with little or no injury to the seedling sugar beets. Repeat treatments consisted of Betamix, one-third pound active ingredient per acre, applied when sugar beets had fully developed cotyledons to two true leaves. The second application was applied about 10 days after the first and included a tank-mix combination of Betamix plus one of the foliar active grass herbicides. Betamix or Betamix plus Nortron effectively control redroot pigweed, lambsquarters, and kochia. Both treatments were equally effective on these weed species in this trial but the combination of Betamix plus Nortron may be more effective than Betamix alone for control of hairy nightshade or when kochia is a serious weed problem.

Grass herbicides varied in control of different grass species. Grass herbicides, Selectone and Assure, were active on all grass weed species in this trial (green foxtail, barnyardgrass, wild oats, and volunteer wheat). PP005 did not effectively control all green foxtail and Poast was least active on wild oats and volunteer wheat. SC-1084 was generally weak on all grass species when applied singly, but grass control with SC-1084 was improved when mixed with Betamix; however, that mixture was still less effective on grasses than the other combination treatments.

In full sugar beet stands, season-long weed control was obtained when frequent cultivations followed effective postemergence herbicide treatments and cultivations continued until the sugar beet rows were closed.

There did not appear to be any physical or chemical in compatability problems with any of the combination treatments in this trial.

TABLE 1. Percent weed control and crop injury ratings from herbicides applied as postemergence treatments to seedling sugar beets. Malheur Experiment Station, Ontario, Oregon, 1984

Herbicides [1]	Rate lbs ai/ac	Initial Crop Injury %	PERCENT WEED CONTROL Pigweed	Lambsquarters	Kochia	Green Foxtail	Barnyardgrass	Wild Oats
Betamix + PP005	0.33 + 0.125	5	97	92	90	88	97	96
Betamix + Nortron + PP005	0.5 + 0.28 + 0.125	8	99	98	100	92	98	97
Betamix + Nortron	0.33 + 0.28	8	100	100	100	45	45	43
Selectone	0.25	0	86	83	76	99	99	99
Selectone	0.375	0	86	83	76	99	100	98
Selectone	0.50	0	86	83	78	100	100	100
Betamix + Selectone	0.33 + 0.25	5	98	97	89	99	100	100
Betamix + Selectone	0.33 + 0.50	5	82	83	90	99	100	100
Poast	0.2	0	81	82	72	97	98	87
Poast	0.3	0	82	81	70	98	98	90
SC-1084	0.125	0	83	81	67	62	60	60
SC-1084	0.25	0	82	83	67	78	78	73
SC-1084	0.50	0	81	82	67	91	92	85
Betamix + SC-1084	0.33 + 0.125	5	99	98	90	68	71	63
Betamix + SC-1084	0.33 + 0.25	8	99	98	90	81	79	79
Betamix + SC-1084	0.33 + 0.50	5	99	99	92	93	94	93
Betamix + Poast	0.33 + 0.2	5	99	98	91	97	98	82
Betamix + Poast	0.33 + 0.3	8	99	98	93	97	97	90
Assure	0.0625	0	81	83	68	78	86	83
Assure	0.125	0	81	82	68	91	96	96
Assure	0.1875	0	82	83	69	92	94	95
Betamix + Assure	0.33 + 0.0625	8	98	99	94	92	96	95
Betamix + Assure	0.33 + 0.125	8	99	99	92	94	99	97
Betamix + Assure	0.33 + 0.1875	8	99	98	93	97	99	99
Betamix + PP005	0.33 + 0.063	5	99	98	94	82	92	92
Betamix + PP005	0.33 + 0.125	8	99	99	93	91	97	96
Betamix + PP005	0.33 + 0.25	5	99	99	93	94	99	99
Betamix	0.33	5	99	99	92	35	32	28
Control	--	0	0	0	0	0	0	0

[1]Betamix was applied alone on May 16 over the entire experiment area when sugar beets were in late cotyledon and two leaf stage. The treatments listed above were applied on May 29. Broadleaf weeds had two to four leaves on May 16 while grasses had one to three leaves. On May 29, sugar beets had four to six leaves, grasses had one leaf to three tillers. Many broadleaf weeds were killed by Betamix applied on May 16.

Mor-Act crop oil was applied with all treatments applied on May 29 at the rate of one quart per acre.

TABLE 2. Percent weed control and crop injury ratings from I.C.I. America's low water volume trial evaluating herbicide treatments applied as postemergence applications to seedling sugar beets. Malheur Experiment Station, Ontario, Oregon, 1984

Herbicides[1]	Rate lbs ai/ac	Initial Crop Injury %	PERCENT WEED CONTROL Pigweed	Lambsquarters	Green Foxtail	Barnyardgrass	Wild Oats
PP005	0.063	0	96	96	63	85	70
PP005	0.125	0	98	98	88	98	90
PP005	0.1875	0	96	96	93	99	93
PP005	0.375	0	95	95	98	100	100
PP005	0.75	0	92	93	100	100	100
Poast	0.25	0	95	95	100	100	70
Betamix	0.50	8	98	99	30	33	25
Betamix + PP005	0.50 + 0.125	10	98	99	94	100	95
Betamix + PP005	0.50 + 0.25	10	100	100	97	100	95
Betamix + Poast	0.50 + 0.25	10	96	98	97	97	65
Check	---	0	0	0	0	0	0

[1]Betamix was applied on May 16 at the rate of one-third pound active ingredient per acre in addition to the treatments applied on May 29. Sugar beets were in the two-leaf stage when the May 16 treatment was applied.

The treatments listed above were applied on May 29.

Water volume (10 gallons per acre).

