Crop Research in Oregon's Treasure Valley 1979

A Research Report

The Malheur Experiment Station

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ALFALFA VARIETY TRIAL

Dwayne Buxton and Oris Rudd

The alfalfa grower visiting his local seed store in search of planting stock finds he has many choices available to him today.

These choices include both public and private varieties many of which have been bred with specific characteristics in mind. Characteristics such as resistance to diseases and to particular insects. Characteristics which address such other concerns as fall dormancy, winter hardiness and recovery after harvest.

The varietal descriptions available to the grower also extol such virtues as leafiness, high protein, and high yield potential. The grower rarely has available to him varietal performance data based on his own local growing conditions.

In response to an expressed need by growers for localized varietal performance information a 10-entry alfalfa variety trial was established in September of 1977 on the Malheur Experiment Station. The alfalfa entries were selected from varieties available to growers of the area and currently being recommended by local seed dealers. Three of the ten entries were public varieties. These were Agate, released by University of Minnesota and USDA; Saranac, released by Cornell University; and Lahontan from the University of Nevada. Private companies varieties included Action from Union Seed Company; Pacer, developed by Land-o-Lakes Inc.; Vanguard and Apollo developed by North American Plant Breeders; Gladiator from Northrup King; and W-L 309 and W-L 318 developed by Waterman Loomis Co.

The alfalfa varieties were planted in plots 400 X 18 feet in a randomized block design with each variety replicated three times. Seeding rate was 12 lbs. per acre. The harvested area per plot was 30 X 12 feet.

Table 1 summarizes yields adjusted to 12% moisture from the first year's harvest. Please note that these data represent only one year's harvest and may not reflect comparative performance over the normal rotation life expected by most growers.

Seven of the varieties have been indexed by the University of Minnesota for resistance to bacterial wilt and to phytophthora root rot (a disease associated with poorly drained soils) (see Varietal Trials of Farm Crops. 1978. Minnesota Agric. Exp. Stn. Misc. Report 24) as indicated also in Table 1 (highest values best).

Table 1

Variety	Harvest date in 1978				Total		Disease resistance	
	5-19	7-11	8-17	10-5			Bact. Wilt	Phyto. Root Rot
	tons/acre							
Vangard	2.68	2.96	2.02	1.24	8.88	(115)‡	28	3
WL 309	2.72	2.88	1.90	1.32	8.83	(114)	25	3
WL 318	2.62	2.91	1.76	1.44	8.74	(113)	32	20
Pacer	2.39	3.02	2.12	1.04	8.53	(110)	33	8
Saranac	2.53	2.80	2.00	1.19	8.53	(110)	49	2
Apollo	2.41	2.91	1.90	1.16	8.39	(109)	36	40
Gladiator	2.63	2.89	1.72	1.13	8.39	(109)	-	-
Agate	2.48	2.88	1.89	1.01	8.25	(107)	65	43
Action	2.62	2.79	1.67	1.09	8.15	(106)	-	-
Lahontan	2.27	2.48	1.94	1.04	7.72	(100)	-	-
Avg.	2.54	2.85	1.89	1.17	8.44			
Sign. Level	NS+	NS	NS	0.01	0.01			
LSD (0.10)	-	-	-	0.16	0.35			

+ Not significant at the 0.05 level

‡ Yield as a percentage of that produced by Lahontan

WEED CONTROL IN MINT

Charles E. Stanger and Oris Rudd

Introduction

The acres of mint grown in Malheur County were increased from about 2,500 acres in 1975 to over 4,800 acres in 1978. The rapid increase in acreage was a result of unusually high prices for oil during 1976 and 1977 and desire among farmers for another cash crop. Oil yields in Malheur County average just over 60 lbs/ac and it is estimated that the 1978 crop was sold for $3 million.

Oil buyers say that weeds are the most troublesome problem facing mint growers. Weeds distilled with mint hay often give mint oil certain flavors and odors that are undesirable and can restrict sales especially when oil supplies are in surplus.

Growers in Malheur County have relied heavily on post-emergence treatments to control annual grasses and broadleaf weeds. Adjuvents have been added with Sinbar to increase foliage activity. Growers using sprinkler irrigation have been satisfied with Sinbar and control has generally been good because overhead moisture increases Sinbar activity. Weed control under furrow irrigation has been less consistent and in many cases unsatisfactory even with as many as 3 applications each year applied during the growing season.

Because of the unsatisfactory weed control with Sinbar as a postemergence treatment and the results obtained experimentally from fall applications of Sinbar, more growers are turning to fall applications and weed control has improved in commercial fields. Several experimental herbicides fall applied are controlling weeds which are not controlled with Sinbar and are being tested further.

The persistence of Sinbar has created problems to mint growers who desire to rotate mint planting with other crops. In experimental trials, we are evaluating shorter lived herbicides and selective post emergence herbicides to control weeds in mint. These herbicides are especially necessary to use during the last year of mint production before another crop is put into rotation.

Perennial broadleaf weeds are difficult to control and particularly so, selectively in a perennial crop. Field bindweed, western goldenrod, and canada thistle are continuing to increase in mint plantings and results from registered herbicides are quite ineffective. Basagran is registered, but research is continuing with Basagran trying to increase control by adding adjuvents and proper time for application in relationship to stage of plant growth.

The weed control trials were conducted in both Oregon and Idaho in cooperation with peppermint and spearmint growers. Experimental trials conducted during 1978 included both soil and foliage active herbicides applied in the fall and spring. The effectiveness of soil applied treatments were evaluated under different methods of incorporation with varying depths and shapes of water furrows. Spring applied herbicides included soil active and contact treatments. Soil active materials were applied early enough to be activated by subsequent occurring rain showers. Contact treatments were begun before mint started spring growth and continued at intervals until mint was 4 inches tall.

Experimental Procedures

Fall applied treatments included herbicides with at least 12 months soil residual. The trials were established at 4 locations on both fall plowed and non-plowed commercial fields. The plowed fields were worked down after plowing and the water furrows established so further tillage was not needed after the herbicide treatments were applied and incorporated. The water furrows were made with a rotary corrugator equipped with teeth to form a shallow V-shaped furrow. The sides were sloped so they would not sluff into the bottom of the corrugator from winter frost action or summer irrigations. Several herbicides were mechanically incorporated and others were sprayed on the soil surface and activated by winter moisture. Incorporation equipment included a Northwest side moving harrow and a roller equipped with spring-loaded teeth which had enough pressure to incorporate the herbicides in the bottom of the water furrows.

The spring applications began in early March when the mint was beginning to break dormancy and starting spring growth. Treatments included soil active herbicides applied singly, combination soil and foliage active, and foliage active applied singly. Enough rain (1-2 inches) occurred after the soil treatments were applied to fully activate the herbicides.

Fall applied treatments were applied as replicated (3) and large (3 ac) strip plots used as grower demonstration trials.

The replicated plots varied in size. The fall treated plots were 18 feet wide and 50 feet long. The spring treated plots were 9 feet wide and 30 feet long. All herbicide treatments were broadcast applied with a plot sprayer equipped with 8003 teejet nozzles and 40 lbs pressure applying water as the carrier at a rate of 43 gallons per acre.

Goal and 2,4-DB treated plots applied as spring treatments were harvested for yield and the oil distilled for quality ratings.

Results

Fall Treatments: Sinbar + Devrinal applied at rates of 2 + 4 lbs ai/ac to the soil surface and activated by winter moisture is an excellent long residual treatment. Sinbar in the combination is active on broadleaf weeds whereas Devrinal persists to control annual grasses until after harvest. The herbicides at lower rates were less effective and some weeds escaped. Treflan incorporated was effective in controlling summer annual grasses but did not control winter annual broadleaf weeds or early spring germinating kochia. Weed control with Surflan was similar to Treflan. An advantage of Surflan is that mechanical soil incorporation is not needed and it can be activated by overhead moisture. Broadleaf weed control was enhanced when Sinbar was combined with Treflan and applied as a mixture.

Spring Treatments: Because of the rain which occurred after the soil active herbicides were applied, all treatments resulted in excellent weed control. Sinbar in combination with Paraquat and 2,4-DB resulted in excellent weed control. Sinbar + oil was not as effective as Sinbar + 2,4-DB or Sinbar + Paraquat. 2,4-DB caused some temporary injury to the mint but at harvest time the mint had fully recovered and appeared to be more leafy than adjacent non-treated plots. Goal applied alone and in combination with Paraquat gave excellent control of all emerged weeds and also had residual activity on grass and broadleaf weeds. Goal burned the mint but it recovered rapidly. Bromoxynil was effective on small summer annual broadleaf weeds but did not control the winter annual prickley lettuce when the rosettes were larger than 2 inches. Herbicides effective in controlling blue mustard includes bromoxynil, Goal + X-77, Goal + Paraquat + X-77, and diuron + Paraquat. 2,4-DB at rates tolerant to mint was not active on this weed species.

Basagran treatments were inconsistent this year for the control of western goldenrod. The best suppression of goldenrod was obtained when Basagran + Mor Ac was applied as a split treatment at a rate of 2 lbs each application. The first treatment was applied when the goldenrod averaged about 12 inches tall and the second application followed 10 days later. Basagran's activity seems to be increased when air temperatures exceed 75^{o} F and when applications follow soon after an irrigation and soil moisture is high.

Common and Trade Names of Herbicides Used in Mint Trials

Common	Trade
terbacil	Sinbar
napropamide	Devrinal
trifluralin	Treflan
oxyzalin	Surflan
diuron	Karmex
oxyfluorfen	Goal
norflurozon	Solicam
metribuzin	Sencor and Lexone
bromoxynil	Brominal and Buctril
paraquat	Ortho Paraquat
phenmedipham	Betanal
desmedipham	Betanex
Vel 5026	-
2,4-DB ester	Butyrac ester
Mor Ac	Wilbur Ellis crop oil

Table 1A-Percent Weed Control and Crop Injury From Herbicides Applied During Late Fall to Non-Plowed Peppermint.

Ted Frahm Farm, Nyssa, Oregon 1978

Treatments		Rate lbs ai/ac	Crop Injury 2) R1	R2	R3	X	Prickly Lettuce 3) R1	R2	R3	X	Flixweed 3) R1	R2	R3	X̄	Kochia 4) R1	R2	R3	X̄	Annual Grasses 4) R1	R2	R3	X
terbacil	Non-incorp.	2	0	0	5	2	100	100	100	100	100	100	100	100	100	99	99	99	80	85	75	80
terbacil + napropamide	Non-incorp.	1½+2	5	5	0	3	100	100	100	100	100	100	100	100	100	100	100	100	95	99	95	96
terbacil + napropamide	Non-incorp.	1½+4	10	5	10	8	100	100	100	100	100	100	100	100	100	100	100	100	100	98	98	98
trifluralin	incorp.	1	0	0	5	2	0	0	0	0	30	25	35	30	50	50	50	50	50	65	65	60
trifluralin	incorp.	1.5	5	0	10	5	35	50	30	38	65	50	60	58	85	85	80	83	98	98	98	98
terbacil + trifluralin	incorp.	1+1	0	0	0	0	100	100	99	99	98	95	98	96	98	98	100	98	95	99	98	97
terbacil + trifluralin	incorp.	1½+1	0	0	0	0	100	90	99	96	100	100	100	100	100	98	96	98	100	99	98	99
terbacil + napro-pamide + trifluralin	incorp.	1+2+3/4	5	10	5	7	100	100	100	100	98	100	95	97	98	100	98	98	98	100	98	98
terbacil + oryzalin	incorp.	1.2+1¼	5	5	5	5	100	100	98	99	100	100	100	100	98	100	98	98	98	99	98	98
1) terbacil (brd) + napropamide (furrow)	Non-incorp.	1+4	5	5	15	8	95	93	95	94	100	95	98	97	100	100	100	100	99	99	100	99
1) terbacil (brd) + napropamide (furrow)	Non-incorp.	2+2	5	5	5	5	100	100	100	100	100	100	100	100	100	100	100	100	99	100	98	99
1) terbacil (brd) + napropamide (furrow)	Non-incorp.	2+4	5	10	5	7	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
terbacil (brd) + terbacil (furrow)	Non-incorp.	1+1	0	0	5	2	100	100	100	100	100	95	95	96	92	95	90	92	85	85	75	81
terbacil (brd) + napropamide (furrow)	Non-incorp.	1+2	0	0	5	2	100	100	100	100	98	93	95	95	90	95	95	93	98	90	85	91
terbacil (brd) + napropamide (furrow)	Non-incorp.	1+4	5	10	5	7	100	100	100	100	100	92	94	95	95	90	96	94	95	85	95	91
Control	-	-	30	40	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rating: 0 = No effect, 100 = Complete control.

1) Broadcast treatments applied in fall and in-furrow treatments were made in early spring (April 8th)
2) August 3rd evaluation
3) Evaluations taken on June 5th for weed control
4) Evaluated on August 3rd for control of kochia and annual grasses (barnyard & green foxtail).

Table 1B - Percent Weed Control and Crop Injury From Herbicides Applied During Late Fall to Plowed Peppermint. Ted Frahm Farm, Nyssa, Oregon 1978

Treatments		Rate lbs ai/ac	Crop Injury 2)				PERCENT WEED CONTROL: Prickly Lettuce 3)				Flixweed 3)				Kochia 4)				Annual Grasses 4)			
			R1	R2	R3	X̄	R1	R2	R3	X̄	R1	R2	R3	X̄	R1	R2	R3	X̄	R1	R2	R3	X̄
terbacil	Non-incorp.	2	0	0	0	0	100	100	100	100	100	99	100	99	99	100	100	99	75	60	70	68
terbacil + napropamide	Non-incorp.	1½+2	10	15	10	9	100	100	100	100	100	96	98	98	100	100	100	100	96	92	95	94
terbacil + napropamide	Non-incorp.	1½+4	15	20	15	17	100	98	100	99	100	98	98	98	100	100	100	100	100	100	100	100
trifluralin	incorp.	1	0	0	0	0	70	15	10	12	30	20	30	27	40	40	40	40	65	50	60	58
trifluralin	incorp.	1.5	0	0	0	0	25	30	20	25	65	70	60	65	65	70	70	68	90	95	95	93
terbacil + trifluralin	incorp.	1+1	0	0	0	0	70	85	80	78	100	100	100	100	70	85	80	78	60	70	65	65
terbacil + trifluralin	incorp.	1½+1	0	0	0	0	100	96	98	98	98	96	95	96	100	96	95	96	100	85	90	91
terbacil + napropamide + trifluralin	incorp.	1+2+3/4	0	0	0	0	100	93	96	96	95	98	95	96	100	99	99	99	100	95	95	96
terbacil + oryzalin	incorp.	1.2+1¼	10	0	0	3	90	96	96	94	100	98	100	99	100	100	100	100	90	100	93	94
terbacil (brd) + napropamide (furrow)	Non-incorp.	1+4	10	15	15	13	90	90	90	90	93	95	98	95	100	100	100	100	98	95	98	97
terbacil (brd) + napropamide (furrow)	Non-incorp.	2+2	10	5	0	5	99	100	99	99	100	100	100	100	100	100	100	100	93	98	98	96
terbacil (brd) + napropamide (furrow)	Non-incorp.	2+4	10	10	5	8	100	100	98	99	100	100	100	100	100	100	100	100	98	98	100	99
1)terbacil (brd) + terbacil (furrow)	Non-incorp.	1+1	0	0	0	0	100	99	98	99	93	95	95	94	100	100	100	100	60	75	80	71
1)terbacil (brd) + napropamide (furrow)	Non-incorp.	1+2	0	0	0	0	90	90	90	90	95	93	90	93	90	95	93	93	90	90	95	92
1)terbacil (brd) + napropamide (furrow)	Non-incorp.	1+4	15	10	15	13	92	90	93	91	93	90	95	93	90	99	96	95	70	85	75	76
Control	-	-	20	25	15	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rating: 0 = No Effect, 100 = Complete Control

1) Broadcast treatments applied in fall and in-furrow treatments made in early spring (April 8th)

2) August 3rd evaluations

3) Evaluations taken on June 5th for weed control

4) Evaluated on August 3rd for control of kochia and annual grasses (barnyard and green foxtail).

Table 2A Percent Weed Control and Crop Injury from Herbicides Applied During Late Fall to Non-Plowed and Plowed Spearmint Bob Kido Farm Ontario, Oregon 1978

Treatments	Rate lbs ai/ac	Crop Injury		PERCENT WEED CONTROL 2) TM		Kochia		RT		HN		GF		BnY		PW	
		Pl	N-PL	Pl	N-PL	Pl	N-PL	Pl	N-PL	Pl	N-PL	Pl	N-PL	Pl	N-PL	Pl	N-PL
trifluralin (incorp.)	1.0	0	0	0	0	80	65	40	20	0	0	99	83	99	83	98	84
trifluralin + terbacil (incorp.)	0.75 + 1.5	0	0	98	89	97	91	92	82	88	81	99	87	99	86	98	84
trifluralin + napropamide + terbacil (incorp.)	.5 + 2 + 1	5	0	99	91	96	87	91	80	82	78	100	93	100	95	95	92
terbacil + oryzalin (incorp.)	1.2 + .92	0	0	94	88	93	86	88	80	85	81	98	92	98	90	97	90
terbacil + napropamide (non-incorp.)	2 + 4	10	0	98	100	95	100	95	100	93	98	100	100	100	100	99	100
1) terbacil + napropamide (non-incorp.)	2 + 4	10	0	92	100	94	100	83	100	89	96	91	100	93	100	92	100
Check	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Ratings: 0 = No effect, 100 = Complete control

1) terbacil applied in December and napropamide applied in the furrows on March 5th.

2) Weed Species:

TM - Tumbling Mustard (*Sisymbrium altissimum* L.)
Kochia -(*Kochia scoparia* L.)
RT - Russian Thistle (*Salsola kali* L.)
HN - Hairy Nightshade (*Solanum villosum* Mill.)
PW - Pigweed (*Amaranthus retroflexus* L.)
GF -Green Foxtail - (*Setaria viridis* L.)
BnY -Barnyard Grass - (*Echinchloa crustgalli* L.)

