A New Pest of Sorghum: the Sugarcane Aphid

R.T. Villanueva and D. Sekula

20th Annual Rio Grande Valley Cotton & Grain Pre-Plant Conference
Edcouch, Jan 17, 2014
What are sugarcane aphids?

- Soft bodied insects that sucks sap from plant tissues and produce honeydew that may hamper transpiration.
Sugarcane aphids found on different host plants in the world. Notice that this aphid only infested one plant host species in some countries while other hosts were not affected. (Adapted from Singh et al. 2004)
Problems with the ID of the sugarcane aphids

• Taxonomically this **new pest of sorghum** was indistinct to *Melanaphis sacchari*

• Using molecular tools it matched the taxonomic ID

• However, there are several biotypes in the world

• A **host shift might occurred** (*It wouldn’t be the first time for aphids*) or **a new biotype was introduced**
HISTORICAL REPORTS ON THE PRESENCE OF SUGARCANE APHIDS IN THE USA

1977 - FL SUGARCANE

1999 - LA SUGARCANE

2013 - TX SORGHUM
The new aphid pest of sorghum was detected in 38 counties and parishes of Texas, Louisiana, Oklahoma, and Mississippi in 2013. All sorghum growing counties in may be at risk. Further expansions into other areas is a possibility. This aphid spreads rapidly across a wide geographic range. The three red dots are the approximate locations where this aphid was reported in Rio Bravo, San Fernando and C. Victoria in Mexico.
Effects on Yield

• Yield losses can be as high as 78%

• In South Africa losses had been reported between 24 to 73% %

• In Louisiana and Mexico losses reported between 50 to 100%

• In Weslaco seed increase plots were completely lost
Grain Quality

- Aphid feeding did not affect grain color but reduce grain hardness in South Africa
- Softer grain may have a significant impact in the milling industry
- Diastatic power reduced: production of a number of enzymes such as amylase which convert starch into sugar
Sugarcane aphids: colonize lower surface of leaves

Greenhouse colony
*S. Armstrong*

Weslaco Field
collected Dec-2013
*R. Villanueva*

Weslaco notice winged aphids: Jan-2014
*R. Villanueva*
Sugarcane aphids

- All females and live 28 days (range 10-37 days)
- 4 nymphal instars can be adults in 5 days
- Nymphs can developed on 4.3 to 12.4 days
- Born alive (viviparous)
Exponential growth of populations

Foundress

1\textsuperscript{st} wk

2\textsuperscript{nd} wk

3\textsuperscript{rd} wk
Apteran forms

Alate

1/16 inch (1.6 mm)

Nymphs
Damage on under side of leaves
Symbiosis of aphids and ants
Louisiana: problems during harvest due to honeydew
Combine in Tamaulipas, MX with abundant sugarcane aphids
Other aphids species pests of sorghum

- Corn leaf aphid
- Yellow sugarcane aphid
- Sugarcane aphid
- Greenbug aphid

Prefers young plants

Biotypes are reported
Resistant cultivars

- Dr. Armstrong (USDA-Stillwater OK): cultivar TX-2783 does provide seedling resistance.
- Many sorghum lines are being evaluated for resistance by Drs. Peterson and Rooney, Texas AgriLife Research.
- Commercial lines???
Natural enemies

Insects:
- Parasitoids
- Lacewings
- Ladybeetles
- Sweat flies
- Thrips

Fungus
- *Lecanicillium lecanii*

Weslaco, January 2014 (R. Villanueva)
Parasitoids

Lace wings
Sweat Flies or Syrphids

Fungus (?)
Lecanicillium lecanii
Chemical control

• Weslaco: Experimental seed increase plots were heavily affected

• Louisiana: Farmer fields were heavily affected, in spite of 2 or 3 applications of Lorsban

• Tamaulipas: Farmers and experimental fields were heavily infested, there were up to 10 applications of mixtures Chlorpyrifos (Lorsban)m cypermethrin, methomyil

• Success with metamidophos (Monitor, Nitofol, Tamaron, Swipe, Nuratron, Vetaron, Filitox, Patrole, Tamanox). Currently phased out in the U.S.
Insecticide test in China, nr Beaumont Dr. Mo Way August 2013

Field previously had been treated with Lorsban 4E: 2 or 3 times

![Graph showing the effectiveness of different insecticides over 4 and 11 days after application (DAA). The graph compares the number of aphids/leaf for each treatment, with treatments grouped by insecticide (Dimethoate, Lorsban, Karate, Transform) and control. The chart shows the rate of application and effectiveness indicated by symbols (LA for low application and TX for treatment).]
Insecticide test in Weslaco, TX. Villanueva and Sekula Oct-Nov 2013

Field previously had been treated with 2 applications each of Warhawk® (2 pts/A), Prevathon® (2 pts/A) and Di-Syston® 8 (1.5 pts/A)
Summary

- The new aphid pest of sorghum is taxonomically indistinct to *M. sacchari*: might be a new biotype that switched hosts or a new invasive species recently introduced into the U.S.
- There are indications that this aphid will persist in the Lower Rio Grande Valley and nearby areas in Mexico, the Coastal Bend and other sorghum regions in the USA and Mexico.
- Management should include tolerant/resistant cultivars TX-2783 (?) or commercial lines.
- **Dimethoate 4EC** at 1 pt/ac might provide adequate control. A Section 18 Emergency Exemption Label has been requested for *Transform WG* insecticide.
- Natural enemies are abundant however, their impact is unknown.
Acknowledgments

• **Beto Garza** who provided a lot of support in this program
• Drs. S. Armstrong, M. Brewer and M. Way collaborators in this program
• People under my program: Gabriela Esparza, Sergio Davila, Alma Olguin, Cedric Galvan, Daniel Garcia, Joe Zamora, Justin Wendell
• Thanks to industry for providing insecticide products.
• Many thanks to the **Texas Grain Sorghum Board, and United Sorghum Checkoff** for their encouragement to address this pest.
• Thanks to the **many grain sorghum producers** who first noticed damaged fields and invited us to their fields