



# Northern New York Agricultural Development Program

## FACT SHEET

# 1 in a series on Alfalfa Snout Beetle

**Thirteen percent, some 500,000 acres, of New York's cropland is infested with alfalfa snout beetles.**

**Once established on a farm, the beetles can destroy entire alfalfa stands in one growing season.**

## Developing Biological Controls for Alfalfa Snout Beetle



Principal Investigators: Elson Shields, Entomology, Cornell University;  
Janice Thies, Crop and Soil Science, Cornell University;  
Don Viands, Plant Breeding, Cornell University

### **Introduction: Invasive Insect Damaging Crop in NNY**

The alfalfa snout beetle is an invasive species of insect that is destroying the alfalfa crop in Northern New York (NNY). The beetle has progressively advanced across the northern region of New York State, moving east from Oswego. In 2004, the insect was found in all six NNY counties: Jefferson, Lewis, St. Lawrence, Franklin, Clinton, and Essex; and in Oswego, Cayuga and Wayne counties in New York State, and in Canada at Prescott, Ontario. Thirteen percent, some 500,000 acres, of New York's croplands are infested.

The alfalfa snout beetle is a native of Central and Northern Europe. Researchers believe the insect traveled in the sand and gravel ballast of sailing ships into the port of Oswego between 1840 when the first canal opened Lake Ontario to ocean-going vessels and 1896 when the insect was first collected. That first specimen is now preserved in the national museum in Washington, D.C.

Alfalfa was introduced into the Oswego area in the mid-1920s. The first infestation of alfalfa snout beetle was reported near Oswego in 1933.

This insect is an all-female species capable of reproducing without mating. Adult beetles are 1/2" to 3/4" long, wingless and about as wide as a person's thumbnail. They have a hard shell and a snout. In the larvae stage, the beetles are grublike.

## **Life Cycle of the Alfalfa Snout Beetle:**

### **SPRING 1**

**May: adult beetles feed on top growth of alfalfa plants for three weeks to build fat reserves for egg-laying**

**May-June: adults enter a non-feeding phase, laying eggs at the base of host plants. One adult can lay up to 500 eggs...**

### **SUMMER-FALL 1**

**June-November: larvae feed on alfalfa plant roots**

**August: most heavily damaged plants begin to die in late August**

### **FALL 1**

**September-October: plant death begins**

**November: larvae burrow deep into soil and become dormant for a full year, becoming adults the following summer, but remaining underground in pupal cells until they emerge into fields in Spring 3 when soils warm to 38 degrees F**

Adult alfalfa snout beetles feed on a wide range of plants with alfalfa as the primary foodsource. The beetles are known to eat red and white clovers, broad-leaved dock, wild carrot (Queen Anne's lace), wild strawberries and blackberries, dogwood and other legumes and weeds. In Europe, the beetle is a major pest on grapes.

Researchers believe the flightless insect migrate by walking and by "hitching a ride" on farm equipment, gravel trucks, and hay transports and in bee hives. The May 2000 *North Adirondack Agricultural News* reported a walking migration that measured more than a mile in length along a roadside in Jefferson County a few years earlier.

Once established on a farm, the beetles can destroy entire alfalfa stands in one growing season. Dairy farmers who lose fields to the beetles suffer an increase of production costs of up to 25 percent caused by the need to purchase protein supplement for their cows, added replanting costs and time lost to replanting. Farmers suffer income losses due to decreased milk production when alfalfa feed crops are lost to infestation.

## **Early Research and Control Measures**

Researchers first began looking for ways to deal with the invasive crop pest in 1934 when the New York State Legislature appropriated funding for alfalfa snout beetle research. A variety of control methods have been tried since then, including poison bait and aerial dusting with chemicals.

Heavy rains diluted the potency of bait programs. Heavy winds off Lake Ontario affected aerial dusting efficiency and large, full-grown grubs were found to be resistant to insecticide - up to 200 lbs of DDT/acre had little effect.

Through the 1950s, more chemical controls were tried with heptachlor becoming the primary treatment chemical. In 1961, *Rural New Yorker* reported field tests of dieldrin. Cornell Entomology Professor George Gyrisco wrote, "At an expense of \$10,000 per year, nearly a million acres of alfalfa in New York, possibly worth nearly \$60 million a year, have been protected. One dollar has been spent to protect \$6,000 - that is cheap insurance."

However, with growing environmental concerns about the use of insecticides, by 1971, Professor Gyrisco and his research team were studying biological control possibilities: parasites, viruses and predators, as well as crop rotation and chemical controls. Heptachlor had proven harmful to other forage plants. The state's alfalfa crop was valued at \$86.5 million a year.

