

Edamame (Vegetable Soybean) Variety Trial IDALS Specialty Grant Program-2002

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Introduction

Interest in edamame or vegetable soybeans has increased in the U.S. in recent years. Edamame soybeans are harvested immature, similar to green beans. Immature soybeans have less of a “beany flavor,” which appeals to American consumers. Edamames are boiled and served either in or out of pods, usually eaten as a snack or in soups, salad, or as a vegetable dish. Edamames are usually harvested at 85% pod fill. Pod color and size can be employed as quality indicators, with high quality pods having 2 - 4 seeds/pod and pod length around 2.5 inches. Insect- and disease-free pods should be harvested. Chilling beans for 3-10 hours after harvest will help limit sugar and amino acid degradation. In 2002, edamame research trials were established on organic fields in four locations across Iowa. All sites used organic production methods.

Materials and Methods

The edamame research sites included the Neely-Kinyon Farm, Greenfield, and three on-farm sites at Abbe Hills Farm (L. Krouse), Mt. Vernon; One Step at a Time CSA (J. Libbey), Kanawha; and the Rinehart’s Farm, Boone, Iowa. Varieties planted in this trial were: IA1010, IA2040-LF, IA3006-LF (Iowa State University, W. Fehr’s Program), and Kenko (Seedex, Inc. Longmont, CO). Varieties planted at the L. Krouse and N-K farms were IA1010, IA2040-LF, and Kenko. At J. Libbey’s, varieties included IA2040-LF, IA3006-LF, and Kenko. The Rineharts planted IA 2040-LF. Edamames were planted from May 30 – June 14 and harvests occurred from Aug. 21 to Sept 14, 2002. A description of the Neely-Kinyon design is described next.

Three varieties of edamame soybeans (IA1010, IA2040 LF and Kenko) were planted at 125,000 seeds per acre in a randomized complete block design with 4 replications on June 3, 2002. Plots (30 x 20 ft) were harrowed on June 17, and row cultivated on June 24 and July 1. Plots were walked on July 18 for any remaining weeds. Stand counts were taken on June 19, 2002. A mechanical bean picker (Pixall BH 100, OXBO, Clear Lake, WI) was used in 2002 to harvest from two 20-ft rows on August 21, 2002, when pods were green and full. Edamames were also hand-harvested on August 21 to compare mechanical vs. hand-harvests.

Results and Discussion

There were no significant differences in plant populations among varieties at the N-K farm, although a lower stand count was apparent in ‘Kenko’ compared to the other varieties (Table1). Soybean stand populations averaged $95,444 \pm 366$ plants/acre. Averaged across all sites, Kenko had a significantly lower stand compared to the other varieties (Fig. 1). There were no significant differences in yield at any sites. At N-K, edamame yields averaged 8268.7 ± 274.7 lb/acre (Fig. 2) and at J. Libbey’s, the average yield was 7053.8 ± 1346.6 lb/acre (Fig. 3). The average edamame yield across all sites was 7964.3 ± 436.6 lb/acre (Fig.4). Bean leaf beetles were present in these trials, although plant health was not impacted.

Significantly higher yields were obtained when plots were hand harvested compared to the mechanically harvested (Table 2). The greatest difference was observed with IA3006 LF (Fig. 5). Greater harvesting efficiency may have been achieved with more familiarity and experience with the equipment.

Table 1. Plant populations at 38 days after planting, Neely-Kinyon, 2002.

| Variety | Stand count \pm SE |
|-----------|----------------------|
| IA 1010 | 97,333 \pm 7,796 |
| IA 2040LF | 100,333 \pm 2.186 |
| Kenko | 84,333 \pm 20,795 |
| LSD 0.05 | NS |

Table 2. Hand-harvested vs. machine harvested edamame yields, 2002.

| Variety | Yield (lb/ac) \pm SE |
|-----------|------------------------|
| | <i>Mechanical</i> |
| IA 1010 | 6911.5 |
| IA 2040LF | 7521.7 \pm 1317.9 |
| Kenko | 6934 \pm 853.8 |
| | <i>Hand</i> |
| IA 1010 | 9252.4 \pm 186.3 |
| IA 2040LF | 8285.1 \pm 406.5 |
| Kenko | 8110.9 \pm 501.4 |
| LSD | 0.002 |

In addition to the challenge of determining which varieties perform best in terms of yield, seed size, taste, color, and nutrition, harvesting poses an additional challenge requiring further studies. Edamames should be harvested when the optimum combination of sugar, amino acid content and pod fill is obtained. The fact that sugar and amino acid concentration peak before complete pod fill provides additional challenges to growers. Unlike most soy products, edamames require minimal, but essential, equipment and processing protocols for maintaining quality. Edamames can be sold fresh in Farmers' Markets, stores or at roadside stands as bundled plants, and sold fresh or frozen in pods or as shelled beans. Several edamame operations utilize hand harvesting, but labor costs may seriously impact the profitability of this crop. Neely-Kinyon organic edamames were served at Field Days and received high grades for excellent taste. Further studies will be conducted in 2003.

