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Assessing the Economic Damage Caused by the Sugarcane Aphid in Texas

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Texas is the second largest producer of grain sorghum in the country. In 2016, about 1.9 million acres were planted with an estimated economic value of $607.5 million. However, the Texas sorghum industry is threatened by a new invasive pest, the sugarcane aphid (SCA) (Fig. 1). The pest was first detected in sorghum near Beaumont, Texas in June 2013, and it is now common to encounter large populations of SCA on sorghum plants in every sorghum producing region of the state. Aphid feeding produces yellow to red or brown leaf discoloration (Fig. 2). Also, SCA waste supports the growth of a black sooty mold which can inhibit plant development. Due to its rapid population growth, great dispersion capacity, and the limited availability of effective insecticides, the SCA has become the most damaging pest in sorghum. The following is a summary of the overall economic impact of SCA during the 2014–2016 growing seasons in Texas[1].

Figure 1. Sugarcane aphids feeding on a sorghum leaf

Local producers were surveyed to gather detailed information about yearly crop yields, perceived losses, crop acreage, insecticide application decisions, and management and production practices.

A total of 57 growers representing 153 sorghum farms voluntarily participated in this study. Collected data were used to estimate the reduction in profit associated to the SCA infestation, as well as the monetary value of the prevented loss attributed to control efforts. Sorghum industry losses were then used to assess the overall economic impact of the SCA outbreak on the Texas economy.

Figure 2. Experimental field severely affected by the SCA

Sorghum producers indicated that the severity of the SCA infestation has increased over time, from some-degree-of-infestation of 58 percent in 2014 to 92 percent in 2015 to 100 percent in 2016 (Fig. 3). As a result, Texas sorghum growers have adopted control practices including active pest monitoring and tolerant hybrids which have been developed in response to the SCA outbreak, along with targeted insecticide applications (Table 1). No major changes were observed regarding the use of insecticide-treated seeds. However, the sorghum cropland planted with SCA tolerant hybrids increased from 30 percent in 2014 to 50 percent in 2016. In terms of insecticide applications, 8 to 9 percent of the total planted acres were treated on each application to

[1] The content of this publication is taken from Zapata et al., 2018.

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control SCA populations. Growers reported *Sulfoxaflor 50% WG* was the most commonly used product, but an increase in the usage of *Flupyradifurone* has been reported in recent years. Lastly, survey results indicate an increase in the number of insecticide applications compared to 2014.

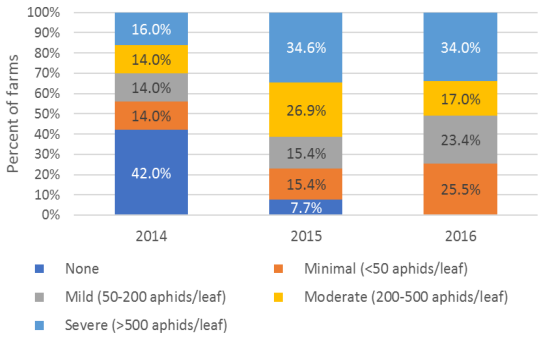

Figure 3. SCA infestation level

The SCA outbreak decreased farmers' profits because monitoring and controlling the pest add to their production costs. SCA also reduced revenue by lowering yields or causing harvest losses. On the other hand, the prevented loss represents the profit saved that can be attributed to private, public, and individual efforts to mitigate the damage caused by the SCA. On average between 2014 and 2016, it is estimated that the SCA caused a loss of $39.89/acre, resulting in a total loss of $276.17 million to the Texas sorghum industry (Table 2). At the same time, producers were able to avoid a potential loss of $25.74/acre and $179.94 million at the industry level by adopting different control practices, including treated seed, tolerant hybrids, pest monitoring, and insecticide applications.

Table 1. SCA control practices adopted by sorghum growers

Control Practices	2014	2015	2016
	---------- *Percent* ----------		
Area planted with insecticide-treated seeds	69.30	67.05	70.16
Area planted with SCA tolerant hybrids	30.04	42.06	50.18
Area sprayed to control the SCA	9.07	8.20	8.26
Insecticide used to control the SCA			
Sulfoxaflor 50% WG	100.00	81.82	51.43
Flupyradifurone	0.00	18.18	45.71
Other	0.00	0.00	2.86
Additional insecticide applications due to the SCA			
0	52.50	21.74	26.83
1	20.00	41.30	43.90
2	22.50	28.26	29.27
3	5.00	8.70	0.00

Table 2. SCA observed and prevented economic impacts

	Total	Average
	--- 2014-2016 ---	
Economic Loss ($/acre)		
Revenue Loss	(93.3)	(32.52)
Additional Insecticide Application Cost[1]	(3.91)	(1.36)
Reduced Variable Harvesting Cost	11.48	3.99
Tolerant Hybrids Cost	(3.63)	(1.21)
Treated Seed Cost	(10.14)	(3.35)
Pest Monitoring Cost	(16.22)	(5.44)
Total Profit Loss	(115.71)	(39.89)
Total Profit Loss for Texas ($ million)	(276.17)	(95.63)
Prevented Economic Loss ($/acre)		
Revenue Saving	126.93	42.38
Additional Control and Monitoring Cost	(33.9)	(11.36)
Increased Variable Harvesting Cost	(15.89)	(5.28)
Total Profit Saving	77.03	25.74
Total Profit Saving for Texas ($ million)	179.94	61.10

The direct observed and prevented losses were magnified in the state economy by the indirect and induced effects. Indirect effects represent the impact on local supporting industries, and the induced effects measure the resulting economic impact at the household and government levels. On average, annual economy-wide losses totaled 513 jobs and $169.83 million in output (Table 3). Observed losses in the Texas economy were substantial. However, they would have been greater had farmers not taken measures to control the SCA. Without control efforts, the state economy would have faced annual additional losses of $150.98 million in output and 718 jobs.

Table 3. Economic impacts of SCA in Texas

Impact Type	Average (2014-2016)	
	Output ($ million)	Employment
Economic Loss		
Direct Effect	(78.57)	118.9
Indirect Effect	10.02	61.6
Induced Effect	(101.3)	(693.5)
Total Effect	(169.83)	(513)
Prevented Economic Loss		
Direct Effect	73.18	190.8
Indirect Effect	3.16	15.8
Induced Effect	74.65	511.6
Total Effect	150.98	718.2

Additional information about the economic impact of the SCA in Texas is available in:

- Zapata, S.D., R. Dudensing, D. Sekula and R. Villanueva. 2018. "The Economic Impact of the Sugarcane Aphid Outbreak in Texas." Texas A&M AgriLife Extension. EAG-051.

- Zapata, S.D., R. Dudensing, D. Sekula, G. Esparza-Diaz and R. Villanueva. 2018. "Economic Impact of the Sugarcane Aphid Outbreak in South Texas." Journal of Agricultural and Applied Economics 50(1): 104-128.

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