Plant size at the time of applying the treatments:
1. Sugar beets - four to six leaves
2. Size of broadleaf weeds not killed by early Betamix treatments:
   a. redroot pigweed - two inches tall
   b. lambsquarters - four inches tall
3. Green Foxtail - one to four leaves
4. Barnyardgrass - one to five leaves
5. Wild oats - one to three tillers

Spray information:
1. 40 pounds per square inch spraying pressure
2. 8001 teejet nozzles
3. Applied between 1 p.m. and 2:30 p.m.
4. Air temperature: 65°F
5. Skies clear, wind calm
6. Added Mor-Act at the rate of one quart per acre to all treatments

FUNGICIDE TREATMENTS FOR POWDERY MILDEW CONTROL IN SUGAR BEETS

Charles E. Stanger
Malheur Experiment Station, Ontario, Oregon, 1984

Purpose

The effectiveness of several fungicides were evaluated for powdery mildew control and to determine the effect of the fungus disease and its control on root and sugar yields in sugar beets.

Procedures

Fungicide treatments were applied and evaluated at three locations within the Ontario, Vale, and Nyssa, Oregon, sugar beet growing area. Evaluations were taken at three locations for control of powdery mildew, but roots were only harvested at the Malheur Experiment Station to determine root and sugar yields. Sugar beet varieties at off-station sites were WS-88 and WS-76. The variety on station was Mono-Hy R_1.

Mildew infection was greater in the off-station trials and general observations indicate that WS-88 and WS-76 are more susceptible to powdery mildew infection than the Mono-Hy R_1 variety.

Fungicides were applied as overlap broadcast treatments using a CO_2 sprayer equipped with fan teejet nozzles spaced 20 inches apart on a boom long enough to cover four rows 22 inches apart. Spray pressure was 40 pounds per square inch and water, as the carrier, was applied at a rate of 42 gallons per acre. Skies were clear and wind was calm at each location when treatments were applied. Temperatures were warm (above 85°F) and spraying was done at each location late in the day when leaves were dry. Each plot was four rows wide by 25 feet long and each treatment was replicated six times at the station site and four times at the two sites off station.

Dates of application and cooperators' names are as follows:

Malheur Experiment Station	Ontario, Oregon	August 9
Don Carter	Vale, Oregon	September 6
Deborer Farms	Nyssa, Oregon	September 13

The sugar beets at the Malheur Station had not been infected by mildew when the treatments were applied. Beets were infected with mildew at the other two sites when the fungicide treatments were applied. Evaluations were taken at off-station sites at the time the treatments were applied and again at regular intervals through September and October. The last mildew evaluation was taken just before the beets were commercially harvested. Plots were evaluated at weekly intervals at the Malheur Station from time of application until harvested on October 25. Because of low mildew populations at the station site, evaluation results were not reported until August 27. Disease control data are reported for evaluations taken on August 27, September 5, 19, and 26, and October 25.

The beets were harvested on October 26. The two center rows of each four-row plot were harvested. All the beets in the two center rows were taken to determine root yields. A sample of seven roots was taken from each harvested row and each sample was evaluated at Amalgamated Sugar Company's Research Laboratory for percent sucrose and conductivity readings. Sugar yields per acre were calculated based on root yield, percent sucrose, and extractable sugar. The data are reported in Tables 1 through 4.

Results

The treatments resulting in best control of powdery mildew were sulfur dust (30 pounds per acre), DPX-H6573 (two and four ounces per acre), and DF formulation of Kwg 0519 (four ounces per acre). All fungicides gave some control, but other treatments were inferior to those listed above. It appears that DPX-H6573 has good persistence since treatments applied on August 9 at the Malheur Station persisted to control rather heavy late infection.

Differences in root and sugar yields were not improved significantly by controlling powdery mildew when measured at the station site. This is probably because of the rather light infection which persisted until early October. There was a trend for improved yields from the better treatments, but differences in yield were not great enough to be considered significant.

In the future, it would probably be advisable to use variety WS-76 for trials evaluating fungicides for powdery mildew control. The variety WS-76 seems to be very susceptible to infection by the powdery mildew fungus.

TABLE 1. Disease control ratings of sugar beets naturally infected by powdery mildew. Don Carter, Vale, Oregon, 1984.

Fungicide	Rate oz ai/ac	Formulation	Mature leaf area diseased (%)[1]				Control[2] %
			9/6	9/20	10/2	10/18	
Bayleton	4	Wp	2.5	14	20	48	54
Bayleton	8	Wp	2.1	4	15	28	74
Bayleton	16	Wp	2.0	2	6	14	88
Kwg 0519	2	Df	2.7	11	18	39	64
Kwg 0519	4	Df	3.1	3	9	16	87
Kwg 0519	2	Ec	1.2	12	28	60	42
Kwg 0519	4	Ec	3.2	5	19	42	61
UBI A815	2	Wp	2.9	13	34	78	25
UBI A815	4	Wp	2.0	10	25	66	36
UBI A815	6	Wp	2.7	8	18	42	61
Bayleton	4	Ec	3.1	14	26	66	37
Check	---	--	2.7	20	46	99	1
Mean			2.5	10	22	50	53

[1]Average from 20 leaves sampled from each of six replications.

[2]Percent of leaf area not infested with powdery mildew.

TABLE 2. Disease control ratings of sugar beets naturally infected by powdery mildew. Deborer Farms, Nyssa, Oregon, 1984

Fungicide	Rate oz ai/ac	Formulation	Mature leaf area diseased (%)[1] 9/13	9/20	9/27	10/4	10/18	Control[2] %
Bayleton	4	Wp	0.3	5.6	11.1	21.7	43.0	57
Bayleton	8	Wp	0.1	1.1	5.3	9.0	21.4	79
DPX-H6573	1	Ec	0.3	0.6	1.0	4.0	5.4	95
DPX-H6573	2	Ec	0.2	0.1	0.1	1.5	3.0	97
DPX-H6573	4	Ec	0.2	0.1	0.1	1.0	1.1	99
UBI A815	2	Wp	0.1	8.2	21.3	38.6	53.9	46
UBI A815	4	Wp	0.1	7.1	16.2	29.5	48.2	52
UBI A815	6	Wp	0.1	5.1	14.1	21.3	32.5	68
Check	---	--	0.1	18.9	48.6	65.1	87.3	13
Mean			0.2	5.2	13.1	21.3	32.8	67

[1] Average of 20 leaves sampled from each of six replications.

[2] Percent of leaf area not infected with powdery mildew.

