

Sap Beetle (Coleoptera: Nitidulidae) Management in Strawberries¹

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Sap beetles (Coleoptera: Nitidulidae) are conspicuous arthropods that feed on flowers, fruits, sap, fungi, stored products, and decaying and fermenting plant tissues from diverse trees and crops, including strawberries. Sap beetles work in association with yeasts and other fungi causing the fermentation of infested plant parts (Fig. 1). They also are known to transport a variety of microorganisms that cause plant diseases; a few species can behave as predators of various ornamental pests (Dowd, 1991; Dowd and Weber, 1991). Sap beetles are often considered minor pests; however, their main impact is due to the contamination of products caused by adults and larvae.

Description

Sap beetles, also known as Nitidulids or picnic beetles, like most of the beetles, present complete metamorphosis: eggs, larvae, pupae, and adults. Eggs are white and small; larvae are about the same size as the adults, white, with lateral projections on



Figure 1. Strawberry fruits infested with a sap beetle adult. Credits: J.F. Price, UF/IFAS, GCREC-Bradenton

abdominal segments, presenting a light brown head (Fig. 2); adult strawberry sap beetles are less than 1/8 inch (3.2 mm) long to 1/4 inch (6.4 mm) wide, oval shaped, usually black, brown, or grayish (Fig. 3).

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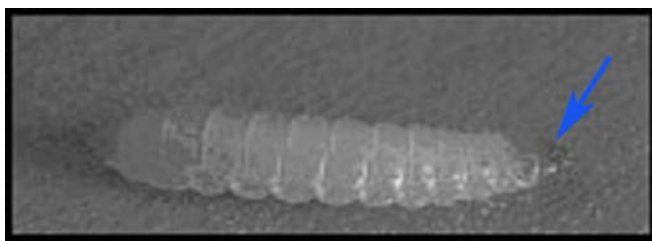


Figure 2. Sap beetle larva. Credits: K. Gray, Oregon State University

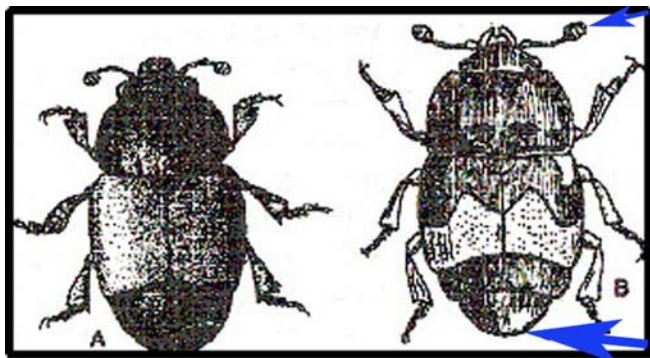


Figure 3. Nitidulids adults can be recognized by the unexposed tip of abdomen heavily sclerotized and antenna distinctly capitata. (A) *Carpophilus pallipennis* (Say) (2.3 mm); (B) *Carpophilus hemipterus* (L.) (2.8 mm). Credits: Arnett, Jr. et al., 1980

Sap Beetles in Florida

There are more than 2,500 species of Nitidulid described with more than half of the genera cosmopolite. Six genera are endemic of North America; twenty-one genera have been reported in Florida including the genera *Carpophilus*, *Stelidota*, *Glischrochilus*, and *Epuraea* (Parsons, 1943). Potter (1995) indicated that nine Nitidulid species can be found on strawberry fruits in east Hillsborough County (Plant City, FL). These species are: *Carpophilus freemani* Dobson, *C. fumatus* Boheman, *C. humeralis* (F.), *C. mutilatus* Erichson, *Colopterus insularis* (Castelnau), *Stelidota geminate* (Say), and *S. ferruginea* Reitter. Approximately 94% of the Nitidulid population is represented by *H. luteolus*, *L. insularis*, and *C. fumatus*, however, consideration must be given to all. Correct identification should be followed by preventive methods to control damage by sap beetles.

Biology and Ecology

Sap beetles fly into strawberry fields from wooded areas (overwintering sites) at about the same

time berries begin to ripen when temperatures exceed 16°C (67°F). Adult sap beetles attack fruits throughout the growing season (2 generations). Longevity of adults is approximately 2 to 2 1/2 months. A few hours after mating, oviposition occurs. After hatching of eggs, larvae burrow inside the berries, feeding on the flesh for approximately 1 1/2 weeks. After that period, larvae fall onto the ground, burrow inside the soil, and pupate. Sap beetles have a wide range of feeding habitats; most are saprophagous and mycetophagous, feeding on fruits and other plant parts that are ripening or decomposing (Myers, 2001; Peng and Williams, 1990).

Damage

There are two types of damage inflicted by sap beetles: direct (feeding cavities) and indirect (dissemination of microorganisms). Cavities in berries also serve as oviposition substrate. Larvae inside the berries usually go unnoticed until berries begin to decompose as a result of the damage. Because overripe berries are attractive to sap beetles, damage is often greatest during harvesting when pickers leave ripe and overripe berries in the field, row middle, pathways, and ditches (Fig. 4).



Figure 4. Overripe berries in the field. Sap beetles are attracted to the fermenting fruit. Credits: S.I. Rondon, UF/IFAS, Horticultural Sciences Department

Control

Sap beetles are not usually economically important in field fresh market strawberries; however, when overripe fruits are harvested for processing, sap beetles may infest the fruit and make the product unmarketable (Price, personal communication). Taking in consideration the ecology of the pest, the following practices are recommended.

1. If possible, avoid planting strawberry next to woody area.
2. Pick berries before they become overripe.
3. Remove all damaged or overripe fruit from the field, especially in warm to hot weather.
4. Similar sanitation practices should be done with other fruits and vegetables.
5. Picking and placing infested fruit into the row middle should be an alternative reliable method to reduce numbers of adults in the field (Potter, 1995). Fruits decompose faster in between rows than beetles can complete their life cycles; thus the beetles' cycles will be interrupted. Keep in mind that fermenting berries may attract beetles capable of migrating from long distances (Potter, 1995).
6. For monitoring, place pitfall traps or "trap buckets" of overripe fruit outside field borders to intercept immigrating beetles and reduce numbers in the crop (Price, personal communication).
7. Biological control by means of augmentative releases of nematodes is currently under study (Dowd et al., 1995). In addition, researchers at the University of Ohio are studying the usefulness of *Brachyserphus abruptus*, a parasitic wasp, to control strawberry sap beetles (Williams et al., 1984).
8. Apply recommended insecticides when conditions justify. Insecticides recommended to control sap beetles include Brigade[®], Diazinon[®], and Pyrenone[®]. Some formulations of Malathion

[®] and Sevin[®] are registered for control of sap beetles on other crops and are allow to be used on strawberry. Insecticide use is limited by frequent harvests. Frequent and thorough applications should be made during early period of activity. Follow label instructions for best results.

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Additional Information

Related Web sites:

http://creatures.ifas.ufl.edu/field/corn/sap_beetles.htm

<http://strawberry.ifas.ufl.edu/>