NMREC Pumpkin Research Update
North Mississippi Research & Extension Center
Horticulture Unit

2014-2016 NMREC Pumpkin Research Update

1. Pumpkin Variety Trial
2. Pumpkin Bio-fungicide vs. Fungicide Study
3. No-Till Pumpkin Research
4. TeraGranix Ag1000 Nutrition Study
5. Future Research

NORTH MISSISSIPPI 2014 PUMPKIN VARIETY TRIAL

- 14 Varieties, 4 Reps
- 9 Large and 6 Mid-Size Types
- Direct Seeded 7 July
- First Harvest Started 7 Sept
PUMPKIN VARIETY TRIAL

- 2 ft Spacing, Rows 12 ft apart.
- All P & K and 1/2 N (40lbs/ac) pre-plant.
- Remaining 40 lbs N (CaN03 5lbs N/week) at flowering
- Strategy herbicide mixed with glyphosate was applied after seeding.

NORTH MISSISSIPPI PUMPKIN VARIETY TRIAL

Large | Mid-size
---|---
1. EARLY GIANT (iPMR) | 10. OKTOBERFEST
2. FIRST HARVEST (iPMR) | 11. Jack-O-Lantern
3. MUSTANG (PMR) | 12. MAGICAL (PMR)
4. GOLD MEDAL | 13. DARLING
5. EARLY KING (PMR) | 14. EARLY ABUNDANCE
6. BIG DADDY (PMR)
7. EL TORO (PMR)
8. SOLID GOLD
9. P1-7606

NORTH MISSISSIPPI 2013 PUMPKIN VARIETY TRIAL

<table>
<thead>
<tr>
<th>Pumpkin Variety</th>
<th>Disease Rating</th>
<th>Days to Harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large</td>
<td>Mid-size</td>
</tr>
<tr>
<td></td>
<td>(1-5)</td>
<td>(1-5)</td>
</tr>
<tr>
<td>Early Giant</td>
<td>4.6 e</td>
<td>95</td>
</tr>
<tr>
<td>First Harvest</td>
<td>3.4 bcd</td>
<td>90</td>
</tr>
<tr>
<td>Mustang</td>
<td>2.2 a</td>
<td>100</td>
</tr>
<tr>
<td>Gold Medal</td>
<td>3.6 cd</td>
<td>95</td>
</tr>
<tr>
<td>Early King</td>
<td>3.8 cde</td>
<td>90</td>
</tr>
<tr>
<td>Big Daddy</td>
<td>3.4 bcd</td>
<td>115</td>
</tr>
<tr>
<td>El Toro</td>
<td>3.2 bc</td>
<td>95</td>
</tr>
<tr>
<td>Solid Gold</td>
<td>4.6 e</td>
<td>100</td>
</tr>
<tr>
<td>Earipack</td>
<td>3.4 bcd</td>
<td>95</td>
</tr>
<tr>
<td>Corvette</td>
<td>2.6 ab</td>
<td>110</td>
</tr>
<tr>
<td>Oktoberfest</td>
<td>3.8 cde</td>
<td>95</td>
</tr>
<tr>
<td>Howdy Doody</td>
<td>3.6 cd</td>
<td>90</td>
</tr>
<tr>
<td>Magical</td>
<td>4.2 de</td>
<td>88</td>
</tr>
<tr>
<td>Darling</td>
<td>3.8 cde</td>
<td>90</td>
</tr>
<tr>
<td>Early Abundance</td>
<td>3.9 abc</td>
<td>90</td>
</tr>
</tbody>
</table>
### Table 1. Pumpkin variety name and yield data of the 16 pumpkin varieties grown in northern Mississippi in 2013 & 2014.

<table>
<thead>
<tr>
<th>Pumpkin Variety</th>
<th>Weight (lbs)</th>
<th>Average</th>
<th>Average #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Giant</td>
<td>20.7 a</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>First Harvest</td>
<td>19.2 b</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>Mustang</td>
<td>17.5 c</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Gold Medal</td>
<td>17.0 c</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Early King</td>
<td>15.7 d</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Big Daddy</td>
<td>15.7 d</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>El Toro</td>
<td>14.1 e</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Solid Gold</td>
<td>12.9 f</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Earlipack</td>
<td>12.9 f</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Corvette</td>
<td>11.3 g</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>Oktoberfest</td>
<td>10.9 g</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Howdy Doody</td>
<td>10.3 g</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Magical</td>
<td>10.1 g</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>Darling</td>
<td>4.4 h</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>Early Abundance</td>
<td>4.1 h</td>
<td>2.3</td>
<td></td>
</tr>
</tbody>
</table>

#### Notes
- PMR = Powdery Mildew Resistance
- iPMR = intermediate PMR
- Disease Rating Scale (estimate of % diseased foliage): 1=10%, 2=20%, 3=30%, 5=50%, 10=100%.
NORTH MISSISSIPPI 2014 PUMPKIN VARIETY TRIAL

1. Early Giant
2. First Harvest
3. Mustang
4. Gold Medal
5. Early King
6. Big Daddy

NORTH MISSISSIPPI 2013 PUMPKIN VARIETY TRIAL

7. El Toro
8. Solid Gold
10. Corvette
11. Oktoberfest
12. P1-7606

NORTH MISSISSIPPI 2013 PUMPKIN VARIETY TRIAL

13. Magical
14. Darling
15. Early Abundance (ACX 1033)
Results

• ‘Mustang’ was one of the top producers with the best disease rating both years, and averaged 1.3 pumpkins per plant.