Plowed - Pl
Non-plowed - N-PL

Table 2B Percent Weed Control and Crop Injury from Herbicides Applied During Late Fall to Non-Plowed and Plowed Peppermint. Owen Froerer Farm Nyssa, Oregon 1978

Treatments	Rate lbs ai/ac	Crop Injury		PERCENT WEED CONTROL 2) P.L.		Kochia		P.W.		Lq.		G.F.		BnY	
		PL	N-Pl	PL	N-Pl	PL	N-Pl	PL	N-Pl	PL	N-Pl	PL	N-Pl	PL	N-Pl
trifluralin (incorp.)	1.0	0	0	0	0	30	25	68	62	72	68	81	76	84	77
trefluralin + terbacil (incorp.)	0.75 + 1.5	0	0	83	79	86	81	83	80	85	82	81	75	83	79
trifluralin + napropamide + terbacil (incorp.)	.5 + 2 + 1	0	0	78	74	80	78	79	73	82	78	86	85	89	84
terbacil + oryzalin (incorp.)	1.2 + .92	0	0	86	82	83	79	88	85	83	80	84	80	86	83
terbacil + napropamide (Non-incorp.)	2 + 4	0	0	98	99	96	100	98	100	98	100	99	99	99	99
terbacil + napropamide (Non-incorp.)	2 + 4	0	0	98	99	97	98	99	98	98	98	99	100	99	100
Check	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rating: 0 = No effect, 100 = Complete control

1) terbacil applied in December and napropamide applied in furrows on March 6, 1978

2) weed species:

PL = Prickly Lettuce (*Lactuca scariola* L.)

Kochia = (*Kochia scoparia* L.)

PW = Pigweed (*Amaranthus retroflexus* L.)

Lq = Lambsquarters (*Chenopodium album* L.)

GF = Green Foxtail (*Setaria viridis* L.)

BnY = Barnyard Grass (*Echinchloa crusgalli* L.)

PL = Plowed

N-Pl = Non-Plowed

List of Cultural Practices and Dates Administered in Establishing Fall Trials

Operation	Frahms'	Kido's	Froerers'
1. Removing Plant Residue (burning or clipping)	11-7-77	11-8-77	11-9-77
2. Plowing	11-9-77	11-9-77	11-10-77
3. Reworking plowed soil	11-10-77	11-9-77	11-10-77
4. corrugating	11-12-77	11-11-77	11-12-77
5. Applied incorporated treatments	11-17-77	11-14-77	11-16-77
6. Incorporated	11-18-77	11-15-77	11-16-77
7. Re-corrugated	5-6-77	12-5-77	12-8-77
8. Applied non-incorporated treatments	5-7-77	12-5-77	12-8-77

Month	Moisture (inches) Total	Moisture (inches) Greatest (24 hrs)	Mean Temperature Air° F High	Mean Temperature Air° F Low	Mean Temperature Soil° F High	Mean Temperature Soil° F Low
December 77	1.81	.62	41.4	29.7	37.7	35.8
January 78	2.33	.52	40.3	28.0	36.0	34.5
February 78	1.70	.40	44.1	31.1	41.2	36.0
March 78	0.53	.23	59.6	34.5	54.5	42.0
April 78	3.51	.79	59.6	38.6	61.5	46.3
May 78	0.14	.05	69.1	43.4	71.5	55.7
June 78	0.56	.30	84.3	50.6	81.1	66.4

Table 3. Herbicide Screening Trial From Fall Applied Treatments to Scotch Spearmint

Darwin Jensen Farm Ontario, Oregon 1978

Treatments	Rate lbs ai/ac	Crop Injury 6-15 R1	R2	R3	Avg	Crop Injury 7-17 R1	R2	R3	Avg	Kochia 6-15 R1	R2	R3	Avg	Kochia 7-17 R1	R2	R3	Avg
terbacil	2.0	5	0	5	3	0	0	5	2	100	100	100	100	100	100	100	100
terbacil + napropamide	2.0+2.0	25	18	10	18	10	20	10	13	100	100	100	100	100	100	100	100
terbacil + napropamide	2.0+4.0	30	20	10	20	20	10	10	13	100	100	100	100	100	100	100	100
terbacil + diuron	1.0+2.0	90	90	98	93	85	80	85	83	100	100	100	100	100	100	100	100
Vel 5026 (wp)	0.5	20	10	10	13	30	25	10	22	100	100	100	100	100	80	87	89
Vel 5026 (wp)	1.0	95	96	75	89	80	85	60	75	100	100	100	100	100	100	100	100
Vel 5026 (wp)	2.0	98	95	99	97	98	95	98	97	100	100	100	100	100	100	100	100
oxyfluorfen + Ag 98	0.5+0.5%	20	10	15	15	10	10	10	10	90	90	85	88	80	70	70	73
oxyfluorfen + Ag 98	1.0+0.5%	15	15	10	13	20	15	5	13	98	90	100	96	90	80	80	83
oxyfluorfen + Ag 98	2.0+0.5%	5	20	25	17	15	30	15	20	100	100	100	100	100	100	85	95
norflurozon	2.5	96	90	96	94	85	70	75	77	100	100	98	99	100	100	100	100
norflurozon	5.0	98	98	98	98	99	95	95	96	100	100	100	100	100	100	100	100
metribuzin	1.0	30	30	25	28	30	40	40	36	100	95	100	98	100	98	100	99
Check		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Treatments	Rate lbs ai/ac	Hairy Nightshade 6-15 R1	R2	R3	Avg	Hairy Nightshade 7-17 R1	R2	R3	Avg	Annual Grasses 1) 6-15 R1	R2	R3	Avg	Annual Grasses 1) 7+17 R1	R2	R3	Avg
terbacil	2.0	98	95	95	96	80	75	75	77	78	75	85	79	75	70	80	75
terbacil + napropamide	2.0+2.0	96	98	98	97	85	85	80	83	100	95	99	98	95	90	95	93
terbacil + napropamide	2.0+4.0	95	98	95	96	85	85	80	83	100	100	100	100	100	100	100	100
terbacil + diuron	1.0+2.0	98	98	98	98	95	95	95	95	100	100	100	100	100	100	100	100
Vel 5026 (wp)	0.5	80	85	85	83	70	70	75	72	80	70	70	73	70	65	60	65
Vel 5026 (wp)	1.0	90	85	90	88	80	80	85	82	80	80	75	78	75	70	70	72
Vel 5026 (wp)	2.0	95	98	98	97	90	92	90	91	90	85	85	87	80	75	75	76
oxyfluorfen + Ag 98	0.5+0.5%	90	85	85	87	80	70	70	73	100	100	98	99	98	98	100	98
oxyfluorfen + Ag 98	1.0+0.5%	98	98	98	98	95	95	95	95	98	100	100	99	100	100	100	100
oxyfluorfen + Ag 98	2.0+0.5%	100	98	100	99	98	96	98	97	100	100	100	100	98	100	100	99
norflurozon	2.5	99	99	99	99	98	95	95	96	100	100	96	98	98	95	90	94
norflurozon	5.0	100	99	100	99	99	96	98	97	100	100	100	100	100	100	100	100
metribuzin	1.0	78	85	80	81	60	65	55	60	70	75	70	72	50	60	50	53
Check		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rating: 0 = No effect, 100 = Complete Control

Evaluated on June 15th and July 17th, 1978

1) Annual grasses included green foxtail and barnyard grass.

Table 4 The Evaluation of Postemergence Applied Herbicides for Blue Mustard Control in Spearmint.

Stuart Batt Farm Ontario, Oregon 1978

Treatment	Rate lbs. ai/ac	Crop Injury 1)				% Control of Blue Mustard			
		R_1	R_2	R_3	Avg	R_1	R_2	R_3	Avg
bromoxynil + X-77	0.5	0	0	0	0	80	90	85	85
bromoxynil + X-77	0.75	0	0	0	0	95	95	98	96
bromoxynil + X-77	1.0	0	0	5	2	99	99	100	99
diuron + paraquat + X-77	1.5 + 0.5	10	10	10	10	99	100	100	99
oxyfluorfen + paraquat + X-77	0.75 + 0.5	20	15	20	18	100	100	100	100
2,4-DB	0.5	15	15	15	15	20	20	30	23
2,4-DB	0.75	20	30	25	25	60	70	80	70
2,4-DB	1.0	40	50	50	46	75	80	80	78
2,4-DB	2.0	60	70	60	63	80	90	85	85
phenmedipham	1.0	0	0	0	0	0	0	0	0
phenmedipham	1.5	0	0	0	0	0	0	0	0
desmedipham	1.0	0	0	0	0	0	0	0	0
desmedipham	1.5	0	0	0	0	10	20	20	17
SN-503	1.25	0	0	0	0	10	20	20	17
Check	-	0	0	0	0	0	0	0	0

Ratings: 0 = No effect, 100 = Complete kill

Evaluated April 14, 1978

1) Injury noted on April 14th and recorded in table was not visible with any treatment except the 2 lb rate by June 1st.

TABLE 5 Percent Weed Control and Crop Tolerance of Herbicides Applied as Early Spring Treatments for Annual Weed Control in Spearmint.

Art Hamanishi Farm Fruitland, Idaho 1978

PERCENT WEED CONTROL

Treatments	Rate lbs ai/ac	Crop Injury				Prickly Lettuce				Flix weed				Tumbling Mustard				Salsify			
		R1	R2	R3	Avg	R1	R2	R3	Avg	R1	R2	R3	Avg	R1	R2	R3	Avg	R1	R2	R3	Avg
terbacil + crop oil	2 + 1 gal	5	0	0	2	98	96	98	97	99	99	96	98	98	96	98	97	20	50	30	33
terbacil + crop oil	2 + 3 gal	5	0	0	2	98	100	98	98	98	96	98	97	96	98	98	97	30	60	40	43
terbacil + oryzalin + crop oil	1.5 + 1.2 + 1 gal	3	0	0	1	98	93	95	95	95	99	98	97	95	98	96	96	45	70	50	55
terbacil + napropamide + crop oil	1.5 + 4 + 1 gal	0	0	0	0	96	95	98	96	99	98	98	98	98	95	95	96	40	60	50	50
2 (terbacil + crop oil)	2 (1 + 1 gal)	0	0	0	0	97	95	95	95	99	93	95	95	95	92	95	94	45	45	30	40
terbacil + paraquat + X-77	2 + .5 + .5%	0	0	0	0	100	100	100	100	99	100	99	99	100	98	98	98	75	80	85	80
terbacil + 2,4-DB	2 + 0.5	5	0	0	3	100	100	100	100	100	100	100	100	100	100	100	100	80	95	85	86
terbacil + 2,4-DB	2 + 1	5	0	0	2	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
2,4-DB (Dormant)	0.25	30	20	30	27	50	60	50	53	65	60	60	62	65	70	60	65	30	40	45	38
2,4-DB (Dormant)	0.5	20	20	25	22	75	80	70	75	80	90	85	85	80	75	80	78	70	80	65	71
2,4-DB (Dormant)	0.75	10	10	10	10	85	80	80	82	80	90	90	86	85	80	80	81	65	75	70	70
2,4-DB (Dormant)	1.0	5	5	0	3	95	90	95	93	100	96	94	96	94	92	90	92	90	95	90	91
2,4-DB (Dormant)	2.0	0	0	5	2	95	98	95	96	100	100	100	100	100	100	100	100	90	95	98	94
bromoxynil	0.5	0	0	0	0	70	75	65	70	55	60	65	60	65	60	60	62	30	25	30	28
bromoxynil	0.75	0	0	0	0	75	60	70	68	65	60	70	68	40	45	45	43	30	60	40	43
bromoxynil	1.0	0	0	0	0	85	70	80	78	70	60	75	68	50	60	55	55	40	70	50	53
metribuzin	0.5	10	5	5	7	80	85	85	83	75	70	85	76	80	85	80	82	65	80	75	73
metribuzin	1.0	15	10	10	12	85	90	90	88	90	95	95	93	95	90	90	91	85	85	80	83
Vel 5026	1.0	0	0	0	0	95	95	98	96	100	99	96	98	95	95	98	96	95	90	90	92
Vel 5026	0.5	0	0	0	0	60	70	60	63	65	75	70	70	65	70	60	65	60	70	60	63
oxyflurofen + paraquat + Ag 98	.375 + .5 + .5%	5	0	0	2	70	75	70	72	60	70	70	66	65	60	60	61	60	50	50	53
oxyflurofen + paraquat + Ag 98	.5 + .5 + .5%	5	0	0	2	98	100	98	98	98	99	98	98	95	98	95	96	85	90	85	88
oxyflurofen + Ag 98	1.0 + .5%	5	10	5	7	100	100	98	99	100	98	98	98	98	100	100	99	90	80	85	85
Check	-	25	20	35	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rating: 0 = No effect, 100 = Complete control.

CONTINUATION OF TABLE 5

Location -Art Hamanishi Fruitland, Idaho

Date of Application -March 2, 1978

Application Information -

1. Applied with single wheel bicycle sprayer equipped with 8.5 foot boom. Nozzles were 8003 teejet spaced to apply a double overlap treatment.
2. Spray pressure 40 psi- applied 40.5 gal. of water per acre

Air temperature- 52^{0} F.

Soil Texture- Sandy loam, moist on soil surface

Plant growth at time of application:

Spearmint- buds appearing above soil surface from spring growth range from ¼-½ inch long.

Prickly Lettuce- uniform growth and stand- made up about 80% of weed population. Largest were 3-4 inches across rosettes -healthy & vigorous in growth

Flix weed- 1-3 inches tall and also across rosettes

Tumbling Mustard- up to 6 inches across rosettes

Salisfy- seedlings up to 4 inch rosettes

Final evaluation- July 6

Residue Sampling- July 6

Table 6 Percent Weed Control and Crop Tolerance of Herbicides Applied as Early Spring Treatments for Annual Weed Control in Spearmint. Ted Frahm Farm. Nyssa, Oregon 1978

Treatments	Rate lbs. ai/ac	Crop Injury				PERCENT WEED CONTROL: Prickly Lettuce				Annual Grasses				Salisfy			
		R1	R2	R3	Avg	R1	R2	R3	Avg	R1	R2	R3	Avg	R1	R2	R3	Avg
terbacil + Crop Oil	2 + 1 gal	0	0	0	0	98	99	100	99	100	100	100	100	50	50	40	46
terbacil + Crop Oil	2 + 3 gal	0	0	0	0	100	100	100	100	100	100	100	100	60	55	60	58
terbacil + oryzalin + crop oil	1.5 + 1.2 + 1 gal	5	5	0	3	100	100	96	98	100	100	100	100	70	60	75	68
terbacil + napropamide + crop oil	1.5 + 4 + 1 gal	5	10	0	5	100	100	100	100	100	100	100	100	60	70	70	67
2 (terbacil + crop oil)	2 (1 + 1 gal)	0	0	0	0	85	95	95	91	100	100	100	100	60	65	55	60
terbacil + paraquat + X-77	2 + .5 + .5%	0	0	0	0	100	100	100	100	100	100	100	100	95	90	95	93
terbacil + 2,4-DB	2 + .5	0	0	0	0	96	100	100	98	100	100	100	100	90	94	95	93
terbacil + 2,4-DB	2 + 1	0	5	0	2	100	99	100	99	100	100	100	100	95	85	94	91
2,4-DB (Dormant)	0.25	30	30	40	33	40	30	30	33	10	0	0	3	30	20	20	23
2,4-DB (Dormant)	0.50	20	25	30	25	50	40	50	47	20	0	0	7	40	50	20	36
2,4-DB (Dormant)	0.75	15	20	20	18	60	50	60	56	20	10	20	16	40	30	40	36
2,4-DB (Dormant)	1.0	5	5	0	3	90	93	85	89	30	40	40	36	70	75	70	71
2,4-DB (Dormant)	2.0	0	0	10	3	99	96	80	91	60	50	40	50	95	92	85	90
2,4-DB (Dormant + 3-4")	0.5 + 0.5	10	0	0	3	90	85	90	88	60	50	50	53	90	85	85	86
2,4-DB (Dormant + 3-4")	1.0 + 1.0	10	10	10	10	100	98	100	99	90	60	70	73	98	98	100	99
bromoxynil	0.5	20	25	20	22	70	60	60	63	0	0	0	0	40	40	40	40
bromoxynil	0.75	15	20	20	18	60	50	70	60	0	0	0	0	30	10	40	26
bromoxynil	1.0	15	10	15	13	70	80	80	76	0	0	0	0	30	55	55	46
metribuzin	0.5	0	0	0	0	87	92	95	91	90	95	90	91	60	50	65	58
metribuzin	1.0	0	0	10	3	95	98	98	97	93	95	98	95	65	60	70	65
Vel 5026	1.0	0	5	0	2	99	94	100	97	75	85	95	85	50	65	70	61
Vel 5026	0.5	0	0	0	0	75	80	90	82	80	75	85	80	40	60	50	50
oxyflurofen + paraquat + Ag 98	.375 + .5 + .5%	0	0	0	0	98	100	100	99	95	100	100	98	65	60	60	61
oxyflurofen + paraquat + Ag 98	.5 + .5 + .5%	0	0	0	0	95	100	98	97	95	100	100	98	70	70	65	68
oxyflurofen + Ag 98	1.0 + .5%	0	0	0	0	98	98	98	98	98	98	98	98	85	80	80	81
Check	-	60	50	45	52	0	0	0	0	0	0	0	0	0	0	0	0

Rating = 0 = No effect, 100 = Complete Control

CONTINUATION OF TABLE 6

Location- Ted Frahm Farm, Nyssa, Oregon

Date of Application- March 10, 1978

Application Information:

1. Applied with single wheel bicycle plot sprayer with 8.5 foot boom. Nozzles were 8003 teejet spaced to apply a double overlap treatment.
2. Spray pressure 40 psi- applied 40.5 gal. of water per acre.

Air temperature- 63^{0} F

Soil texture: Clay loam, moist on surface

Plant growth at time of application:

Peppermint- dormant (No new growth)

Prickly Lettuce- 2-3 inch rosettes

Salisfy- Seedlings with up to 3 inch rosettes

Final evaluation- August 7, 1978

Residue sampling- August 7, 1978

Table 7 Crop Tolerance and Goldenrod Control with Basagran (bentazon). Ontario and Nyssa, Oregon 1978

Treatments	Rate lbs ai/ac	Crop Injury 1) S1	S2	S3	S4	Avg	Goldenrod Suppression S1	S2	S3	S4	Avg
bentazon	2	0	0	0	0		50	42	63	58	53
bentazon + crop oil 4)	2 + 1 gal	0	0	0	0		60	60	70	68	64
bentazon + Mor Act 5)	2 + 1 qt	0	0	0	0		57	80	75	70	70
bentazon 2)	2 (2)	0	0	0	0		96	80	82	83	85
bentazon + crop oil 2)	2 (2 + 1 gal)	0	0	0	0		97	80	82	84	86
bentazon + Mor Act 2)	2 (2 + 1 qt)	0	0	0	0		97	85	88	90	90
bentazon 3)	2	0	0	0	0		71	48	60	65	81
bentazon + terbacil + crop oil	2 + 1.5 + 1 gal	0	0	0	0		83	55	83	80	75
Check	-	0	0	0	0		0	0	0	0	0

1) Total of 4 sites with average of 3 replications from each site.

