Reniform Resistance from Texas Day Neutral Lines

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Cultural and Genetic Methods to Manage Reniform Nematode in Cotton

**USDA**

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- Erik Sacks
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- Kristi Jordan
- Hans Hinrichsen

**Technician:**
- Anna Blessitt
Research Objectives

- Transfer resistance genes from related species into Upland cotton
- Develop management practices to minimize damage by reniform nematode
- Identify plants with resistance or tolerance to reniform nematode
- Identify plant genes that limit reniform nematode infection

Effective reniform nematode management
Research Objectives

- Transfer resistance genes from related species into Upland cotton
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Effective reniform nematode management
Resistance from Related Species and Gene Identification

- Transfer resistance from *Gossypium herbaceum* and *G. arboreum* into *G. hirsutum*
- Identify polymorphisms between *G. hirsutum* and diploid species
- Determine inheritance of resistance
- Identify plant genes that have altered regulation in resistant genotypes
Research Objectives

- Transfer resistance genes from related species into Upland cotton
- Develop management practices to minimize damage by reniform nematode
- Identify plants with resistance or tolerance to reniform nematode
- Identify plant genes that limit reniform nematode infection
Identify Resistance or Tolerance

- Improve or develop screening techniques (greenhouse, lab, field)
- Evaluate commercial cultivars for tolerance to reniform nematode
- Assess ability of nematode populations to overcome resistance
- Resistance from day-neutral Texas race stocks
Resistance from Texas Day Neutral Lines

PARENT GENOTYPES

PRIMITIVE MATERIALS

*Gossypium hirsutum*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>T19</td>
<td>T1348-27</td>
</tr>
<tr>
<td>T19-12</td>
<td>T1348-30</td>
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<td>T19-13</td>
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<td>T19-27</td>
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<td>T19-30</td>
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<tr>
<td></td>
<td>T1347-2</td>
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ADAPTED MATERIALS

*Gossypium hirsutum*

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>DES119H</td>
</tr>
<tr>
<td></td>
<td>DES119B</td>
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Resistance from Texas Day Neutral Lines
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Resistance from Texas Day Neutral Lines

T1347-2 x DES119H

#89
min 121
max 306
mean 201

#59
min 0
max 6
mean 3

2003
Resistance from Texas Day Neutral Lines

CROSSES

2003: (field)  
889 progeny rows \((F_{2:3} \text{ populations})\) screened

↓

117 selections advanced

2004: (field)  
76 selections advanced

2005: (greenhouse)  
31 selections advanced

PARENT LINES

150 rows screened

↓

53 selections advanced

↓

31 selections advanced
Resistance from Texas
Day Neutral Lines

SELECTION CRITERIA

2003:
(field) 30 or fewer females/root on each of 5 roots

2004:
(field) 30 or fewer females/root on at least 4 of 5 roots and 100 or fewer females on all roots
AND
151 (6E) or 179 (6W) females/g root on at least 4 of 5 roots examined

2005:
(greenhouse) mean females/g root is 33% or less of susceptible control on 4 roots
Resistance from Texas Day Neutral Lines

CROSSES

2003:
(field) 889 progeny rows (F₂:₃ populations) screened
117 selections advanced

2004:
(field) 76 selections advanced

2005:
@greenhouse 31 selections advanced

PARENT LINES

150 rows screened
53 selections advanced
31 selections advanced
31 selections advanced
## Resistance from Texas Day Neutral Lines

<table>
<thead>
<tr>
<th>Pedigree</th>
<th>min</th>
<th>max</th>
<th>mean</th>
<th>evaluated</th>
<th>selected</th>
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<td>63</td>
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*Statistics for all lines tested within each population

*The range for all entries evaluated was 0 to 950 females/root.*
### Resistance from Texas Day Neutral Lines

#### 2004

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<tr>
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<td>5</td>
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<td>520</td>
<td>71</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
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<tr>
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<td>0</td>
<td>500</td>
<td>86</td>
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• Statistics for all lines tested within each population

The range for all entries evaluated was 0 to 1,000 females/root.
Resistance from Texas Day Neutral Lines

What’s next?

• Stabilize resistant phenotype
• Additional crosses
• Durability of resistance