Red-headed Flea Beetle Biology and Management

Red-headed flea beetle adult. Photo by Dr. Matt Bertone, NC State Entomology Extension Associate

By Danny Lauderdale

Red-headed flea beetle (RHFB), *Systena frontalis*, is a native insect that is an increasing problem for nursery growers. RHFB adults chew holes in tender leaves or feed through the upper or lower leaf surface on plants with thick leaves. Its native range runs from Maine to Florida to Texas and Montana. Nurseries along the Atlantic Coast, from Connecticut to Michigan, and throughout the south have reported injury.

RHFB feeds on many woody plants in North Carolina nurseries, including:

- Virginia sweetspire (*Itea virginica*)
- forsythia (*Forsythia x intermedia*)
- panicle hydrangea (*Hydrangea paniculata*)
- anise-tree (*Illiucium spp.*)
- azalea, (*Rhododendron spp.*)
- crapemyrtle (*Lagerstroemia spp.*)
- dogwoods, (*Cornus spp.*)
- Japanese holly (*Ilex crenata*)
- weigela (*Weigela florida*)
- loropetalum (*Loropetalum sinense*)
- fragrant osmanthus (*Osmanthus fragrans*)
- rose (*Rosa sp.*) viburnum (*Viburnum spp.*)
- wax myrtle (*Morelia cerifer*a, formerly *Myrica cerifera*).

Herbaceous plant favorites include:

- aster (*Aster spp.*)
- chrysanthemum (*Dendranthema spp.*)
- tickseed (*Coreopsis spp.*)
- goldenrod (*Solidago spp.*)
- Joe-Pye weed (*Eutrochium spp.*, formerly *Eupatorium spp.*)
- salvia *(Salvia spp.*)
- sedum *(Sedum spp.*)
- veronica *(Veronica spp.*)
- zinnia *(Zinnia spp.*)

RHFB also feeds on many weeds including:

- Canadian thistle (*Cirsium arvense*)
- clover (*Trifolium spp.*)
- common burdock (*Arctium minus*)
- jewelweed (*Impatiens capensis*)
- lambsquarter (*Chenopodium album)*
- pigweed (*Amaranthus spp.*)
- smartweed (*Polygonum spp.)*

Biology

Adults are shiny black with a red head and are 1/10 to 1/4 of an inch long. The insect overwinters as eggs. First generation larvae hatch and feed on roots of container

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Since 1979, the North Carolina Nursery & Landscape Association has provided over $1 million in funding to research, endowment and program activities at NC State University. This industry research, in part supported by NCNLA's member dues premiums (silver, gold and platinum) and successful fundraising events throughout the year, demonstrates the effectiveness that private-sector collaboration with a world class public institution can provide. This is just one example of how NCNLA has partnered with NC State to provide solutions for green industry businesses here in North Carolina.

Red-headed flea beetle with foliar damage. Photo by Danny Lauderdale

grown plants from 250 to 480 GDD_{50} (Growing Degree Day with a base temperature of 50 degrees Fahrenheit).

Growing Degree Days are calculated for North Carolina starting on January 1 and use the daily average of the maximum and minimum temperature, then subtract the base temperature of 50 degrees Fahrenheit. For each degree above 50, a growing degree-day is accumulated. Growing degree-days take into account weather variables that cause earlier or later activity.

Plants in bloom in Delaware and Maryland during larval activity are black locust (*Robinia pseudoacacia*) and Chinese fringetree (*Chionanthus retusus*). Plants on the eastern shore of Virginia observed during larval activity include azaleas (*Rhododendron spp.*), wild cherry (*Prunus serotina*), and Virginia sweetspire (*Itea virginica*). Larvae do not significantly injure roots but controlling larvae will reduce adult foliar feeding.

Larvae are creamy-white in color with some red streaking and are 2/10 to 4/10 of an inch in length. They look similar to small roots and move quickly inside the root ball when exposed to light. Larvae have a brown head capsule and six legs near the head. The feature that distinguishes RHFB larvae is a small fleshy projection on top of the last section of the abdomen. Between the larval and adult stage is the pupal stage.