TABLE 3. Disease ratings taken from mature leaves of sugar beets treated with fungicides. Malheur Experiment Station, Ontario, Oregon, 1984

Fungicide	Rate	Mature leaf area diseased (%)[1]					Control[2]	Gross Sucrose
	oz ai/ac	8/27	9/5	9/19	9/26	10/25	%	% of Control
Bayleton	4	.1	.8	12.1	16.7	63.7	36	102
Bayleton	8	.1	.1	4.9	10.2	25.6	74	105
Kwg 0519 (Df)	2	.1	.1	6.9	13.8	37.3	63	104
Kwg 0519 (Df)	4	.1	.1	2.6	9.7	5.1	95	109
Kwg 0519 (Ec)	2	.1	.1	9.2	12.5	39.6	60	106
Kwg 0519 (Ec)	4	.2	.5	9.4	16.4	29.7	70	105
DPX-H 6573 + X-77	1	.1	.1	1.7	9.1	26.6	73	103
DPX-H 6573 + X-77	2	.1	.1	.8	3.1	17.1	83	105
DPX-H 6573 + X-77	4	.1	.1	.8	1.2	3.8	96	105
UBI A815	2	.1	.1	10.3	18.4	38.9	61	103
UBI A815	4	.1	.1	6.3	14.4	47.2	53	103
UBI A815	6	.1	.1	4.2	13.6	28.7	71	105
Sulfur (Powdered)[3]	30 lbs/ac	.0	.1	0.3	1.3	2.1	98	109
Check	---	.1	1.6	15.6	25.9	82.6	17	100
Mean		.1	0.2	6.1	11.9	32.0	68	105
CV (%)						12		7.4
LSD (.05)						8.4		NS
LSD (.01)						11.1		NS

[1] Average rating given based on a sample of 20 leaves taken from each treatment over six replications on five sampling dates.

[2] Percent of leaf area not infected with powdery mildew.

[3] Sulfur dusted using cyclone seeder. Sulfur plots were isolated from other treatments to prevent drift from influencing results obtained from adjacent plots. Sulfur plots were eight rows wide and 50 feet long.

Fungicides were applied on August 9, 1984.

TABLE 4. Yield data from sugar beets treated with fungicides for the control of powdery mildew. Malheur Experiment Station, Ontario, Oregon 1984

Fungicide	Rate oz ai/ac	Root Yields T/A	Percent Sucrose	Conductivity	Percent Extraction	Recoverable Sugar lbs/ac
Bayleton	4	42.7	15.54	728	83.8	11121
Bayleton	8	45.3	15.46	718	83.9	11752
Kwg 0519 (Df)	2	44.3	15.31	722	83.8	11367
Kwg 0519 (Df)	4	44.3	15.86	688	84.4	11860
Kwg 0519 (Ec)	2	44.3	15.57	704	84.1	11602
Kwg 0519 (Ec)	4	44.0	15.52	722	83.9	11459
DPX-H 6573 + X-77	1	44.5	15.21	752	83.4	11290
DPX-H 6573 + X-77	2	43.9	15.56	692	84.3	11517
DPX-H 6573 + X-77	4	43.3	15.65	701	84.2	11412
UBI A815	2	43.4	15.46	696	84.2	11299
UBI A815	4	42.7	15.60	689	84.3	11230
UBI A815	6	43.6	15.69	694	84.3	11533
Sulfur (powdered)	30 lbs/ac	45.1	15.70	716	84.0	11896
Check	--	42.2	15.50	723	83.6	10936
LSD (.05)		NS	NS	NS	NS	NS
CV (%)		6.3	2.6	6.8	1.0	7.4
Mean		44.0	15.54	710	83.9	11504

SONALAN APPLIED TO SEEDLING SUGAR BEETS FOR LAYBY WEED CONTROL

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon 1984

Purpose

Sonalan (ethalfluralin) was evaluated for crop tolerance and layby weed control when applied as broadcast treatments to seedling sugar beets.

Procedure

Sonalan at three rates (0.75, 1.0, and 1.25 pounds active ingredient per acre) and Treflan at one rate (0.75 pounds active ingredient per acre) were applied on June 2 to Great Western Mono Hy R_2 variety of sugar beets. The sugar beets had been thinned and cultivated to establish water furrows before the herbicide treatments were applied. Most of the sugar beet plants had six leaves but plants ranged from the four- to six-leaf stage of growth. Each plot was 50 feet long and eight rows wide (14.7 feet). The sugar beets were planted on 22-inch centers. Each treatment was replicated four times and arranged at random using a complete block experimental design. The herbicides were applied as double overlap broadcast treatments using a bicycle wheel plot sprayer. Teejet fan nozzles size 8003 were spaced 10 inches apart on a 7 1/2-foot boom. Spray pressure was 35 pounds per square inch and water was applied as the carrier at a rate of 28 gallons per acre. The sugar beets were nearly weed free (handweeded and thinned) when Sonalan and Treflan were applied. The herbicides were incorporated immediately after application with a cultivator. Tools on the cultivator included knives, eight-inch duckfeet, sinner weeders, and angle iron furrow openers. The furrow openers were set to run slightly shallower than the depth the furrows had been when the herbicide treatments were applied.

Weed species in the field and check plots included lambsquarters, hairy nightshade, pigweed, barnyardgrass, and green foxtail.

The treatments were evaluated for weed control and crop injury on June 29 and October 8. The four center rows of the eight-row plots were harvested on October 28 to obtain root yield, root quality, and percent sucrose information.

Soils were silt loam texture with 1.2 percent organic matter and a pH of 7.3.

Results

Crop injury and weed control results are reported in Table 1. Sonalan at 1.25 pounds active ingredient per acre gave season-long weed control of all weed species. Reduced rates were less effective. Treflan gave satisfactory control of all weed species except hairy nightshade. Crop tolerance was generally good. Some individual beet plants showed some chlorotic symptoms and the leaves were cupped and turned to a upright position. This effect was only temporary and was only noticed on the beets that were smallest when herbicides were applied. This may indicate that beets should be in the six-leaf stage before Sonalan is applied. All roots appeared normal in shape at harvest time.

