



BUG BIZ

Pest Management and Insect Identification Series



Water Hyacinth Weevils

Scientific name: *Nechetina eichhorniae* (Hustache) and *N. bruchi* (Warner) (Insecta: Coleoptera: Curculionidae)

Introduction

Water hyacinth, *Eichhornia crassipes* Martius (Pontederiaceae) is an exotic free-floating perennial plant that is native to South America (Figure 1). Originally introduced in 1884 for its beautiful flowers, water hyacinth has invaded most of the southern United States and many tropical and subtropical regions around the world (Figure 2). Water hyacinth displaces native vegetation due to its rapid growth during the summer. Major economic impacts caused by invasion of water hyacinth include interference with navigation, irrigation and power generation. Additionally, dense mats can provide ideal mosquito breeding habitats.

Water hyacinth weevils, *Nechetina eichhorniae* and *N. bruchi*, were introduced as biological control agents to suppress the growth and reproduction of water hyacinth. Both weevils were imported from Argentina and released in United States to help manage water hyacinth. Feeding damage caused by both species of weevils is complimentary and contributes to the suppression of water hyacinth.

Distribution

The water hyacinth's first introduction to the United States was at the Cotton States Exposition in New Orleans in 1884. Presently, it inhabits most of the southeastern U.S., California and Hawaii (Figure 3). Despite previous reports, populations of water hyacinth are considered eradicated in Arizona, Arkansas and Washington State. Reports from New York, Kentucky, Tennessee and Missouri, where water hyacinth was intentionally introduced, have not been permanently established due to extreme winter temperatures. The *Nechetina* weevils are found across the entire distribution range of water hyacinth in United States.

Description of the weevils

N. eichhorniae and *N. bruchi*

Eggs: White and ovoid, eggs are less than 3/64 inches (1 mm) in length. Adults can lay 300-400 eggs over a life span.

Larvae: Larvae are white with orange heads and legs are absent. Third instar larvae are approximately 5/16 inch (8-9 mm) in length. Length of larval period is less than 30-45 days.

Pupae: Pupae are white and enclosed in a cocoon attached to the rootstock under the water's surface. Pupal stage is approximately seven



Figure 1. Water hyacinth infestation in a drainage ditch. Photo credit: Allie Cozad, Red River Waterway Commission.

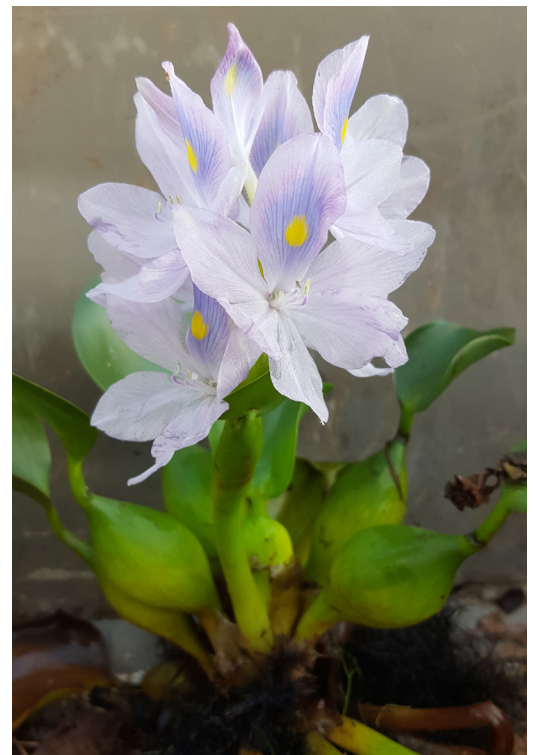


Figure 2. Water hyacinth inflorescence. Photo credit: Allie Cozad, Red River Waterway Commission.

days, but young (teneral) adults sometimes remain in cocoons for extended periods of time.

***N. eichhorniae* adults**

Adults: Males and females, excluding heads, are approximately between 1/8 and 9/62 inch (3.2 and 3.7 mm) long, respectively (Figure 4). Adults are covered in grey scales and mottled with brown. Dense, yellow water shedding scales are located at the base of the head and antennae and lower leg segments are reddish-brown. Male snouts are thick and slightly curved and females are more slender and strongly curved. Compared to the male, female snouts are also noticeably shiny near the tip. This characteristic is common to both species.

***N. bruchi* adults**

Adults: Males and females, excluding heads, are approximately 9/64 inch and 1 1/64 inch (3.5 and 4.5 mm) long, respectively (Figure 4). Adults are densely covered in brown and tan scales, with tan scales forming a V-shaped chevron on its back. This feature distinguishes it from *N. eichhorniae*. Yellow, water-shedding scales are located on the underside and at the leg joints. Lower leg segments and antennae are reddish-brown. Weevil snouts are thick and curved. Compared to males, female snouts are more slender, longer and more curved.

