

Statement of work

Since the late 1800s, wireworms (Elateridae: Coleoptera: Insecta) have been recognized as crop pests in the United States. Approximately 20 species are of economical importance (Paul Johnson, South Dakota State University, personal communication) attacking a range of agricultural crops, including: field and sweet corn, potato, sweet potato, tobacco, carrots and other vegetables, small grains, and grasses.

Wireworms (the larval stages of click beetles) can cause significant crop damage without warning or understanding of what the conditions were that led to the damage. Within the same field one or more years may pass with minimal damage before significant damage reoccurs. Damage is caused by wireworms feeding on: the growing point in corn; the seed pieces of white potatoes; the tubers and roots of white potatoes and sweet potatoes; the roots of tobacco, carrots and other vegetable crops; vegetable fruit and other produce in direct contact with the soil; and the tillers of small grains and grasses.

Although wireworms are typically regarded as secondary pests in most crops they attack, crop or yield loss may reach 50% in field corn (Joseph Ingerson-Mahar, Rutgers Field Crops IPM Program, unpublished data) and potatoes (New York Potato Crop Profile). Replanting costs for field corn could be \$50 to \$100 per acre. Delaware white potato growers estimate 10% to 20% loss of yield in affected fields due to wireworms. These growers estimate that the dollar value loss each season can range from \$60 - \$200/A. This loss results from a reduction in quality of potatoes. When there is no market for culled potatoes or if potatoes are rejected by processors, this can result in a total loss in certain fields. In most cases, fresh market potatoes with wireworm damage will be sold at approximately one-half the market value of U.S. Number 1 potatoes (average price of \$ 8-9 per cwt for U.S. No 1 potatoes versus \$ 4 per cwt for culled potatoes). In 2005, wireworms were included on the 2005 Vegetable IPM Working Group Priority Pest List as pests of potatoes for the Northeastern IPM Region.

Wireworms are difficult pests to manage because: 1) they are capable of feeding on a wide range of host crops; 2) often there is more than one species or variant in the same field; 3) they are soil insects with the inherent problems of estimating populations, observing behavior and feeding habits; 4) they have a poorly understood biology (larvae and adults) including conditions that provoke severe crop loss; 5) the *Melanotus communis* species is actually a species complex with incomplete taxonomy that may reflect different behaviors; 6) all wireworms tend to be lumped together regarding their damage and control; and 7) they have multi-year life cycles.

The current, most practical and consistent recommendation that can be made to growers for reducing wireworm injury is to avoid planting susceptible crops in fields known to be infested.

Acknowledging the lack of effective wireworm pest management recommendations, two informal conferences on wireworms have been held; Harrisburg, PA, 2003, and Charlottesville, VA, 2006. These conferences were open forums discussing wireworm management problems and included representatives of private industry and university and extension personnel. Encouraged by these conferences we are now attempting to develop a coordinated approach to

improving IPM recommendations for wireworm management in the Northeast and the Mid-Atlantic States.

We are proposing holding a meeting of key research and extension personnel and farmers, in the disciplines of vegetable entomology, field crops entomology, insect taxonomy, and horticulture, to develop research and extension objectives to 1) increase our knowledge of wireworm biology, and, 2) improve our pest management recommendations for wireworms. We need to learn how to prevent economically severe wireworm crop injury to help keep our growers in business. Represented states and institutions will include Delaware, Pennsylvania, New Jersey, Virginia, North Carolina, and South Dakota State University.

We are proposing that this meeting be held immediately after the Eastern Branch Entomological Meeting, March 20, 2007, in Harrisburg, PA. We are asking for funding to address travel expenses and lodging, especially for those people coming from North Carolina and South Dakota and those who have to stay an additional night to enable all interested parties to attend this meeting.

Once the research and extension objectives are identified, we will proceed on obtaining grant funding from the NE IPM Center, Southern IPM Center, and other sources, to conduct the research and outreach supporting these objectives. The results from our activities will be most applicable to the northern and eastern states, as well as, the Mid-Atlantic States. Our results should be applicable in other regions where wireworms are crop pests, although some modifications may be needed adjusting to different species complexes and cropping systems.

Anticipated Outcomes

- 1) development of a long-term coordinated effort of research and extension program of wireworm IPM
- 2) increased communication between this mid-Atlantic group and others concerned with wireworm IPM
- 3) reduced risk of crops sustaining wireworm injury for the region's farmers