Yield data are reported in Table 2. Root yields and quality were good from all treatments. Sonalan did not reduce root or sugar yields when compared to yields from the handweeded check treatments.

TABLE 1. Percent weed control and crop injury ratings from Sonalan and Treflan applied to sugar beets for layby weed control. Malheur Experiment Station, Ontario, Oregon, 1984

Herbicides	Rates lbs ai/ac	Crop Injury 6/29	Crop Injury 10/8	Pigweed 6/29	Pigweed 10/8	Lambs-quarters 6/29	Lambs-quarters 10/8	Hairy Nightshade 6/29	Hairy Nightshade 10/8	Barnyard-grass 6/29	Barnyard-grass 10/8	Green Foxtail 6/29	Green Foxtail 10/8
		PERCENT CROP INJURY AND WEED CONTROL RATINGS											
Sonalan	0.75	0	0	72	65	65	60	45	30	70	55	65	50
Sonalan	1.00	0	0	93	85	85	70	75	60	95	90	93	85
Sonalan	1.25	10	0	100	100	98	95	96	92	100	100	100	100
Treflan	0.75	0	0	98	98	96	93	20	10	100	100	100	100
Handweeded	--	0	0	96	88	98	85	93	80	98	85	96	88

Evaluated June 29 and October 8. Ratings: 0 = No effect, 100 = plants killed.

TABLE 2. Root yields, percent sucrose, sugar yields, and root quality data for sugar beets harvested from plots treated with Sonalan and Treflan applied after thinning for layby weed control. Malheur Experiment Station, Ontario, Oregon, 1984

Herbicides	Rate lbs/ac	Root Yield T/A	Sucrose %	Conductivity	Extraction %	Calculated Recoverable Sugar lbs/ac
Sonalan	0.75	42.7	15.60	689	84.3	11230
Sonalan	1.00	43.3	15.65	701	84.2	11412
Sonalan	1.25	44.0	15.52	722	83.9	11459
Treflan	0.75	43.9	15.56	692	84.3	11517
Check	--	42.2	15.50	723	83.6	10936
LSD (.05)		NS	NS	NS	NS	NS
CV (%)		6.3	2.6	6.8	1.0	7.4

Harvest: All roots in the two center rows were harvested for root yield data. Seven roots were sampled from each harvested row for percent sucrose and root quality information. Samples were analyzed at Amalgamated Research Laboratory, Nyssa, Oregon.

SUGAR BEET HARVEST DATE AND VARIETY INTERACTION TRIAL

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon

Purpose

There is interest among sugar beet processors and growers to increase sugar beet acreage. The sugar beets produced from an acreage increase would have to be harvested and processed before the normal harvest date. It has been estimated that an early harvest would increase the sugar beet acreage in Treasure Valley by as much as 10,000 acres.

Seven varieties of sugar beets were compared for root yield, percent sucrose, root quality, percent extraction, and recoverable sugar when harvested on two harvest dates (September 25 and October 25). The objective is to measure varietal performance from an early harvest and determine if net returns to both growers and processors are great enough to justify growing beets to be harvested early.

Procedures

Varieties included in the trial were WS-76, WS-88, WS-57, Mono Hy R_1, Mono Hy 732, Mono Hy 571, and Mono Hy 955. Each variety was replicated eight times and tested in a complete randomized block experimental design. Each plot was four rows wide and 25 feet long planted on 22-inch row spacings.

The trial was established in a field planted to winter wheat for two years (1982-1983) before planting sugar beets. The field was fall plowed (1983) and left in the plowed condition overwinter. One-hundred pounds per acre phosphate (P_2O_5) and 60 pounds per acre of nitrogen ($(NH_4)_2SO_4$) was broadcast before plowing.

In the spring (1984), an additional 140 pounds per acre of nitrogen ($(NH_4)_2SO_4$) was broadcast and mixed with the top six inches of soil by tillage as the seed bed was prepared for planting. Nortron (two pounds active ingredient per acre) and Hoelon (1 1/2 pounds active ingredient per acre) were broadcast as a tank-mix combination and incorporated with a spike-tooth harrow for control of broadleaf and grassy species of weeds.

The sugar beets were planted on April 18, using cone seeders mounted on John Deere flexi-planting units. Seeds were planted at a rate of approximately 12 viable seeds per foot of row and thinned during the third week of May to an eight-inch spacing between plants. Three-foot wide alleyways were cut at the end of the separate blocks, leaving each plot 25 feet long.

After planting, the sugar beets were re-corrugated and watered by furrow-irrigation to assure adequate soil moisture for seed germination and emergence.

Other pesticides applied included Bayleton for powdery mildew control, Omite for control of two-spotted mite and Orthene for control of sugar beet army worm.

All water was applied by furrow-irrigation between each row of sugar beets at approximately 10-day intervals through June, July, August, and the first three weeks of September. The last irrigation was applied on September 18 to the early harvested treatments and on October 3 to the late harvested treatments.

The early harvest date was September 25 and the late harvest date was October 25. Root yields were determined by harvesting all the sugar beets from the two center rows of each four-row plot. Percent sucrose and conductivity readings were obtained by analyzing pulp residues cut from two samples taken from each plot. Each sample contained seven roots of uniform size and shape. Estimates of extractable sugar and pounds of recoverable sugar per acre were calculated for each variety.

Results and Summary

Data results are summarized in Tables 1 and 2. Table 1 summarizes yield and quality for each variety harvested on separate dates. Table 2 summarizes net returns in dollars per acre using the table information in TASCO's 1984 grower's contract and a sugar value of $24 per hundredweight.

The data in Table 1 show there are significant differences in both sugar yields and root quality for each sugar beet variety harvested on the same date and also for each single variety when the growing season was extended from September 25 to October 25. Variety WS-88 was the highest yielding variety in this test resulting in significant increases in sugar yields for both harvest dates. Each variety produced more than one ton of additional sugar per acre when the harvest date was extended from September 25 to October 25. Sugar yield increase was a result of increased root yields, increased percent sucrose, and improved conductivity readings. WS-88 variety produced about 11 percent more sugar per acre than the other varieties. Very little difference existed between the other six varieties when compared for recoverable sugar yields. Each of these varieties was capable of producing 79-93 pounds of sugar per acre per day for a 30-day period between September 25 and October 25.

