Strengthening Organic Sweetpotato Propagation Systems in the North Central Region

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Introduction: Sweetpotato (*Ipomoea batatas*)

- Growing demand for local, organic vegetables.
  - Nutritional benefits
  - Flavor
  - Versatility
  - Shelf-life
- Consumption ↑ 80% between 2000-2014
- 7.5 lbs. annual per capita
- Easily grown in variety of climates and soils types

Source: Ag Marketing Resource Center
Cultivars are propagated vegetatively. Roots are sprouted, sprouts are cut and transplanted.
Sweetpotato Propagation “slips”

• Tropical crop: no frost tolerance, needs warm soils

• Slip production that fits planting schedule is a challenge in North Central Region.
  – Regional growers often buy slips from Southeastern U.S.

• **Cost of buying slips** remains single biggest expense for growers

• **High-tunnel production** represents promising alternative
KSU was awarded funding in 2015 for a 3-year study of Regional Sweetpotato Propagation Systems.

**Overall Objectives:**

- *Define best management practices for high tunnel production of sweetpotato slips*
- Outline economic feasibility of the high tunnel slip propagation system
- Develop recommended postharvest (e.g. MAP) technologies to extend slip storage/shipping life
- Conduct field days and extension bulletins to highlight the results of the project
# High Tunnel Crop Value Comparison

<table>
<thead>
<tr>
<th>Crop Type</th>
<th>Rotation interval</th>
<th>Sale Price/unit</th>
<th>Gross Revenue/ft²</th>
</tr>
</thead>
<tbody>
<tr>
<td>OG Sweetpotato Slips</td>
<td>04/15-05/30</td>
<td>$130/1000 slips</td>
<td>$5.37</td>
</tr>
<tr>
<td>Tomato</td>
<td>04/01-10/01</td>
<td>$2.50/lb</td>
<td>$3.66</td>
</tr>
<tr>
<td>Cucumber</td>
<td>04/15-07/15</td>
<td>$1.50/lb</td>
<td>$1.62</td>
</tr>
<tr>
<td>Bell Pepper</td>
<td>04/15-10/01</td>
<td>$1.50/lb</td>
<td>$2.30</td>
</tr>
<tr>
<td>Salad Mix</td>
<td>02/15-05/01</td>
<td>$8/lb</td>
<td>$2.40</td>
</tr>
</tbody>
</table>

Based on enterprise budgets from KRC *Growing Under Cover* v2 Dec. 2016
Trial Locations

- Haysville, KS
- Olathe, KS
Experimental Design (1)

- **Randomized Complete Block Design @ John C. Pair Center**
  - Comparing yields & physical characteristics of slips grown in High Tunnels (HT) v. Open-Field (OF).
  - 4 replicated HT plots and 4 OF
Experimental Design (2)

- Split Plot Design @ Olathe Hort. Research & Extension Center
  - Main plots 6 HT v. 6 OF
  - 3 subplot treatments comparing seed root planting density effects on slip yield (45, 65, 85)
- Replicated 6 times in HT and OF
Materials and Methods

Sweetpotatoes are placed in ground and covered with 2-3” soil and clear plastic. Mid to late Spring.

About 4 weeks later when we see the slips breaking the surface, we remove the plastic.

Start cutting when they reach 8” – 12”
Data collection

Slip Yield / m²
- Total Marketable #
- Total Marketable Weight g
- Total Cull Weight g
- Total Marketable dry weight (g)
- Total Cull dry weight (g)

Slip Characteristics
- Fresh Weight (g)
- Dry Weight (g)
- Leaf Area cm²
- Stem Diameter
- Length cm
- # of Nodes
- Compactness (dry weight/length)
Field Study (Edible Root production)

- **RCBD @ the OHREC**
  - Comparing slip growing environment impact on root yield
    - 4 treatments JCP & OHREC HT vs. OF
Marketable Yields

Haysville, KS Marketable Slip Yields

- **1st Harvest**
  - High Tunnel: 400
  - Open Field: 150

- **2nd Harvest**
  - High Tunnel: 450
  - Open Field: 300

Legend:
- Blue: High Tunnel
- Red: Open Field
Slip Compactness

Haysville, KS Slip Compactness

![Chart showing compactness dry weight (mg)/length(cm) for 1st and 2nd harvests in High Tunnel and Open Field conditions.]
Planting Density

Marketable Slips by Seed Root planting density (high tunnel)

1st Harvest
- 45 seed roots/ sq meter
- 65 seed roots/ sq meter
- 85 seed roots/ sq meter

2nd Harvest
- 45 seed roots/ sq meter
- 65 seed roots/ sq meter
- 85 seed roots/ sq meter
Olathe, KS Average Marketable Weight

- High Tunnel
- Open Field
Slip Origin Impact: Roots per plant

Olathe, KS Marketable Roots per plant

Average # of Roots/slip

- High Tunnel
- Open Field
Slip Origin Impact

Marketable Root Yields by Grade

- # of Marketable Roots per 10ft

<table>
<thead>
<tr>
<th>Grade</th>
<th>High Tunnel</th>
<th>Open Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total USDA 1s #:</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>Total Mediums #:</td>
<td>28</td>
<td>30</td>
</tr>
<tr>
<td>Total Jumbos #:</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

High Tunnel | Open Field
Preliminary Conclusions

Yield: HT vs. OF
- High tunnels average greater # of marketable slips

Physical Characteristics
- Open field treatment resulted in greater slip compactness

Slip Origin Impact
- Little correlation to greater root yield

Planting Density
- Marginal difference in slip yields at 65 v. 85 roots/m²
Thank you:

- Great Plains Growers Conference & Attendees
- Funders NCR-SARE & KCSAAC
- KSU and Horticulture & Natural Resources Dept. & Faculty
- KSU Hort. Research Center Staff and Interns