From 1984 to 1986 the populations of alfalfa snout beetle exploded in the infested counties. By 1991, the beetles had migrated as far east as Essex County, where alfalfa was grown on one-third of all harvested areas in the county.

Through the 1990s, a three-year crop rotation of alfalfa with a non-host crop, such as corn or soybeans, appeared to be the best method for controlling the alfalfa snout beetle.

### **Current Research Methods**

Cornell University's Dr. Elson Shields, an entomologist, Dr. Janice Thies, a crop and soil science researcher, and Dr. Don Viands, a plant breeder, currently lead the Northern New York Agricultural Development Program-funded research related to the alfalfa snout beetle.

Current research includes:

- use of nematodes to destroy beetle larvae
- use of fungi to destroy adult beetles
- use of rotational cropping systems
- developing beetle-resistant alfalfa plants, and
- investigation of microsporidia as a possible control.

Field conditions at the Peck Farm in Jefferson County have been set up to mimic the conditions seen in areas of Hungary where the alfalfa snout beetle is not a problem. Test plots on the farm are being used to test the efficacy of nematodes and fungi as beetle control measures.

A 2003 field test of the fungi met with some success. Two methods of application have been tested: a granular product applied and lightly mixed with surface soil designed to destroy burrowing beetles, and an oil-based spray with sunscreen designed to kill adults in the field before they lay their eggs. Researchers are hoping to repeat their success with fungi application in 2004 and to understand more about how the anti-beetle fungi affects native soil bacteria and native fungi. A crop rotation of alfalfa one year and corn or oats the next year as a recurrent cropping cycle is being tested as a way to enhance the fungi's effectiveness as an extended control.

Efforts continue to develop beetle-resistant alfalfa plants, while the organism microsporidia is being examined under lab conditions and is a long way from field testing.

At the Willsboro Research Farm in Essex County, researchers are looking to understand why a large die-off of the beetles occurred there in 2003 and to apply that understanding to current work.

### **Life Cycle of the Alfalfa Snout Beetle (con't):**

#### **SPRING 2**

**May: stand loss is seen, fields are patchy or barren. Damage mimics winterkill, however, areas may fill in quickly and not be seen as damaged.**

#### **SUMMER 2**

**Larvae hibernating deep in the soil now change to adult beetles, but remain in hibernation.**

#### **SPRING 3**

**May: Adult beetles that began in Spring 1 now emerge into alfalfa fields as adults.**

**To learn more about efforts to breed alfalfa snout beetle-resistant plants, see the second fact sheet in this series: **Breeding Alfalfa Snout Beetle-Resistant Alfalfa, available at Cornell Cooperative Extension offices in NNY and online at [www.nnyagdev.org](http://www.nnyagdev.org).****

## **Alfalfa Snout Beetle Project Sponsors**

Research into biological controls for the alfalfa snout beetle is funded by the Northern New York Agricultural Development Program Program.

## **Principal Investigators**

Dr. Elson Shields, Department of Entomology, Cornell University; Dr. Janice Thies, Department of Crop and Soil Sciences, Cornell University; Dr. D. R. Viands, Department of Plant Breeding, Cornell University

## **Technical Coordinator**

Christopher M. Jones, Technician II, Department of Crop and Soil Sciences, Cornell University

## **Participating Farmers**

Jefferson County: John Peck, Carthage

## **Participating CCE Educators and Research Partners**

Cornell Cooperative Extension of Essex County: Anita Deming, 518-962-4810; Cornell Cooperative Extension of Jefferson County: Mike Hunter, 315-788-8450; Willsboro Agricultural Research Farm: Mike Davis, 518-963-7492

## **For more information:**

contact your local Cornell Cooperative Extension office

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**The Northern New York Agricultural Development Program** selects and prioritizes research the results of which can be practically applied to farms in the six-county region of Northern New York: Jefferson, Lewis, St. Lawrence, Franklin, Clinton and Essex Counties.

**To learn more about the Northern New York Agricultural Development Program**, contact Co-Chairs Jon Greenwood, 315-386-3231, or Joe Giroux, 518-563-7523; or R. David Smith, Cornell University, 607-255-7286, or visit [www.nnyagdev.org](http://www.nnyagdev.org) on the web. ♦



Northern New York  
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Northern New York  
Agricultural Development  
Program  
162 Morrison Hall  
Cornell University  
Ithaca, NY 14853  
607-255-7286  
[www.nnyagdev.org](http://www.nnyagdev.org)