Information published in an Oregon State Extension bulletin estimates that it costs about $1,000 to produce an acre of sugar beets in Treasure Valley. In Table 2, dollar returns per ton of roots are calculated for each variety at each harvest date. Value per ton of beets is determined using the table from TASCO's 1984 grower's contract.

Data from Table 2 show that grower's net returns from an early harvest with variety (WS-88) are $364 per acre. This is about $137 per acre more than the average net returns of the other six varieties. Comparing daily net returns as an average of the seven varieties for the 30-day period between harvest dates suggests that net returns per day because of increased sugar yields amount to about $12.63 per acre. The net returns from WS-88 for the same period of time were $13.46 per acre per day.

These data furnish evidence that an early harvest is economically possible and that variety selection is an important aspect to obtaining the greatest margin of profit.

TABLE 1. Data for root yield, percent sucrose, conductivity, percent extraction, and recoverable sugar from variety and harvest date trial. Malheur Experiment Station, Ontario, Oregon, 1984

Varieties	- - Root Yield- -		Percent Sucrose		- Conductivity -		Percent Extraction		Recoverable Sugar	
	Sept. 25 T/A	Oct. 25 T/A	Sept. 25 %	Oct. 25 %	Sept. 25	Oct. 25	Sept. 25 %	Oct. 25 %	Sept. 25 lbs/ac	Oct. 25 lbs/ac
WS-76	34.80	44.29	14.66	15.32	1.115	1.036	80.78	81.99	8326	11129
WS-88	38.58	47.09	14.56	15.25	1.060	1.013	81.54	82.31	9172	11843
WS-57	33.40	40.74	15.05	15.78	1.140	1.065	80.49	81.66	8088	10493
Mono Hy R_1	34.29	43.08	14.52	15.06	1.066	1.002	81.45	82.43	8117	10702
Mono Hy 732	35.79	43.80	13.84	14.45	1.046	0.975	81.61	82.70	8079	10465
Mono Hy 571	38.65	46.06	13.71	14.46	1.186	1.088	79.60	81.13	8449	10807
Mono Hy 955	33.95	41.77	15.01	15.66	1.049	1.016	81.77	82.32	8345	10769
LSD (.05)	1.96	2.02	0.36	0.34	.055	.065	0.80	0.93	493	557
LSD (.01)	2.59	2.71	0.48	0.46	.073	.087	1.07	1.24	659	744
CV (%)	7.82	4.59	3.55	2.24	7.25	6.29	0.98	1.12	5.8	5.1
Grand Mean	35.63	43.83	14.48	15.13	1.094	1.028	81.03	82.07	8364	10883

TABLE 2. Root yields, percent sucrose, and dollar returns per acre from seven varieties and two harvest dates. Malheur Experiment Station, Ontario, Oregon, 1984

Variety	- - -Sucrose - - -		- - - Root - - -		-Total Returns/ac-		- -Approximate - - Net Returns	
	Sept. 25	Oct. 25	Sept. 25	Oct. 25	Sept. 25	Oct. 25	Sept. 25	Oct. 25
	%	%	T/A	T/A	$	$	$	$
WS-76	14.66	15.32	34.8	44.29	1242	1673	242	673
WS-88	14.56	15.25	38.58	47.09	1364	1768	364	768
WS-57	15.05	15.78	33.40	40.74	1233	1597	233	597
Mono Hy R_1	14.52	15.06	34.29	43.08	1208	1592	208	592
Mono Hy 732	13.84	14.45	35.79	43.80	1184	1533	184	533
Mono Hy 571	13.71	14.46	38.65	46.06	1262	1614	262	614
Mono Hy 955	15.01	15.66	33.95	41.77	1249	1623	249	623
Mean	14.48	15.13	35.63	43.83	1250	1629	250	629

SUGAR BEET PREPLANT SOIL INCORPORATED AND NON-INCORPORATED PREEMERGENCE HERBICIDE TRIALS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1984

Purpose

Several soil active herbicides were evaluated for weed control and crop tolerance when applied in the spring. Herbicides evaluated as preplant treatments were incorporated in bedded land. Preemergence herbicides were applied to the soil surface after planting and left without tillage for incorporation. Different rates, combinations, and formulations were tested in this study.

Procedures

The soil at the experimental site is classified as an Owyhee silt loam with a pH of 7.1 and an organic matter content of 1.2 percent. The previous crop in the field was Russet Burbank potatoes. After the potato harvest in the fall of 1983, the field was disced and fertilized with 100 pounds per acre of phosphate and 60 pounds per acre of nitrogen. The field was moldboard plowed and left overwinter without further tillage.

In the spring, the field was triple-K'd and harrowed. The plots were staked and the preplant herbicides applied as double overlap broadcast treatments over flat level soil on May 4. Within one hour after the herbicides were applied, the trial area was bedded. Individual beds were spaced 22 inches apart and each plot was four rows wide and 30 feet long.

On May 11, the beds were harrowed with special equipment designed to work-down bedded ground. The soil on the top half of the beds was pulled into the furrows by a bar-beam mounted in front of a heavy ridged-built spike-tooth harrow. The teeth of the harrow stirred the soil at the base of the beds and incorporated the herbicides. The harrow was taken over the field twice. The direction of travel during the second pass was opposite to that of the first time.

Herbicides were applied on dry soil. All applications were broadcast using a double overlap boom with teejet fan nozzles size 8002. Spray pressure was 35 pounds per square inch and one quart of water carrier was applied per plot (48 gallons per acre). Winds were calm and skies clear during the time all applications were applied. Air temperatures were 68°F and soil temperatures 52°F when the preplant treatments were incorporated.

WS-88 variety of sugar beet seed was planted on May 12. The soil surface treatments were applied after planting. The trial area was furrow irrigated on May 13 and again on May 20 to germinate seed and add moisture for seedling emergence and growth.

The treatments were evaluated visually on June 12 for weed control and crop tolerance.

