

## SOYBEAN RESEARCH AT ONTARIO IN 1995

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### Introduction

Soybean is a potentially valuable new crop for Oregon. Soybeans could provide a high quality protein for animal nutrition and oil for human consumption, both of which are in short supply in the Pacific Northwest. In addition, edible or vegetable soybeans could be exported to the Orient and provide a raw material for specialized food products. Soybeans would also be a valuable rotation crop because of the soil improving qualities of its residues and N<sub>2</sub>-fixing capability.

Because of the high value irrigated crops in the Snake River valley, soybeans may be economically feasible only at high yields. Hoffman and Fitch (1972) demonstrated that soybeans lines of the 0 and 00 maturity groups adapted to Minnesota could yield 50 to 65 bushels/acre at Ontario. The most productive lines averaged 60-65 bushels/acre for several years. Furthermore, yields were increased by approximately 20 percent for certain cultivars by decreasing row widths to 22 inches.

Soybean varieties developed for the midwestern and southern states are not necessarily well adapted to Oregon due to lower night temperatures, lower relative humidity, and other climatic differences. Previous research at Ontario has shown that compared to the commercial cultivars bred for the midwest, plants for Oregon need to have high tolerance to seed shatter and lodging, reduced plant height, increased seed set, and higher harvest index (ratio of seed to the whole plant). In addition, there is a need to identify cultivars that will grow and yield well under high seeding rates and narrow row spacing. We believe that yields could also be increased by increasing the seeding rate from 200,000 seeds/ac to 300,000 seeds/ac if semi-dwarf lines were found adapted to local conditions.

In 1992, 241 single plants were selected from five F<sub>5</sub> lines that were originally bred and selected for adaptation to eastern Oregon. Seed from these selections was planted and evaluated in 1993. A total of 18 selections were found promising and selected for further testing in larger plots in 1994 and 1995. This report summarizes work done in 1995 as part of the continuing breeding and selection program to adapt soybeans to eastern Oregon.

### Procedures

The 1995 trials were conducted on a Greenleaf silt loam previously planted to sugar beets. Dual at 1 lb ai/ac was broadcast and incorporated with a bed harrow on May 9. Seed was planted on May 15 at 300,000 seeds/acre in rows 22 inches apart.

Rhizobium japonicum soil implant inoculant was applied in the seed furrow at planting. The crop was furrow irrigated as necessary.

Thirteen of the single plant selections from 1992, 11 single plant selections made in 1993, and 8 older cultivars were planted in replicated plots four rows wide by 25 feet long in 1995. The experimental design was a complete randomized block with five replicates. Fifteen single plant selections made in 1994 were planted in single rows 25 feet long.

Plant height and reproductive stage were measured weekly for each cultivar. Prior to harvest the cultivars were evaluated for lodging and seed shatter. The middle two rows in each 4 row plot and single rows from the single plant selection plots, were harvested on October 13 using a Wintersteiger Nurserymaster small plot combine. The beans were cleaned, weighed and oven dried for moisture content determination. Dry bean yields were corrected to 13 percent moisture. Single plant selections were cut at ground level, threshed in the small plot combine and labeled individually.

### Results and Discussion

Emergence started on May 22 and was poor due to inadequate soil moisture.

Yields ranged from 7 to 55 bu/ac (Table 1). Three hail events on June 16, June 19, and July 29 decreased the performance of all crops at the Malheur Experiment Station during the 1995 season. The older cultivars, in general, lodged heavily and took too long to mature or did not reach adequate harvest maturity for efficient combining. Seven of the 1992 single plant selections reached physiological maturity in 115 days or less, had no lodging, and had seed sizes large enough for the manufacturing of tofu (< 2,270 seeds/lb). Three of the 1994 selections matured in 115 days or less, had no lodging, and had seeds large enough for the manufacturing of tofu (Table 2).

### Literature Cited

Hoffman, E.N. and L.A. Fitch. 1972. Soybean trials in the Annual Report of the Malheur Branch Experiment Station, Ontario, Oregon. pp 84-89.