Acknowledgements

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References

Washington State University's Edamame Program, <http://agsyst.wsu.edu/edamhome.html>

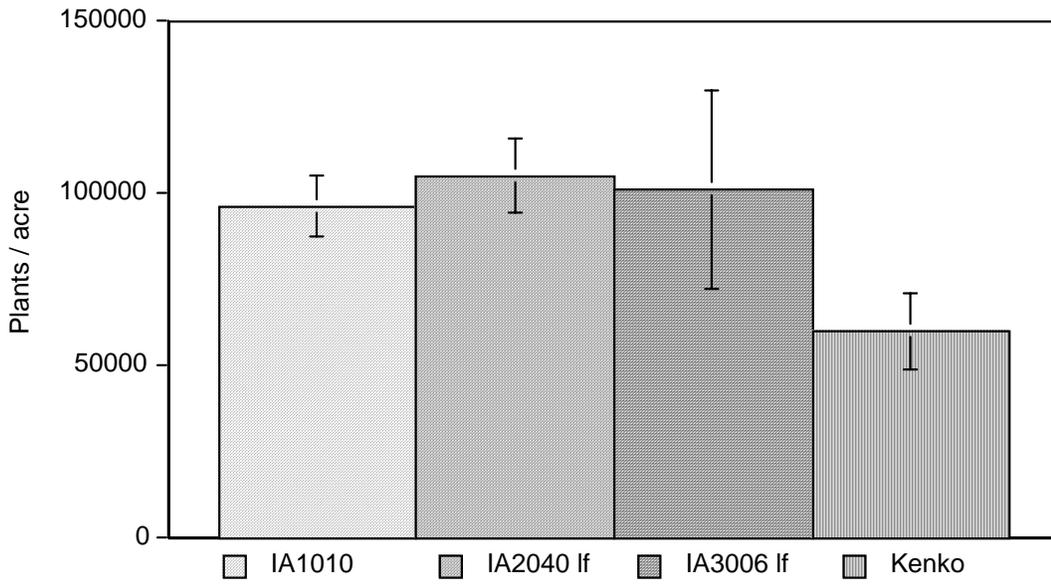


Figure 1. Edamame stands across all sites, 2002.

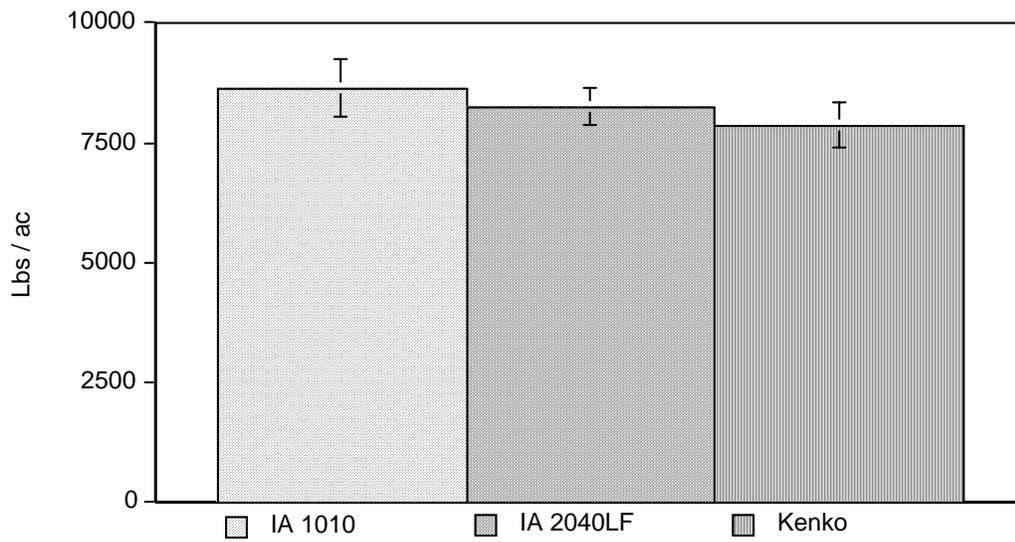


Figure 2. Edamame yield, Neely-Kinyon 2002.

