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REDHEADED FLEA BEETLE

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The redheaded flea beetle, *Systena frontalis* (F.) Coleoptera: Chrysomelidae, (RHFB), is an important native insect pest of container-grown nursery ornamental plants. Understanding its behavior, identifying signs of infestation and implementing effective management strategies are crucial for reducing the RHFB population and their damage. The distribution of RHFB from east to west extends from the Rocky Mountains to the East Coast, and its north to south range runs from Southern Canada to Florida and Texas.

Figure 1. *RHFB adult. Photo credit: Alfred Daniel Johnson, Tennessee State University.*

IDENTIFICATION AND BIOLOGY

Redheaded flea beetles are tiny (2.5-6.25 mm long), metallic-black, oval-shaped and with a reddish head. Other notable characteristics include light-brown serrate (toothed) antennae, which are nearly half as long as the body and located below the eyes, and they have enlarged femurs on their hindlegs that allow them to jump from plant to plant (Fig 1). Females are slightly larger than males.

RHFB females lay their eggs in the potting medium. The eggs are oval, pale yellow and can be anywhere from 0.7- 0.9 mm in size. The larvae are creamy-white with a brown head capsule, 5.1-10 mm long, and they have three pairs of legs (Fig 2). The larvae have an upward projection at the end of their abdomen with fine hairs, which is an important diagnostic character. The larvae develop through three instars while feeding on the roots and pupate in the soil. However, it is not known if the RHFB larvae cause significant damage to the plant. The adult beetles are first seen during the last week of May and are active until October. After the adults die off, eggs remain in the potting media and overwinter.

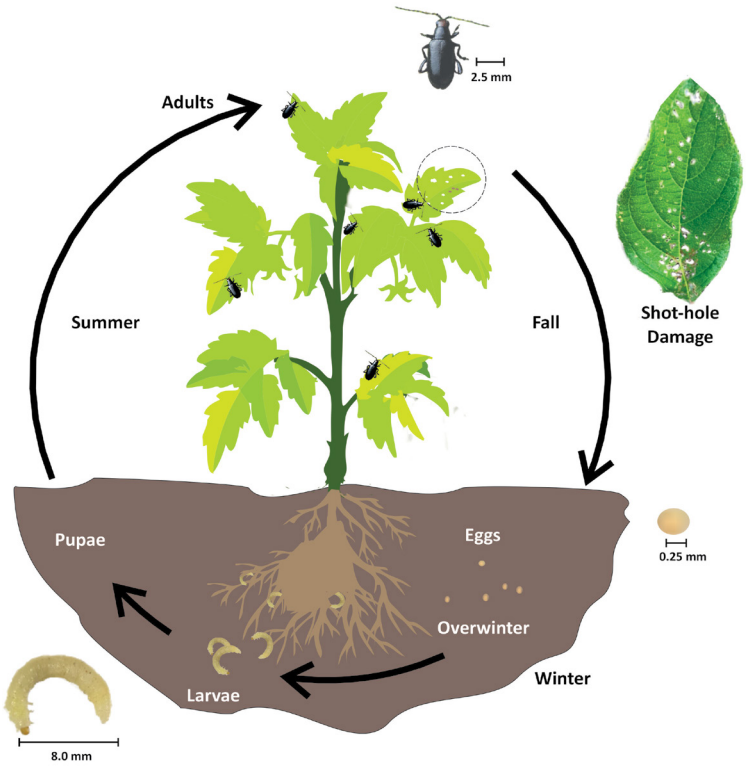

Figure 2. *RHFB life cycle. Photo credits: Eleanor Lane and Alejandro Del-Pozo, Virginia Tech University (eggs and larvae); Alfred Daniel Johnson, Tennessee State University (adult); Kripa Dhakal, Tennessee State University (leaf). Images adapted by Zee Ahmed, Clemson University.*

HOSTS

RHFB can feed on a wide variety of plant species. Nursery crops most frequently affected include panicle hydrangeas (*Hydrangea paniculata*), roses (*Rosa* spp), Virginia sweetspire (*Itea virginica*) and weigela (*Weigela florida*). Additionally, RHFB have also been located on a variety of woody ornamental plants such as crape myrtle (*Lagerstroemia* spp.), anise-tree (*Illicium* spp.) and dogwood (*Cornus* spp.). Moreover, RHFB can feed on crops such as cranberry (*Vaccinium macrocarpon*), highbush blueberry (*Vaccinium corymbosus*) and alfalfa (*Medicago sativa*).

