Program 3CR-2

Sugarcane Aphid: A New Pest Of Sorghum In The U.S.

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In 2013, an outbreak of an invasive aphid was discovered damaging grain sorghum in Louisiana, Texas, Oklahoma and Mississippi. Populations eventually made their way into northern Mexico. The aphid appears to be a new variant of sugarcane aphid, Melanaphis sacchari, which appears to have a high preference for sorghum over sugarcane. In sugarcane, this species has been relegated as a pest of sugarcane in Florida since 1977 and in Louisiana since 1999. In 2013, infestations appeared in sorghum originating in the Beaumont, TX / Southwest Louisiana. The reason for the shift to sorghum is not certain, but may represent a new biotype. In 2014, the scope of the infestation widened, to include sorghum produced in Arkansas, Tennessee, Missouri, Alabama, Georgia, Florida and Kansas. In other regions of the globe, sugarcane aphid feeding on sorghum has been reported in portions of Africa, South America and India. Current information suggests that this aphid does not infest corn or other non-sorghum and sugarcane related hosts, although infestations in rice have been reported in China and in corn in Southeast Asia. No sexual lifecycle is believed to exist for sugarcane aphid. It is believed that the population consists entirely of females reproducing asexually; giving birth to live young. A single female may give birth to 60-80 young which in turn will give birth within 4 days. Thus this aphid has a very high population growth rate.

In the U.S., infestations have been widespread and very heavy; often resulting in thousands of aphids per leaf. Pre-boot sorghum can be killed by heavy aphid infestations or rendered sterile. It is not unusual to note a 30-100% yield loss associated with high aphid populations. The leaves of infested sorghum, at heading, become extremely sticky from honeydew and coated with sooty mold fungus; which have hampered harvesting operations, causing as much as 50% of the grain to be expelled from the combine. Additionally, coated leaves appear to be more difficult to desiccate with harvest aids and once the plants are desiccated, the aphid will often move into the head, further interfering with harvest.

Insecticide efficacy data collected in 2013 suggested that insecticides currently labelled for aphid control in sorghum were ineffective and/or exhibited a PHI that prohibits their use during critical infestation periods. Therefore, a Section 18 Emergency Exemption registration was sought for Transform (sulfoxalfor) in most infested states. Overall, control with Transform has been acceptable although multiple applications have been necessary in some instances. Because of the heavy reliance on Transform for sugarcane aphid management and a limited number of applications available, there is a great deal of interest among research and extension personnel to identify alternatives insecticides to aid in control and mitigate insecticide resistance concerns. Several alternatives show potential including: imidacloprid, thiamethoxam and flupyradiurone. None of these are currently labelled for foliar applications ion sorghum.

Effective management of sugarcane aphid in sorghum will require a systems IPM approach including host plant resistance, cultural practices, hybrid selection, insecticide seed treatments, insecticide choice, insecticide application timing and promoting biological control. The long-term solution to sugarcane aphid in sorghum is identify-

ing and breeding hybrids with resistance. Preliminary screenings have indicated that resistance to this aphid does exist and that resistance may take many forms and vary in degree from slight to fully resistant. In the short term, current commercial hybrids need to be screened for indication of resistance; even if it is only slight. Additionally, there is some circumstantial evidence that some structural plant characteristics may be more desirable for suppressing sugarcane aphid populations or fostering improved harvest efficiency where aphids exist. These characteristics may include narrower leaves and panicle extruded further above the leaves. Cultural factors that may have an influence on aphid density potential include plant population, row spacing and fertility.

Insecticide seed treatments of imidacloprid, thiamethoxam and clothianidin have all proved to be highly effective in preventing aphid colonization for 30-45 days post planting. Pre-boot to early boot infestations have been effectively managed using Transform. However, since we have been limited to 2 applications of Transform, it may be advisable to save the Transform (14 day PHI) applications for later in the season. Chlorpyrifos at 1 qt/ac has demonstrated good activity although it has a 60 day PHI. Dimethoate and lower rates of Chlorpyrifos have provided marginal (~50%) control in most cases. There are situations where none of the products available, including Transform, have provided adequate control. The reason for the lack of control is not clear and maybe multifaceted, including: 1) rapidly increasing aphid population, 2) destruction of natural enemies (pyrethroids targeting midge), 3) inadequate spray volume of coverage, 4) cool temperatures 5) accumulation of honeydew and sooty mold on leaves (hindering spray/leaf contact), and 6) too high of an aphid population at application.

Currently there is no action or economic threshold available for determining when to treat for sugarcane aphid in sorghum. Initial observations suggest that 100-250 aphids per leaf may be a good target along with 20-30% of the plants in the field infested with aphids. However, populations of aphids have been noted for expanding from just a few to many thousands per leaf in as little as 7 days' time. Additionally, the threshold may very well fluctuate depending on the crop stage of growth. Circumstantial evidence suggests that aphids infesting boot stage and younger sorghum appear to be more easily controlled with insecticides than in more mature sorghum. Thus, it may be a reasonable assumption that post boot sorghum may require a lower action threshold. There is a great deal of research that needs to be conducted before a reliable action threshold(s) can be recommended with confidence.

Similar to many other aphid species, sugarcane aphid populations will often naturally, rapidly decline to non-damaging levels. These crashes usually occur after the aphids have already reached very high densities. The reason for the decline appears at least in part due to natural enemies, including lady beetles, syrphid flies and parasitoids. Other possible reasons for the decline may include environmental conditions, phytohormones and pathogens.

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