Estimating the Economic Viability of a New Crop Alternative for the U.S. Organic Market: Edamame – A Vegetable Soybean

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Introduction

• Edamame is gaining popularity in the U.S and will surpass all other soy based products by 2020 (Soybean Board, 2010).
• Mostly imported from Asia and rarely organically certified.
• Possibility for U.S. organic producers to pursue a high value niche product.
• Empirical evidence regarding the potential for mass production is lacking.
• An economic evaluation to determine the profitability and appropriate implementation of producing organic edamame is warranted.

Objectives

This study addressed three questions involving the production of edamame on a commercial scale for the frozen food industry.

(1) Is the production of edamame in the U.S. profitable for organic producers?
(2) How do various weed management strategies, specifically cover cropping versus tillage, impact net returns?
(3) What market prices and land area are required to economically justify the adoption of commercial edamame production

Economic Model

• A whole farm planning, resource allocation modeling technique is used to compare producing organic edamame in lieu of organic soybeans under conventional tillage and cover cropping methods.
• The objective function maximizes net returns.
• The decision variables included the land area designated to producing organic corn and soybeans/edamame.
• The model constraints include:
  • Land and labor resource available
  • Annual sales balance by crop
  • Input purchases balance
  • Annual net returns balance
  • Expected net returns balance
  • Rotation limitations
  • Soil type balance

The Data

• Kentucky producer growing organic corn and soybeans on 200 acres.
• Thirty years of corn, soybean, and edamame yields based on biophysical simulation (Jones et al., 2003).
• Yields adjusted to reflect loss from weed management strategies.
• Assumed a green bean harvester could be used for mechanical harvesting with a 25% yield loss (Born, 2006)

Results

Table 1. Break-even edamame prices ($/lb) required for a 200 acre organic farm.

<table>
<thead>
<tr>
<th>Break Even Edamame Prices ($/lb)</th>
<th>Tillage</th>
<th>Cover Cropping</th>
</tr>
</thead>
<tbody>
<tr>
<td>To Cover Variable Costs</td>
<td>$0.25</td>
<td>$0.38</td>
</tr>
<tr>
<td>To Cover All Specified Costs</td>
<td>$0.29</td>
<td>$0.48</td>
</tr>
<tr>
<td>Required to Switch from Soybeans</td>
<td>$0.37</td>
<td>$0.50</td>
</tr>
</tbody>
</table>

Table 2. Break-even acres required to cover all specified costs of production given various edamame prices ($/lb).

<table>
<thead>
<tr>
<th>Edamame Price ($)</th>
<th>Tillage Break-even Acres</th>
<th>Cover Cropping Break-even Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.30</td>
<td>163</td>
<td>157</td>
</tr>
<tr>
<td>$0.35</td>
<td>113</td>
<td>121</td>
</tr>
<tr>
<td>$0.40</td>
<td>86</td>
<td>98</td>
</tr>
<tr>
<td>$0.45</td>
<td>70</td>
<td>83</td>
</tr>
<tr>
<td>$0.50</td>
<td>60</td>
<td>72</td>
</tr>
</tbody>
</table>

Table 3. General economics regarding the production of organic corn and soybeans/edamame for a 200 acre organic farm when edamame prices are at break-even level required to switch from soybeans.

<table>
<thead>
<tr>
<th>General Economics</th>
<th>Corn Edamame</th>
<th>Corn Soybeans</th>
<th>Cover Cropping Edamame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Returns</td>
<td>$133,426</td>
<td>$295,257</td>
<td>$87,955</td>
</tr>
<tr>
<td>Net Returns</td>
<td>$52,345</td>
<td>$52,345</td>
<td>$8,930</td>
</tr>
<tr>
<td>Variable Costs</td>
<td>$46,495</td>
<td>$177,958</td>
<td>$47,389</td>
</tr>
<tr>
<td>Ownership Costs</td>
<td>$34,587</td>
<td>$62,954</td>
<td>$3,636</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>$15,604</td>
<td>$28,286</td>
<td>$9,884</td>
</tr>
<tr>
<td>Coeff. of Var.</td>
<td>29.81%</td>
<td>54.04%</td>
<td>110.69%</td>
</tr>
<tr>
<td>Min. Net Returns</td>
<td>$12,411</td>
<td>($30,186)</td>
<td>($15,675)</td>
</tr>
<tr>
<td>Max. Net Returns</td>
<td>$84,501</td>
<td>$95,313</td>
<td>$29,602</td>
</tr>
</tbody>
</table>

Conclusions

• If the market price for organic edamame was favorable, it could flourish in Kentucky.
• Conventional tillage was economically preferred over cover cropping for weed management.
• Market prices of $0.37/lb. was required to switch to edamame from soybeans under the preferred weed management strategy.
• Due to an increase in the coefficient in variation when producing edamame, risk preference must also be considered and could influence the results of this study.

Selected References

• Soybean Board, U. (2010). Food Use of Soy Protein Market Study.

Acknowledgements

• This study was funded by the CSREES Special Grant through Hatch Funds: New Crop Opportunities – Phase X – Specialty Grains.