DAMAGE

RHFB are particularly problematic in nurseries and landscapes where they cause extensive damage to foliage. These beetles are known for their distinctive 'shot-hole' feeding pattern. The adult beetles feed on both the upper and lower surfaces of leaves, leading to necrotic leaf spotting, shot-hole damage and skeletonization of leaves (Fig 3). Moderate to severe foliar damage caused by these beetles reduces aesthetic quality and marketability of ornamental plants (Fig 4).

Figure 3. *RHFB foliar damage on Hydrangea plants. Photo credit: Kripa Dhakal, Tennessee State University.*

Figure 4. *RHFB foliar damage on rose plant. Photo credit: Midhula Gireesh, University of Tennessee*

MONITORING AND SCOUTING

Monitoring eggs and larvae of RHFB is challenging because they live below ground. However, if the size of the population on the root system can be evaluated through monitoring, management of the egg and larval stages may be an effective option. Make sure that the growing medium is moist with irrigation before examining the root balls for the larvae. This is important because if the growing medium is dry, larvae move to the interior of the root balls and makes their detection more challenging. However, assessing larval stages and their development time is essential for determining the optimal timing for applying insecticides to the media and foliage before adult emergence.

Furthermore, regular scouting for adult activity should start from early to mid-May. Most nursery growers rely on visual inspection for adults and their damage to the susceptible plants. The use of trapping methods (such as using pheromones, light or sticky cards) or other monitoring methods (such as beat sheets or sweep nets) have not been fully developed or understood. Adults are most active during the day and can be easily spotted on leaves. In a nutshell, regular monitoring helps in early detection and timely intervention.

CULTURAL MANAGEMENT

RHFB utilizes many weeds and native plants that grow in and around nurseries as hosts. Effective weed management in and around the nursery can significantly reduce these alternative food sources, thereby preventing the beetles from establishing and proliferating within the nursery. Additionally, if container stock is already infested with RHFB, it is advised to avoid placing newly propagated plant containers near the infested plants.

CHEMICAL CONTROL

RHFB populations are typically managed using various insecticides to both larvae and adults effectively. Neonicotinoids such as dinotefuran, clothianidin, and thiamethoxam, along with acephate, carbaryl, and bifenthrin, are the most commonly used insecticides against adults on ornamental plants, as listed in Table 1. Rotating active ingredients is crucial to prevent chemical resistance. Soil drench or top-dressing application of insecticides in the spring or during egg hatch can target larvae in the growing medium, significantly reducing their populations. A foliar spray of insecticides is essential to reduce adult damage by repelling the beetles or making the foliage unpalatable or toxic to consume; however, repeated applications and thorough coverage are necessary to manage adult populations. Consequently, the adults will hop off the plant leaves and land on the surface of the growing medium or on the leaves of nearby plants. However, many insecticides can pose a risk to beneficial insects and other organisms, particularly if not used in accordance with the label. Always read and follow the label prior to making an application.

BIOLOGICAL CONTROL

Some commercially available entomopathogenic nematodes (*Steinernema carpocapsae*) and entomopathogenic fungi (*Beauveria bassiana*, *Isaria fumosorosea* and *Metarhizium anisophliae*) have the potential to control RHFB larvae in containers. These entomopathogens could be used as an alternative to insecticides in ornamental plant nurseries.

Table 1. Insecticides available for the management of redheaded flea beetle adults and larvae.

Insecticide class	Active Ingredients	Selected trade names1	Application Method
Carbamates	Carbaryl*	Sevin	Foliar
Organophosphate	Acephate*	Orthene	Foliar
Pyrethroids	Bifenthrin*	Talstar	Foliar
	Cyfluthrin*	Tempo	Foliar
	Lambda-cyhalothrin*	Scimitar GC	Foliar
Neonicotinoids	Thiamethoxam*	Flagship	Foliar
	Dinotefuran*	Safari 20SG	Drench
	Imidacloprid*	Mallet	Soil incorporated
	Imidacloprid*	Marathon 1G	Top dressing
	Acetamiprid*	Tristar 30SG	Foliar
Neonicotinoids and Pyrethroids	Imidacloprid + cyfluthrin*	Discus	Drench
Diamides	Chlorantraniliprole*	Altacor	Foliar
	Cyclaniliprole*	Sarisa 50SL	Foliar
Sulfoxaflor and Spinosyns	Sulfoxaflor + spinetoram*	XXpire 40WG	Foliar
Pyrazole	Tolfenpyrad*	Hachi-Hachi SC	Foliar
Fungi	*Beauveria bassiana*	Botanigard, Naturalis	Drench
	Metarhizium anisophliae	Met52, Tick-Ex	Drench
Nematodes	*Steinernema carpocapsae*	Millenium, Nematac	Drench

[1]*Trade names are provided for informational purposes only.*
*Active ingredients which showed efficacy in controlling RHFB in IR-4 trials, nursery demonstrations, and nursery research trials.

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