

## SOYBEAN PERFORMANCE IN ONTARIO IN 2004

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### Introduction

Soybean is a potentially valuable new crop for Oregon. Soybean 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 soybean production could provide a raw material for specialized food products. Soybean is valuable as a rotation crop because of the soil-improving qualities of its residues and its N<sub>2</sub> -fixing capability. Because of the high-value irrigated crops typically grown in the Snake River Valley, soybeans may be economically feasible only at high yields.

Soybean varieties developed for the midwestern and southern states are not necessarily well adapted to Oregon's lower night temperatures, lower relative humidity, and other climatic differences. Previous research at Ontario, Oregon has shown that, compared to the commercial cultivars bred for the Midwest, plants for eastern 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).

M. Seddigh and G.D. Jolliff at Oregon State University, Corvallis identified a soybean line that would fill pods when subjected to cool night temperatures. This line was crossed at Corvallis with productive lines to produce OR 6 and OR 8, among others. At this point, the development moved to Ontario, Oregon. The later two lines were crossed at our request for several years with early-maturing high-yielding semi-dwarf lines by R.L. Cooper (USDA, Agriculture Research Service, Wooster, OH) to produce semi-dwarf lines with potential adaptation to the Pacific Northwest. Selection criteria at the Malheur Experiment Station (MES) included high yield, zero lodging, zero shatter, low plant height, and maturity in the available growing season. In 1992, 241 single plants were selected from 5 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; 18 selections were found promising and selected for further testing in larger plots from 1994 through 1999. Of the 18 lines, 8 were selected for further testing. In 1999, selections from one of the MES lines were made by P. Sexton at the Central Oregon Agricultural Research and Extension Center (COAREC) in Madras, Oregon. Sixteen of these Madras selections were chosen for further testing. In 2000, selections were made from six of the 1992 MES lines and from OR-6. This report summarizes work done in 2004 as part of the continuing breeding and selection program to adapt soybeans to eastern Oregon.

### Methods

The trial was conducted on a Greenleaf silt loam previously planted to wheat. Forty lbs of nitrogen, 100 lb of sulfur, 2 lb of copper, and 1 lb of boron were broadcast in the fall of 2003. The field was then disked twice, moldboard plowed, groundhogged twice, and bedded to 22-inch rows.

Five commercial cultivars, 5 older lines selected at MES in 1992, 9 lines selected in 1999 at the COAREC from a MES line, and 24 lines selected in 2000 at MES were planted in plots 4 rows by 25 ft.

The plots were arranged in a randomized complete block design with four replicates. The seed was planted on May 20 at 200,000 seeds/acre in rows 22 inches apart. *Rhizobium japonicum* soil implant inoculant was applied in the seed furrow at planting. Emergence started on June 1. The field was furrow irrigated as necessary. The field was sprayed on August 3 and August 11 with dimethoate at 0.5 lb ai/acre for lygus bug and stinkbug control.

Plant height and reproductive stage were measured weekly for each cultivar. Prior to harvest, each plot was evaluated for lodging and seed shatter. Lodging was rated as the degree to which the plants were leaning over (0 = vertical, 10 = prostrate). The middle two rows in each four-row plot were harvested on October 8 using a Wintersteiger Nurserymaster small plot combine. Beans were cleaned, weighed, and a subsample was oven dried to determine moisture content. Dry bean yields were corrected to 13 percent moisture. Variety lodging, plant population, yield, and seed count were compared by analysis of variance. Means separation was determined by the protected least significant difference test.

## Results and Discussion

Yields in 2004 ranged from 44.2 bu/acre for 'OR-8' to 70.5 bu/acre for 'M12' (Table 1). Several of the lines had seed counts sufficient for the manufacturing of tofu (< 2,270 seeds/lb). Several lines combined high yields, little lodging, and early maturity. Considerable yield advantages were obtained through continued selection.

Table 1. Performance of soybean cultivars ranked by yield in 2004, Malheur Experiment Station, Oregon State University, Ontario, OR. Cultivars M92-085 through M92-350 are from single plant selections made at the Malheur Experiment Station in 1992. Cultivars M1 through M16 are from single plants selected from M92-330.

Table 2. Performance of soybean varieties over years, Malheur Experiment Station, Oregon State University, Ontario, OR.