

New planting guidelines could boost edamame profits

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Edamame in the field. Credit: Marty Williams

Edamame may be a niche crop in the United States, but growers and processors still need the best possible information to make sound management decisions. That's why USDA Agricultural Research Service (USDA-ARS) and University of Illinois researchers are making new plant density recommendations for machine-harvested edamame, at less than half the rate suggested by seed companies.

"Until now, [edamame](#) processors and growers had no research-based information to determine crop [density](#). While some [seed](#) companies make recommendations, the basis for these recommendations is unclear," says Marty Williams, ecologist with USDA-ARS and the Department of Crop Sciences at Illinois.

Seed companies recommend plant densities from 80,100 to 139,200 plants per acre, and at \$11 to \$22 per pound of edamame seed, the cost adds up very quickly. Williams says these recommendations may be based on what works for grain-type soybean, but they're not necessarily appropriate for edamame, which is harvested while pods are bright green and seeds are still immature.

To get a better handle on what's realistic and profitable for the crop, Williams and crop sciences graduate student Daljeet Dhaliwal planted four edamame cultivars at five densities, ranging from 10,000 to 160,000 plants per acre. They measured multiple growth, harvest, and processing characteristics for each cultivar at all five densities, over two years. Finally, they derived the economically optimal planting density (EOPD) based on the cost of seed, yield of marketable pods, and sales price.

"Results identified that the EOPD for machine-harvested edamame ranged from 35,200 to 48,600 plants per acre," Dhaliwal says. "That's less than half of what's recommended by [seed companies](#)."

Lower densities were more profitable, in part, because increasing plant density led to a lower ratio of pod mass to vegetative mass.

"We showed that higher plant densities change the architecture of the crop. For the most part, as plants are added beyond the EOPD, the crop is less suitable for mechanical harvest. It's taller, with more leaf area, and fewer marketable pods. Obviously, we need enough [plants](#) to utilize

available resources, but there are diminishing returns beyond the EOPD," Williams says.

The new report underscores that edamame agronomy is not interchangeable with grain-type soybean. For the U.S. edamame market to maximize profitability and become competitive with China, Williams says, growers and processors should follow research-backed recommendations specific to the unique aspects of the crop.

More information: Daljeet S. Dhaliwal et al, Economically Optimal Plant Density for Machine-harvested Edamame, *HortScience* (2020).

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