Results

Six herbicides were evaluated in the trial. They included Nortron, Pyramin, Hoelon, Antor, Ro-Neet, and SC-1102. Nortron was evaluated alone and in tank-mix combinations with Pyramin, Hoelon, and Antor. Two formulations of Pyramin (wettable powder and flowable) were compared for herbicide activity. SC-1102 (Stauffer Chemical) numbered herbicide was evaluated at two rates (1.5 and 3). SC-1102 was compared for weed control and crop tolerance as preplant incorporated and preemergence surface applied treatments.

The weed species in the plots included pigweed, lambsquarters, kochia, and barnyardgrass.

Nortron plus Antor was the only treatment that caused substantial crop injury. It delayed emergence of seedling sugar beets and reduced sugar beet stands. The two best treatments considering weed control and crop safety were Nortron plus Hoelon tank-mix and SC-1102 at the three pounds active ingredient per acre rate preplant incorporated. SC-1102 did not work well surface applied even though the plots received rain after the herbicide was applied. Nortron plus Pyramin (wp) was more effective for controlling broadleaf weeds than either Nortron or Pyramin alone, but none of these treatments were effective on barnyardgrass. Slightly more herbicidal activity occurred with the wettable powder formulation of Pyramin than with flowable Pyramin, but the flowable formulation was more active this year (1984) than it had been in the 1982 and 1983 trials. Ro-Neet continues to be a very effective herbicide for pigweed and grass control but it has been consistently slow for activity and control of kochia.

TABLE 1. Percent weed control and crop injury ratings to seedling sugar beets treated with herbicides applied as preplant incorporated and preemergence non-incorporated applications. Malheur Experiment Station, Ontario, Oregon, 1984

Herbicides	Rate lbs ai/ac	Application	Crop Injury %	PERCENT WEED CONTROL Pigweed	Lambs-quarters	Kochia	Barnyard-grass
Nortron	1.5	PPI	0	87	73	87	78
Nortron	2	PPI	0	97	89	95	88
Nortron + Pyramin (wp)	1.5 + 1.5	PPI	0	99	97	99	86
Nortron + Hoelon	2 + 1	PPI	0	98	92	94	99
Nortron + Antor	1.5 + 1.5	PPI	20	100	88	88	99
Pyramin (wp)	4	PPI	0	88	92	84	20
Pyramin (fl)	4	PPI	0	83	86	80	12
Ro-Neet	4	PPI	5	97	89	62	98
SC-1102	1.5	PPI	0	91	83	80	87
SC-1102	3.0	PPI	0	98	92	94	96
SC-1102	1.5	PES	0	68	65	72	72
SC-1102	3.0	PES	0	83	75	78	87
Check	---	---	0	0	0	0	0

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

SUGAR BEET VARIETY TESTING RESULTS

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon, 1984

Purpose

Forty-two varieties of sugar beets were evaluated in trials conducted at the Malheur Experiment Station near Ontario, Oregon. Fifteen of the entries were varieties available for commercial planting. Twenty-seven entries were varieties classified as experimental, but several will be available in 1985 for commercial plantings. Parameters measured in the trial included root yield, percent sucrose, and root purity. Percent sugar extraction was calculated for each variety based on percent sucrose and purity of that variety. An estimate of total recoverable sugar was also calculated for each variety based on root yield, percent sucrose, and percent extractable sugar. Each variety was also evaluated for tolerance to curly top virus.

The data results are useful to sugar beet growers and seed companies for evaluating and comparing varietal performance. Data discussed in this report are for one year, but trials are conducted each year and varietal performance information has been accumulated for several years.

Procedures

The experimental study was conducted on silt loam textured soil which was planted to Stephens variety of fall wheat for two years before planting this trial. The soil pH ranged from 7.3 to 7.6 and the soil organic matter was 1.23 percent. The field was plowed in the fall of 1983. One-hundred pounds of phosphate (P_2O_5) and 60 pounds of nitrogen ($(NH_4)_2SO_4$) were applied as a broadcast treatment before plowing. In the spring, an additional 140 pounds of nitrogen ($(NH_4)_2SO_4$) were broadcast and tilled into the soil with a triple-K and spike-tooth harrow as the seed bed was prepared for planting. Two pounds active ingredients per acre of Nortron and 1 1/2 pounds active ingredient per acre of Hoelon were broadcast and incorporated preplant by a spike-tooth harrow.

Commercial sugar beet varieties were planted in one trial and experimental entries in another. Each variety was replicated eight times and arranged in a complete randomized block experimental design. Each plot was four rows wide and 25 feet long with three-foot alleyways between blocks. Enough seed was prepackaged to plant approximately 12 viable seeds per foot of row for each 25 feet of row. The seed was planted on April 16 and 17 with a cone seeder mounted on a John Deere Model 71 flexi-planter equipped with disc openers. After planting, the sugar beets were furrowed and surface irrigated to assure enough moisture for uniform seed uniform germination and seedling emergence.

The sugar beets were thinned during the third week of May. Spacing between plants was approximately eight inches. In mid-July, just before the last cultivation, one pound active ingredient of Bayleton was applied broadcast with a ground sprayer. On August 10, Comite was applied for control of two-spotted mites and on September 10, Orthene was applied for army worm control. Both treatments were applied by air.

All irrigations were applied by furrow and water was applied between every row of sugar beets.

The trials were harvested on October 23, 24, and 25. The top foliage was removed by rubber flail beater and the crowns clipped with dragging scalping knives. The roots from only the two center rows of each four-row plot were dug with a single-row lifter type harvester and all the roots in each 25 feet of row weighed to calculate root yields. A sample of seven beets was taken from the two harvested rows of each plot and analyzed to measure percent sucrose and obtain a conductivity reading as a measure of root purity. The coded samples were analyzed at the Amalgamated Sugar Company's Research Laboratory in Nyssa, Oregon.

Results

The variety test results are reported in the two tables that follow. Varieties entered in the commercial trial are included in Table 1. Experimental entries evaluated are entered in Table 2. Each entry has been evaluated for root yields, percent sucrose, percent extraction, sugar yields, and susceptibility to curly top virus.