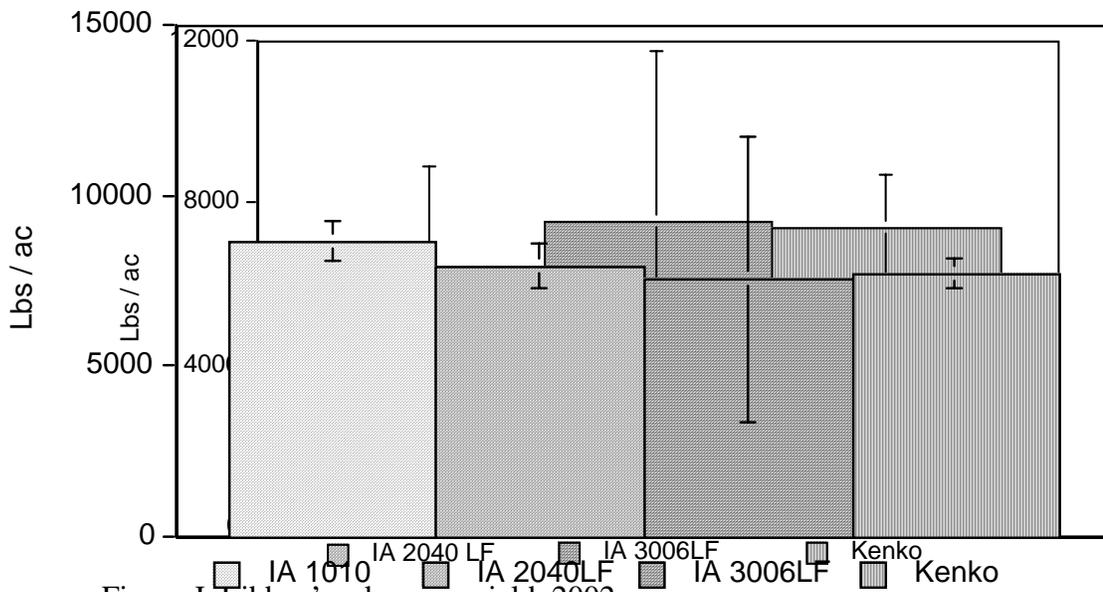


Figure J. Libbey's edamame yield, 2002.

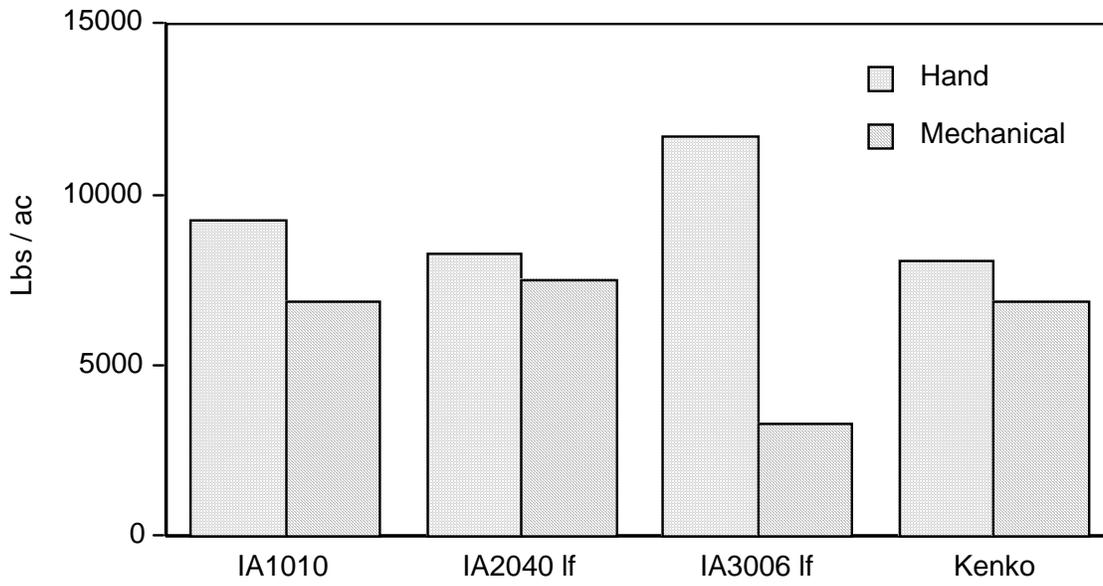


Figure5. Edamame variety trial, mechanical vs hand harvest.