2) Repeated applications with rate in parenthesis applied each time.

3) Single application applied at time of 2nd application on repeat treatments.

4) Red-Top (Wilbur-Ellis) superior spray oil N.W.

5) Red-Top (Wilbur-Ellis) MorAct adjuvent

Application Information

	Site 1	Site 2	Site 3	Site 4
Date of first application	5/13	5/19	5/19	5/13
Date of repeat application	5/25	5/25	6/14	5/21
Size of mint (first application)	4-5 inches	4-6 inches	4-6 inches	4-6 inches
Size of Goldenrod (first application)	6-18 inches	8-20 inches	8-20 inches	6-20 inches
Air temperature (first application)	78^{0} F	70^{0} F	70^{0} F	75^{0} F
Air temperature (second application)	63^{0} F	63^{0} F	81^{0} F	79^{0} F
Soil moisture (first application)	80%	70%	90%	80%
Skies (first application)	P. Cloudy	P. Cloudy	P. Cloudy	P. Cloudy
Skies (second application)	P. Cloudy	P. Cloudy	Clear	Clear

TESTING OF ONION VARIETIES

Charles E. Stanger and Dwight S. Fisher

In 1978, approximately 6,800 acres of onions were grown in Malheur County. Average yields in 1978 ran about 450 cwt/acre with estimated sales at $8.5 million. About one-half the onions produced in the Treasure Valley are grown in Malheur County. Several different types of onions are grown including yellow and white sweet spanish, white globes, and red onions of the globe type. By far the largest acreage is planted to onions of the yellow sweet spanish variety.

Research trials presently underway with onion production at the Malheur Experiment Station include testing of cultivars, cultural improvement, bulb storage quality,and weed control.

Introduction

The year 1978 concluded the 4th year of testing onion varieties at the Malheur Experiment Station. Each year about 35 different varieties are evaluated for total yield, bulb size, maturity date, storage quality, percent solids, ring thickness,and number of hearts. Seed evaluated include both commercial and semi-commercial lines. Companies furnishing seed are Dessert, Crookham, Asgrow,and Keystone.

Experiment Procedures

Raw onion seed was planted the 1st week of April with a single row cone seeder. Each plot was 22 feet long, two rows wide and each entry was replicated five times in a randomized complete block experimental design. Onions were planted in single rows with 22 inches between each row. Fertilizer (P_2O_5-100 units and N - 200 units) and herbicides (Dacthal - 9 lbs ai/ac) were applied preplant.In addition to Dacthal preplant, Tok (ec) was applied postemergence when the onions were in the 1 and 2 leaf stage of growth at 2 lbs ai/ac broadcast each application. At the two leaf stage of growth, the onions were hand thinned to a final population of four plants per linear foot of row. The onions were irrigated between each row by furrow irrigation.

The onions were lifted on September 13 and topped on September 25. Data recorded in Table 1 were determined when onions were removed from storage on December 12-14.

Results of Testing Onion Varieties

The performance of each variety for yield and quality is summarized in Table 1 and Fig. 1, 2 and 3.

Total yields were generally lower this year and the incidence of storage rot much higher than normal. Generally, the higher yielding and later maturing varieties resulted in the greatest losses from rot during storage. Some early varieties were nearly equal in total yield at harvest, yet stored well. Varieties which have stored well during previous years and continued to do so this year under extreme disease pressure include Early Shipper, Ringmaker, Golden Treasure, Golden Cascade, and Cima. These varieties are early maturing with high storage quality. Varieties which have not stored well include Amigo, Victory, Crookham YSS, Utah YSS, Dai Maru, Inca, El Diablo, and Valencia. Generally, varieties of the white sweet spanish and globe varieties are very susceptible to neck rot and up to 80% of the bulbs were lost during 8 weeks of storage.

Data collected to date show that proper selection of onion variety is important to commercial growers depending on when they intend to market their crop. Late maturing varieties are generally high yielding and even though unsatisfactory for storage may be a good choice for an early market crop. Whereas, early maturing cultivars even though lower in initial yield when measured at harvest time, generally keep better in storage and will result in a higher yield of marketable onions after an extended period of time in storage.

Table 1 A comparative evaluation of several entries of sweet spanish varieties of onions for total yield, bulb size, quality, and storability. Malheur Experiment Station 1978.

Entries	Bulb diameter 2¼-3"	3-4"	>4"	No. 2's	Total yield	Jumbo's	Rot	Maturity ratings 8/21	9/8	Solids
	cwt per acre					%	%			%
Autumn Surprise	13	148	230	50	579	83	21	3.4	6.8	10.97
Bronze Marvel	19	173	179	33	539	84	24	3.0	5.2	-
Bronze Wonder	20	159	252	38	621	85	23	2.6	5.6	10.06
Challenger	12	167	260	10	576	91	21	4.6	7.0	9.64
Dai Maru	11	112	148	13	543	87	44	1.6	1.8	9.05
Early Shipper	11	149	312	24	596	92	16	4.8	7.8	9.92
Early Shipper "75"	25	238	179	13	524	91	13	7.6	9.2	-
Golden Treasure	11	196	227	31	534	90	13	6.2	8.8	9.65
Ringmaker	13	158	358	15	645	95	15	4.8	8.4	9.01
Ring King	14	178	190	33	536	84	20	3.0	5.6	9.85
W 187	13	207	189	27	557	89	21	2.8	5.8	10.43
N 96	5	110	360	22	645	92	22	3.2	6.2	8.69
N 38	17	138	199	30	575	86	30	1.6	3.2	10.32
W 181	10	120	249	2	604	93	35	3.0	3.6	8.89
Crookham YSS-W	12	113	213	33	620	85	37	1.4	2.4	10.28
Cima	21	170	223	22	538	89	16	5.4	7.8	10.74
Valencia	10	106	180	17	581	90	43	1.0	1.6	9.98
XP-419	8	96	318	7	645	89	30	3.0	5.0	9.98
Inca	7	70	285	9	702	91	45	3.2	3.6	8.49
XP-45	19	149	199	57	549	81	21	3.2	9.8	7.94
1010/Peck	8	161	332	1	653	95	22	4.0	8.0	8.91
Brahma Twiss 76	24	214	154	10	507	90	17	6.6	8.8	10.10
Bullring	15	227	197	3	572	92	19	5.4	7.0	10.51
1010/Gill	15	171	264	49	612	87	17	7.6	9.0	9.23
Spanish 9010	16	145	193	21	542	86	26	5.6	7.6	9.58
Golden Cascade	8	145	313	6	594	95	18	7.4	9.0	9.55
Peckham	18	190	232	6	615	91	25	2.0	4.4	8.04
Amigo	13	139	158	13	639	86	46	1.4	2.8	-
Utah YSS	11	174	85	56	533	79	38	3.0	4.8	10.96
Monarch	17	120	365	35	724	86	23	2.2	3.8	9.23
Victory	6	146	240	34	640	86	29	2.2	5.8	10.45
Spanish Beauty	12	134	215	14	546	94	30	2.8	5.0	-
Amarillo	21	203	174	36	516	87	17	6.4	8.6	-
LSD 0.1	9	41	63	15	49	5	11			
LSD 0.05	10	49	75	17	59	6	13			
LSD 0.01	14	65	100	23	78	7	17			

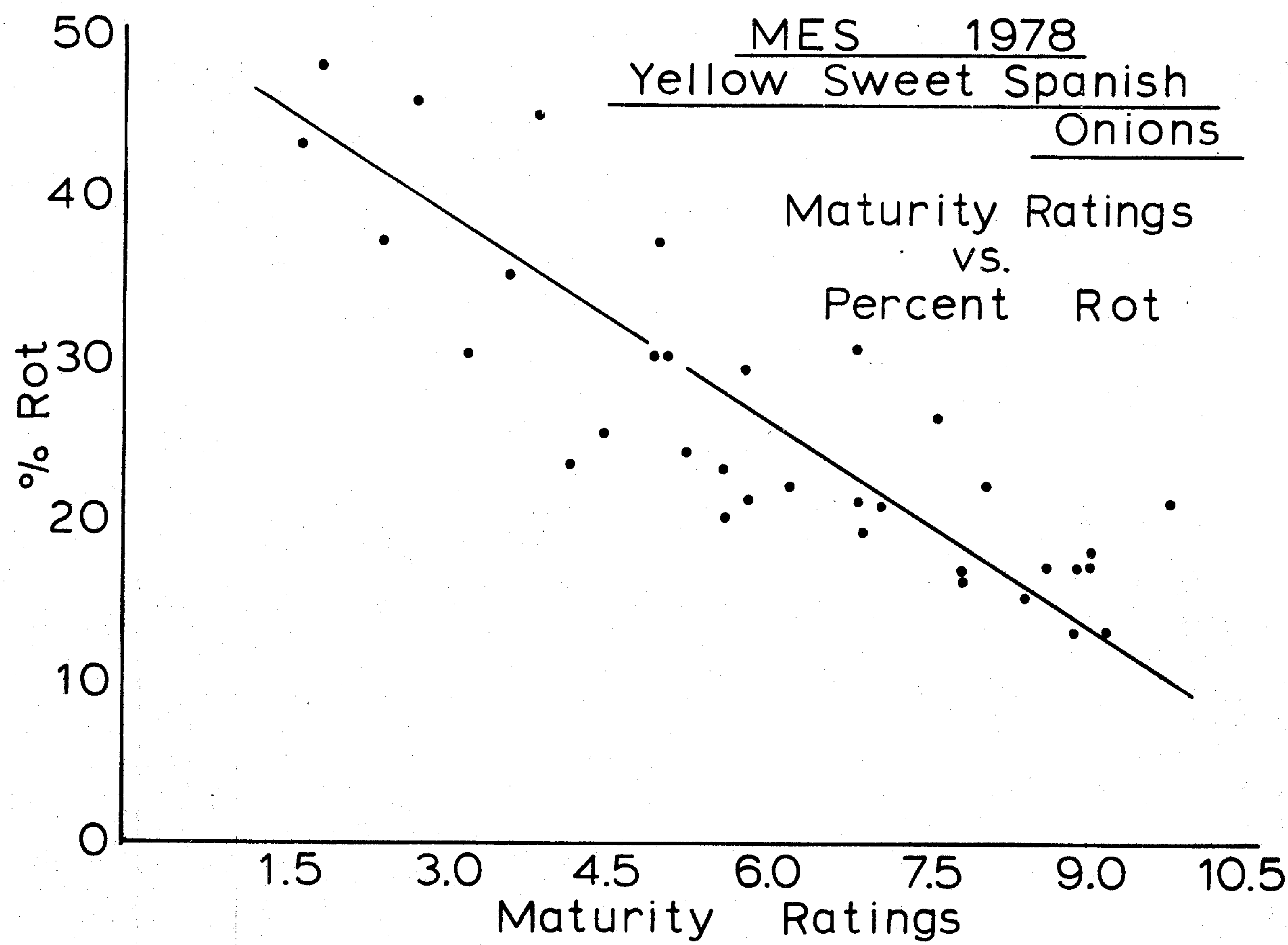

Fig. 1 Relationship between maturity at time onions when lifted and percent storage rot for each onion selection of the yellow sweet spanish variety. 1978.

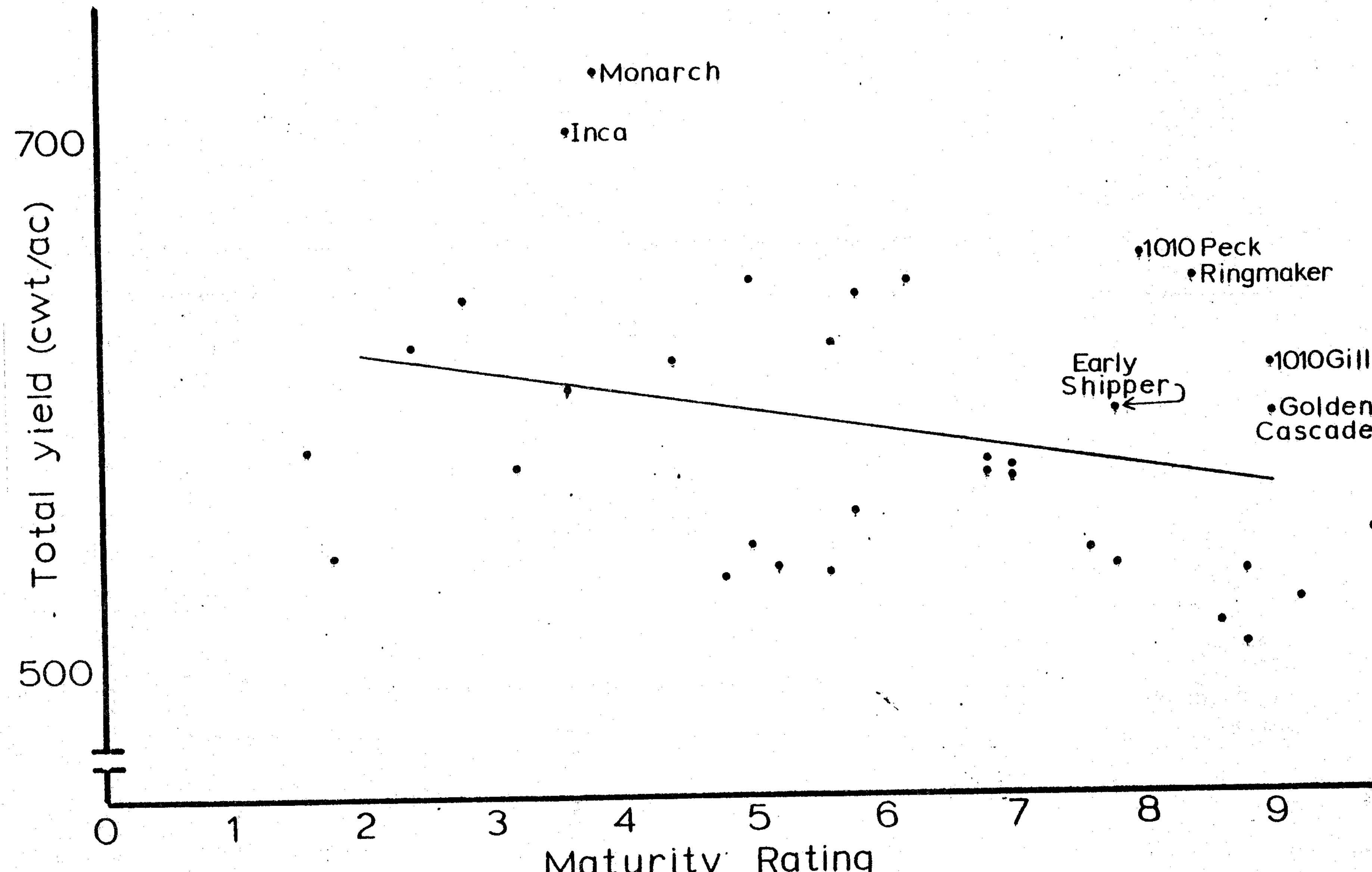

Fig. 2. Relationship between total yield and onion maturity for each variety. Maturity ratings were taken just prior to field lifting.

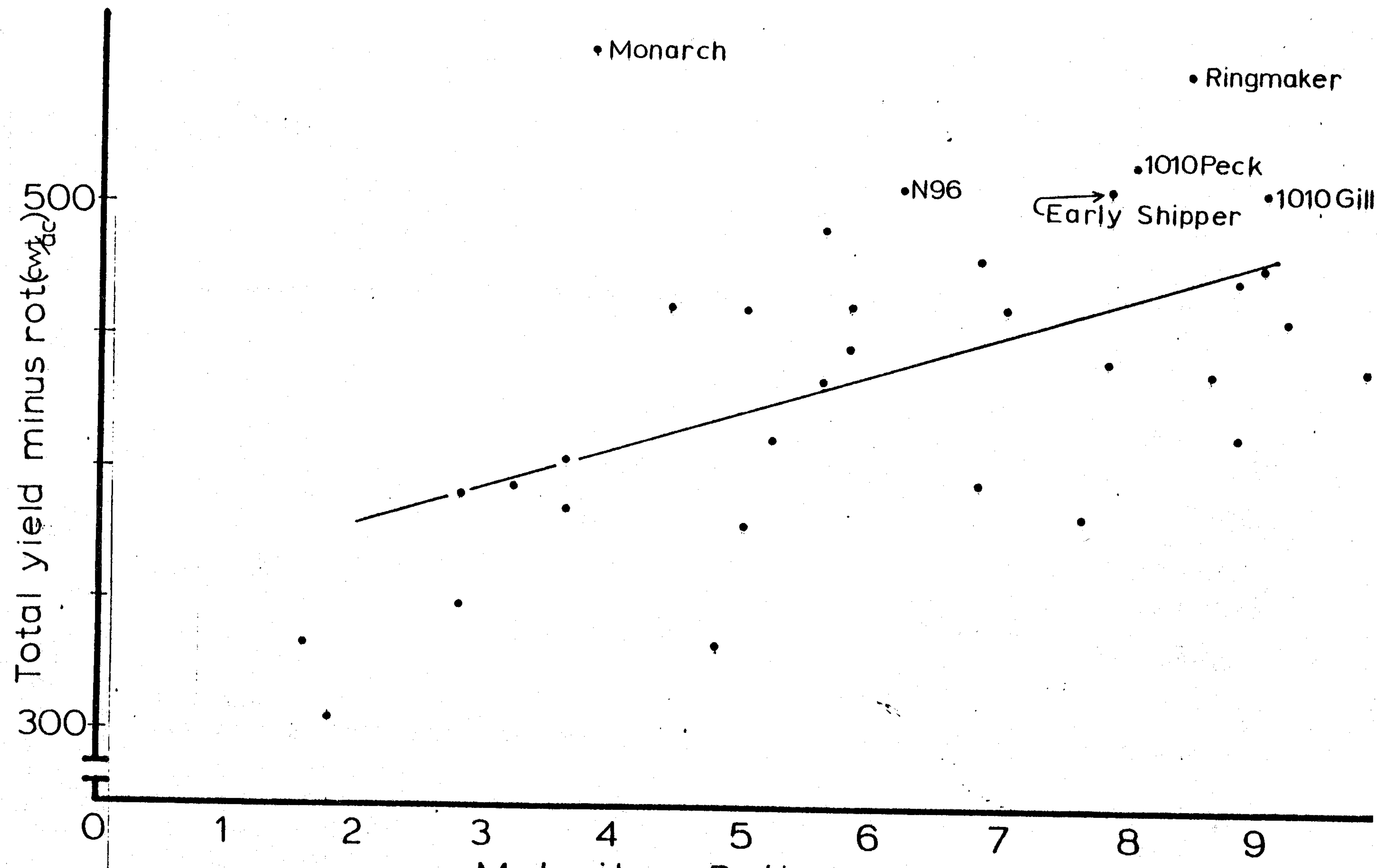

Fig. 3. Relationship between total yield minus rot and onion maturity for each onion variety. Maturity ratings were taken just prior to field lifting.

