THE ECONOMIC IMPACT OF THE SUGARCANE APHID OUTBREAK IN SOUTH TEXAS

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SCA RESEARCH TEAM

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INTRODUCTION

- Sorghum is a multibillion-dollar crop with over 7 million acres planted each year in the U.S.

- The sorghum industry is threatened by a new invasive pest, the sugarcane aphid (SCA).

- SCA has become the most important pest in sorghum since its detection in 2013.

- Due to its rapid population growth, great dispersion capacity, and reduced availability of effective insecticides, this insect has caused significant economic losses to sorghum growers.
• Observed damages caused by the SCA include:
  o Leaf discoloration.
  o Honeydew produced support the growth of fungus which can inhibit plant growth.
  o Infestations of seedling grain sorghum can kill young plants and later infestations can prevent the formation of grain.
  o Honeydew prevents efficient movement of crop material through harvest equipment.

• Little work has been conducted to assess and better understand the economic impact of the SCA outbreak.
RANDOM SAMPLING OF COMMERCIAL FIELDS, LRGV
OBJECTIVES

- To quantify the economic loss of SCA on sorghum growers in the Lower Rio Grande Valley (LRGV), Texas.

- To estimate the economic value of the prevented loss attributed to control efforts to mitigate the damage caused by the SCA

  - In 2015, about 310,000 acres of sorghum were planted in the region with an estimated economic value of $92.3M.
  
  - Given its geographical location, the LRGV is a key region to timely understand and identify the economic impact of new invasive pests.
SCA OUTBREAK OVER TIME
SORGHUM PRODUCERS SURVEY

- Forty-one local producers were surveyed resulting in a representative sample of 46,578 acres in 2014 and 49,761 acres in 2015.

- The questionnaire gathered detailed information about yearly crop yields, crop acreage, insecticide application decisions, and management and production practices.

- Collected data were used to estimate the economic impacts associated to the SCA infestation.
ECONOMIC IMPACT ESTIMATION

- No SCA
- SCA with Control
- SCA without Control

**Dollars**

- Profits
- Revenue Loss
- Control Cost

Legend:
- Green: Profits
- Blue: Control Cost
- Red: Revenue Loss
ECONOMIC IMPACT ESTIMATION

Dollars

No SCA  SCA with Control  SCA without Control

Profits  Revenue Loss

Control Cost  Unavoidable Loss  Prevented loss

Profits  Revenue Loss

Profits  Control Cost  Revenue Loss
ECONOMIC IMPACT ESTIMATION

<table>
<thead>
<tr>
<th></th>
<th>Profits</th>
<th>Control Cost</th>
<th>Revenue Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>No SCA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCA with Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCA without Control</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Dollars
- Prevented loss
- Unavoidable loss

Legend:
- Green: Profits
- Blue: Control Cost
- Red: Revenue Loss
SURVEY RESULTS
Average Yield

2014
- All fields: 4,544 lb/acre
- Sprayed Fields: 4,922 lb/acre
- Non-sprayed Fields: 2,972 lb/acre

2015
- All fields: 4,729 lb/acre
- Sprayed Fields: 5,274 lb/acre
- Non-sprayed Fields: 4,335 lb/acre
Average Farm Size

- 2014: 1,136 acres
- 2015: 1,214 acres
Farms Location

2014

- Cameron: 46%
- Hidalgo: 34%
- Starr: 3%
- Willacy: 17%

2015

- Cameron: 49%
- Hidalgo: 34%
- Starr: 2%
- Willacy: 15%
Spray to Control the SCA

2014

- Yes: 100%
- No: 0%

2015

- Yes: 73%
- No: 27%
Insecticide Used to Control the SCA

2014

Transform 100%
None 0%

2015

Transform 73%
None 27%
Insecticide Applications to Control the SCA

2014
- None: 0%
- One: 34%
- Two: 63%
- Three: 3%

2015
- None: 27%
- One: 61%
- Two: 12%
- Three: 0%
Insecticide Applications Type

2014
- Aerial: 39%
- Ground: 61%

2015
- Aerial: 23%
- Ground: 77%
Average Transform® Application Rate

- 2014: 1.01 oz/acre
- 2015: 1.02 oz/acre
ECONOMIC IMPACT RESULTS
ECONOMIC LOSS

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Loss ($/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>$68.96</td>
</tr>
<tr>
<td>2015</td>
<td>$55.25</td>
</tr>
<tr>
<td>Average</td>
<td>$61.88</td>
</tr>
</tbody>
</table>

![Bar chart showing economic loss breakdown for 2014, 2015, and average.]
PREVENTED LOSS

Total Savings

2014: $80.61
2015: $16.54
Average: $47.52
OVERALL INDUSTRY ECONOMIC EFFECTS

<table>
<thead>
<tr>
<th>Year</th>
<th>Economic Loss</th>
<th>Prevented Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>21.87</td>
<td>25.60</td>
</tr>
<tr>
<td>2015</td>
<td>17.13</td>
<td>5.13</td>
</tr>
<tr>
<td>Total</td>
<td>39.00</td>
<td>30.73</td>
</tr>
</tbody>
</table>

Million $
SUMMARY AND CONCLUSIONS

- Assessed the economic impact of SCA on sorghum growers in the LRGV, Texas.

