Scientists offer new knowledge on 're-discovered' switchgrass moth

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(PhysOrg.com) -- South Dakota State University scientists and their colleagues elsewhere are adding to what is known about an insect "re-discovered" in switchgrass research plots at SDSU.

In an article in the Oct. 25, 2010, issue of the journal *Zootaxa*, researchers for the first time described the immature stages of the insect species Blastobasis repartella (Dietz), the insect scientists have started calling the switchgrass moth. It is the first important study of the insect since two male specimens of the adult moth were collected in Denver, Colo., in 1910.

What scientists are learning about its diet and life cycle suggests it could become one of the first pests of a new biobased economy in which native grasses will be grown for energy.

Already in May 2004 at the Dakota Lakes Research Farm, professor Arvid Boe, a forage and biomass grass breeder, and postdoctoral research associate DoKyoung Lee estimated that up to 40 percent of new tillers of a few scattered plants of switchgrass was lost to the caterpillar. However, many other plants were unaffected, so the average was estimated to be less than 10 percent.

Professor Paul Johnson, the curator of SDSU's Severin-McDaniel Insect Research Collection, collected adult moths using simple emergence traps in 2008, and estimated population densities. SDSU scientists first suspected the stem-borer might be entirely new to science.

“At first we thought it was an undescribed species. I started calling it ‘the switchgrass moth’ because everything we know about it so far is that it feeds only on switchgrass,” Johnson said. “We had no idea what this thing was. We had no identified material in the insect collection here that would allow us to identify it to any level. Suddenly this species, in an agronomic sense, was presenting itself as a pest of switchgrass.”

SDSU’s search for answers finally led scientists to Dr. David Adamski, a research associate with the Department of Entomology at the Smithsonian Institution in Washington, D.C. Adamski, a specialist in small moths, identified the insect and told them it had been reported to the scientific community in 1910, but scarcely anything was known about it.

“In this case a worker named Dietz using electric light collected two specimens of Blastobasis repartella from Denver, Colorado, and they weren’t collected since,” Adamski said.

Adamski made a trip to South Dakota in summer 2009 to gather specimens of the insect. He reared adults of the moth from larvae that were collected in South Dakota. Adamski co-authored the recent paper about the insect with the help of several colleagues including Johnson and Boe at SDSU.

The insect may not be rare so much as it has been simply ignored, Adamski said, since it apparently depends on a plant that previously was unimportant to humans.

“This moth is, with wings spread, very small and generally would go unnoticed by anyone. It’s not like it’s hiding,” Adamski said. “An insect like this, someone would ignore it without a thought.”

Johnson said the insect is an interesting example of issues that can

emerge when a native plant is elevated to crop status.

“Part of the question from a biodiversity perspective is, how thoroughly do we know the insects of native prairie plants?” Johnson said. “As we convert native plants into crops, we are bringing with them the potential for new pests and diseases. Here we have a native, prairie grass-adapted species that apparently no one knew about.”

Encouraging large tracts of native grasses as agricultural crops would give insects that use those species the signal to thrive. “When you start encouraging large monocultures, it’s like there’s a Thanksgiving feast laid out for them,” Johnson said.

In fact, Johnson said, the switchgrass moth is only one of several puzzling insects that SDSU scientists have found in the course of their research on various species of native grasses and other plants. One other switchgrass insect is a cecidomyiid fly that was previously unknown to science.

“We now have a genus name, Chilophaga. And it is confirmed to be a new species,” Johnson said. “Then there are different moths, midges, aphids and other insects on big bluestem, prairie cordgrass, cup plant, and other plant species being studied as potential crops.”

Those ongoing discoveries among scientists who are working with native grasses that are being studied as potential feedstocks for cellulosic ethanol challenges an important assumption, Johnson noted.

“Before these recent discoveries, the mantra in the national biofuels and biomass circles was that there were no significant pests of concern and that growing native plants as crops would be environmentally benign if not beneficial. Our basic insect natural history work here at the Severin-McDaniel Insect Research Collection has shown this presumption to be

false and that native prairie plants are just as vulnerable to insects as other crops," Johnson said. "A major concern in the near future, then, becomes designing pest management programs."

One of Johnson's webpages discusses SDSU's work on biomass insects. Find it here: www.sdstate.edu/ps/Severin-McD … el/biomass/index.cfm

Adamski said the incident raises other serious biological issues for entomologists. The switchgrass moth belongs to a family called Blastobasidae, commonly known as scavenger moths. Yet repartella and other newly discovered relatives are not scavengers but phytophagous insects that feed on living plants. These new discoveries may change the way scientists think about the group in general.

About 400 species of Blastobasidae are known worldwide, Adamski said, and of those only about six percent are known to have host plant associations. In addition, Adamski said, the number of known Blastobasidae is increasing. For example, Adamski has yet to publish a work on Costa Rican Blastobasidae that will add 102 new species to the list.

The incident points to the need for taxonomic expertise that focuses on insects that live inside the stems of plants, where the switchgrass moth lives for most of its life cycle.

Provided by South Dakota State University