WEED CONTROL IN SPRING SEEDED ONIONS FROM HERBICIDES APPLIED IN THE FALL

Charles E. Stanger

Introduction

The year 1978 was the third year that herbicides applied in the fall have been evaluated for selective weed control in spring seeded onions. Nearly all herbicides evaluated as fall applied treatments have persisted over winter and resulted in weed control and selectivity to onions at least equal to the same herbicides applied and incorporated in the spring. Spring preplant incorporated herbicides are effective, but in most cases the soil moisture needed for germination of the seeded crop is lost when the soil is stirred during incorporation. Herbicides applied in the fall are in the soil and activated for control of weeds when the spring crop is planted.

Experimental Procedures

Several different herbicides were applied the first week during October 1977 to bedded and non-bedded land during fall soil preparation for spring onion planting. On bedded land, the herbicides were sprayed in 12-inch bands on flat soil and the soil adjacent to the band covered over the herbicide, forming a peak shaped bed with the herbicide layer located near the base of the bed. In the spring, the beds were pulled down until the soil surface was nearly flat and the onion seed drilled into the herbicide treated layer of soil. The herbicide treatments were applied to the non-bedded land as broadcast applications and incorporated with the top 1-2 inches of soil and left over winter. In the spring, the soil was harrowed lightly and the onions seeded on March 15.

The treatments were evaluated in mid-May for percent weed control and crop tolerance. Following evaluation for weed control, the plots were weeded and the two center rows of each four row plot thinned to an average of four plants per foot of row. Total yield, bulb size, and quality data were collected when the plots were harvested on September 24 and 25.

Results from Fall Herbicide Treatments

All the herbicides evaluated in 1977-78 persisted over winter and resulted in excellent weed control with selectivity to the crop. Fall applied Dacthal (DCPA) was much more effective in controlling weeds than when applied as a post-plant preemergence incorporated treatments. Weed control persisted for as long into the growing season from fall treatments as from spring treatments. Combination treatment of ethofumesate (Nortron) + diclofop (Hoelon) persisted to control water grass until harvest at the optimum usable rate of 2 + 1.5 lbs ai/ac respectively. Yields and bulb size were not significantly affected by herbicide treatments, but in most cases treated plots yielded better than untreated checks, probably because of weed competition occurring early in the season before the plots were weeded.

Table 1 The percent weed control, crop injury, and yield of onions spring seeded when herbicides were applied the previous fall on non-bedded land. Malheur Experiment Station. Ontario, Oregon 1978.

Herbicides	Rate	Crop Injury [+]	Percent Weed Control [‡] Ko	Rt	Pk	BrnG	Gf	Alf	Pw	Lq	Yield
	lbs ai/ac										cwt/ac
DCPA	9	0	90	20	45	93	95	10	90	89	798
DCPA	12	0	98	60	70	100	100	10	97	98	836
DCPA + diclofop	6 + 1	0	90	50	60	100	100	10	94	92	941
DCPA + diclofop	9 + 1	0	98	60	60	100	100	10	98	98	931
DCPA + diclofop	6 + 1.5	0	88	40	50	100	100	10	94	93	898
DCPA + diclofop	9 + 1.5	0	98	50	60	100	100	15	98	98	898
ethofumesate	2	10	95	85	60	100	100	100	100	95	822
ethofumesate	3	30	98	95	75	100	100	100	100	98	846
ethofumesate + diclofop	2 + 1	10	90	89	60	100	100	100	100	92	875
ethofumesate + diclofop	2 + 1.5	10	95	92	80	100	100	100	100	96	827
ethofumesate + diclofop	3 + 1	25	95	94	82	100	100	100	100	96	779
ethofumesate + diclofop	3 + 1.5	30	98	98	80	100	100	100	98	98	779
Hoe 29152	0.5	0	20	30	25	83	85	0	15	30	846
Hoe 29152	1.0	0	20	25	20	90	88	0	10	20	841
Hoe 29152	1.5	0	25	25	25	98	92	0	15	20	789
Control	-	0	0	0	0	0	0	0	0	0	822

[+] Rating: 0 = no effect, 100 = plant elimination

Plot size: 4 rows X 30 feet

Herbicides applied on 10/13/77

Onions planted: 3/27/78

[‡] Ko = kochia
Rt = russian thistle
Pk = prostrate knotweed
BrnG = barnyard grass
Gf = green foxtail
Alf = seedling alfalfa
Pg = pigweed
Lq = lambsquarters

Table 2 The percent weed control, crop injury, and yield of spring seeded onions from various herbicide treatments applied in the fall to bedded land. Malheur Experiment Station 1978.

Herbicides	Rate	Crop Injury[+]	Percent Weed Control[‡] Lq	Pg	Rt	BrnG	Yield
	lbs ai/ac						cwt/ac
DCPA	9	0	87	83	23	87	756
DCPA	12	5	98	96	20	93	772
ethofumesate	2	10	87	95	83	84	749
ethofumesate	3	23	96	100	90	89	725
ethofumesate + diclofop	2 + 1.5	10	90	96	94	100	765
control	-	0	0	0	0	0	721

[+] Ratings: 0 = no effect, 100 = plant elimination

Plot size: 8 rows X 30 feet 4 replications

Applied treatments and bedded on 10/12/77

Onions planted 3/27/78

[‡] Lq = lambsquarters
Pg = pigweed
Rt = russian thistle
BrnG = barnyard grass

WEED CONTROL IN ONIONS FROM SPRING APPLIED HERBICIDES

Charles E. Stanger

Introduction

Research results have shown that herbicides presently registered for use in onions can reduce hoeing costs by 76%. By comparison,experimental herbicides not yet registered can increase this savings in labor costs to 94% if and when they become registered treatments. Research efforts are directed towards evaluating new herbicides, methods and time of applying herbicides for optimum weed control and crop selectivity, and working cooperatively with chemical companies to obtain information which will help towards registration of those herbicides which have a potential use in seeded onions. In most instances, chemical companies are reluctant to register herbicides for use in onions because of the small total onion acreage and liability associated with a high valued crop. When a material is registered, it will undoubtedly exhibit a great deal of crop safety, yet be effective in controlling weeds.

Experimental Methods

Spring applied treatments consisted of preemergence, combination preemergence-postemergence, and postemergence applications. The preemergence treatments were applied after planting and incorporated with a nail-board shallowly with the soil above the planted seed. Postemergence treatments consisted of single and repeat applications. The first application of the repeat treatments was applied when the flag leaf of the seedling onions was fully developed and the first true leaf was approximatley 1-inch long. The second application of the repeat treatments and the single postemergence treatments were applied when the 2nd true leaves were 3/4 to equal the length of the first true leaf.

The treatments were evaluated for percent weed control and crop tolerance in late May. After evaluation, the plots were hand weeded and thinned to an average of four plants per foot of row.

The bulbs were harvested in late September to determine bulb yields, size,and quality.

Results From Spring Applied Herbicides for Weed Control in Onions

Excellent weed control was obtained from several herbicides particularly when preemergence treatments were used in combination with postemergence applications. Dacthal (DCPA) and Nortron (ethofumesate) were generally more effective this year as preemergence treatments because of greater than normal amounts of precipitation following their application.

Herbicides varied in species of weeds controlled (Table 1). Combination treatments were more effective over a range of weed species. The most effective single treatment was Nortron which showed some herbicidal activity on all weed species and was the only herbicide evaluated that was active on germinating alfalfa and red clover. Postemergence applications of bromoxynil in combination with preemergence Dacthal gave excellent control of all weed species except legumes. Bromoxynil was very effective in controlling shepherds purse and prostrate knotweed. Ronstar was active on several broadleaf weed species but did not adequately control shepherds purse, prostrate knotweed or legumes. Hoelon as expected was only active on annual grasses, but showed excellent onion tolerance whether applied singly or in combination with other herbicides. Difference in weed control was not noted this year between repeat and single applications of Tok (ec) or Ronstar. Blazer + surfactant was very effective on lambsquarters, pigweed, kochia, and shepherds purse, but had no herbicidal activity on grasses. Generally all herbicides showed excellent onion tolerance as is reflected in the yield data recorded in Table 1.

Table 1 Percent Weed Control and Onion Tolerance from Herbicide Treatments in 1978 at the Malheur Experiment Station

Herbicides	Time of Application	Rate	Crop Injury[+]	Percent Weed Control[‡] Lq	Pg	Ko	Sp	Pk	BrnG	GrF	Alf	Total Yield
		lbs ai/ac										cwt/ac
DCPA	pei	9	2	91	96	94	30	57	100	100	13	758
ethofumesate	pei	2	8	88	97	93	91	84	100	100	100	728
ethofumesate	pei	3	27	97	99	98	90	87	100	100	100	667
ethofumesate + diclofop	pei	1½ + 1	5	82	89	85	78	70	100	100	100	712
ethofumesate + diclofop	pei	1½ + 2	10	70	82	75	83	78	100	100	100	637
ethofumesate + diclofop	pei	2 + 1	13	78	92	85	80	73	100	100	100	655
ethofumesate + diclofop	pei	2 + 2	18	78	90	82	83	77	100	100	100	605
DCPA + nitrofen ec	pei + post (2 lf)	9 + 4	2	99	100	100	55	58	100	100	23	745
DCPA + bromoxynil	pei + post (2 lf)	9 + 2/3	7	100	100	100	98	97	100	100	23	687
DCPA + nitrofen ec	pei + post (flag + 2 lf)	9 + 2 + 2	3	98	99	98	45	58	100	100	30	717
DCPA + oxadiazon	pei + post (flag + 2 lf)	9 + 3/4 + 1	2	100	100	100	60	90	100	100	37	696
nitrofen ec	post (flag + 2 lf)	2 + 2	2	85	90	80	35	37	52	55	33	735
diclofop	post (flag + 2 lf)	1 + 1	0	0	0	0	0	0	86	88	0	716
diclofop	post (flag + 2 lf)	2 + 2	0	0	0	0	0	0	97	98	0	719
nitrofen + diclofop	post (flag + 2 lf)	1 + 1	0	65	77	67	25	23	83	85	23	717
nitrofen + diclofop	post (flag + 2 lf)	2 + 1	0	83	89	90	30	30	87	88	37	730
oxadiazon	post (flag + 2 lf)	3/4 + 3/4	0	97	98	97	35	33	57	62	30	709
oxadiazon + diclofop	post (flag + 2 lf)	3/4 + 1	2	99	100	99	75	55	95	95	57	764
nitrofen ec	post (flag + 2 lf)	4	0	60	73	65	20	22	63	65	13	682
nitrofen ec + diclofop	post (flag + 2 lf)	4 + 1	2	58	70	63	28	27	80	80	17	692
nitrofen ec + diclofop	post (flag + 2 lf)	4 + 2	0	62	75	67	23	23	78	78	13	732
oxadizon + diclofop	post (flag + 2 lf)	1 + 1	0	99	100	98	70	55	83	83	30	711
oxadizon + diclofop	post (flag + 2 lf)	1 + 2	3	97	99	97	40	33	90	90	32	737
nitrofluorfen + surf.	post (flag + 2 lf)	¼ + 0.05%	7	90	94	94	85	33	7	7	40	689
Control	post (flag + 2 lf)	-	0	0	0	0	0	0	0	0	0	651
LSD 0.05			5	10	8	10	15	16	10	11	16	61

[+]Rating: 0 = No effect, 100 = Plant elimination

‡ Weed Species:

Ko - kochia
Pk - prostrate knotweed
BrnG - barnyard grass
GrF - green foxtail
Pg - pigweed
Lq - lambsquarters
Alf - alfalfa

ONION CULTURAL STUDY

Charles E. Stanger and Dwight S. Fisher

Introduction

Results from variety trials have shown that lines of the yellow sweet spanish variety of onions differ by as much as 16-24 days in dates of maturity. Generally, early maturing lines with dry tops at the time they are lifted keep better during storage and have less neck rot than bulbs which are lifted before the tops have matured and are dry. Previous researchers have observed that the time onions mature can be affected by the total amount of nitrogen applied during the growing season and by the length of the irrigation season. This study was initiated to evaluate the effects of nitrogen and irrigation on time of onion bulb maturity and the resulting effect on storage quality. Treatment variables include two nitrogen rates (150 and 300 lbs per acre), two cutoff dates for the time of last irrigation (August 1 and 20), and three different varieties (Monarch, Bronze Wonder, and Victory).

Experimental Procedure

The study was conducted in a field which had been previously cropped to barley for several years. Soil test results indicated essentially no nitrogen residual to the 3-foot depth. Sixty lbs of nitrogen and 100 lbs of phosphorus per acre were applied in the fall as a broadcast treatment and moldboard plowed. The remainder of the nitrogen to bring the total amount to desired treatment rates of 150 and 300 lbs per acre was applied by combination preplant and sidedress applications. Dacthal herbicide was applied at 7 lbs per acre as a preplant treatment and incorporated with a spike-tooth harrow. The three onion varieties were planted on March 27. Each plot was four rows wide and 50 feet long and each treatment was replicated four times in a split plot experimental design. The onions in the two center rows were thinned to an onion population of four plants per foot on June 5 and 6. A postemergence application of Tok (ec) was applied on May 25 at the rate of 4 lbs ai/ac. The onions were furrow irrigated at weekly intervals beginning in early May and the irrigation by treatments terminated on August 1 and 23.

Harvest began on September 13 when the onions were lifted. The two center rows of each four-row plot was hand topped on September 23 and 24 and left in the field in burlap bags for 2 weeks. At the end of the 2-week drying period, the harvest yields were determined and four boxes (120 lbs) of onions from each treatment were put in storage at the University of Idaho facilities located near Parma, Idaho.

On January 3, 1979, the onions were removed from storage and graded for shrinkage, bulb size, quality, and rot.

The data obtained are recorded in Table 1.

Table 1 Summary of means for yields, percent shrink, and storage rot of onion cultivars treated with different rates of nitrogen and irrigation regimes. Malheur Experiment Station 1978.

Treatments	Total yield at harvest	Total yield at end of storage	Jumbo's	Rot	Shrink
	cwt per acre		%	%	%
1. Cultivars					
Monarch	776	515	87	32	2.7
Bronze Wonder	698	506	92	24	4.6
Victory	718	487	92	30	2.6
2. Last Irrigation					
August 1	693	508	90	24	3.6
August 20	768	497	91	33	3.0
3. Nitrogen Rates					
150 lbs	703	467	90	31	3.3
300 lbs	758	538	91	26	3.3

Results of Onion Cultural Trial

Total yields for each cultivar were increased significantly as nitrogen rates increased from 150 to 300 lbs per acre and as irrigation season was lengthened from August 2 to 23. Individual yields by variety show that Monarch produced 58 cwt/ac more than Victory and 78 cwt/ac more than Bronze Wonder.

The late irrigation resulted in more bulbs rotting during storage thus less yield of marketable bulbs out of storage compared to the August 3 cut-off date. The varieties differed in storability. Bronze Wonder had the lowest incidence of rot (24%); Victory was intermediate (30%), and Monarch highest (32%). Even though Monarch had the highest percent rot in storage, it still produced slightly more marketable onions. Yield of jumbo size bulbs was not affected by nitrogen rates or date of last irrigation, but Monarch consistently produced a lower percent jumbos than the other cultivars.

POTATO VARIETY EVALUATION

Charles E. Stanger

Introduction

Approximately seventy-five different experimental lines of potatoes for early and late harvest are evaluated each year at the Malheur Experiment Station. Each experimental line is evaluated for total yield, tuber size and shape, surface texture, total solids, percent sugars, and fry color. In selecting a new variety for commercial production,processing quality is important because the highest percentage of potatoes grown in Malheur County is sold for processing. Experimental lines entered in the trial are received from plant breeders and other cooperating potato researchers working in the states of Idaho, Washington, Colorado, and California.

Each year about 12,000 acres of potatoes are grown in Malheur County. In 1978 average yields were 360 cwt per acre and gross sales were estimated at $13 million. For the most part, the total potato acreage is planted to Norgold and Russet Burbank varieties. Norgold is harvested early and marketed as fresh pak and for processing. Russet Burbank is processed at harvest time and from controlled storage as late as mid-summer.

Experimental Procedures

Experimental trials consist of early and late harvested varieties evaluated in advanced and preliminary tests. Entries in the advanced trials include potato selections with the highest performance standards when previously evaluated in the preliminary trials. Individual plots in each trial are single row. Plot lengths and number of replications vary between advanced and preliminary trials. Each entry in the advanced trial is 35 hills long and replicated four times. Entries in the preliminary trials are 25-hill plots with three replications. Efforts are made to cut seed at a uniform set size of 2 ozs. Trials are planted in fall bedded ground treated with vernolate in the fall at a rate of 4 lbs ai/ac. During the growing season,dates of emergence, disease incidence, and maturity dates are recorded. Early varieties are harvested during the 1st week of August and late harvest during the 2nd week of October. The vines are beat-off 1 week before harvest date. Each potato entry is evaluated for total yield, tuber size and quality at time of harvest. Ten pound samples of each entry are taken and analyzed for total solids, percent reducing sugars, and fry color by Ore-Ida Foods Company at Ontario, Oregon and by Dr. Joe Pavek at the University of Idaho Experiment Station located in Aberdeen, Idaho.

Results of Potato Variety Trials

Varieties considered as commercial standards are Norgold and Russet Burbank. Commercial acceptance is based upon standards for processing quality. Desirable characteristics for processing include long blocky shaped tubers, high percent number of 10 oz tubers, high in solids, low in percent reducing sugars, and uniformity of internal quality within a single tuber and between tubers within the same variety.

Experimental selections of special interest based upon previous trials include NDA8694-3 (early) and A68678-1 (late). These selections meet most requirements essential for possible commercial release.

