Researchers Evaluate New Potential Pests In Biomass Crops

URBANA, ILL.

Perennial grasses could become popular biomass crops in the future. Many perceive these grasses require little to no management for insects or other pests. However, researchers are finding rather than being pest-free, the identity of insect pests and their effects on harvestable biomass are simply not yet known.

A small caterpillar known as the tiller-killer has been documented in switchgrass across the Midwest by a team of researchers at the Energy Biosciences Institute (EBI) at the University of Illinois. In addition, this team has recently identified fall armyworms, corn leaf aphids and yellow sugarcane aphids as potential pests of Miscanthus x giganteus.

Mike Gray, a U of I entomologist leading this team of researchers, said, "Our goal is to discover perennial grass pests now so we can study their potential impact before these grasses become widespread. However, finding insects does not necessarily indicate a problem."

Fellow team member Jarrad Prasifka, a U of I post-doctoral research associate, presented their team's research and goals at the Bioenergy Feedstocks Symposium in Champaign on Jan. 11. For the past two years, they have been conducting surveys and searching for pests on biomass crops.

"As biomass production increases, pests will react to the new resources we put out and make available to them," Prasifka said. "In the United States, soybeans were considered a pest-free crop for many years. But now, soybeans, just like any other crop, have management issues related to both insects and diseases."

Prasifka discussed the latest pests discovered on biomass crops, including fall armyworms, tiller-killers, corn leaf aphids, and yellow sugarcane aphids.

Fall armyworms were found feeding on the whorls of Miscanthus and switchgrass. The fall armyworm is a seasonal migrant that comes from southern Texas and Florida to the Midwest in August. More research is needed to determine how serious of a threat these insects are to perennial grasses. Prasifka encourages producers to be aware of this potential pest, particularly in areas where multiple cuttings of switchgrass are desirable as fall armyworm larvae prefer the succulent regrowth.

The tiller-killer is a stem-boring caterpillar that feeds on switchgrass and causes browning of whorl leaves and halts the growth of infested tillers. It spends the winter as a larva in the ground, which Prasifka believes may help keep the population suppressed in Illinois. Because the injury from this insect occurs early, it is possible that switchgrass could compensate for the loss of some tillers.

Corn leaf aphids are another low-threat migrant to the Midwest and show up in mid-August on the whorls of transplanted (first-year) Miscanthus. While they don't cause much visual concern with slight yellowing of leaves, they can transmit barley yellow dwarf virus.

The yellow sugarcane aphid can winter in Illinois. They are known to infest the lower leaves of Miscanthus and cause red stippling, which eventually can lead to leaf death. They are also capable of transmitting sugarcane mosaic virus.

Prasifka said it's hard to forecast the effects of pests on perennial biomass crops.

"If you were to ask me what the outlook on a certain pest is for next year, I might be able to make a good prediction," he said. "But if you are looking 10 more years down the line at Miscanthus, that's very difficult to do. We are talking about a scale of time that actually permits evolution of insect and pathogen populations."

In addition, Prasifka said one of their challenges is aiming at a "moving target." The optimum distribution of feedstocks can change through improvements in plant breeding or incentives to grow particular crops in certain areas. Also, the economic situation changes depending on the value of the commodity and the cost of management.

Yet, researchers are optimistic about how these pests will interact with biomass crops.

"Biomass crops should be able to tolerate significantly greater amounts of injury before you need to consider intervening to preserve the yield of biomass," Prasifka said.

He encourages biomass crop producers to utilize wise breeding efforts.

Prasifka said, "If you put out one variety that you think is a world-beater, remember that it really doesn't provide the same level of protection from evolving pathogens or insects that a mosaic of several similar feedstocks would have with different levels of resistance to those pests." Δ