

**Edamame Soybean Production in North Dakota:  
2004 Variety and Irrigation Experiment**  
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**Objective:**

The goal of this project was to assess the agronomic performance of several edamame soybean varieties grown in eastern North Dakota during two growing seasons, and to ascertain the necessity of irrigation in the production system.

**Materials and Methods:**

The second year of this field experiment was conducted at the North Dakota State University research site near Prosper, ND, on a Bearden silty clay loam (fine, silty, frigid, Aeric Calciaquoll) with 3.6% organic matter and 7.5 pH. Previous crop was spring wheat (*Triticum aestivum* L.), and the soil was tilled in the fall, early spring, and immediately prior to planting. The plots were arranged in a split plot design with four replicates. Main plots were two irrigation schedules (irrigation weekly vs. no irrigation) and subplots were six soybean varieties: Envy, Butterbean (JS), IA1010, IA2062 (Iowa State University, Ames, IA), Sayamusume, and Misono Green (T). An experimental unit consisted of four 20-ft long rows spaced 24-in apart, and data was taken from the two middle rows.

Planting occurred on 7 June 2004 at a target seeding rate of 100,000 plants/A. Stand counts were taken on 23 July, and plant height and width measurements were taken on 25 August. First flowering was detected on 29 July. The field was lightly hand-weeded once during July and once again in August. Irrigation occurred weekly (to supplement natural rainfall) beginning 2 July. Plots were hand harvested by collecting the aboveground biomass from 10 feet of each middle row on 7 September (Envy), 10 September (Misono Green), 13 September (Sayamusume), 17 September (Butterbean), and 28 September (IA1010 and IA2062). All pods were removed from the plants, with damaged and unfilled pods discarded. Marketable pods were separated into categories of 1-bean, 2-bean, and 3-beans per pod, and fresh weights were obtained for each. Additional data included number of pods on each of three randomly selected plants per plot, and fresh weights for 100 shelled seeds of three subsamples per plot. Data were subjected to analysis of variance and the means were separated by the LSD test using a 0.05 level of significance.

**Results and Discussion:**

For all experimental variables appearing Table 1, there were no significant differences between irrigated and non-irrigated plots. However, significant differences were detected among the varieties for most variables. Among the stands of the varieties, populations were significantly lower in IA1010 and Misono Green plots, and the highest stand occurred with Sayamusume. IA2062, IA1010, and Butterbean were significantly taller than the other varieties.

Sayamusume had a significantly greater total marketable pod yield than the other varieties, producing 10,118 lbs/A. The seed size for this variety was also statistically

greater than the other varieties, but it also produced significantly fewer pods per plant than the others. The highest percentages of 3-bean pods were found in Misono Green, Butterbean, and IA1010. The earliest maturing variety, Envy, was the lowest yielding, had the fewest 3-bean pods, and had the smallest seed size.

In general, the plant populations were average to above-average for the Midwest. Edamame yields (7502-10,118 lbs/A) appeared higher than those reported in other parts of the Midwest, possibly due to good emergence and stand. No statistical differences were detected between the irrigated and nonirrigated plots, and this was most likely due to the ample rainfall received during the growing season (6.73" from 7 June to 7 September). The soil in this location is also an important factor to consider regarding moisture availability and irrigation, because it is heavier and tends to retain moisture longer than sandy soils. It appears that vegetable soybeans have good potential as a high-value crop in the Northern Great Plains, though markets and harvesting machinery are current economic constraints for producers.

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**Table 1.** Vegetable soybean variety and irrigation\* experiment, 2004. Prosper, ND.

| Variety             | Stand                | Biomass    |       | Pod         |                | Pods/<br>Plant | 100 Seed<br>Wt |
|---------------------|----------------------|------------|-------|-------------|----------------|----------------|----------------|
|                     |                      | Height     | Width | Fresh<br>Wt | 3-Bean<br>Pod  |                |                |
|                     | plants/A             | ----in---- |       | lb/A        | % <sup>‡</sup> |                | oz             |
| <b>Envy</b>         | 76,638a <sup>†</sup> | 31.7b      | 25.8  | 7502d       | 9.6            | 39.7a          | 1.46d          |
| <b>Butterbean</b>   | 78,953a              | 34.6a      | 27.4  | 8469c       | 32.4           | 33.1b          | 1.81b          |
| <b>IA 1010</b>      | 65,748b              | 35.4a      | 28.3  | 9024bc      | 31.9           | 36.4ab         | 1.67c          |
| <b>IA 2062</b>      | 77,319a              | 35.8a      | 26.7  | 8675bc      | 30.0           | 33.5b          | 1.76b          |
| <b>Sayamusume</b>   | 83,580a              | 32.7b      | 26.5  | 10,118a     | 22.0           | 27.8c          | 2.27a          |
| <b>Misono Green</b> | 68,334b              | 31.8b      | 26.8  | 9,285b      | 32.8           | 39.9a          | 1.62c          |
| <b>LSD 0.05</b>     | 7,982                | 1.6        | NS    | 723         |                | 4.2            | 2.45           |

\*No statistical differences were detected between irrigated and non-irrigated plots.

<sup>†</sup>Within a column, means followed by the same letter are not significantly different at  $P = 0.05$ .

<sup>‡</sup>Percentage of total pod fresh weight.