Total yields obtained from many selections were excellent in the 1978 trials (Tables 1 and 2). Yields of Russet Burbank were exceptionally high and topped yields of late maturing varieties. Norgold yields were low this year because of a high incidence of disease. Although Russet Burbank yielded well, several experimental selections performed superior in percent 10 oz., total solids, and percent reducing sugars. Experimental lines NDA8694-3 and A68678-1 did well again this year. Seed increase for commercial planting of these varieties is in progress at this time. These lines are being evaluated again in 1979 as acre plantings in commercial fields.

Table 1 Yield and quality of potato lines evaluated in the advanced early harvest trial. Malheur Experiment Station 1978.

Entry	Total Yield	size of No. 1 potatoes: 10 oz	6-10 oz	4-6 oz	No. 2's	Culls	Total Solids	Reducing Sugars	Maturity at Harvest[+]
	cwt per acre						%	%	
A66107-12	339	55	115	77	16	76	21.4	0.30	2.0
A68588-16	349	118	98	46	36	51	21.1	0.47	1.4
A68678-1	307	83	93	50	19	62	23.2	0.38	1.7
A68710-5	403	106	102	40	98	57	20.9	0.38	2.7
A7079-3	340	120	93	52	11	64	21.7	0.48	3.7
A72360-5	331	78	109	63	12	69	-	-	2.4
A72687-11	448	134	173	65	17	59	22.4	0.30	5.4
ALR22-2	402	114	115	74	17	82	22.6	0.40	7.0
NDA8694-3	422	120	129	79	28	66	22.3	0.28	3.4
Norgold	233	78	49	29	17	60	20.4	0.60	7.0
Pioneer	384	130	98	68	32	56	22.2	0.26	5.0
$LSD_{0.05}$	91	48	44	21	38				

[+]Maturity rating - 1 = green vines, 10 = dead vines.

Most lines each year evaluated in both the preliminary and advanced trials are dropped from further testing. Many experimental lines by the time they are entered into trial at this location are 5 years old. Most often it takes 12-15 years of research time before varieties are fully tested and released to commercial production. Many potential lines are screened but very few ever fulfill the required standards for commercial acceptance.

TILLAGE PRACTICE EVALUATION FOR POTATO PRODUCTION

Dwayne Buxton and Jim Burr

Introduction

Many of the intensely row cropped soils in the Treasure Valley have developed low water infiltration rates. Probable causes are low organic matter content, soil compaction from large tractors and equipment, sealing of soil surface by some tillage operations, and possible changes in soil chemical and physical properties as a result of intensive use of fertilizers. Although production of most crops can be adversely affected, the negative influence on potato yield and quality may be greater than on other crops. In potato management, high soil moisture availability with minimum fluctuations (between 90 and 65% of available soil moisture) between irrigations is important for producing high yields of quality potatoes.

Potato production is frequently characterized by extensive machine traffic which can compact and seal soils resulting in reduced water infiltration rates. If the natural infiltration rate is low, these machine operations can reduce it to the point where it is difficult to fill the soil profile during irrigation.

The crop naturally has a shallow root system (usually less than 2 feet deep) with limited water extraction capacity. Restricted rooting as a result of soil compaction further impairs the root's water supplying capacity.

Most soils contain a network of large pores in the form of cracks, worm holes, and root channels. When this system is functioning properly, it carries water into the soil and exhausts soil air. Tillage resulting in a smooth surface can seal these channels and retard water infiltration and air exhaust. Different tillage operations create various physical conditions of the soil surface. A crop residue mulch and some minimum tillage practices create conditions conducive to rapid infiltration. However, if infiltration is too rapid, it is difficult to surface irrigate potatoes without excessive deep percolation.

Experimental Procedure

A study was initiated in 1978 on the Malheur Experiment Station to evaluate the influence of several tillage practices on soil compaction and water infiltration rate in potatoes. The study is continuing and this article presents a progress report. The practices applied were as follows:

1. Previous crop: wheat and barley
2. Fertilizer application: 90 pounds per acre of phosphate and 220 pounds per acre of nitrogen
3. Planting date and row spacing: May 11 on 36-inch rows
4. Irrigation: alternate rows on a 4-6 day schedule
5. Number of replications: five
6. Plot size: 40 by 100 feet with 40 feet of two rows harvested for yield
7. Harvest date: September 21

Five sets of tillage treatments were evaluated as follows after the grain stubble was disked:

1. Fall plow, conventional spring work, and five post-plant cultivations.
2. Fall chisel and plow, conventional spring work, and five post-plant cultivations.
3. Fall chisel and plow, conventional spring work, and three post-plant cultivations.
4. Fall chisel, conventional spring work, and three post-plant cultivations.
5. Chisel center of bed (precision chisel) and three post-plant cultivations.

Treatments 2, 3, and 4 were chiseled twice at right angles in December. The chisel shafts were 18 inches apart and inserted about 18 inches into the ground. The bed centers of Treatment 5 were chiseled to a depth of 14 inches before planting.

Between August 3 and 8,measurements were made in each plot of compaction with penetrometer resistance (measured from the force required to push a pointed probe into the soil) to a depth of 2 feet and water infiltration rate using 12-inch diameter metal cylinders. These were driven 3-4 inches into the ground and filled with water. Water infiltration was not measured until 2 hours after water was placed in cylinders. Measurements were made in both wheel trafficed furrows and those without wheel traffic.

Results and Discussion

Although the tillage treatments had a large influence on rate of water infiltration during the first few irrigations, there was no statistically significant effect when the measurements were taken in August (Table 1).

During the early irrigations, water infiltrated rapidly into plots that were chiseled. Apparently wetting of the soil profile caused the soil to settle enough in these plots to subsequently greatly reduce water infiltration.

Wheel trafficed furrows had a much lower rate of water infiltration than those not receiving wheel traffic in August. When averaged over the tillage treatments, the infiltration rate of non-wheel furrows was over six times higher than that of furrows that supported tractor wheels during machine operations. The values were 0.11 and 0.72 inches per hour. Penetrometer resistance up to 12 inches beneath wheel furrows was much higher than beneath non-wheel furrows (Fig. 1).

Studies with other crops indicate that root growth is reduced by 60-90% when penetrometer resistance reaches 300 psi and that root growth is stopped in soils with penetrometer resistance of 400-600 psi.

Table 1. Effect of tillage treatments on water infiltration, potato yield, potato rot, and amount of clods in field.

Treatment	Infiltration rate	Total yield	Water rot	Clods+
	inches/hour	cwt/ac	%	
1. Plow, 5 cultivations	0.65	350	4.1	1.4
2. Chisel, plow, 5 cultivations	0.57	264	6.1	1.8
3. Chisel, plow, 3 cultivations	0.38	258	8.1	1.6
4. Chisel, 3 cultivations	0.20	343	2.4	2.0
5. Precision chisel	0.30	292	0.5	3.4
Sign. level	ns	15%	5%	5%
LSD (5%)	-	-	4.1	1.4

+0 = none, 5 = extremely cloddy

Although tillage treatments had little consistent effect on water infiltration in August, these treatments had marked effects on penetrometer resistance (compaction) especially under furrows, as shown in Fig. 2 and 3. A comparison of treatments 1 and 2 shows the marked effect of chiseling in reducing soil compaction in the top 12 inches of soil beneath the furrows (Fig. 2) and at 16 inches beneath the bed surface (Fig. 3). Plowing resulted in compaction at depths of 16 and 20 inches below the furrows (Fig. 2) and at 24 inches below the bed surface (Fig. 3) (compare treatments 3 and 4). This effect resulted from wheel traffic from the tractor in the bottom of the plow furrow. The effect was large in this study because a two-bottom plow was used resulting in wheel traffic in every other plow furrow. Precision chiseling the center of beds in treatment 5 reduced penetrometer resistance to the 12-inch depth below bed surface (Fig. 3).

Generally penetrometer resistances below beds in this study were low enough to afford only limited restriction to root growth in the top 12 inches of soil (Fig. 3). Even at deeper depths, only a few measurements exceeded 500 psi.

Potato yields were highest when the soil was plowed or chiseled but not when both were done in combination (Table 1). The yields were somewhat inconsistent among replications which was probably caused in part by a moderate blackleg infestation and some water rot of the potato tubers. Precision chiseling (treatment 5) resulted in an intermediate yield (Table 1) level which probably was limited by the relatively shallow depth of chiseling (Fig. 3).

Very little water rot was associated with precision chiseling (Table 1). However, high levels of rot occurred when the potato crop was both chiseled

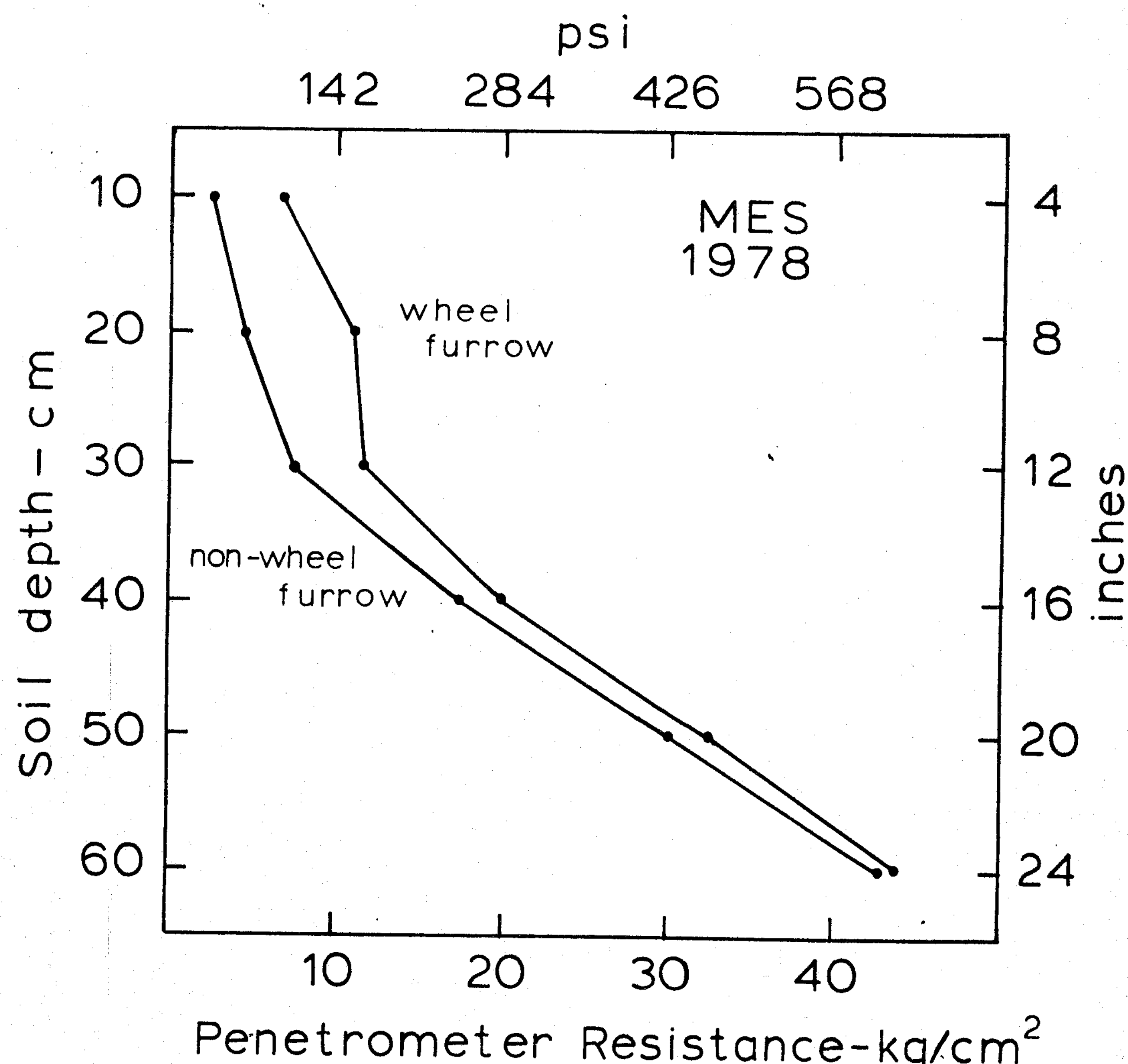

Fig. 1 Penetrometer resistance beneath furrows that had wheel traffic and furrows without wheel at the Malheur Experiment Station.

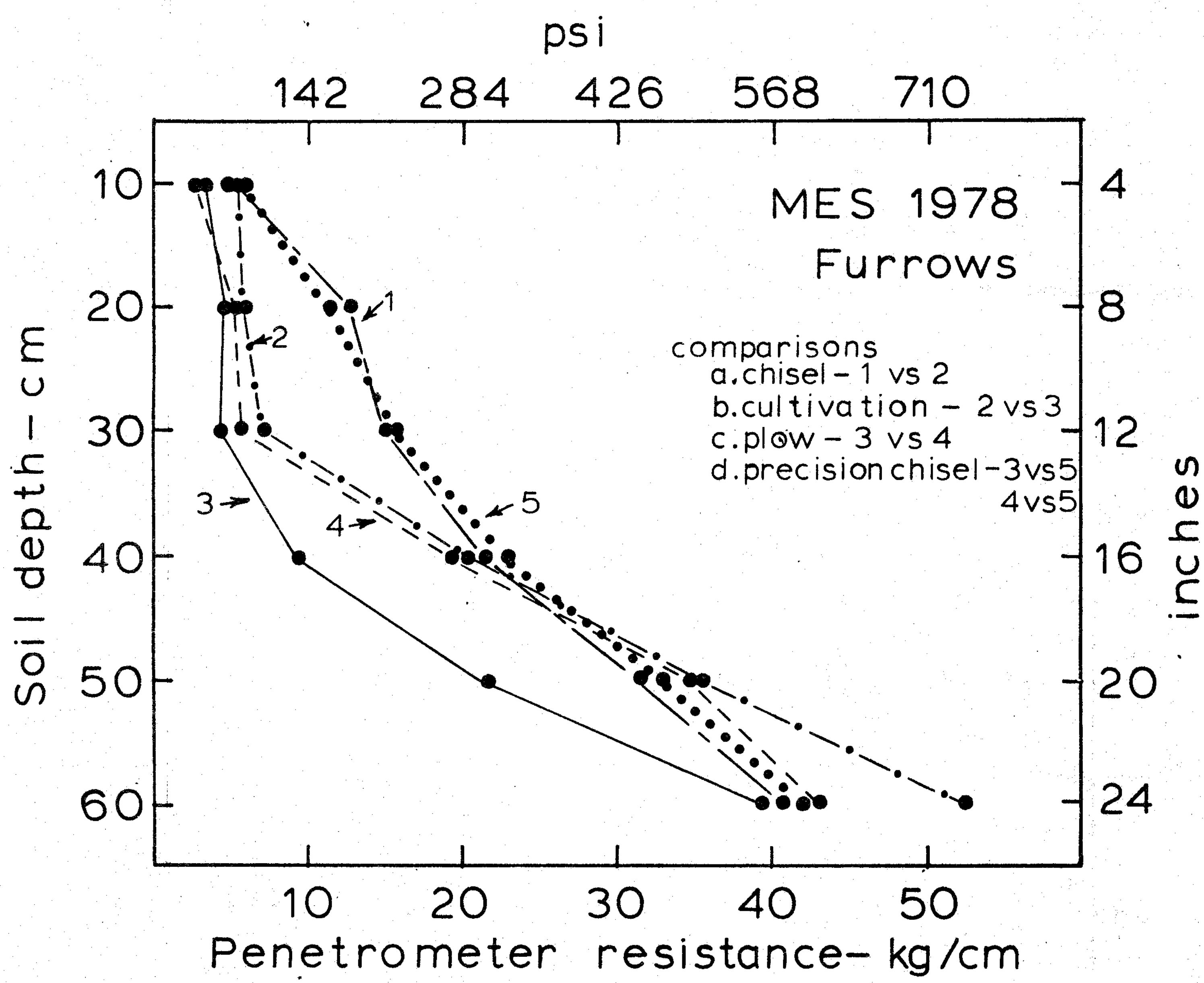

Fig. 2 Penetrometer resistance beneath furrows of tillage study at the Malheur Experiment Station. See text for description of treatment numbers.

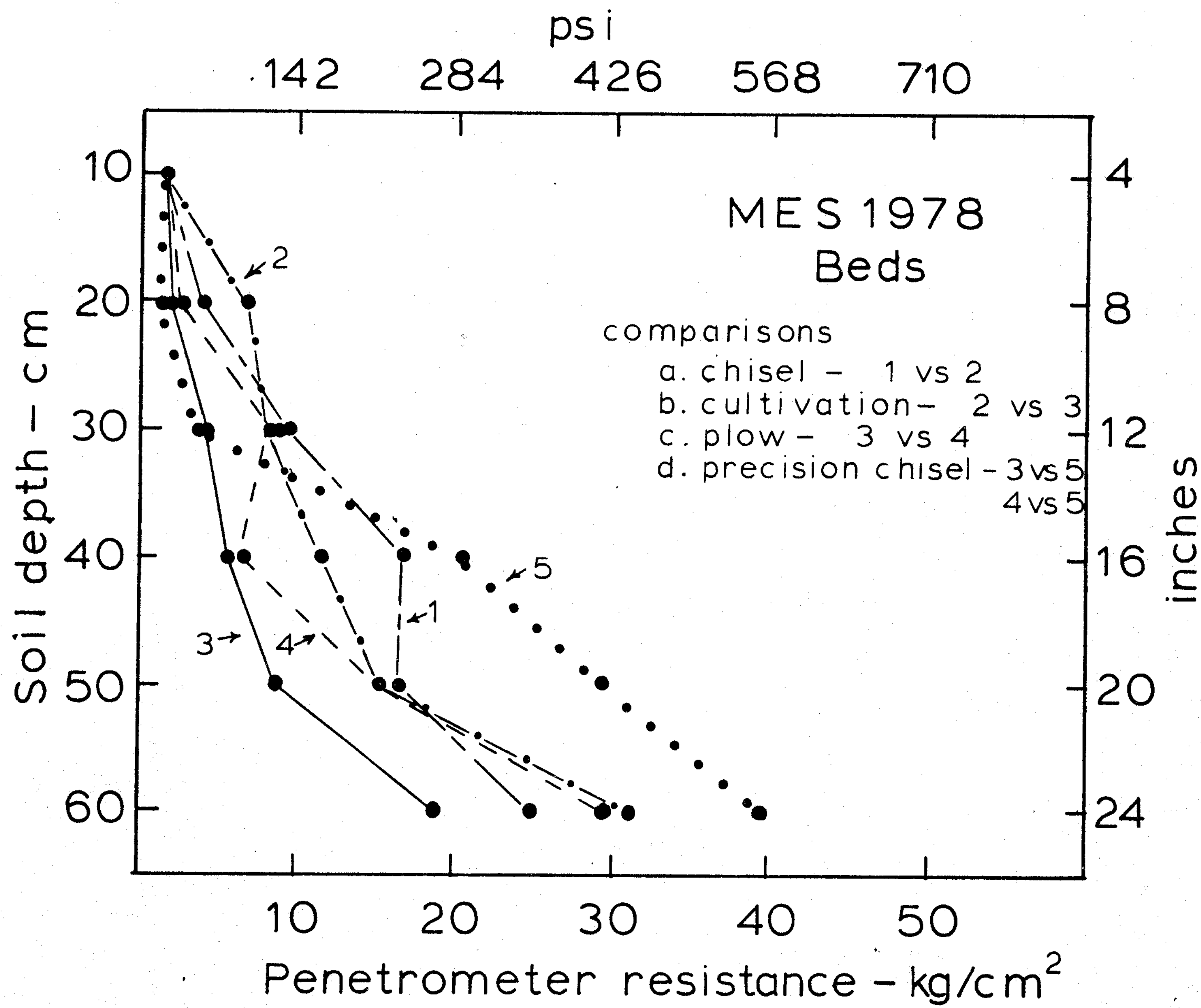

Fig. 3 Penetrometer resistance beneath beds of tillage study at the Malheur Experiment Station

and plowed (treatments 2 and 3 in Table 1). Precision chiseling resulted in cloddy soil at harvest (Table 1) which probably occurred because of the soil being wet when this treatment was applied in the spring. The other treatments were applied in the fall which allowed clods to be broken up by freezing and thawing during the winter.

