

# STRAWBERRY SAP BEETLE: IDENTIFYING KEY AREAS FOR IMPROVING PEST MANAGEMENT



*Rebecca L. Loughner, Dept. of Entomology, NYSAES, Cornell University, Geneva, NY 14456*

The strawberry sap beetle (SSB) has emerged as the most significant insect pest in much of the Northeast. The small, brown adults are approximately 1/16 inch in length and appear in strawberry fields as the berries ripen. The adults and larvae prefer to feed on over-ripe fruit but will also damage marketable berries. Customers often report finding larvae after washing the berries at home. The beetles are widespread and present at all of 14 New York farms sampled in 2002, but seem to be a significant problem only in certain locations. Concern regarding SSB centers on the lack of effective control measures if the beetles become a problem at a farm.



Current recommendations for control include application of pyrethroids, field sanitation, and renovating promptly after harvest. Labeled pyrethroids (Brigade [bifenthrin] and Danitol [fenpropathrin] in NY) have not provided sufficient control and are broad spectrum, potentially disrupting predatory mite populations that provide spider mite control. The beetles are not resistant to pyrethroids but rather tend to feed underneath fruit where they are unlikely to be contacted by insecticide.

The focus of our current work is improving SSB management through a better understanding of the beetle biology. This includes examining how cultural practices and habitat surrounding strawberry fields (wooded areas and alternate food sources) influence

the size of the SSB population. The following summary of our recent sap beetle work discusses factors that may impact SSB pest management throughout the growing season.

## **Overwintering location**

The beetles are known to overwinter as adults in wooded areas, but the extent to which they overwinter in fields of strawberry or other crops is unclear. In spring 2004, soil cores were collected from wooded areas and fields of several crops (apple, blueberry, cherry, peach, raspberry, and strawberry) at multiple farms. A total of 6 SSB was found in the 220 samples collected from wooded areas and no SSB were extracted from the 480 samples taken from fields of other crops. While the number of beetles found was rather small, early indications are that SSB overwinters primarily in wooded areas. More extensive sampling of a larger area will be conducted in 2005.

## **Colonization of strawberry fields**

Adult SSB can be sampled in the field using traps baited with whole wheat bread dough. When these attractive traps are placed in the edges of wooded areas near strawberry fields and in the strawberry field itself, beetles are caught as much as 3 weeks earlier in traps placed in the woods. In early to mid-June in New York, SSB adults can be caught both in the woods and strawberry fields, indicating the beetles are both active and searching for a food source. Adults can be found on fruit as ripe strawberries become available. Activity of the beetles is influenced by temperature, with the number of SSB in traps decreasing when the minimum temperature is below about 60°F.

### **Cultural practices in strawberry**

Production practices, including cultivar and time of renovation, may impact SSB choice of host and survival in a particular field. It has been suggested that accessibility of strawberry fruit to SSB may be reduced by growing cultivars that have more firm fruit or that tend to hold fruit up off the ground. Although we do not have any data on use of different cultivars, it is unlikely that growing a particular variety will sufficiently control sap beetles.

Development time for SSB from egg to adult is approximately 3 weeks, such that the first generation of adults is emerging about the time renovation is expected to take place. Some evidence exists that renovating early reduces the number of emerging SSB (Galen Dively, University of Maryland). A comparison of prompt and delayed renovation for potential to reduce number of emerging beetles in New York was conducted in a replicated research plot and two commercial strawberry fields in 2004. Cages with attractive bait were used to each cover approximately 1/3 m<sup>2</sup> area of strawberry field and trap emerging adults over a 5-week period. In all three locations, the number of SSB emerging was greater in the prompt renovation treatment. The reason for this is not clear and may be related to timing of beetle development or weather conditions. The experiment will be repeated in 2005.

### **Where do beetles go after strawberry harvest?**

Adults emerging from the strawberry fields may 1) stay in the strawberry field to overwinter, 2) return to woods to overwinter, or 3) search for other sources of food. To help determine if beetles are remaining in the strawberry field or leaving for wooded areas, attractive traps were placed in 3 strawberry fields and associated wooded edges after renovation. Traps were placed in the field for 24 hours each week from mid-July to mid-September. The number of adults caught per trap peaked around mid-August. Mean number of SSB per trap was similar across the 3 strawberry fields, however the mean number varied with wooded edge. Despite the similar number of beetles emerging from strawberry fields, it seems the beetles may be more likely to move to certain wooded edges. SSB continued to be caught later in the woods than in the field, again suggesting the beetles are moving to wooded areas for overwintering.

Beetles emerging from strawberry fields potentially have enough time to produce a second generation of beetles if they are able to find an adequate food source. SSB is not considered to be an economically important pest in crops such as apples, raspberries, blackberries, blueberries, cherries, pumpkins, melons, and various vegetables, however SSB adults and sometimes larvae have been reported in these crops. If SSB emerging from strawberry fields move to these other crops to feed and reproduce, the numbers of beetles present to infest strawberries the following spring may increase. Addressing whether SSB presence in late season crops is a concern for SSB management in strawberry was conducted with two studies in combination: 1) a laboratory assay to evaluate SSB reproduction on potential alternate food crops and 2) a field study to quantify the number of SSB adults per unit area in various crops.

In the laboratory assay, 20 adult SSB were provided with one of the following food sources continuously: apple, blueberry, corn, cherry, raspberry, or strawberry. The larvae, pupae, and adults in each cage were counted after 5 weeks. Although reproduction was much lower on apple and corn, the beetles reproduced on all food sources. The beetles were also present in all crops sampled in the field. The ability of the beetles to reproduce on a wide variety of food sources and to find these sources in the field provides the opportunity for the beetle population to increase in size substantially in late summer. It is unclear, however, whether a late summer increase in SSB numbers results in a greater number of SSB surviving the winter.

### **New directions for controlling SSB**

The strawberry sap beetle is a pest that is quite mobile on a farm scale, able to use a wide range of crops as a food source, exists in a system where changes to cultural practices would be difficult, and is not easily contacted by current insecticide application methods. The most promising option is development of a trap-and-kill technique where attractive traps could be deployed in the early spring immediately before strawberry ripening with the idea of reducing the number of beetles entering the strawberry fields. Sap beetles have a male-produced aggregation pheromone,

which is attractive to both male and female SSB and could be included in a trap along with a food odor and insecticide. Traps for related beetles species are much more attractive when a food odor and pheromone are presented in combination, therefore current work in this area is focusing on identifying the chemical components of the SSB specific aggregation pheromone.

(Reprinted with permission from [New York Berry News](#) Vol. 4, No. 1, January 2005)