HISTORY AND ECOLOGY IN NORTH AMERICA

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Neohydronomus affinis
Waterlettuce weevil

Neohydronomus affinis is a biological control agent approved in North America for release against waterlettuce.

CLASSIFICATION

RANKING	SCIENTIFIC NAME	COMMON NAME
Kingdom	Animalia	Animals
Phylum	Arthropoda	Arthropods
Class	Insecta	Insects
Order	Coleoptera	Beetles
Family	Curculionidae	Weevils
Genus	*Neohydronomus*	
Species	*Neohydronomus affinis* Hustache	Waterlettuce weevil

DESCRIPTION

Eggs are small, oval, and cream-colored. Larvae are up to 3 mm long and have a white or yellow body with a brown head capsule (**Fig. 1a left**). Pupae are cream-colored and only up to 2 mm long (**Fig. 1a right**). Adults are approximately 2 mm long and have a nearly straight snout with an obvious constriction at the base. Adults range from golden-brown (**Fig. 1b**) to bluish-gray (**Fig. 1c**). Bare patches form on the elytra where the scales are rubbed off, giving the adults a chevron-like pattern. Females are usually slightly larger than males.

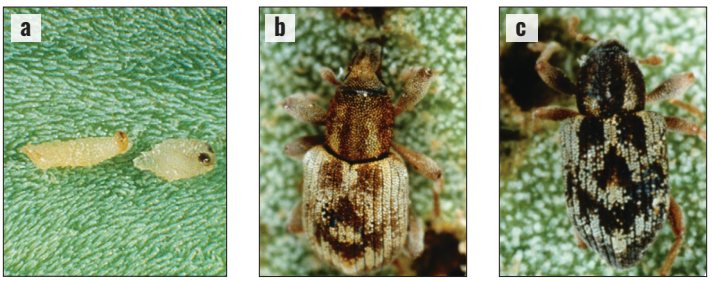

Figure 1. *Neohydronomus affinis* (a) larva (left) and pupa (right); (b) golden-brown adult; (c) bluish-gray adult (a–c: USDA-ARS, Bugwood.org CC BY-3.0 US)

LIFE CYCLE

At warm locations, both *Neohydronomus affinis* and waterlettuce develop throughout the year; adults and pupae are the stages most often observed over winter. Adult females lay eggs singly in holes they chew in the upper surface of waterlettuce leaves near leaf margins. Larvae mine into leaves and feed towards the spongy tissue of leaves through three instars. This leaves a distinctive mining trail clearly visible in thin leaf tissue (**Fig. 2a**). Pupation occurs within leaves. Emerging adults feed on waterlettuce leaves, creating round feeding holes and occasionally chewing into the leaf spongy tissue (**Fig. 2b**). There are three generations per year in the native range.

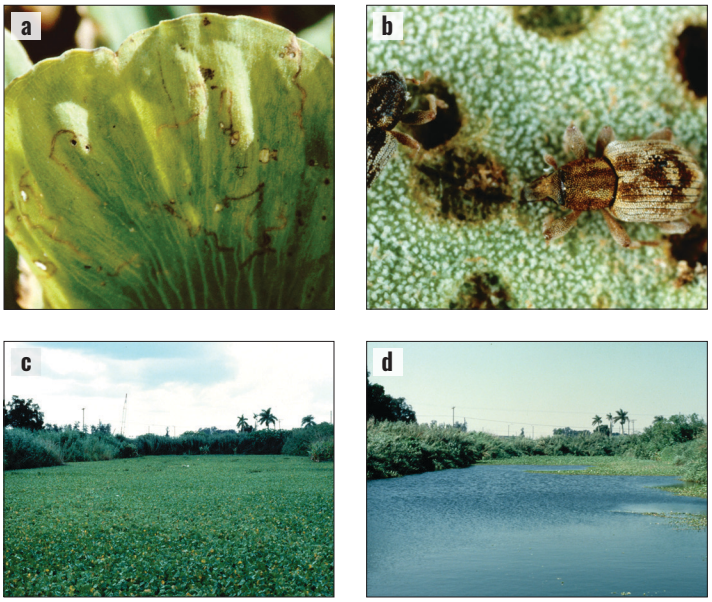

Figure 2. *Neohydronomus affinis* (a) larval mining trails; (b) adults and adult feeding holes; before and after damage to waterlettuce infesting a 10-acre (4 ha) pond at Torry Island in Lake Okeechobee, Florida (a–d: USDA-ARS, Bugwood.org CC BY-3.0 US)

DAMAGE

Larval and adult feeding destroy leaf buoyancy, and attacked plants sink and die under high weevil densities (**Fig. 2c,d**).