Discussion

Although plowing in combination with chiseling did not result in highest yields, here, in fields where soils are more compacted than in this study, a yield advantage may occur. In these treatments, initial water infiltration rates were high in the spring which appears to have been associated with over irrigation resulting in a high amount of water rot (Table 1). All treatments were irrigated on the same schedule. Lighter irrigations of treatments 2 and 3, if possible, would probably have improved yields in these treatments.

Although precision chiseling of only potato beds did not result in highest yields (probably because of shallow chiseling) the practice seems to have merit. With normal chiseling and field preparation, several operations occur after chiseling which can recompact the soil. On the other hand, some fields that are intensively chiseled may have soil so loose that it is difficult to surface irrigate without excessive deep percolation of water into the soil profile and deep movement of nitrogen. With precision chiseling of beds, only a few field operations are required after beds are formed so that recompaction of soil is reduced. In addition, the irrigation furrows are not excessively loose so as to interfere with irrigation and restrictive zones beneath the plants are broken so that water and roots can penetrate into the soil profile. Also, less energy is required because the shanks are 36-inches apart instead of 18-inches apart and the field is only chiseled once.

WINTER AND SPRING BARLEY VARIETY TRIALS

E. Neil Hoffman, Dwayne Buxton, and Warren Kronstad

Barley varieties have been evaluated nearly every year since the founding of the Malheur Experiment Station in 1942. During this time, many winter and spring varieties and experimental lines have been tested. The tests have generally been conducted with small plots that were about 25 feet in length and 3 feet wide with four replications. Fertility levels were moderate.

Winter Barleys

High yielding winter barley varieties have generally shown a 20-25 bushel per acre yield advantage over high yielding spring barley varieties. Important winter barley varieties that are now grown in the Treasure Valley include Boyer, Luther, Kamiak, and Schuyler. (For a more complete description of most of the barley varieties discussed in this section, see Rohde, C.R. 1978. Cereal variety descriptions. Oregon Agric. Exp. Stn. Columbia Basin AGric. Res. 1978 Progress Report. p. 12-25.) All are six-row barleys grown as feed grains. The first three were developed by the Washington Agricultural Experiment Station and Schuyler was developed by the New York Agricultural Experiment Station.

The highest yielding variety in recent tests is Boyer (Table 1). Averaged for several years, Boyer has yielded about 6% more than Luther. Yields of Kamiak and Schuyler have averaged 8-9% less than Luther. Boyer is a medium short, mid-season variety released in 1975. It has a grain test weight similar to Luther. It is moderately winterhardy being equal to Kamiak and better than Luther. Boyer is more resistant to lodging than Luther, Kamiak, or Schuyler. It is earlier in maturity than Luther but later than Kamiak.

Table 1. Summary winter barley yields at the Malheur Experiment Station

	Harvest Year							Avg. yields as percent
Variety	1972	1973	1974	1975	1976	1977	1978	of Luther+
	bushel/acre							
Boyer	133	113	-	147	167	160	133	106
Luther	132	126	147	144	149	118	137	100
Kamiak	129	88	146	144	153	92	-	91
Schuyler	131	102	143	107	-	-	147	92

+calculated by computing percentage yield of Luther and then averaging for years in which variety was included in test.

Spring Barleys

Spring barley varieties of interest in the Treasure Valley include Steptoe, Vale 70, Blazer, Kombar, Lud, Klages, Kimberly, and Vanguard. The first four are six row barleys while the last four are two row varieties. Blazer, Klages, Kimberly, and Vanguard have been designated as malting barleys. In recent tests at the Station, the highest yielding varieties have been Lud and Steptoe (Table 2).

Lud is a medium short, late maturing feed grain released in 1975 by North American Plant Breeders. Steptoe is a medium height, early feed grain released in 1973 by the Washington Agriculture Experiment Station. Grain test weight of Lud is about 4 pounds per bushel greater than that of Steptoe. Lud is about 9 days later in maturity and 4 inches shorter than Steptoe. Both varieties are susceptible to lodging under irrigated conditions with high fertility.

Table 2. Summary spring barley yields at the Malheur Experiment Station

Variety	Harvest Year 1972	1973	1974	1975‡	1976	1977	1978	Avg. yields as percent of Steptoe+
	bushel/acre							
Lud	-	-	-	-	108	146	98	101
Steptoe	128	115	138	104	114	143	92	100
Vale 70	123	109	120	86	113	127	86	90
Kombar	-	-	-	-	86	-	-	75
Klages	-	97	108	50	99	132	70	78
Kimberly	-	-	-	80	107	119	84	86
Blazer	-	-	-	-	114	-	83	95
Vanguard	-	-	-	82	100	-	83	86

+Calculated by computing percentage yield of Steptoe and then averaging for years in which variety was included in test.

‡Severe wind storm caused shattering of several varieties

Vale 70 is a medium tall, late maturing variety released in 1970 by the Oregon Agriculture Experiment Station. It is about 2 pounds per bushel less than Steptoe in grain test weight, 8 days later in maturity, and 2 inches taller.

Kombar is a short, late maturing variety released in 1977 by Northrup King Co. after being tested in California and Arizona. Compared to Steptoe, grain test weight is about 3 pounds per bushel less, maturity is 7 days later and it is about 9 inches shorter. It is resistant to lodging.

Blazer and Vanguard were developed by the Washington Agricultural Experiment Station. Blazer is a medium tall, medium maturing variety released in 1974. Grain test weight of Blazer is similar to Steptoe. It is about 4 days later in maturity and about 8 inches taller than Steptoe. Vanguard is a medium tall, medium late maturing variety released in 1971. It has about a 3 pound per bushel greater test weight than Steptoe with similar height and maturity.

Klages and Kimberly were developed by the USDA and the Idaho Agricultural Experiment Station. Klages was released in 1973 while Kimberly was released in 1978. Both varieties are medium tall and late maturing. Grain test weight is about 2 pounds per bushel greater than Steptoe with similar height. Maturity is 8 days later than Steptoe in the case of Klages and about 9 days later than Steptoe in the case of Kimberly.

WINTER AND SPRING WHEAT TRIALS

E. Neil Hoffman and Dwayne Buxton

Spring wheat has been grown in Malheur County since the beginning of irrigated agriculture. Winter wheat was of little importance until the introduction of Gaines in the early sixties.

Gaines was followed by Nugaines, both developed by the Washington Agricultural Experiment Station, Hyslop, McDermid,and Stephens, the latter three from the Oregon Agricultural Experiment Station. Winter wheat, due to higher yields, has become increasingly popular with a substantial portion of the county's more than 35,000 acres of wheat-producing winter varieties.

In recent years, winter wheat has become a rotation crop with onions, potatoes, and sugar beets. Reasons are two-fold (1) high yields provide the grower with a reasonably profitable crop and (2) the straw provides a much needed source of organic matter in otherwise totally row crop farming.

Winter Wheats

The following table summarizes data of certain winter wheat varieties tested at the Malheur Experiment Station.

Table 1. Summary winter wheat yields at the Malheur Experiment Station

	Harvest Year							Avg. yields as as a percent
Variety	1972	1973	1974	1975	1976	1977	1978	of McDermid +
	bushel/acre							
McDermid	121	136	146	149	162	143	106	100
Stephens	127	137	135	141	155	133	110	98
Hyslop	122	114	138	138	148	139	-	94
Gaines	122	126	133	135	144	122	-	92
Nugaines	116	130	131	129	143	120	-	90

+ Calculated by computing percentage yield of McDermid and then averaging for years in which variety was included in test.

Stephens is a bearded, semi-dwarf wheat released in 1977. Grain test weight is about 1 pound per bushel less than McDermid and Gaines, and about 2 pounds per bushel less than Nugaines. Winterhardiness and seedling emergence of Stephens are similar to McDermid. It is about one inch taller than Hyslop and resistant to lodging under irrigation. It matures slightly earlier than McDermid.

McDermid is a bearded, semi-dwarf wheat released in 1974. Grain test weight is about 1 pound per bushel less than Nugaines. McDermid is similar in height and seedling emergence to Hyslop but has slightly earlier maturity. Gaines and Nugaines head 1 to 2 days earlier than McDermid, Stephens, and Hyslop. However, they reach maturity later. Both Gaines and Nugaines are highly resistant to shattering (for more complete description of most of the wheat varieties discussed in this section, see Rohde, C.R. 1978. Cereal variety descriptions. Oregon Agric. Exp. Stn. Columbia Basin Agric. Res. 1978 Progress Report. p. 12-25).

Spring Wheats

During the past 6-10 years, substantially better spring wheat varieties have become available, mostly from the USDA breeding program located in Idaho. These semi-dwarf varieties include Springfield, Twin, Fielder, and Fieldwin. All are soft white varieties. None have the yield potential of winter varieties as shown in Table 2.

Table 2. Summary spring soft white wheat yields at the Malheur Experiment Station.

Variety	Harvest Year					Avg. yield as a percent of Fielder +
	1973	1974	1975‡	1976	1977	
	bushel/acre					
Fieldwin	-	97	67	120	130	108
Twin	93	90	68	109	112	103
Fielder	84	89	60	114	120	100
Springfield	83	83	60	105	112	95
Urquie	-	-	74	121	-	114

+Calculated by computing percentage yield of Fielder and then averaging for years in which variety was included in test.

‡Severe wind storm caused shattering.

Fieldwin is a sister line to Fielder. Both are bearded wheats with Fielder being released in 1974 and Fieldwin being released in 1977. They are similar in test weight, both being about 4 pounds per bushel heavier than Twin. Fieldwin is slightly taller than Fielder and about 1 day later in maturity. Twin is also bearded and was released in 1971.

Urquie was developed by the Washington Agricultural Experiment Station and released in 1975. It is a bearded, semi-dwarf variety. Test weight is about 1 pound per bushel less than Fieldwin. It is about 2 days later in maturity than Twin and about 2 inches taller.

In addition to the soft white spring varieties discussed, hard red spring varieties have also been tested in the same trials for several years. In general, these varieties have yielded no more than 90% of the soft white spring varieties and have shown greater lodging. Their market value is higher, depending upon their protein content.

Varieties tested include both public and proprietary varieties as shown in Table 3.

Table 3. Summary hard red spring wheat yields at the Malheur Experiment Station.

Variety	Harvest Year 1975‡	1976	1977	Avg. yield as a percentage of Borah+
	bushel/acre			
Sawtell	67	103	120	112
Prodax	58	111	112	107
Borah	53	102	109	100
Prospur	55	108	-	105
Profit 75	-	96	102	94
WS6	-	93	102	92
Protor	51	94	-	94

+ Calculated by computing percentage yield of Borah and then averaging for years in which variety was included in test.

‡ Severe wind storm caused shattering

Borah and Sawtell are bearded varieties developed by the USDA in cooperation with the Idaho Experiment Station. Borah was released in 1974 and Sawtell in 1978. Sawtell is about 3 inches taller than Borah. Test weight of Sawtell is similar to that of Borah and about 2 pounds per bushel less than Fieldwin. Protein levels of Sawtell have been less than those of Borah.

Prodax and Protor were developed by Northrup King Co. Prodax is similar to Sawtell and Borah in test weight while Protor is about 1 pound per bushel heavier.

FEED GRAIN YIELD TRIALS AT THE MALHEUR EXPERIMENT STATION

Mathias F. Kolding

Winter feed wheat and barley yield trials are grown each year at the Malheur Experiment Station, Ontario, Oregon. The objective is to discover and develop more suitable cereal cultivars for the Malheur Basin. During the years since 1975, 608 different wheats and barleys were tested. In 1975, 1976 and 1977 none of the new feed wheats brought to the Malheur Station had better grain yields than the white winter wheat McDermid. In 1978, however, 21 feed wheats yielded more than McDermid. The development of a better winter barley is well underway. Twenty-six of the barleys tested have yielded better than the winter feed barley Boyer. One of the 26, FB73130, Ione/Luther, has a 107% yield advantage over Boyer from 1975 through 1978, and is now in a breeders seed increase at the Malheur Station.

Winter Feed Wheat

Since 1975, promising winter wheat selections have been taken to the Malheur Station and planted in a rill irrigated yield trial which is limited to 90 wheat entries. If the entries prove unsuitable, they are dropped from the yield trial entry list and replaced by new lines from the feed grain program at the Columbia Basin Agricultural Research Center at Pendleton or Hermiston. Only 51 of the 285 different wheats tested in the feed wheat trials remain for the 1979 trial. These 51 are reported in Table 1.

In Table 1, the grain yields are summarized. Only one wheat, FW73577P03, a WA4995/Hyslop cross, has equaled McDermid's grain production more than one year. Some new wheat selections in the 1978 trial, however, are particularly promising, especially the new selections in the FW74922 and FW74938 series which were selected from two bulk wheat populations growing in the 1976 trial at the Malheur Experiment Station.

Plant height, relative maturity, test weight, and kernel color are also given in Table 1. The plant height ranges from 28 to 46 inches. Twenty-nine lines mature as early as McDermid and 11 as late as Luke. The average test weight for the selections in Table 1 is 59.7 pounds per bushel. Some of the less than satisfactory test weights might be caused by a shortage of water, since the early maturing selections had a 2.1 pound per bushel higher average test weight than the late maturing wheats. There was no lodging in the wheat trial at the Malheur Experiment Station in 1978, but several did lodge in a similar trial at Hermiston.

Table 1. 1978 Ontario Winter Feed Wheat Trial. A summary of grain yield plus plant height, maturity, test weight, and grain class notes for 1978.

Variety or Selection	Identity Number	Harvest Year 1975	1976	1977	1978	Percent+ McDermid	Plant height	Relative Maturity	Pounds/ bushel	Kernel color
		bushels per acre					inches			
1. Luke	C.I.14586	72.4	95.1	127.0	102.1	87	40	Late	61.4	White
2. McDermid	C.I.14565	88.3	109.7	150.0	106.0	100	40	Early	61.6	White
3. 65-116/MDM/2/Cama	FW72264	73.1	94.5	131.0	105.8	89	41	Early	61.8	Mixed
4. Stephens	C.I.17569		106.0	137.0	102.1	94	41	Medium	59.9	White
5. 64-116/MDM/2/Cama	FW72160-02		102.6	135.0	103.1	93	40	Early	61.3	Mixed
6. YY/2*63-112-66-4	R72-160-03		97.7	130.0	106.0	91	45	Early	61.6	White
7. 71CB125/6720-69-13	FW73525P08		94.6	126.0	95.2	86	37	Early	59.9	Purple
8. 71CB125/6720-69-13	FW73525-03		101.3	125.0	97.2	88	29	Medium	61.4	White
9. 67-237-69-30/Cama	FW73541P01		92.3	119.0	106.0	87	35	Early	61.1	Mixed
10. JJG/MDS/2/Bulk Sel.	FW73555RP15		95.2	118.0	102.1	86	38	Early	56.6	White
11. JJG/MDS/2/Bulk Sel.	FW73555RP20		98.2	133.0	98.9	90	36	Late	56.5	Red
12. P-101/BZ	FW73571P01		103.8	133.0	102.7	93	40	Medium	61.2	Mixed
13. WA4995/Hys	FW73577P03		117.5	139.0	110.5	100	43	Early	59.7	White
14. WA4995/Hys	FW73577P05		98.7	133.0	102.0	91	42	Early	57.3	White
15. F67-4704/63120-66-2	FW73501-01			119.0	106.9	88	40	Early	60.8	Mixed
16. HYS/YY/2/63-112-4	FW73515			127.0	101.4	89	38	Early	61.1	White
17. 71CB126/2/7C/6720	FW73580NT1			116.0	101.7	85	35	Medium	61.3	Red
18. 71CB126/2/7C/6720	FW732580NT2			124.0	108.3	91	36	Early	60.3	Red
19. NE/HYS/2/YH/AT66	FW74885P01			120.0	108.0	89	39	Medium	58.0	White
20. P-101/710..2*P-101	FW741097P03			124.0	111.4	92	43	Late	57.6	Mixed
21. RB/1523-DC	FW73830P10				101.6	96	41	Medium	61.3	White
22. AT/Yh/2/Yh/NE.	FW74922-701				109.9	104	41	Early	57.7	White
23. AT/Yh/2/Yh/NE.	FW74922-702				108.3	102	39	Early	61.4	White
24. AT/Yh/2/YH/NE.	FW74922-705				107.3	101	41	Early	61.3	White
25. AT/Yh/2/YH/NE.	FW74922-706				114.9	108	40	Early	61.6	White
26. AT/YH/2/YH/NE.	FW74922-708				113.5	107	39	Early	60.9	White
27. AT/YH/2/YH/NE.	FW74922-712				107.9	102	40	Early	61.3	White
28. AT/YH/2/YH/NE.	FW74922-714				106.0	100	41	Medium	57.1	White
29. AT/YH/2/YH/NE.	FW74922-715				105.7	100	39	Early	57.2	White
30. YH/NE/2/YH/AT	FW74938-702				103.5	98	38	Early	58.4	White

