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**ESTIMATING THE ECONOMIC IMPACT OF INVASIVE PESTS: THE CASE OF THE
SUGARCANE APHID OUTBREAK IN TEXAS**

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Estimating the Economic Impact of Invasive Pests: The Case of the Sugarcane Aphid Outbreak in Texas

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Introduction

- The sugarcane aphid (SCA) has become the most damaging 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 crop losses.
- Little work has been conducted to assess and better understand the economic implications of the SCA outbreak.

Objectives

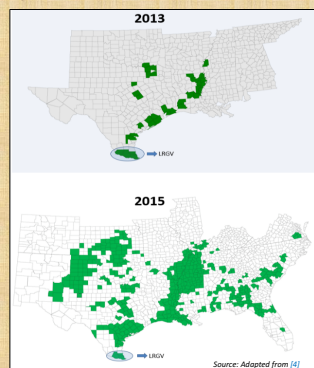
The main goals of this study are:

- Quantify the economic impact of the resulted and prevented crop losses attributed to the SCA outbreak in Texas.
- Estimate the state-wide impacts of both occurred and prevented losses associated to the SCA outbreak in Texas

Texas Sorghum Industry

- Given its geographical location, Texas is a key region to timely understand and identify the economic impact of new invasive pests (Figure 1).
- In 2016, about 1.9M acres of sorghum were planted in the state with an estimated economic value of \$607.5M [2,3].

Figure 1. SCA Outbreak Over Time



SCA Damage

- Observed damages caused by the SCA include (Figure 2):
 - Leaf discoloration.
 - Honeydew produced support the growth of fungus which can inhibit plant growth.
 - Infestations of seedling grain sorghum can kill young plants and later infestations can prevent the formation of grain.
 - Honeydew prevents efficient movement of crop material through harvest equipment.

Figure 2. SCA Effects On Sorghum



Data and Methods

- Fifty-eight Texan producers were surveyed resulting in a representative sample of 49,587 acres in 2014, 58,933 acres in 2015, and 46,402 acres in 2016.
- The questionnaire gathered detailed information about yearly crop yields, crop acreage, SCA control methods, and management and production practices (Figure 3-5).
- Collected data were used to estimate the economic impacts associated to the SCA infestation (Figure 6):
 - Observed loss: Direct impact
 - Prevented loss: Control efforts

Figure 3. Number of Insecticide Applications to Control SCA

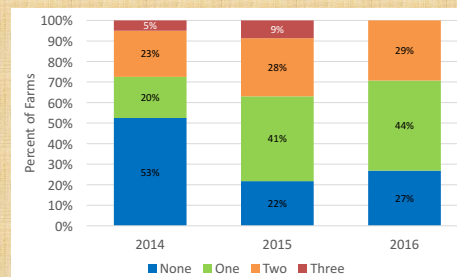


Figure 4. Grain Sorghum Hybrids Planted

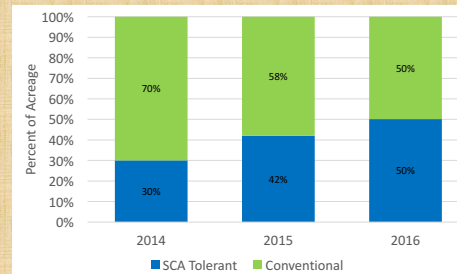


Figure 5. Insecticide Treated Seeds Used

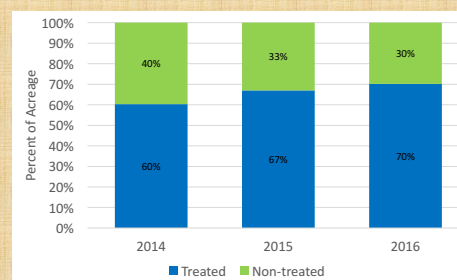
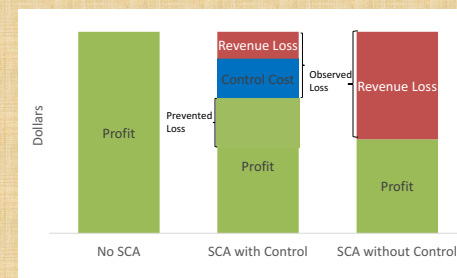


Figure 6. Economic Impact Estimation



Preliminary Results

- Observed losses on farmers' profits were substantial. However, they would have been greater had farmers not taken measures to control the SCA (Table 1).

Table 1. SCA Estimated and Prevented Economic Impacts on Texas Sorghum Industry

Economic Impact	2014	2015	2016	Average
Economic Loss (\$/acre)				
Revenue Loss	(22.09)	(49.16)	(22.05)	(32.52)
Additional Insecticide Application Cost	(0.87)	(2.04)	(1.00)	(1.36)
Insecticide	(0.44)	(1.24)	(0.54)	(0.78)
Surfactant	(0.08)	(0.20)	(0.12)	(0.14)
Application	(0.35)	(0.60)	(0.34)	(0.44)
Reduced Variable Harvesting Cost	2.29	5.91	3.28	3.99
Tolerant Hybrids Cost	(0.09)	(1.22)	(1.51)	(1.21)
Treated Seeds Cost	(3.30)	(3.02)	(3.82)	(3.35)
Pest Monitoring Cost	(4.22)	(6.00)	(6.00)	(5.44)
Total Profit Loss	(29.09)	(55.52)	(31.10)	(39.89)
Total Profit Loss for Texas (\$M)	(72.73)	(144.35)	(59.09)	(95.63)
Prevented Economic Loss (\$/acre)				
Revenue Saving	38.33	44.16	44.44	42.38
Additional SCA Control Cost	(9.29)	(12.28)	(12.33)	(11.36)
Increased Variable Harvesting Cost	(3.97)	(5.31)	(6.61)	(5.28)
Total Profit Saving	24.96	26.57	25.50	25.74
Total Profit Saving for Texas (\$M)	62.40	69.08	48.45	61.10

Future Work

- SCA outbreak impacts are magnified in the regional economy by the indirect and induced effects. These spillover impacts will be estimated using IMPLAN economic modeling tool and data [1]

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