First generation adults emerge from 517 to 1028 GDD_{50}, when southern magnolia (*Magnolia grandiflora*) and winterberry (*Ilex verticillata*) are in bloom in Delaware and Maryland. Second generation larvae are active from 1,570 to 1860 GDD_{50}. Second generation adults emerge from 1,878 to 2,318 GDD_{50}. By mid-summer you will find all three stages in containers as generations overlap. Brian Kunkel, Entomologist at the University of Delaware, determined that up to three generations are occurring along the Atlantic Coast in container grown ornamentals.

Clockwise from above: Red-headed flea beetle larvae look similar to plant roots. Red-headed flea beetle pupae are usually only found by destructively sampling roots. Red-headed flea beetle larvae are creamy-white, with red streaks, and a fleshy projection on the last section of the abdomen. Photos by Dr. Matt Bertone, NC State Entomology Extension Associate

Grower concerns

Nursery growers indicate concern about movement of this insect from wooded or crop production areas into nurseries. Literature includes references as far back as 1917, when it was first referred to as the cranberry flea beetle. It has been reported as an occasional pest on beans, beets, blueberries, cabbage, corn, clover, grapes, pears, potatoes, soybeans and sweet potatoes. An article in the Journal of Entomology from 1969 indicated it was not thought to be an abundant pest in these crops.

My conversations with corn, soybean, and blueberry specialists indicate a similar lack of concern or knowledge about this insect. Literature does indicate that these crops are able to withstand a significant amount of defoliation without reducing yield (ex. Soybean threshold is 15-30% defoliation depending on growth stage).

The yield of ornamental crops sold in retail is defined by appearance and need for foliage free of holes, so there is little to no threshold for damage in many markets.

Management

Early larval scouting is important to prevent foliar damage. Larvae can be found on the edge of plant root balls with and without previous year leaf damage during the 250 -480 GDD_{50} range. Scouting should be done when substrate is moist since larvae move inside the root ball when drying occurs.

Documenting larval populations can determine need for larval treatments (drenches) or early adult applications just prior to emergence. A second larval scouting can be done from 1,570 to 1860 GDD_{50} to help determine need for later season management. Adults will be actively feeding from 517 to 1028 GDD_{50} and from 1,878 GDD_{50} through the fall until eggs are laid. Scouting for larvae in purchased liners is also recommended.

Research by Brian Kunkel has shown that inoculating containers when larvae are active with the entomopathogenic nematode, *Steinernema carpocapsae,* has significantly reduced larval and adult populations. Also, entomopathogenic fungi *Beauveria bassiana* and *Metarhizium anisophliae* show promise for controlling larvae as does azadiractin (from neem seed), and the insecticides acephate (Orthene), dinotefuran (Safari), bifenthrin (Talstar), cyantraniliprole (Mainspring), imidacloprid (Merit), chlorpyrifos (Dursban) and cyfluthrin + imidacloprid (Discus).

Products that have shown promise on adult RHFB in Kunkel's research, grower observations, and IR-4 research by Kristine Braman (Univeristy of Georgia) and Steve Frank (NC State University) include bifenthrin (Talstar), carbaryl (Sevin), cyfluthrin + imidiclo-prid (Discus), cyantraniliprole (Mainspring), diazinon (Diazinon), dinotefuran (Safari), imidacloprid (Merit), lambda-cyhalothrin (Scimitar), spinosad (Conserve), spinetoram + sulfoxaflor (Xxpire), tau-fluvalinate (Mavrik), and thiamethoxam (Flagship). Rotating active ingredients is important to prevent resistance and limit outbreaks of others pests like spider mites.

Other management options might include control of host weeds, avoidance by not growing favored plants, exclusion, feeding confusion, or feeding deterrents. Trap crops seem unlikely to work due to the diversity of plants damaged. If you have ideas, interest in research, or need help managing this insect contact me at **danny_lauderdale@ncsu.edu.**

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