Table 1. (continued) 1978 Ontario Winter Feed Wheat Trial. A summary of grain yield plus plant height, maturity, test weight, and grain class notes for 1978

Variety or Selection	Identity Number	Harvest Year 1975	1976	1977	1978	Percent+ McDermid	Plant height	Relative‡ Maturity	Pounds/ bushel	Kernel color
		bushels per acre					inches			
31. YH/NE/2/YH/AT	FW74938-703				107.0	101	41	Late	62.2	White
32. YH/NE/2/YH/AT	FW74938-705				115.1	108	40	Early	61.3	White
33. YH/NE/2/YH/AT	FW74938-710				108.4	102	39	Medium	62.4	White
34. YH/NE/2/YH/AT	FW74938-711				105.9	100	40	Early	62.5	White
35. JJG/7C/3/AT/DC	FW74049-704				102.0	96	46	Late	58.3	White
36. YH/MDM/2/TS/3/S/R	FW74625-735				111.8	105	38	Late	58.1	White
37. YH/MDM/2/TS/3/S/R	FW74625-736				107.6	101	38	Late	57.7	White
38. YH/MDM/2/TS/3/S/R	FW74625-737				110.9	105	41	Early	56.8	White
39. YH/MDM/2/TS.3.S/R	FW74625-739				115.1	109	42	Late	59.9	Mixed
40. YH/MDM/2/TS/3/S/R	FW74625-741				114.5	108	42	Late	57.7	White
41. YH/MDM/2/TS/3/S/R	FW74625-742				116.0	109	41	Late	52.4	White
42. YH/MDM/2/TS/3/S/R	FW74625-743				104.1	98	39	Late	58.4	White
43. YH/MDM/2/TS/3/S/R	FW74625-745				102.7	97	36	Late	56.8	White
44. 71CB126/2/7C/6720	FW73528-701				110.7	104	28	Early	57.9	Mixed
45. 71CB126/2/7C/6720	FW73528-703				110.9	105	32	Early	62.4	Red
46. 71CB126/2/7C/6720	FW73528-705				108.7	102	36	Early	58.0	Red
47. FW72244/FW74419	FW741018-701				83.5	79	39	Medium	61.2	White
48. FW72244/Fw74419	FW741018-702				110.2	104	40	Early	61.5	White
49. FW72244/FW74419	FW741018-703				112.4	106	39	Early	61.5	White
50. FW72244/Fw74419	FW741018-709				109.2	103	36	Early	58.3	White
51. FW72244/Fw74419	FW741018-710				97.5	92	36	Early	62.0	White

+ Percent McDermid. Comparison is for same years grown. McDermid bushels per acre: 4 years = 113.5
3 years = 121.9
2 years = 128.0
1 year = 106.0

‡ Relative maturity Dertermined by kernel ripeness at a particular date. McDermid's ripeness = "Early" "Luke's" = "Late"

Winter Feed Barley

The winter feed barley trial is managed like the winter wheat trial. Usually new entries are selected at Hermiston or Pendleton and brought to Ontario. Starting with the 1979 test year, the Western Regional Winter Barley Trial is included in the feed grain trial.

FB73130 and FB73597-15 (Table 3) are two selections grown for four years which have yielded 107% of the check variety Boyer. FB73130 is in a breeder's seed increase plot. FB73597-15 is too weak strawed for the Malheur area. The next most promising selections are shown in Table 2.

Table 2. Yield of six winter barleys grown at the Malheur Experiment Station in 1977 and 1978

Variety or Selection	1977	1978	Average	Percent Boyer
	bushels per acre			
Luther	135.5	143.3	139.4	92
Boyer	166.6	135.6	151.1	100
Schuyler	148.3	159.1	153.7	102
FB73130	166.5	148.5	157.5	104
FB74506-01	144.5	187.1	165.8	110
FB74506-06	162.9	170.2	166.6	110

The winter barleys available to growers are classified from weak to stiff strawed. As new genetic sources contributing to straw strength are discovered or put together, the perspective about straw strength changes and the older varieties are considered among the weak strawed. Luther, Schuyler, and Boyer are tall winter barley varieties available to growers in the Malheur area. These barleys, as they were released in their turn, are stiffer strawed and better yielders than their predecessors. However, as growers become more sophisticated with their cultural practices, the tall barleys often have disastrous lodging problems. The two FB74506, Vogelsanger Gold/DR68-1255/2/ Kamiak, crosses in Table 2 are examples of shorter, stiff strawed barley selections which have stood well in both sprinkler and flood irrigated plots.

Grain yields are given for 47 barleys in Table 3. Nine selections have yielded at or above 110 percent of Boyer. Seven head are late as Luther and 26 are earlier than Boyer. Luther, Schuyler, and Boyer are the tallest entries lodging was evident in the plot area, though the variety Schuyler was starting to fall over at harvest.

Table 3. 1978 Ontario Winter Feed Barley. A summary of grain yields, plus heading date, plant height, relative maturity, test weight, and lodging notes for 1978.

	Selection	Identity Number	Harvest Year 1975	Harvest Year 1976	Harvest Year 1977	Harvest Year 1978	Percent[+] Boyer	Date headed	Plant height	Relative Maturity	Pounds per bushel	Percent Lodged
			bushels per acre						inches			
1.	Boyer	C.I.15559	126.6	104.2	166.6	135.6	100	5-19	50	MD	49.0	0
2.	Lth/Hudson	FB73109	130.7	84.1	162.9	135.2	96	5-18	48	MD	50.6	0
3.	Ione/Luther	FB73123	130.7	108.6	150.8	155.6	102	5-16	48	SD	50.9	0
4.	Ione/Luther	FB13130	140.6	113.6	166.5	148.5	107	5-20	47	SD	51.4	0
5.	Lth/Hpr	FB73637-06	129.5	106.3	132.1	159.3	99	5-21	44	MD	47.3	0
6.	Boyer/A 989	FB73597-15	130.4	110.9	164.7	162.4	107	5-17	43	MD	50.9	5
7.	Apn/Dr69-738	FB73216D07		114.2	157.1	156.6	105	5-18	44	SD	48.7	0
8.	DR67-875/Slr.	FB73246D03		104.2	158.8	141.3	101	5-28	44	SD	48.6	0
9.	DR69-735/Miller	FB73248D26		99.6	152.9	138.4	96	5-20	43	MD	49.9	10
10.	Lth/Hpr	FB73637-242		92.9	136.2	153.7	94	5-29	47	M	58.1	0
11.	DR68-1285/Astrix	FB73607D28		109.3	155.0	150.8	102	5-14	42	MD	49.5	10
12.	Lth/Hpr	FB73637-236		92.2	123.1	153.4	91	5-26	48	MD	51.4	5
13.	Luther	C.I.13440			135.5	143.3	92	5-26	52	SD	50.2	0
14.	Schuyler	C.I.11887			148.3	159.1	102	5-17	51	MD	51.8	Trace
15.	DR68-1285/Astrix	FB73607D04			162.2	158.2	106	5-16	41	HD	49.7	10
16.	Lth/Hpr	FB73637-14			141.4	142.4	94	5-10	36	MD	47.8	Stiff
17.	VG/SE/2/DR68-1917	FB74505-02			158.9	146.2	101	5-19	43	SD	50.8	0
18.	VG/DR68-1285/2/Kmi	FB74506-01			144.5	187.1	110	5-19	32	SD	49.5	0
19.	VG/DR68-1285/2/Kmi	FB74506-06			162.9	170.2	110	5-19	32	SD	51.2	0
20.	VG/DR68-1285/2/Kmi	FB74506-10			156.4	154.6	103	5-18	36	MD	50.4	0
21.	DR69-735/Miller	FB73258D28			132.8	136.3	89	5-25	33	MD	47.7	0
22.	DR69-735/Miller	FB73258D24			140.2	128.1	89	5-20	38	MD	49.1	Weak
23.	A989/DR67-875	FB73589-12			142.5	144.2	95	5-12	36	MD	49.9	0
24.	DR69-735/Miller	FB73258D08				127.9	94	5-26	41	SD	49.0	0
25.	Boyer/DR67-1608	FB73594D13				119.0	88	5-10	40	R	48.8	0
26.	Boyer/DR67-1608	FB73594D15				119.8	88	5-12	40	HD	47.7	0
27.	DR68-1285/Kmi	FB73596D26				123.7	91	5-14	40	MD	48.7	0
28.	DR68-1608/Slr	FB73608D28				127.0	94	5-17	45	SD	49.6	0
29.	DR68-1608/Slr	FB73608R30H				126.1	94	5-17	39	SD	----	0
30.	VG/SE/2/DR68-1917	FB74505-01				167.5	123	5-10	49	HD	51.3	0

Table 3. (continued) 1978 Ontario Winter Feed Barley. A summary of grain yields, plus heading date, plant height, relative maturity, test weight,and lodging notes for 1978.

	Selection	Identity Number	Harvest Year 1975	1976	1977	1978	Percent Boyer +	Date headed ‡	Plant height	Relative Maturity §	Pounds per bushel	Percent Lodged
			bushels per acre						inches			
31.	VG/SE/2/DR68-1917	FB74505-03				155.0	114	5-17	38	MD	50.8	0
32.	Apn/DR67-738	FB73216D02				144.5	107	5-20	40	MD	49.2	0
33.	Apn/DR67-1623	FB73218D01				142.4	105	5-20	43	MD	49.2	0
34.	Apn/DR67-1623	FB73218D02				141.9	105	5-26	43	MD	48.9	0
35.	DR68-1285/Mlr.	FB73255D01				144.1	106	5-15	41	MD	50.8	0
36.	DR69-735/Mlr.	FB73258D21				132.6	98	5-26	39	MD	48.8	0
37.	DR69-735/Mlr.	FB73258D25				133.4	98	5-15	30	MD	50.1	0
38.	DR69-735/Mlr.	FB73258D26				129.4	95	5-20	42	MD	51.1	0
39.	DR69-735/Mlr.	FB73258D29				143.2	106	5-20	43	MD	50.1	0
40.	DR68-1917/2138-68	FB73598D05				143.3	106	5-7	47	MD	51.6	0
41.	7108/Boyer/2/A989	FB74436-02				154.2	114	5-13	46	HD	51.1	0
42.	SE.DR68-1917	FB73605D07				158.5	117	5-16	42	MD	50.7	0
43.	DR68-1608/Slr.	FB73608D31				130.1	96	5-17	39	HD	50.2	0
44.	13068/13089//Hpr	FB741137				149.8	110	5-17	45	MD	49.7	0
45.	MEB/CI10432	FB73826-50				148.5	109	5-5	48	HD	53.2	0
46.	Boyer/DR68-1608	FB73211-04				148.6	110	5-21	48	MD	53.5	0
47.	Boyer/DR68-1608	FB73211-06				166.7	123	5-12	46	MD	52.4	0

+ Percent Boyer. Comparison is for the same years grown. Boyer yields used are : 4 years = 133.2
3 years = 135.4
2 years = 151.1
1 year = 135.6

‡ Heading date, plant height and relative maturity from the same trial at Pendleton in 1978.

§ Kernel maturation. SD = soft dough
MD = mid dough
HD = hard dough
R = ripe

A NEW WINTER FEED BARLEY FOR THE TREASURE VALLEY
FB73130, Ione/Luther

Mathias F. Kolding

Selection FB73130, Ione/Luther, has yielded 107% of Boyer winter barley in the 1975 through 1978 feed grain yield trials at the Malheur Experiment Station (Table 1). FB73130 is a six-rowed, medium-late, mid-tall, stiff strawed winter barley. It's rough, medium-long beards tend to dehisce after ripening. Selection FB73130 heads a day or two later than Boyer, (Table 2) but earlier than Luther. It appears to have a longer seed maturation period than Boyer which could cause a yield advantage, but could also contribute to a low test weight if a water shortage or hot days come near the end of the grain-filling period. FB73130 is in a 1979 breeders seed increase plot at the Malheur Experiment Station.

Table 1. Comparative grain yields of FB73130 with Boyer, Schuyler, and Luther winter barleys grown in the feed grain yield trials at the Malheur Experiment Station at Ontario.

Variety or Selection	Harvest Year 1975	1976	1977	1978	Percent of Boyer +
	bushels per acre				
FB73130	140.6	113.6	166.5	148.5	107
Boyer	126.6	104.2	166.6	135.6	100
Schuyler			148.3	159.1	102
Luther			135.5	146.6	92

+ For years the variety was grown

Table 2. Some agronomic observations comparing FB73130 with Boyer, Schuyler, and Luther winter barley when grown at the Malheur Experiment Station.

Variety or Selection	Plant height	Heading date	Pounds per bushel	Lodging 1977
	inches			percent
FB73130	40	5-16	51.4	30 MC
Boyer	44	5-15	49.0	30 MN
Schuyler	45	5-11	51.8	60 MC
Luther	46	5-20	50.2	70 LC

1977 was the only year when differential lodging was present in the feed grain trials at the Malheur Experiment Station. FB73130 did lodge some, (Table 2) but it tends to bend at mid-culm (MC). Boyer, in contrast, was bending at the mid-nodes (MN). Both Schuyler and Luther are weaker strawed than FB73130.

Selection FB73130 has yielded well in other trials where its time of maturity is not a problem. At the present, however, it seems most suited to the Malheur Basin.

VARIETY TESTING OF SUGAR BEETS

Charles E. Stanger and Dwight S. Fisher

Introduction

Testing of sugar beet varieties began at the Malheur Experiment Station in 1976 at the request of the Nyssa-Nampa Beet Growers Association when many new varieties from several seed companies became available to local growers. Comparative production performance for several varieties being sold in the area had never been evaluated under our environmental conditions.

Over a 3-year period, the number of entries in the trials increased from 5 to 22. Data indicate that enough differences occur among varieties in root yield, percent sucrose, and extracted sugar to affect income from crop sales by $100 per acre. This represents a sizeable difference when production costs are the same regardless of variety grown. Varieties also differ in tolerance to curly-top virus and severe virus infection has reduced the amount of extracted sugar by 1,000 to 1,500 pounds per acre in susceptible varieties. This difference is enough to be a highly significant factor when selecting which sugar beet variety to grow.

Commercial and semi-commercial varieties from all companies providing seed to growers in the Treasure Valley are being tested. The 1979 variety trial includes 27 selections of seed obtained from five companies -- Amalgamated, Great Western, Holly, Beta Seed, and American Crystal. Each variety is evaluated for total root yield, percent sucrose, root purity, and tolerance to curly-top virus.

Experimental Procedures

The 1978 sugar beet variety trial was planted in an area which had been cropped to barley for several consecutive years. Field preparation began in the fall when 60 pounds of nitrogen and 100 pounds of P_2O_5 per acre were applied and plowed down. The field was disked once after planting and left over winter. In the spring, 140 pounds per acre of additional nitrogen was broadcast on the soil surface and worked into the soil with a triple-K and spike-tooth harrow as the seed bed was prepared. A combination of Nortron (1.5 lbs/ac) and Pyramin (1.5 lbs/ac) was applied broadcast just before planting and incorporated shallowly with a spike-tooth harrow. The beets were planted on April 3 and 4 with a cone seeder. Seed for each plot row was individually packeted. Seeding rate was approximately 8 seeds per linear foot of row. Each variety was replicated eight times in the variety trial and six times in the curly-top trial. Each plot was four rows wide and 25 feet long. The curly-top plots were divided and half the beets inoculated by virus-carrying leafhoppers caged on each plant. A cage containing four leafhoppers was placed on the surface of one leaf of each plant and left for 10 days. Plants were caged on May 28 and 29 just after thinning.

The beets were grown under furrow irrigation and were irrigated each week in alternate water furrows. Each furrow received water every 2 weeks.

The beets were treated with powdered sulfur during mid-July for powdery mildew.

The trials were harvested the last week of October. The plots were thinned to 22 beets per row. Twenty beets from each of the two center rows were harvested. A beet at the end of each plot row was discarded. Weights of roots for each row were taken at harvest to determine total root yields. Percent sucrose and root quality were determined at the Amalgamated Sugar Company Research Laboratory in Nyssa, Oregon, from two samples of five beets taken from each of the two center rows of each plot.

The data obtained were statistically analyzed and the results recorded in the attached tables. A report of the experimental results was made to the local growers through the Nyssa-Nampa Beet Growers Association.

Results

Sugar varieties grown commercially in this area include Hybrid 8, D_2, AH-12, HH-7, R_1, AH-10, and HH-22. The order that the varieties are listed in the preceding sentence is how they ranked in this trial based on yield of extracted sugar per acre. Hybrid 8 and D_2 produced at least 637 lbs more sugar per acre than R_1, AH-10, and/or HH-22 when compared in the variety trial. This difference in sugar yield is great enough to be highly significant. Calculated dollar returns per acre showed that superior yielding varieties can increase gross returns by $102 per acre.

Curly-top virus caused a reduction in sugar yield to all varieties evaluated when virus inoculated plots were compared to non-inoculated plots, but some varieties were much more tolerant than others. D_2 has performed well in variety trials but was susceptible to curly-top infection and sugar yields were reduced by 22%. Varieties AH-12 and EH-14 were most tolerant to curly-top and although yields were reduced slightly, the amount of reduction was not significant.

Results indicate that differences in yield and quality exist among commercial sugar beet varieties which can affect returns to the grower. In an area where curly-top infection can occur, final yields can be affected and caution whould be taken when selecting a variety. If less curly-top tolerant varieties are selected, insecticide treatments applied at planting time have given protection against infection from leafhoppers.

Table 1 A comparison of 22 varieties of sugar beets for total yield, quality, and estimated returns per acre. Malheur Experiment Station 1978.

