2012: Weed Management and Crop Injury when Intercropping Melons and Cotton

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Introduction

- Cantaloupe or watermelon intercropped with cotton
  - Increase resource efficiency
  - Improve grower profit
  - Stability in production
Cantaloupe and Cotton Intercropped (Tift County, GA)
Objectives

1. Identify herbicide systems to manage troublesome weeds in melon-cotton intercropping production

2. Determine the profitability of melon-cotton intercropping versus a monoculture of melon or cotton
Hypothesis

1. Herbicide options exist to adequately control weeds in melon-cotton intercropping systems

2. Crop value per acre will be greater when melon and cotton are intercropped versus a monoculture of melon or cotton
Materials and Methods

• Two separate field studies conducted at Ty Ty, Georgia on a Tifton loamy sand during 2011
  – Cantaloupe
  – Watermelon

• Each study consisted of:
  – Two planting dates of melon-cotton intercrops, three herbicide systems and a non-treated control
  – Melon and cotton alone were planted for each planting date to serve as comparisons
Materials and Methods

- Melons were transplanted into a 0.8 mil plastic mulch having an 18” wide bed top

- Cotton plantings for each planting date were made when the initial melon vine reached the mulch edge

- PHY 499 WRF was planted on 36 inch row spacing, using a 2-row planter centered over the plastic mulch
Intercropping systems were managed for melon production until harvest.
Material and Methods

• Data recorded throughout the season:
  – Visual estimates of Palmer amaranth control
  – Melon and cotton injury
  – Melon vine length
  – Cotton height
  – Melon and cotton yield
    • Melon harvested by hand
    • Cotton harvested using a spindle picker designed for small plot research
Material and Methods

• Total crop value per acre of intercropping systems and monoculture systems were calculated
  – Total crop value/A = value of total products generated - cost to produce crop

• Data subjected to ANOVA and means separated using Fisher’s Protected LSD (p \leq 0.05) when appropriate
Cantaloupe-cotton intercropping

“Athena” cantaloupe transplanted:
• Transplant date 1: April 5, 2011
• Transplant date 2: April 20, 2011

Herbicide treatments in intercropping systems:
1. Ethalfluralin (0.75 lbs ai/A) preplant
2. Ethalfluralin + Fomesafen (0.25 lb ai/A) preplant
3. Ethalfluralin + Fomesafen preplant fb Halosulfuron (0.032 lb ai/A) + NIS (0.25% v/v) 10 days after transplant
4. Non-treated control

Herbicide treatments in monoculture systems:
  – Melon: Ethalfluralin + Fomesafen preplant
  – Cotton: Sequential applications of Glufosinate + S-metolachlor or Glyphosate + Acetochlor when sensitive weeds were less than three inches tall
Palmer amaranth control prior to cantaloupe harvest

<table>
<thead>
<tr>
<th>Treatment</th>
<th>% Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethalfuralin</td>
<td>55</td>
</tr>
<tr>
<td>Ethalfuralin + Fomesafen</td>
<td>95</td>
</tr>
<tr>
<td>Ethalfuralin + Fomesafen fb Halosulfuron</td>
<td>98</td>
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</tbody>
</table>

LSD(P≤0.05)=2
Non-treated control

*Average of 57 Palmer amaranth in NTC
**Picture taken 8 weeks after transplant

Ethalfluralin +
Fomesafen fb
Halosulfuron
Cantaloupe Yield

*Data pooled over planting and harvest

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield/acre</th>
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<tbody>
<tr>
<td>NTC</td>
<td>1791</td>
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<tr>
<td>Ethalfuralin</td>
<td>7093</td>
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<tr>
<td>Ethalfuralin + Fomesafen</td>
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<td>Ethalfuralin + Fomesafen fb Halosulfuron</td>
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<td>Ethalfuralin + Fomesafen (Cantaloupe Only)</td>
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LSD(\(P\leq0.05\))=558

*Data pooled over planting and harvest*
Palmer amaranth control prior to cotton harvest

*Data pooled over planting dates

LSD(\(P\leq0.05\))=5
Lint Cotton Yield

LSD(P≤0.05)=119
Cantaloupe-cotton intercropping vs. monoculture

*Data pooled over planting dates*

**Calculated using $530 and $2,450 as the cost to produce and harvest cotton and cantaloupe, respectively. Cotton value set at $0.92/lb. and cantaloupe value set at $1.00/fruit.
“Melody” (seedless) watermelon transplanted:
• For pollination, “Sangria” transplanted every fourth plant
  • Transplant date 1: March 23, 2011
  • Transplant date 2: April 7, 2011

Herbicide treatments in intercropping systems
1. Ethalfuralin (0.75 lbs ai/A) preplant
2. Ethalfuralin + Fomesafen (0.25 lb ai/A) preplant
3. Ethalfuralin + Fomesafen + Terbacil (0.2 lb ai/A) preplant
4. Non-treated control

Herbicide treatments in monoculture systems:
  Melon: Ethalfuralin + Fomesafen preplant
  Cotton: Sequential applications of Glufosinate + S-metolachlor or Glyphosate + Acetochlor when sensitive weeds were less than three inches tall
Palmer amaranth control prior to watermelon harvest

- Ethalfuralin: 56%
- Ethalfuralin + Fomesafen: 86%
- Ethalfuralin + Fomesafen + Terbacil: 92%
Non-treated control

*Average of 160 Palmer amaranth in NTC
**Picture taken 8 weeks after transplant

Ethalfluralin + Fomesafen
Terbacil Injury
Watermelon Yield

- NTC
- Ethalfuralin
- Ethalfuralin + Fomesafen
- Ethalfuralin + Fomesafen + Terbacil
- Ethalfuralin + Fomesafen (Watermelon Only)

LSD(\(P \leq 0.05\)) = 6696

*Data pooled over planting and harvest dates*
Palmer amaranth control prior to cotton harvest

*Data pooled over planting dates

LSD(P≤0.05)= 7
Lint Cotton Yield

LSD(P≤0.05)= 41
Watermelon-cotton intercropping vs. monoculture

*Data pooled over planting dates

**Calculated using $530 and $2900 as the cost to produce and harvest cotton and watermelon, respectively. Cotton value set at $0.92/lb. and watermelon value set at $0.15/lb.
Conclusions

• Melon-cotton intercropping improved total crop value per acre as compared to a monoculture of melons or cotton

• Herbicide options exist for adequate control of troublesome weeds in melon-cotton intercropping systems
  – Fomesafen is not registered for use in watermelon or cantaloupe
  – Halosulfuron and ethalfluralin are not registered for use in cotton
Future Research

• Registration of fomesafen for use in watermelon and cantaloupe
• Registration of preplant applications of halosulfuron and ethalflurulin for cotton
• Complete a comprehensive economic budget comparison of these systems
Questions or Comments?
Introduction

- Background on spring melon production
  - Transplant late March to late April
  - Harvest mid to late June
  - Melons followed by plant grain sorghum

### Sensitivity Analysis of Grain Sorghum, Irrigated

<table>
<thead>
<tr>
<th>Price \ Bushel/Acre</th>
<th>-25%</th>
<th>-10%</th>
<th>Expected</th>
<th>+10%</th>
<th>+25%</th>
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Smith and Smith, 2011