• ‘Early Giant’ was one of the biggest pumpkins both years but had a high disease rating and averaged 1.0 pumpkin per plant.

• ‘Corvette’ was one of the best mid-size varieties, had one of the best disease ratings, and averaged 1.5 pumpkins per plant.

• ‘Darling’ and ‘Early Abundance’ were two mid-size to small pie pumpkins that produced the most number per plant and had the least average weights with moderate to good disease resistance.

• The 2 new varieties trialed in 2014, ‘Jack-O-Lantern’ and P3-7606, an unnamed experimental variety, both had high disease ratings and yielded moderately.

PUMPKIN FUNGICIDE STUDY
Organic vs. Standard

- Special thanks to Certis USA

2014-2015 Fungicide Trial

• Challenges growing pumpkins in the southeast United States
  — Powdery mildew, a fungal disease that can cause extensive early defoliation.

• Growers are advised to spray with fungicides every 7 days to achieve acceptable yields.

• Increased interest in growing naturally or organically
Cultivar name, seed source, and description of the 3 pumpkins grown in northern Mississippi during the summer of 2014.

<table>
<thead>
<tr>
<th>Entry</th>
<th>Seed Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Giant</td>
<td>Abbott &amp; Cobb</td>
<td>Hybrid Large, 95 days, iPMR</td>
</tr>
<tr>
<td>Mustang</td>
<td>Seigers</td>
<td>Hybrid Large, 100 days, PMR</td>
</tr>
<tr>
<td>Gold Medal</td>
<td>Rupp</td>
<td>Hybrid Large, 95 days</td>
</tr>
</tbody>
</table>

\* PMR = Powdery Mildew Resistance, \*iPMR = intermittent Powdery Mildew Resistance

**Fungicide Treatments**

- Control (no spray treatment)
- OSO (Zinc salt)
- Double Nickel (Bacillus spp.) / Cueva (Copper soap)
- Bravo (Chlorothalonil) / Quatris (Azoxystrobin)

**Experimental Design**

- 4 Fungicide Treatments
- 3 Cultivars
- Split-plot design (main plot=fungicides; subplot=cultivars)
- 4 replications
- 3 plants of each cultivar per plot
Figure 1. Mean disease severity on the leaf surfaces of pumpkin leaf tissue treated with control (water), Oso (polyoxin D zinc salt), Double Nickle/Cueva (Bacillus amyloliquefaciens and copper octanoate), and Bravo/Quadris (chlorothalonil and aoxysrobin) once a week for 8 weeks. Means with the same letter for each separate year do not differ significantly at P ≤ 0.05 according to Fisher’s protected least significant difference test.

Figure 2. Mean disease severity on the leaf surfaces of pumpkin leaf tissue for the years 2014 and 2015. Means with the same letter for each separate year do not differ significantly at P ≤ 0.05 according to Fisher’s protected least significant difference test.

Pumpkin Yields

Table 1. Main effect for mean yield, number of fruit, and average fruit weight for three pumpkin cultivars grown under four fungicide treatments in 2014 and 2015 in Verona, MS.

<table>
<thead>
<tr>
<th>Fungicide Treatments</th>
<th>2014</th>
<th>2015</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fungicide Treatments</td>
<td>Yield (cwt/acre)</td>
<td>Number (no./acre)</td>
<td>Avg fruit wt (lb)</td>
<td>Yield (cwt/acre)</td>
</tr>
<tr>
<td>Control</td>
<td>293 b</td>
<td>2094 b</td>
<td>15.01 a</td>
<td>3024 ab</td>
</tr>
<tr>
<td>Oso</td>
<td>286 b</td>
<td>1904 b</td>
<td>14.02 a</td>
<td>337 b</td>
</tr>
<tr>
<td>Double Nickle/Cueva</td>
<td>286 b</td>
<td>2400 ab</td>
<td>11.92 b</td>
<td>529 a</td>
</tr>
<tr>
<td>Bravo/Quadris</td>
<td>423 a</td>
<td>2976 a</td>
<td>14.22 a</td>
<td>487 a</td>
</tr>
<tr>
<td>Early Giant</td>
<td>272 b</td>
<td>1904 b</td>
<td>14.29 a</td>
<td>280 b</td>
</tr>
<tr>
<td>Mustang</td>
<td>456 a</td>
<td>3408 a</td>
<td>13.40 a</td>
<td>543 a</td>
</tr>
<tr>
<td>Gold Medal</td>
<td>241 b</td>
<td>1760 b</td>
<td>13.60 a</td>
<td>533 b</td>
</tr>
</tbody>
</table>