- SCA reduced profit by $68.96/acre in 2014 and by $55.25/acre in 2015.

- Control efforts saved $80.61/acre and $16.54/acre in 2014 and 2015, respectively.

- After it appearance in 2013, the SCA has caused a total economic loss to farmers in the LRGV of about $39.00M. However, growers were able to protected $30.7M.
ONGOING AND FUTURE WORK

- Use aggregated farm-level economic estimates to assess the total economic impact of the SCA outbreak in the LRGV.
  - Output
  - Value-added
  - Labor income
  - Employment

- Extend the analysis to the rest of the state.
Thank you!

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## Model Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2014</td>
</tr>
<tr>
<td>Sorghum Price</td>
<td>$/cwt</td>
<td>7.23</td>
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<tr>
<td>Insecticide Price</td>
<td>$/oz</td>
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<tr>
<td>Surfactant Price</td>
<td>$/oz</td>
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<tr>
<td>Aerial Application Cost</td>
<td>$/acre</td>
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<td>Ground Application Cost</td>
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<td>Variable Harvesting Cost</td>
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<td>Yield Penalty:</td>
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<tr>
<td>Sprayed Fields</td>
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<tr>
<td>Non-sprayed Fields</td>
<td>%</td>
<td>-49.60</td>
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## SURVEY RESULTS

<table>
<thead>
<tr>
<th>Variable</th>
<th>2014</th>
<th></th>
<th>2015</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean (Standard Error)</td>
<td>n</td>
<td>Mean (Standard Error)</td>
</tr>
<tr>
<td>Surveyed farms</td>
<td>41</td>
<td>4,543.68 (308.38)</td>
<td>41</td>
<td>4,729.47 (225.71)</td>
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<tr>
<td>Yield (lb/acre)</td>
<td>41</td>
<td>1,136.05 (182.44)</td>
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<td>1,213.69 (220.49)</td>
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<td>Farm size (acre)</td>
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<td>0.73 (0.07)</td>
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<tr>
<td>1=Dryland</td>
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<td>Farm location</td>
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<td>6</td>
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<tr>
<td>Cameron</td>
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<td>Starr</td>
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<td>1</td>
<td>0.73 (0.07)</td>
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<tr>
<td>Willacy</td>
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<td>0.73 (0.07)</td>
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<tr>
<td>Sprayed to control the SCA</td>
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<td>83.84 (3.89)</td>
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<td>79.55 (6.05)</td>
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<tr>
<td>1=Yes</td>
<td>41</td>
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<td>30</td>
<td>0.73 (0.07)</td>
</tr>
<tr>
<td>Insecticide used to control the SCA</td>
<td>41</td>
<td>1.00 (0.00)</td>
<td>30</td>
<td>0.73 (0.07)</td>
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<tr>
<td>0=None</td>
<td>0</td>
<td>1.00 (0.00)</td>
<td>11</td>
<td>0.73 (0.07)</td>
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<tr>
<td>1=Transform</td>
<td>41</td>
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<td>30</td>
<td>0.73 (0.07)</td>
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</table>
## SURVEY RESULTS - Continuation

<table>
<thead>
<tr>
<th>Variable</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean (Standard Error)</td>
</tr>
<tr>
<td>Additional insecticide applications due to the SCA</td>
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</tr>
<tr>
<td>0</td>
<td>0</td>
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<tr>
<td>1</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
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<tr>
<td>Insecticide application rate to control the SCA (oz/acre)</td>
<td>41</td>
<td>1.01 (0.01)</td>
</tr>
<tr>
<td>Type of insecticide application to control the SCA</td>
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<td>0.61 (0.06)</td>
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<td>0=Aerial</td>
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<td>1=Ground</td>
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<tr>
<td>Water used on each insecticide application aimed to control the SCA (gallons/acre)</td>
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<td>Additional surfactant used due to the SCA</td>
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<tr>
<td>1=Yes</td>
<td>38</td>
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ECONOMIC LOSS - Sensitivity Analysis

2014

2015