FIELD IDENTIFICATION

Although other insect species may opportunistically feed on waterlettuce, their damage is inconsistent and sporadic.

Neohydronomus affinis can be confirmed present by observing the distinctive larval mining scars (**Fig. 2a**) or adult feeding scars (**Fig. 2b**), or by observing actively feeding larvae and adults (**Fig. 1**).

PREFERRED HABITAT

This weevil develops fastest and feeds most actively in warmer temperatures and on large nutrient-rich waterlettuce plants.

HISTORY AND CURRENT STATUS

Weevils originally collected in Brazil were released in Australia, and from Australia individuals were redistributed to Florida, USA beginning in 1987. Weevils were subsequently released in other southern states. In 2013, a redistribution was attempted from Louisiana to California; however, the release site was compromised by waterfowl.

Neohydronomus affinis is currently established in three states in the USA (**Fig. 3**). The weevil disperses well, and within 18–30 months of its release, waterlettuce was eliminated from three of four original release sites in Florida. Though it has proven effective at many sites in the southeastern USA, establishment has not been universal, and long-term suppression of waterlettuce has not been achieved.

NONTARGET EFFECTS

None reported

Figure 3. *Neohydronomus affinis* reported distribution in the USA (Winston et al. 2021)

NON-ESTABLISHED SPECIES

Spodoptera pectinicornis
(Lepidoptera: Noctuidae)

SYNONYMS

Namangana pectinicornis, Epipsammea pectinicornis

DESCRIPTION AND LIFE CYCLE

Adults have mottled brown forewings with light and dark markings (**Fig. 4a,b**) and have creamy-white hindwings. They have a wingspan of 19–23 mm; females are slightly larger than males. Adults are generally only active (and mate) at night. Females lay up to 1,000 eggs in their lifetime, depositing these in masses of up to 150 on both sides of waterlettuce leaves. Eggs are tiny, round, and yellow-green, but the egg mass is often covered by hairy scales that protect the eggs (**Fig. 4c**). Larvae feed on the spongy tissue within leaves and on leaf buds. Larvae are yellow-green initially but become green intermixed with brown by the final instars (**Fig. 4d**). They can be up 25 mm long and feed through six instars. Pupation occurs within leaves. Adults are short-lived and do not feed on waterlettuce. This species is continuously brooded throughout the year, creating frequent overlap of generations.

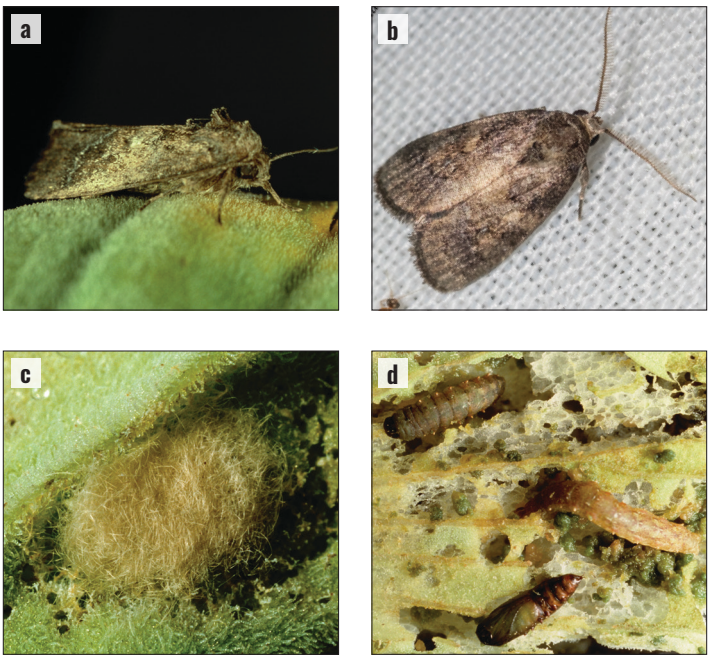

Figure 4. *Spodoptera pectinicornis* (a,b) adult; (c) egg mass covered in hairy scales; (d) larvae (top and middle) and pupa (bottom) (a,c,d: USDA-ARS, Bugwood.org, CC BY-3.0 US; b: Andrew Hardacre, iNaturalist.org CC BY-NC-ND 4.0)

HISTORY AND CURRENT STATUS

Spodoptera pectinicornis individuals collected in Thailand were released in Florida and Texas, USA beginning in 1990. The moth was initially believed to have established following multiple and varying release attempts. Populations have since dwindled and are no longer detectable.

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SUGGESTED CITATION

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