Table 1. Performance characteristics of soybean cultivars. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1995.

Cultivar	Days to maturity <sup>1</sup>	Days to harvest maturity <sup>2</sup>	Lodging	Shatter	Height	Yield	Seed count
	days from emergence		0-10 <sup>3</sup>	%	cm	bu/ac	seeds/lb
M92-223	115	129	0	0	65	55.3	2,017
M92-350	106	129	8	0	105	55.2	2,219
M92-330	98	123	2	0	95	51.1	2,037
M92-237	106	123	0	0	95	50.6	2,142
M92-220	123	n	0	0	80	49.6	2,213
M92-217	115	129	0	0	75	49.3	2,033
M92-225	106	115	0	0	80	49.1	2,353
M92-314	106	123	0	0	55	48.9	2,113
M92-085	106	123	0	0	95	48.7	2,188
M92-213	123	129	0	0	80	43.4	1,995
M92-239	106	129	0	0	55	42.2	1,946
Agassiz	123	n	5	0	100	36.3	2,166
OR-8	129	n	7	0	100	34	2,059
M93-19	129	n	1	0	95	33.3	2,030
Gnome 85	123	129	6	0	100	32.6	2,167
M93-46	135	n	4	0	90	32.3	1,975
M92-249	123	129	0	0	70	31.9	2,046
Lambert	129	n	6	0	85	31.7	2,126
M92-201	123	129	0	0	60	31.1	2,238
M93-20	129	n	0	0	75	28.4	1,996
OR-6	106	123	2	0	100	28.2	2,205
M93-26	129	n	1	0	85	27	1,891
Sibley	125	n	8	0	90	24	1,845
HC89-2018	131	n	9	0	90	22.1	2,225
M93-28	132	n	1	0	85	18.9	1,827
M93-21	129	n	2	0	85	18.5	2,250
M93-18	131	n	1	0	90	18	2,030
M93-84	132	n	6	0	100	15.1	2,188
M93-25	131	n	2	0	100	14.5	2,081
Evans	123	129	8	0	110	13.2	2,152
M93-42	132	n	3	0	85	8.3	1,875
M93-27	132	n	0	0	75	7.1	1,959
LSD (0.05)						14.1	155

<sup>1</sup>Pods yellowing, 50% of leaves yellow. <sup>2</sup>95% of pods brown, stems dry enough to be combined. <sup>3</sup>0= none, 10= 100 percent lodging. n= never reached harvest maturity.

Table 2. Performance characteristics of single-plant soybean selections made in 1994. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1995.

Cultivar	Days to maturity <sup>1</sup>	Days to harvest maturity <sup>2</sup>	Lodging	Shatter	Height	Yield <sup>4</sup>	Seed count
	days from emergence		0-10 <sup>3</sup>	%	cm	bu/ac	seeds/lb
M94-C	115	129	0	0	90	62.2	1,993
M94-B5	115	129	1	0	110	60.4	2,016
M94-E	123	129	0	0	85	53	2,525
M94-B3	115	129	4	0	100	52.6	1,945
M94-A6	123	n	0	0	85	51.2	1,906
M94-B2	115	129	0	0	85	47	1,865
M94-D	123	129	0	0	80	43	1,842
M94-B1	115	129	0	0	85	41.4	2,010
M94-B4	115	129	6	0	100	41.1	1,982
M94-A3	123	129	3	0	90	38.4	2,223
M94-A4	123	129	4	0	95	38.3	2,170
M94-A2	123	129	0	0	95	37.8	2,389
M94-A1	123	129	0	0	80	36.2	2,123
M94-A7	123	129	0	0	90	34.3	2,135
M94-A5	123	129	4	0	95	31.6	2,212

<sup>1</sup> Pods yellowing, 50% of leaves yellow. <sup>2</sup> 95% of pods brown, stems dry enough to be combined. <sup>3</sup> 0= none, 10= 100 percent lodging. <sup>4</sup> Yields are not necessarily realistic due to lack of border, on single row plots. n= never reached harvest maturity.