Analyzing Economic Feasibility of Extending the Growing Season for Pepper Production

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Introduction
Changing consumer preferences on fresh fruits and vegetables, increasing the number of new farmers markets and establishing new wholesale auction markets provide ample opportunities for small and limited resource farmers to diversify their production and marketing strategies. The purpose of this study is to assess the economic feasibility of growing early season vegetables and fruits using high tunnels.

Various Production Technologies to Extend Growing Season

- **High Tunnels**
- Conventional Green Houses
- Plastic mulch
- Row Covers
- Low tunnels
- Walk-in or Caterpillar Tunnels

Advantages and Disadvantages of Seasonal Extension

Advantages
- Increased profit margin earlier and later in the growing season
- Developing customer loyalty to a brand
- Higher productivity and income
- Improved quality - Reduction in weather, pest and disease damage to crop
- Extended or year around employment for skilled employees

Disadvantages
- Increased management demands and marketing costs
- Higher production costs
- Plastic disposal

High Tunnel Production System

Advantages
- Allows for an extended growing season
- Uses sun for heat and wind for ventilation
- Protects plants from weather and pest pressure
- Allows to grow alternative crops and more disease resistant varieties
- Allows controlled irrigation

Disadvantages
- Salinity problems, soil-borne diseases, compaction, and other problems evolve over time

Economic Analysis

**Economic Budget: Pepper High Tunnel–Conventional**

- High-Tunnel Size ft$^2$ (30’x90’): 2700
- Utilization (%): 94
- Orig. High-Tunnel Cost: $11,000
- Plastic Cover Cost: $2,300
- Number of Plants: 640

**March – Sept. Labor Use (in hours)**

- Bed Preparation: 12.50
- Gen. Maintenance Planting: 12
- Pest Management: 12
- Harvest Expenses: 12
- Total Annual Labor Expenses: 89

**Ownership Costs**

- Depreciation – Tunnel (8yrs): $11,000
- Depreciation – cover (4yrs): $2,300

**Total Annual Expenses**: $853

**Total Ownership Costs/Year**: $2,282.50

Each graph depicts the price and quantity of peppers that were traded at Fairview Auction Market on a weekly basis during the growing season in the years 2015-2017.

Risk Management Analysis

<table>
<thead>
<tr>
<th>Exp. Yield (Lb/Plant)</th>
<th>$0.50</th>
<th>$0.75</th>
<th>$1.00</th>
<th>$1.25</th>
<th>$1.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>(0.85)</td>
<td>(0.45)</td>
<td>(0.04)</td>
<td>0.36</td>
<td>0.76</td>
</tr>
<tr>
<td>10</td>
<td>(0.65)</td>
<td>(0.14)</td>
<td>0.36</td>
<td>0.86</td>
<td>1.37</td>
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<tr>
<td>12</td>
<td>(0.45)</td>
<td>0.16</td>
<td>0.76</td>
<td>1.37</td>
<td>1.97</td>
</tr>
<tr>
<td>14</td>
<td>(0.25)</td>
<td>0.46</td>
<td>1.17</td>
<td>1.87</td>
<td>2.58</td>
</tr>
</tbody>
</table>

A drop in revenue (by 20%) as result of diseases or other unexpected disasters will increase the required price to $1.50 per pound. This reiterates the importance of applying best management practices and appropriate risk management strategies.

**Sensitivity Analysis**

<table>
<thead>
<tr>
<th>Expected Price</th>
<th>$0.50</th>
<th>$0.75</th>
<th>$1.00</th>
<th>$1.25</th>
<th>$1.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Break-Even Yield per Plant</td>
<td>14.0</td>
<td>9.3</td>
<td>7.0</td>
<td>5.6</td>
<td>4.7</td>
</tr>
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</table>

The break-even analysis of expected price and expected yield per plant show that the investment in a high tunnel will require higher return marketing strategies.

Pay-Back Period Analysis

<table>
<thead>
<tr>
<th>Exp. Yield (Lb/plant)</th>
<th>$0.50</th>
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<tr>
<td>14</td>
<td>6.93</td>
<td>3.47</td>
<td>2.32</td>
<td>1.74</td>
<td></td>
</tr>
</tbody>
</table>

Pay-back period analysis shows the required years necessary to recoup the investment cost at various prices and yield per plant

- * Depicts that the investment is economically not feasible (negative returns), and ** denotes the required time to recoup the investment is greater than the expected life of the investment.

Discussion

- The economic analysis is based solely on conventional pepper production sold at wholesale auction markets.
- The average trend (not shown) reveals that 16 to 21 weeks can be considered as early season however, this varies from year to year, depending on weather conditions.
- Economic and financial analysis show that the investment in a high tunnel requires higher average pepper prices than the wholesale auction market prices provide.

Conclusion

Despite a number of advantages of this production technology, higher required prices and yields per plant force growers to identify more efficient production strategies and improved marketing strategies to make this venture successful. Adopting higher yield and more disease resistant varieties, growing higher valued products, marketing value added products, finding new marketing opportunities like selling the products directly to their end-users are alternatives, to name a few. However, these strategies can increase both production and marketing costs thus it is necessary to conduct proper economic analysis to assess this technology.

References

Extending the Garden Season with High Tunnels. https://extension.psu.edu/extending-the-garden-season-with-high-tunnels
Vegetable Production Budgets for a High Tunnel. https://www.extension.iastate.edu/AgCrops/html/HL23.html

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