Life Cycle and Ecology

Neochetina eichhorniae and *N. bruchi* are both nocturnal, have very similar biology and life cycles. In warm climates, reproduction takes place year round without distinction between generations. For both species, oviposition occurs in the leaf tissue. *Neochetina eichhorniae* lays eggs singly in feeding scars in the leaf epidermis, preferring the young central leaves (Figure 5). *Neochetina bruchi* lays eggs either singularly or in clusters of up to 25 in feeding scars of the petiole, preferring older bulbous leaves. Depending on temperature, eggs will hatch in seven to 17 days. Larvae feed aggressively on plant tissue and develop inside the petiole moving downward and undergo three instars or stages. By the final instar, they are near the base of the petiole which is near the water's surface. Pupation takes place after mature larvae move into the upper root zone attaching themselves to the main root axis. Duration of pupation is approximately seven-to-nine days at 80 F (27 C). Initial feeding by the adult occurs 24 hours after emergence and egg production begins about six days later. Over a lifetime, 200-400 eggs can be oviposited (laid); however, egg production is heavily dependent upon an abundance of healthy plants. Generational time for *N. eichhorniae* is 70-140 days and *N. bruchi* is 56-94 days depending on temperature.

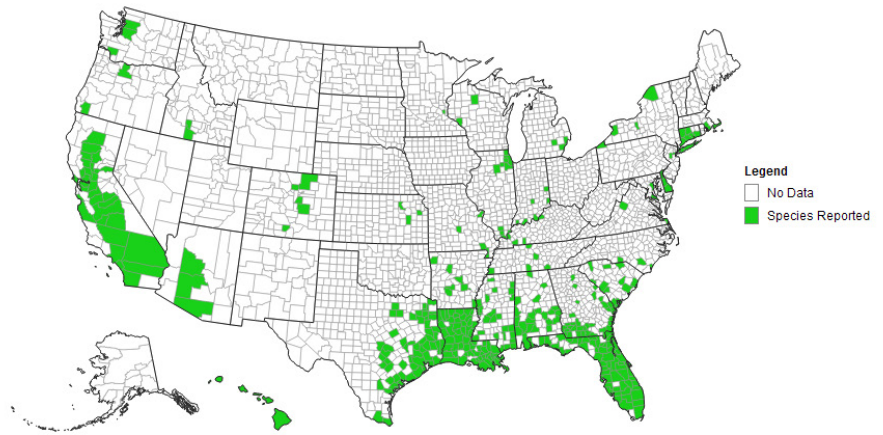


Figure 3. Distribution of water hyacinth in United States. Source: EDDMapS, 2015. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health.



Figure 4. *Neochetina eichhorniae* (left) and *N. bruchi* (right) adults. Photo credit Willey Durden, USDA-ARS, Bugwood.org.



Figure 5. Adult feeding scars on water hyacinth. Photo credit Katherine Parys, USDA-ARS, Bugwood.org.

Host Range

Neochetina weevils are specialist herbivores and feed solely on water hyacinth. Studies indicate that both weevils have a narrow host range; moreover, they have developed a method of pupation underwater that relies on specific aspects of the water hyacinth's root system.

Economic importance

Water hyacinth's growth in waterways is only limited by temperature and availability of nutrients. The aesthetic value of water hyacinth in the aquarium trade is far outweighed by the potential damage the plant can cause. It can alter natural communities and prefers environments similar to desirable fish. Water hyacinth can impede navigation, displace native vegetation and reduce the dissolved oxygen in a water body if not properly managed.

Water hyacinth weevils feed heavily on plant tissue. Larvae feed internally and adults feed externally. Feeding damage by both life stages suppress the growth of the plant often inhibiting flowering (Figure 6). In addition, feeding scars by weevils can promote plant pathogens to attack the plant and contribute to the overall suppression of the plant population (Figure 7).

Selected References

Center, T.D. 1994. Biological control of weeds: Water hyacinth and water lettuce. In: Pest Management in the Subtropics: Biological Control--a Florida Perspective. Eds. D Rosen, FD Bennet, and JL Capinera. Intercept, Ltd., Andover, UK. 737.

DeLoach, D.J. and H.A. Cordo. 1976. Life Cycle and Biology of *Neochetina bruchi*, a Weevil Attacking Water hyacinth in Argentina, with Notes on *N. eichhorniae*. *Annals of the Entomological Society of America* 69: 643-652.

Gettys, L.A. 2014. Waterhyacinth, pp. 113-117. In: *Biology and Control of Aquatic Plants: A Best Management Practices Handbook*. Eds. L.A. Gettys, W.T. Haller, and M. Bellaud. 3rd ed. Aquatic Ecosystem Restoration Foundation, Marietta, Georgia.

Harley, K.L.S. 1990. The role of biological control in the management of water hyacinth, *Eichhornia crassipes*. *Biocontrol News and Information* 11: 11-22.

Moran, P.J. 2005. Leaf scarring by the weevils *Neochetina eichhorniae* and *N. bruchi* enhances infection by the fungus *Cercospora piaropi* on waterhyacinth, *Eichhornia crassipes*. *Biocontrol* 50: 511-524.

Stark, J. and R. Goyer. 1983. Life-Cycle and behavior of *Neochetina eichhorniae* Warner (Coleoptera, Curculionidae) in Louisiana: a biological-control agent of waterhyacinth. *Environmental Entomology* 12:147-150.



Figure 6. Waterlogged, damaged hyacinth bulb from adult weevils. Photo credit Allie Cozad, Red River Waterway Commission.



Figure 7. Water hyacinth plants stressed by weevils tend to lose buoyancy and to be small in stature. Photo credit Willey Durden, USDA-ARS, Bugwood.org.

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