*1 cwt/acre = 112.0851 kg/ha; 1 fruit/acre = 2.4711 fruit/ha
*2 Marketable pumpkins; 1 lb = 0.4536 kg.
*3 2014 and 2015 control = water; Oso = polyoxin D zinc salt; Double Nickle/Cueva = Bacillus amyloliquefaciens and copper octanoate, respectively; Bravo/Quadris = chlorothalonil and aoxysrobin, respectively.
*4 Values of the same column for the same main effect (fungicide treatment or cultivar) followed by the same letter are not significantly different at P ≤ 0.05 according to Fisher’s protected least significant difference test.
Results and Discussion

- Conventional treatments of chlorophalanil and aosurobin (Bravo/Quadris) were best at controlling disease.
  - Bacillus spp./copper octanoate (Double nickel/Cueva) – 2015
- Mustang was the best cultivar for disease resistance and yields (cwt/acre and number/acre)
- In 2014, chlorophalanil and aosurobin (Bravo/Quadris) yields were greatest.
- In 2015, they were not significantly different than the organic fungicides of polyoxin D zinc salt (Oso) and Bacillus spp./copper octanoate (Double nickel/Cueva)
- Current study showcased that the biofungicides can be as effective in treating the pumpkin plants for powdery mildew and keep up with yields compared to conventional fungicides.
- Paired with disease resistance cultivars biofungicides may be a viable option for growers
  - Reduce chemical exposure
  - Reduce disease resistance with conventional fungicides

No-Till Pumpkin Study

- Conventional production and tillage practices can damage soil physical properties and reduce soil OM and N retention.

- No-till practices have demonstrated numerous benefits for soil biology, structure, and overall soil health.

No-Till Pumpkin Study

- Short-term GOAL is to measure vegetable quality and soil health (chemical and physical properties) in no-till vegetable production systems in Mississippi.

- Data from this project will provide researchers, extension personnel, and growers with information regarding the benefits of cover crops and vegetable crop rotations for no-till production systems.

- Results from the research experiments and extension workshops will be published in peer-reviewed journals, research and extension bulletins, workshops and field days, and quarterly newsletters.

- Long-term GOAL of this research will demonstrate to Mississippi and surrounding state’s growers the benefits of no-till vegetable production such as long-term improvements in soil chemical and physical properties; increased yields with reduced fertilizer and herbicide applications; and fuel savings by reducing the number of equipment passes in the field.
No-Till Pumpkin Study

- The objectives of the proposed research studies and extension outreach are to
  - 1) Examine the benefits of no-till vegetable production on soil physical and chemical properties;
  - 2) Determine the benefits of no-till production on vegetable fruit quality;
  - 3) Examine the efficacy of killed cover crop mulches on weed management in no-till production;
  - 4) Develop strategies for producers to incorporate no-till vegetable production in Mississippi.

No-Till Pumpkin Study

- 4 cover crop treatments
  - 1. Control
  - 2. Cereal rye
  - 3. Vetch
  - 4. Cereal rye/Vetch

- RCB Design with 4 replications.

Cover crop plots
TeraGranix Field Trial

- TeraGranix Ag1000 product: Microorganisms: 1 million colony forming units/cc (units/ml) 1% of *Lactobacillus casei*

- Objective: To determine if pumpkins have a better vigor when growing from a transplant treated with Ag1000.

- Yields (cwt/acre; number/acre) and rind thickness.

TeraGranix Field Trial

- Fertilizer preplant according to soil test requirements
  - 80 N – 50 P – 200 K

- Pest and disease management following GAP when needed.

- Plot design: RCB design with 4 replications and 8 plants per plot.
TeraGranix Field Trial

- Treatment 1. Apply 3 gallons/acre of Ag1000 through drip irrigation at second true leaf of direct seeded pumpkins. Apply 3 gallons/acre through the drip every three weeks thereafter for total of four (4) applications and 12 gallons.

- Treatment 2. Apply 3 gallons/acre of AG1000 foliar at second true leaf of direct seeded pumpkins. Apply 3 gallons/acre foliar every three weeks thereafter for total of four (4) applications and 12 gallons.

- Treatment 3. Apply 5 gallons/acre of AG1000 through drip irrigation at second true leaf of direct seeded pumpkins. Apply 5 gallons/acre through the drip every three weeks thereafter for total of four (4) applications and 20 gallons.

- Treatment 4. Apply 5 gallons/acre of AG1000 foliar at second true leaf of direct seeded pumpkins. Apply 5 gallons/acre foliar every three weeks thereafter for total of four (4) applications and 20 gallons.

- Treatment 5. Control

Future Research

- Plant nutrition studies
  - Nitrogen/Sulfur (utilization and efficiency)
  - Potassium/Calcium (fruit quality and postharvest)

- Irrigation studies
  - Water deficit

- Pest and disease management
  - PM
  - Nutshedge
  - Squash bug

Future Research

- Suggestions?
Questions?