The varieties have been grouped by companies furnishing the seed. Each variety has been ranked within each company's group based on yield of recoverable sugar per acre. The highest yielders are at the top of the group. Statistical data are at the bottom of each table and include LSD values at the five and one percent levels, coefficient of variations and mean values for all evaluated categories except for curly top. Curly top ratings are reported as an average of three replications. The higher numerical values indicate the varieties that are most susceptible to infection by curly top virus.

Commenting only on yield of recoverable sugar, commercial entries ranged from a high of 11,506 pounds per acre to a low of 9,953 pounds per acre with a varietal mean value of 10,561 pounds per acre. Seven varieties of the 15 varieties produced sugar yields greater than the mean. Of these seven varieties only one variety produced a sugar yield significantly greater than the mean and this was only at the five percent level of significance.

Yields of recoverable sugar for entries among the experimental lines ranged from 9,574 to 11,411 with a mean of 10,431 pounds per acre. Sixteen varieties of the 27 tested had sugar yields above the test average. Four of these varieties had sugar yields significantly higher than the mean when tested at the five percent level. One variety had sugar yields significantly higher than the mean at the one percent level.

Comparing 1984 to 1983 recoverable sugar yields, yields were higher in 1983. In the 1984 test, comparing averages for experimental lines, both root yields and percent sucrose were down by seven tons of roots per acre and 0.32 percent sucrose. The commercial lines were down in 1984 by three tons of roots per acre but percent sucrose was slightly higher (0.16 percent). In 1983, average yield of recoverable sugar was 11,240 pounds per acre among the commercial varieties and 12,500 pounds per acre among the entries tested in the experimental variety trial.

TABLE 1. Summary of data from sugar beet variety trial (commercial entries). Malheur Experiment Station, Ontario, Oregon, 1984

Company	Variety	Root Yield tons/acre	Sucrose %	Extraction %	Estimated Recoverable Sugar lbs/acre	Curly Top[1]
American Crystal	173	42.74	15.24	82.91	10801	3.67
American Crystal	130	43.93	14.78	81.69	10608	3.67
American Crystal	31	42.92	14.65	81.46	10244	3.67
Betaseed	8654	46.10	14.78	81.57	11115	3.67
Betaseed	Hyb.8	43.22	14.81	83.14	10642	3.67
Betaseed	7463	43.60	14.97	80.84	10553	4.33
Betaseed	9421	45.53	14.41	79.85	10478	4.33
Great Western	55	45.06	14.54	81.74	10710	4.00
Great Western	CX_2	43.63	14.56	81.33	10333	4.00
Great Western	R_2	44.46	14.37	80.78	10323	3.67
Great Western	149	42.86	14.53	81.62	10166	4.33
Great Western	R_1	42.09	14.51	81.49	9953	4.00
Holly	HH-28	43.75	14.32	81.63	10228	4.00
TASCO	WS-88	46.01	15.06	83.03	11506	3.67
TASCO	WS-76	42.83	15.32	82.04	10766	3.67
LSD (.05)		2.09	0.43	1.03	615	--
LSD (.01)		2.77	0.57	1.37	814	--
CV (%)		5.2	2.9	1.3	6.3	--
Mean		43.92	14.72	81.67	10561	--

[1]Evaluated September 17, 1984, University of Idaho Trial - Twin Falls, Idaho. Mean of three replications.

TABLE 2. Summary of data from sugar beet variety trial (experimental entries). Malheur Experiment Station, Ontario, Oregon, 1984

Company	Variety	Root Yield tons/acre	Sucrose %	Extraction %	Estimated Recoverable Sugar lbs/acre	Curly Top[1]
Betaseed	2C0115	43.58	15.41	83.52	11218	4.67
Betaseed	2G5730	42.10	15.17	84.27	10765	4.00
Betaseed	3G5575	41.64	15.28	84.56	10761	3.67
Betaseed	8654	43.01	14.82	83.58	10655	3.67
Betaseed	8555	39.59	14.96	83.69	9914	3.33
Betaseed	3G5513	39.98	14.83	82.74	9816	4.33
Great Western	176	44.81	14.82	84.06	11165	3.33
Great Western	485	44.84	14.32	82.58	10604	3.67
Great Western	249	42.62	14.55	83.69	10381	4.00
Great Western	100	38.83	15.32	84.48	10050	3.67
Great Western	90	39.76	14.53	83.80	9682	3.67
Great Western	173	36.75	15.57	83.86	9597	4.33
Great Western	R_1	39.35	14.68	83.02	9590	4.00
Great Western	205	39.89	14.44	83.10	9574	3.67
Holly	8475-02	43.01	15.16	84.76	11053	3.50
Holly	1437-02	40.00	15.48	85.73	10617	4.33
Holly	14207-02	41.10	15.15	84.06	10467	3.50
Holly	83C117-02	39.35	15.16	83.09	9912	4.00
Holly	8472-02	37.76	15.47	84.68	9894	--
Holly	HH-28	39.67	14.88	83.74	9887	4.00
Holly	0460-02	40.03	14.72	83.78	9867	4.00
TASCO	E-3162	42.84	15.71	84.77	11411	
TASCO	0299-02	41.83	15.63	85.23	11146	3.33
TASCO	WS-88	42.21	15.42	85.12	11082	3.67
TASCO	9361-02	42.93	15.35	83.71	11032	3.67
TASCO	E-344	41.89	15.40	85.08	10976	4.00
TASCO	9360-02	39.92	15.81	84.65	10685	3.67
LSD (.05)		2.18	0.61	1.62	698	--
LSD (.01)		2.87	0.80	NS	917	--
CV (%)		5.4	4.1	1.9	6.8	--
Mean		41.08	15.11	84.04	10431	--

[1]Evaluated September 17, 1984, University of Idaho Trial - Twin Falls, Idaho. Mean of three replications.

