



BUG BIZ

Pest Management and Insect Identification Series



Lissorhoptrus oryzophilus, Rice Water Weevil (Coleoptera: Curculionidae)

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Description

The rice water weevil is a semi-aquatic pest insect that is capable of causing major damage in rice production. Adults are convex, with a prominent beak or snout, up to 5 mm in length. They are dark brown in color and may vary in hue, with a darker oval patch across the middle of the wing covers (elytra) 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 central abdomen, 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 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 watertight mud cell attached to roots. Eggs are less than 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 32-50 days, depending on temperature. The rice water weevil completes two to three generations a year in Louisiana. Egg laying is temperature dependent, mainly occurring during March to May. 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 nitrogen in plant tissues. Younger plants with more tillers and higher nitrogen content 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 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 develop into



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



Rice water weevil (*Lissorhoptrus oryzophilus*) larvae
in floatation sample (Natalie Hummel, Louisiana State
University AgCenter, Bugwood.org).

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 the 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 reduce crop yield from 25%-30% in severe conditions and without treatment. Most damage to the crop is from larval feeding, causing root pruning, which leads to 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 larval infestations in future growth cycles.

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 methods have great potential to mitigate damage. For example, the drill-seeded system adopted in the 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 methods that have been employed include use of the entomopathogenic fungi *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.



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

Chemical 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. Seed treatment is mainly used in Louisiana. 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 AgCenter for approved insecticides.

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