Entry	Root Yields	Sucrose	Conductivity Reading	Extracted Sugar	Net Returns	Curly-top Ratings
	T/ac	%		lbs/ac	$/ac	
Hybrid 8	45.3	15.53	741	12,111	1,097	6.15
D_2	46.4	15.29	810	12,066	1,101	5.40
AH-12	44.1	15.93	762	11,998	1,103	2.70
6G5208	47.6	14.88	889	11,892	1,091	5.80
43106-02	47.3	14.80	830	11,853	1,076	6.05
63201-03	46.6	15.05	895	11,776	1,084	5.65
EH-14	45.7	15.23	852	11,771	1,079	3.15
HyWX1	46.0	15.12	845	11,765	1,076	5.55
HH-7	45.2	15.20	824	11,650	1,065	3.95
63208-02	45.3	15.18	842	11,640	1,065	5.10
53104-02	45.6	15.09	860	11,618	1,064	4.25
AH-11	45.6	15.08	866	11,596	1,063	4.85
C_3	44.6	15.29	810	11,595	1,058	5.75
6G5108	45.6	15.03	856	11,580	1,059	5.85
R_1	43.7	15.44	821	11,464	1,050	6.80
77MSH113	43.3	15.48	811	11,386	1,044	6.60
UIA41	42.9	15.49	769	11,362	1,035	5.15
AH-10	43.8	15.14	829	11,255	1,026	3.40
Hybrid 50	42.9	15.18	785	11,136	1,009	3.55
7A0140	44.6	14.97	940	11,112	1,030	5.80
HH-22	42.9	15.12	833	11,005	1,004	3.40
Hybrid 51	42.5	15.12	851	10,846	994	3.00
LSD 0.05	2.5	0.40	65	637	-	-
CV %	5.6	2.6	7.9	5.6	-	-

+Logan, Utah USDA curly-top trial

Rating: 0 = No symptoms, 9 = lethal to plant

Table 2 Results of sugar beet varieties when compared for root yield, percent sucrose, conductivity, and sugar extracted from curly-top infected and non-infected plots. Malheur Experiment Station. 1978.

Variety	Treatment	Root Yields	Sucrose	Conductivity Readings	Total Sugar
		T/ac	%		lbs/ac
Hybrid 50	infected	36.9	15.85	694	9,310
	non-infected	41.2	16.14	719	10,568
Hybrid 51	infected	37.2	15.97	607	9,591
	non-infected	41.4	16.23	675	10,717
HH-7	infected	40.1	16.25	657	10,450
	non-infected	44.3	15.90	787	11,092
HH-22	infected	38.0	16.24	658	9,878
	non-infected	44.0	15.83	780	10,931
7A0140	infected	35.8	15.98	758	9,007
	non-infected	45.7	15.69	878	11,054
D_2	infected	35.6	16.16	583	9,300
	non-infected	45.2	16.36	659	11,844
R_1	infected	40.1	16.16	644	10,388
	non-infected	44.8	16.40	723	11,646
C_3	infected	36.7	16.09	618	9,522
	non-infected	42.8	16.12	739	10,931
AH-10	infected	39.6	15.98	697	10,074
	non-infected	46.1	16.11	753	11,724
AH-12	infected	39.4	16.96	628	10,741
	non-infected	43.9	16.79	698	11,756
EH-14	infected	43.8	16.27	749	11,070
	non-infected	47.3	16.26	855	11,950
susceptible check	infected	19.4	15.88	598	4,991
	non-infected	36.1	16.51	633	9,578

WEED CONTROL IN SPRING SEEDED SUGAR BEETS FROM HERBICIDES APPLIED IN THE FALL

Charles E. Stanger

Introduction

Several years of experience have shown that better weed control is obtained when soil active herbicides are applied as preplant treatments and incorporated 2 to 3 inches in the soil. Growers have not fully accepted incorporation by tillage in early planted small seeded crops because the soil moisture needed for seed germination is lost during the incorporation process. Nearly all the acreage planted to sugar beets is worked in the fall so the seed beds can be prepared in the spring with a minimum amount of tillage and moisture loss. In October 1976, several herbicides were applied to fields being fall-bedded and evaluated for weed control and crop tolerance in beets planted the following spring. Data from 1976 and 1977 have shown that most herbicides fall applied will persist over winter to give weed control equal to spring applied treatments. Trials in 1978 were expanded, increasing the number of herbicides tested and evaluating another method of application.

Stauffer Chemical Company registered Roneet (cycloate) for application in the fall. Registration of other herbicides for fall application is pending.

Experimental Procedures

In mid-October, several different herbicides at varying rates were applied to bedded and non-bedded land. Herbicides were applied to the bedded land during the bedding operation by applying a 12-inch band on flat land and throwing soil adjacent to the herbicide band over the treated soil forming a peak shape bed. The herbicide was essentially layered at the base of the bed. Spacing between beds was 22 inches. Treatments on non-bedded land were applied as broadcast treatments and incorporated 1 to 2 inches deep with a spike-tooth harrow. Treated areas were left in this condition over winter.

In the spring, the beds were pulled down nearly flat with sweeps mounted ahead of a spike-tooth harrow. The beds were then rolled with a cultipacker in preparation for planting. The non-bedded land was harrowed twice with a spike-tooth harrow to prepare a seed bed. AH-10 variety of sugar beets was planted on March 27 with a John Deere flex planter. Excellent stands of beets and several different species of annual grasses and broadleaf weeds emerged. The treatments were evaluated on May 21 for percent weed control and crop tolerance. Following a weed control field day, the plots were thinned, weeded, and sidedressed with 150 pounds of nitrogen per acre.

During the growing season, the treatments were evaluated for weed control to determine persistence of herbicides applied in the fall.

On October 26 and 27, the two center rows of each four row plot was harvested to determine root yields from the various treatments.

Results

EPTC (Eptam) and diethatyl-ethyl (Antor) did not persist over winter to control weeds in spring planted sugar beets. Cycloate (Roneet), ethofumesate (Nortron), pyrazon (Pyramin), vernolate (Vernam) and Hoe 29152 persisted overwinter and gave weed control equal to the same treatments applied in the spring. Nortron applied in the fall was very impressive resulting in control of most grass and broadleaf weeds for the growing season. Hoe 29152 controlled grassy weeds but was not active on broadleaf weeds. Vernam had excellent herbicide activity resulting in excellent weed control. Although yield data do not show an effect, Vernam caused a delay in crop emergence, seedling injury, and stand reduction.

Difference in herbicide performance was not noted between bedded and non-bedded treatments. Herbicide injury might occur, however, if treatments are applied broadcast, incorporated, and then bedded because of a mechanical concentration of the herbicide throughout the bedded soil. Injury would be more apt to occur during winters when excessive moisture could leach the herbicide down from the top of the bed concentrating it at the planting depth of the seed.

Table 1 The percent weed control, crop injury and yield of sugar beets from herbicide treatments applied in the fall of 1977 to bedded land. Malheur Experiment Station. 1978.

Herbicides	Rate	Crop Injury +	Percent Weed Control ‡					Yield
	lbs ai/ac		Ko	Pg	Lq	BrnG	Gf	T/ac
ethofumesate	2	0	95	100	97	87	83	33.9
ethofumesate	3	0	100	100	100	91	87	34.8
ethofumesate and pyrazon	2 + 2	0	96	100	98	78	81	33.5
cycloate (incorp.)§	3	0	65	93	90	84	86	31.3
cycloate (incorp.)	4	0	86	98	95	92	93	32.3
cycloate (incorp.)	6	0	90	100	94	98	96	33.9
cycloate (non-incorp.)	3	0	65	90	90	80	80	32.3
cycloate (non-incorp.)	4	0	80	96	90	92	93	32.9
cycloate (non-incorp.)	6	5	82	98	95	97	98	30.5
EPTC	3	0	20	30	20	35	40	31.3
diethatyl-ethyl	3	0	50	60	60	70	75	30.1
diethatyl-ethyl and pyrazon	2 + 2	0	86	100	94	93	90	33.7
ethofumesate and diclofop	2 + 1½	0	100	100	99	100	100	32.9
control	-	0	0	0	0	0	0	8.7

+ Rating - 0 = No effect, 100 = plant elimination

§ incorporated with roto-tiller 2-3 inches deep before bedded.

Herbicides applied October 10, 1977

Plot size: 4 rows X 30 feet - 4 reps.

Evaluated June 6, 1978

‡
Ko = kochia
Pg = pigweed
Lq = lambsquarters
BrnG = barnyard grass
Gf = green foxtail

Table 2 The percent weed control, crop injury and yield of sugar beets from herbicide treatments applied in the fall of 1977 to non-bedded land. Malheur Experiment Station 1978.

Herbicides	Rate	Crop Injury[+]	Percent Weed Control[‡]						Yield
			Lq	Pg	Ko	Rt	BrnG	Gf	
	lbs ai/ac								T/ac
cycloate	3	0	75	95	68	0	90	92	27.9
cycloate	4	0	83	97	83	20	94	96	27.1
ethofumesate	2	0	97	99	97	90	85	87	28.8
ethofumesate	3	0	99	100	99	98	92	90	29.9
ethofumesate and diclofop	2 + 1	0	99	99	93	96	95	96	28.3
ethofumesate and diclofop	2 + 1.5	0	99	100	97	98	100	100	27.0
ethofumesate and Hoe 29152	2 + 0.5	0	97	97	86	90	92	91	29.4
ethofumesate and Hoe 29152	2 + 1.0	0	91	92	88	92	100	100	29.2
EPTC	3	0	50	65	50	0	60	55	28.0
vernolate	3	15	88	92	82	15	95	93	29.5
vernolate	4	20	92	96	85	20	97	98	32.4
control	-	0	0	0	0	0	0	0	23.8

[+] Rating - 0 = No effect, 100 = plant elimination

Herbicides applied October 13, 1977

Plot size: 4 rows X 30 ft. 3 reps.

[‡]
Lq = lambsquarters
Pg = pigweed
Ko = kochia
Rt = russian thistle
BrnG = barnyard grass
Gf = green foxtail

SPRING APPLIED HERBICIDES FOR WEED CONTROL IN SUGAR BEETS

Charles E. Stanger

Introduction

Most often to control the number of different broadleaf and grassy weed species that occur in fields, more than one herbicide is required. In sugar beets, as in many other crops, herbicides are applied before planting, at planting time, after planting, but before the weeds and crops emerge, and as postemergence treatments. Usually, two treatments are required and optimum weed control is obtained when soil active herbicides are used in combination with postemergence treatments. Soil active herbicides are generally lethal to weeds at time of seed germination or shortly after and must be incorporated by special tillage or injection equipment or by overhead moisture. Weed control is generally enhanced when shallow soil incorporated preemergence applications are followed by rain. Herbicide treatments applied during early spring are those most apt to be followed by rain.

Many effective herbicides are available for commercial use to control weeds in sugar beets. The objective of researching spring applied herbicides in 1978 was (1) to compare the effectiveness of fall applied to spring applied preplant treatments, (2) to establish sugar beet tolerance for preplant incorporated treatments of ethofumesate (Nortron) and diclofop (Hoelon) when applied as a mixture, (3) to compare diallate (Avadex) to triallate (Avadex) for sugar beet tolerance, (4) and to evaluate several soil active herbicides for weed control and sugar beet tolerance when applied in sequence with postemergence treatments.

Experimental Procedures

The trial was established on silt loam textured soil. The field had been plowed in the fall. A triple-K and spike-tooth harrow were used in the spring to till the soil and level the surface in preparation for application and incorporation of preplant herbicides. The preplant treatments were applied on April 12 and incorporated immediately to a depth of 2-3 inches with a rotary tiller. Hairy nightshade and barnyard grass seed were broadcast over the plot area after the preplant herbicide application and mixed into the soil when the preplant treatments were incorporated. U and I sugar beet seed variety 50 was planted on April 24 with a John Deere flex planter. Frequent rain showers occurred after planting and good stands of sugar beets and weeds emerged.

The postemergence treatments were applied on May 19. Most of the sugar beets had four true leaves when the postemergence treatments were applied. When combination Hoelon and Betanal/Betanex treatments were applied, they were not mixed and applied together but Betanal/Betanex treatments followed Hoelon applications by 24 hours.

Each treatment was replicated three times and each plot was four rows wide and 30 feet long. All herbicide treatments were applied as double-overlap broadcast treatments. Sprayer was equipped with 8003 teejet nozzles. Spraying pressure was 40 psi and water as the carrier applied at the rate of 40 gallons/A.

The treatments were evaluated in late-May following the annual weed tour. After the tour, the beets were thinned, weeded, and side-dressed with 150 lbs of nitrogen per acre.

During the last week of October, the two center rows of each plot were harvested to determine the effect of herbicide treatments on total yield.

Results

The better preplant treatments which resulted in both weed control and crop tolerance included Roneet (cycloate), Roneet + triallate (Avadex BW), ethofumesate (Nortron), and Nortron + diclofop (Hoelon). The rates applied varied and reference should be made to the summary table to determine which rates are optimum. Nortron at rates above 3 lbs ai/ac caused delayed emergence and some stand reduction, but evidence of injury was not noted after the beets were thinned. Diallate (Avadex) and triallate (Avadex BW) are wild oat herbicides and were included in the trial to determine sugar beet tolerance. Sugar beets were tolerant of both materials applied singly or in combination with Roneet or Nortron. Hoelon showed excellent activity on all annual grasses as both a preplant incorporated and postemergence treatment, but was not active on broadleaf weeds. Postemergence treatments of combinations phenmedipham (Betanal) and desmedipham (Betanex) + Hoelon gave excellent overall weed control. Blazer was only active on broadleaf weed species and only active with the addition of a surfactant.

Comparisons between fall and spring applied preplant incorporated treatments show that fall applied treatments are as effective as when spring applied. These results have been consistent for a period of 3 consecutive years.

Table 1 Percent weed control and crop tolerance of sugar beets to spring applied sugar beets. Malheur Experiment Station 1978.

Herbicides	Rate	Application	Crop Injury[+]	Percent Weed Control[‡] Lq	Ko	Pg	BrnG	Hn	Yield
	lbs ai/ac								T/Ac
triallate + cycloate	1 + 3	ppi	0	94	88	96	94	96	41.3
triallate + ethofumesate	1 + 2	ppi	0	82	83	93	93	70	35.2
cycloate	3	ppi	0	85	83	93	95	86	38.0
cycloate	4	ppi	0	92	86	96	97	93	38.0
diclofop	2	ppi	0	0	0	0	100	0	39.0
diclofop	4	ppi	0	0	0	0	100	0	35.0
ethofumesate	2	ppi	0	88	92	94	93	88	38.2
ethofumesate	3	ppi	7	96	96	99	98	96	35.8
ethofumesate	6	ppi	47	98	100	100	100	97	37.5
diclofop + ethofumesate	1 + 1.5	ppi	0	70	80	86	100	78	35.9
diclofop + ethofumesate	1.5 + 2	ppi	0	85	93	96	100	83	38.2
diclofop + ethofumesate	2 + 3	ppi	0	89	92	96	100	87	37.5
blazer + surfactant	½ + 0.5%	post	15	83	90	96	17	63	37.5
blazer	½	post	10	23	33	32	0	33	36.1
blazer	¼	post	5	13	23	23	0	25	37.1
triallate	2	ppi	0	72	78	82	62	63	33.7
diallate	2	ppi	0	72	65	78	58	65	39.0
diclofop + phenmedipham + desmedipham	2 + ½ + ½	post	3	96	94	98	96	73	37.1
diclofop + phenmedipham + desmedipham	1 + ½ + ½	post	2	96	92	98	92	82	36.4
diclofop	4	post	0	13	23	30	100	23	39.0
diclofop	2	post	0	13	20	18	98	27	38.2
diclofop + phenmedipham + desmedipham	1.5 + ½ + ½	ppi + post	0	98	99	99	100	83	37.5
diclofop + ethofumesate	4 + 6	ppi	43	100	100	100	100	92	37.1
check	-	-	0	0	0	0	0	0	40.4

[+] Rating - 0 = No effect, 100 = Plant elimination

[‡] Lq = lambsquarters; Ko = kochia; Pg = pigweed; BrnG = barnyard grass; Hn = hairy nightshade

TURF GRASS VARIETY TRIAL

Oris Rudd and Dwayne Buxton

Investigation of new crop prospects for the area is a responsibility of research and of interest to growers.

With this thought in mind and after hearing grower expression of interest in assessing the grass seed production potential of the area, we decided to establish a grass seed variety trial on the Malheur Experiment Station.

Seed from 20 varieties of turf grass was assembled and planted in 4-row plots 20 feet long and 22 inches between rows. Varieties were replicated three times in a randomized block design.

The first 15 varieties as listed in Table 1 were planted September 16, 1977, with the remaining five planted September 27, 1977.

Varieties for the trial were selected from among those being grown for seed elsewhere in Oregon or from varieties provided by individual seed companies.

Fertilizer application included 90 pounds of phosphorus and 30 pounds of nitrogen per acre plowed down pre-plant and 100 pounds per acre nitrogen top dressed and sprinkled in on October 10. After establishment, the trial was rill irrigated.

Table 1 summarizes the first year's results.

It should be noted that stands were not uniform and that several varieties did not develop enough seed to warrant harvesting this first year.

Seed was hand harvested by cutting the entire plant. It was dried in paper bags and threshed in small plot threshers at the OSU cereals laboratory. The seed was cleaned in a small clipper at the Station.

Table 1. Summary information of grass seed variety trial at the Malheur Experiment Station in 1978

Variety	Species[2]	Stand Rat-ing[3]	Height April 24	% Heading Apr. 24	% Heading May 16	Harvest Date	Seed Yield[5]	Remarks
			inches				lb/ac	
1. Baron	KB	5	4	5	85	June 21	725	Rust.
2. Bristol	KB	5	5	0	75	July 3	219	-
3. Cougar	KB	4	5	5	75	NH[4]		Poor stand with few seed heads.
4. Fylking	KB	5	4	0	20	NH		Pale green color, heavy foliage but few heads.
5. Kenblue	KB	2	3	65	100	NH		Poor stand but many seed heads.
6. Merion	KB	4	5	5	70	June 21	198	-
7. Newport	KB	4	5	10	85	June 21	651	-
8. Parade	KB	5	8	0	100	June 21	423	Mildew
9. Park	KB	5	9	0	100	June 21	427	Much mildew.
10. Victa	KB	4	4	0	45	June 21	688	Rust.
11. Altanta	FLF	4	4	5	60	July 3	643	More lodging than Dawson.
12. Dawson	FLF	4	4	15	80	NH		-
13. Scaldis	FLF	1	2	5	100	NH		Poor stand and small heads.
14. Waldorf	FLF	3	2	5	50	NH		Thin stand, heads similar to Altanta and Dawson.
15. Manhattan	PR	5	10	5	90	July 3	1055	95% lodging.
16. Rugby	KB	4	4	0	55	July 3	159	-
17. Granada	KB	3	3	0	5	NH		Similar to Fylking, few heads.
18. Sving	KB	4	2	0	5	NH		Rust.
19. Trenton	KB	4	3	5	60	July 3	215	-
20. P-66	KB	4	3	0	10	July 3	241	Late maturity, mildew.

1 Entries 1-15 planted Sept. 16, 1977 and entries 16-20 planted Sept. 27, 1977.
2 KB = Kentucky Bluegrass, FLF = Fine leaf fescue, PR = Perennial Ryegrass.
3 Rated with 5 best and 1 worst on April 24, 1978.
4 Not harvested
5 LSD (0.10) = 136