BUG BIZ
Pest Management and Insect Identification Series
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Lissorhoptrus oryzophilus, Rice Water Weevil

(Coleoptera: Curculionidae)

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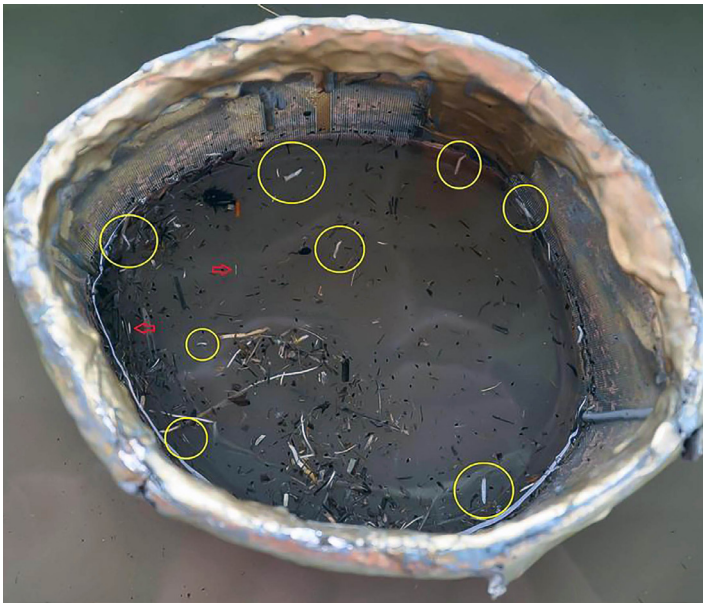
Description

The rice water weevil is a semi-aquatic insect that is a major destructive pest of rice in the southeastern and western U.S. and in many other rice-growing countries. Adults are convex, with a prominent beak, up to 1/5 of an inch (5 mm) in length, and dark brown in color. Color may vary in hue, with a darker oval patch across the middle of the elytra (wing covers) that is continuous with a smaller oval patch on the top of the thorax. Males and females can be differentiated by examining the underside of the abdomens. The female is larger, with convex segments in the middle, while the male has concave segments and is usually smaller. Larvae are aquatic and creamy white in color with brown heads. They possess hook-shaped projections arranged along the top of the abdomen. Larvae are about 1/3 of an inch (8 mm) in length when mature. Pupae are similar in size and are enclosed within a silken cocoon that is in turn encased within a water-tight mud cell attached to roots. Eggs are about 1/30 of an inch (<1 mm) long, cylindrical in shape, and pearly white in color. Eggs are deposited on leaf sheaths just above the water surface.

Life Cycle

The life cycle from egg to adult requires 32 to 50+ days, depending on temperature. Rice water weevil completes two to three generations a year in Louisiana. Egg laying begins during March to May, earlier in the South and later in northern locations. Female weevils lay eggs directly into the plant tissue of the leaf sheath. Larvae hatch in four to nine days. Oviposition preferences vary by plant age, number of tillers and availability of plant tissue nitrogen. Younger plants with more tillers and higher nitrogen are preferred. Larvae feed on submerged roots of rice and related host plants. They possess specialized hard, hook-shaped, chitinous processes (spiracles) that pierce air pockets in plant root

Rice water weevil adult (Juliana Cardona-Duque, University of Puerto Rico, Bugwood.org)



Rice water weevil larvae in flotation sample (Natalie Hummel, Louisiana State University AgCenter, Bugwood.org).

tissue (aerenchyma cells). This allows gaseous exchange directly via the respiratory tubes (trachea) of the larvae. Twenty-eight to 35 days are required to complete all four larval stages and transform into pupae, which remain submerged. The pupal stage requires five to 14 days before adult emergence. Adults are terrestrial, feeding on leaves of host plants, and producing elongate, skeletonized scars parallel to leaf veins.

Ecological Significance and Pest Status

The rice water weevil is a native species in North America that has spread to other rice-growing countries. The first case of rice water weevil infestations in U.S. rice was documented in Florida during 1916, eventually expanding to Texas, Louisiana, Arkansas, California and other states. Expansion of rice water weevil has been remarkably rapid, possibly accelerated by the ability of some exclusively female populations to reproduce without the need for egg fertilization by males (parthenogenesis).

Rice water weevil can cause damage ranging from 25% to 30% of crop yield in severe conditions and without treatment. Most damage to the crop is from larval feeding, causing reduced number of tillers, vegetative growth, grain size and grain number. Damage by early stage larvae is typically greater than that of late larval stages. Adult damage is usually minor and is typically caused by high weevil densities around edges of fields. Monitoring adult densities is a valuable tool in predicting subsequent larval infestations.

Management and Control

The LSU Agricultural Center has a long history of research on biology and control of rice water weevil. Many cultural and chemical approaches are available for rice water weevil management, depending on region, cultivation methods and rice cultivars used in production.

Cultural control. These control methods have great potential to mitigate damage. For example, the drill-seeded system adopted in southern U.S. allows delayed flooding and exposure to rice roots to weevil infestation and damage. Draining fields, winter flooding, manipulating the depth of flooded water, weed management, delayed planting, and nutrition augmentation are the primary cultural practices for rice water weevil control.

Biological control. Control methods that have been employed include use of the entomopathogenic fungus

Rice water weevil larval damage (Natalie Hummel, Louisiana State University AgCenter, Bugwood.org).

Beauveria bassiana, the soil microbe *Bacillus thuringiensis* and mermithid nematodes. The wolf spider, *Pardosa ramulosa* (Lycosidae), has shown some promise as a generalist predator of various pests in rice crop systems.

Chemical control. Control methods include the use of chlorantraniliprole as a seed treatment, lambda-cyhalothrin, zeta-cypermethrin for foliar application against adults and carbofuran applications to flooded soil as an effective larvicide. Neonicotinoids are recommended for growers with rice-crawfish rotations, since pyrethroids are toxic to crawfish. Consult the current Louisiana Pest Management Guide published annually by the LSU Agricultural Center for approved insecticides.

References

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