THE EVALUATION OF "FRIGATE" AS A SURFACTANT WITH REDUCED RATES OF ROUNDUP

Charles E. Stanger
Malheur Experiment Station - Ontario, Oregon 1984

Purpose

The foliar activity of Roundup (glyphosate) at rates less than one pound active ingredient per acre is usually increased with the addition of non-ionic surfactants. Most often, X-77 is the surfactant recommended for use with Roundup. Frigate is a surfactant supplied by Bio Teck. Researchers have reported increased weed control from Roundup when Frigate was used as the surfactant instead of X-77. The purpose of this study was to compare the two surfactants as additives for use with Roundup. Roundup was evaluated for weed control activity at various rates with and without the addition of "X-77" and "Frigate".

Procedures

Roundup was applied at rates of one-half, one, and two pounds active ingredients per acre. Frigate and X-77 were added to the Roundup treatment only when Roundup was applied at the one-half pound and one pound active ingredient per acre rates. No surfactant was used in the two pounds active ingredient per acre rate of Roundup. The surfactants were added at a rate of 0.5 percent of the spray volume. Water was the carrier and applied at the rate of 12.26 gallons per acre. The treatments were applied on August 1. Major weed species in the trial area included barnyardgrass (*Echinochloa crusgalli*), curly dock (*Rumex crispus*), and yellow nutsedge (*Cyprus esculentus*).

The treatments were applied with a CO_2 pressurized back pack plot sprayer. The boom was six feet wide with four teejet fan nozzles, size 8001, spaced on the boom at 20-inch intervals. The treatments were applied as broadcast applications between 4 p.m. and 6 p.m. Skies were clear; air temperature was 89°F and winds were calm. Individual plots were eight feet wide and 30 feet long. A six-foot strip was sprayed in the center of each eight-foot plot. Each treatment was replicated three times and arranged at random in a complete block experimental design. The experimental site was a waste area at the bottom of a sugar beet field and soils, moisture, and other conditions were good for weed growth. The larger plants of each weed species evaluated were starting to head-out when treatments were applied.

The treatments were observed on several occasions on different days after the treatments were applied. Evaluations were taken on August 14 and September 5. The data are recorded in Table 1 and 2.

Results

Two pounds of Roundup without surfactant were consistently the better treatment resulting in the most rapid and highest percent control of each weed species. One pound per acre of Roundup plus 0.5 percent Frigate was nearly as effective as two pounds per acre of Roundup. Frigate plus Roundup was slightly more active than was X-77 and Roundup. This effect was quite obvious at the one-half pound per acre rate of Roundup, but less obvious at the one pound per acre rate of Roundup. Two pounds per acre of Roundup were definitely more active on yellow nutsedge than any of the other treatments. Temperatures remained hot and dry during the four-week period while the trial was being evaluated. The area was irrigated twice between the time of application and final evaluations.

TABLE 1. Percent weed control as a measurement of the activity of Roundup in combination with Frigate and X-77. Rod Frahm Farm, Ontario, Oregon 1984

Treatment	Rate lbs ai/ac	Surfactant	Percent Control: Barnyardgrass Replications 1	2	3	Avg	Curly Dock Replications 1	2	3	Avg	Yellow Nutsedge Replications 1	2	3	Avg
Roundup	2.0	none	100	100	100	100	99	98	96	97	95	93	95	94
Roundup	0.5	none	60	65	60	62	35	40	40	38	15	20	15	16
Roundup	1.0	none	93	95	95	94	80	75	80	78	55	60	50	55
Roundup	0.5	X-77	90	85	90	88	75	70	75	73	60	55	50	55
Roundup	1.0	X-77	99	100	99	99	90	85	90	88	70	75	70	72
Roundup	0.5	Frigate	95	95	98	96	80	85	85	83	65	60	60	62
Roundup	1.0	Frigate	100	100	100	100	95	92	95	94	75	85	80	80
Check	---	X-77	0	0	0	0	0	0	0	0	0	0	0	0
Check	---	Frigate	0	0	0	0	0	0	0	0	0	0	0	0
Check	---	--	0	0	0	0	0	0	0	0	0	0	0	0

Evaluated August 14, 1984
Rating: 0 = no herbicide effect, 100 = all plants killed

TABLE 2. Vegetation control by Roundup with and without addition of surfactants. Rod Frahm Farm, Ontario, Oregon, 1984

			Total Vegetation Control			
Treatment	Rate lbs ai/ac	Surfactant	Replication 1	Replication 2	Replication 3	Average
Roundup	2.0	none	100	99	100	99.7
Roundup	0.5	none	90	80	80	83.3
Roundup	1.0	none	100	98	98	98.7
Roundup	0.5	X-77	90	90	80	86.7
Roundup	1.0	X-77	98	98	98	98.0
Roundup	0.5	Frigate	100	95	95	96.7
Roundup	1.0	Frigate	99	95	98	97.3
Check	---	X-77	0	0	0	0
Check	---	Frigate	0	0	0	0
Check	---	---	0	0	0	0
LSD (.05)						3.6
LSD (.01)						5.1
Mean						94.3
CV (%)						3.0

COMMON AND TRADE NAMES OF HERBICIDES EVALUATED IN EXPERIMENTAL PLOTS

Common Names	Trade Names
alachlor	Lasso
bensulide	Prefar
bentazon	Basagram
bromoxynil	Brominal, Buctril
cycloate	Ro-Neet
DCPA	Dacthal
desmedipham	Betanex
diclofop methyl	Hoelon
diuron	Karmex
EPTC	Eptam
EPTC + safener	Eradicane
ethalfluralin	Sonalan
ethofumesate	Nortron
fluazifop butyl	Fusilade
glyphosate	Roundup
hexazinone	Velpar
Hercules 22234	Antor
MCPB	Thistrol, Can-trol
metham	Vapam
metolachlor	Dual
metribuzin	Sencor, Lexone
napropamide	Devrinol
nitrofen	Tok
oryzalin	Surflan
oxadiazon	Ronstar
oxyfluorfen	Goal
paraquat	Paraquat CL, Gramoxone
pendimethalin	Prowl
phenmedipham	Betanal
propachlor	Ramrod
pyrazon	Pyramin
sethoxydim	Poast
terbacil	Sinbar
trifluralin	Treflan
vernolate	Vernam
vernolate + safener	Surpass