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Occurrence of *Neochetina bruchi* Hustache A Biocontrol agent of *Eichhornia crassipes* (Martius.) Solms in Satara, Maharashtra

B.A. Kore¹, S.V. Thite² and A.S. Kadam³

Water hyacinth (*Eichhornia crassipes* (Martius.) Solms; Family: Pontederiaceae) a free floating, perennial, aquatic herb of South American origin and is one of the world's most serious aquatic weeds (Holm, *et.al* 1977). It was introduced in India as an ornamental plant with broad, thick, glossy, ovate leaves. Water hyacinth may rise above the surface of the water as much as 2 feet in height. The leaves are 10–20 cm across, and float above the water surface. They have long, spongy, bulbous stalks. The feathery, freely hanging roots are purple-black. An erect stalk supports a single spike of 8-15 conspicuously attractive flowers, mostly lavender to pink with six petals. One of the fastest growing plants known, it reproduces primarily by runners or stolons, which eventually form daughter plants.

Water hyacinth is one of the key pressures on the world's biodiversity altering ecosystem services and processes, reducing native species abundance and richness, and decreasing genetic diversity of ecosystems (Vila *et.al*, 2011). Since its introduction into India in late 19th century water hyacinth spread throughout the country creating problems in the management and utilization of fresh water resources (Gopal and Sharma 1981). At present, more than 2,00,000 ha of water surface has been occupied by this weed in India. Water hyacinth has been identified by the International Union for Conservation of Nature (IUCN) as one of the 100 most aggressive invasive species (Tellez, *et.al* 2008) and recognized as one of the top 10 worst weeds in the world (Patel, 2012). The success of this invasive alien species is largely due to its reproductive output. Water hyacinth can flower throughout the year and releases



Fig 1A. *Eichhornia crassipes* Habit

more than 3000 seeds per year which survives for about 20 years (Gopal, 1987). Failure in management of this weed by manual, mechanical and chemical methods which are expensive and unsatisfactory led to research in biological control.

The water hyacinth weevil *N. bruchi* (Coleoptera: Curculionidae), is also native to South America, and introduced to India in 1982 for the biological suppression of water hyacinth (Jayant, 1988). Field releases with *N. bruchi* were initiated in 1984 after obtaining

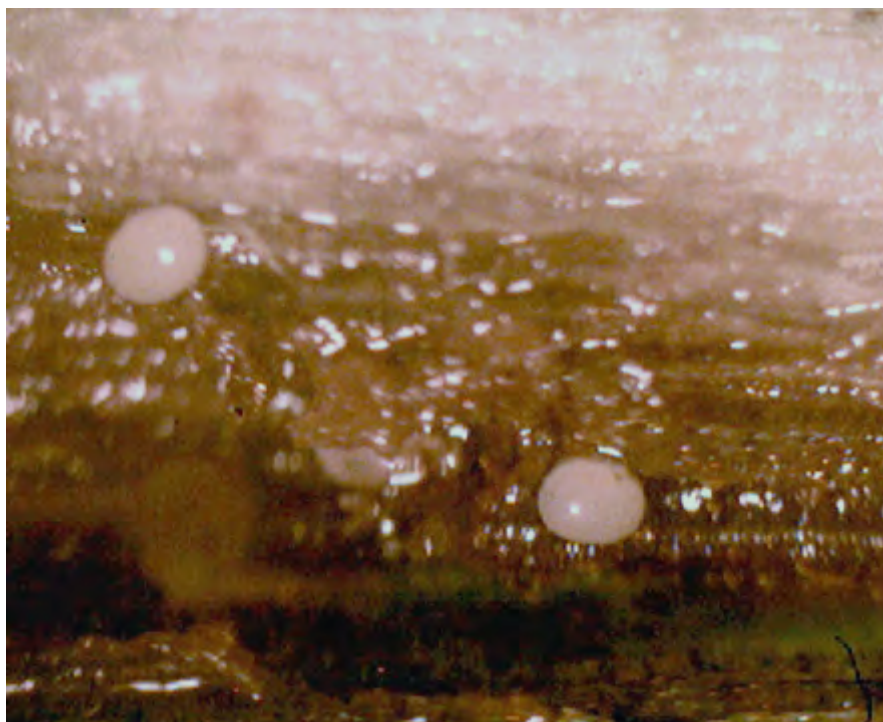


Fig 1B. Eggs of *Neochetina bruchi*

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permission of the plant protection adviser to the Government of India. Biological control of water hyacinth by release of *N. bruchi* has been reported from Argentina by Deloch and Cordo (1983) and from India by Jayant (1988). Detailed host specificity test involving 76 plants belonging to 42 families under quarantine condition confirmed the safety of this insect to cultivated crop in the country (Jayant and Nagarkatti 1987). The present study showed that *N. bruchi* is a capable biological control agent for water hyacinth and has the potential to suppress the weed throughout the country.

During routine survey of Botanical Garden of Yashvantrao Chavan Institute of Science, Satara (17° 42.940' N, 73° 48.786' E Altitude 733 m) Satara (MS) India (Fig. 1A) *E. crassipe* was found to be infested by *N. bruchi*. The different life cycle stages were collected from study area and brought to the laboratory and with the help of DEC 2000 eyepiece capturing camera Image pro Ver. 6.0 the different life cycle stages were photographed. The specimen was deposited in Bombay Natural History Society with accession number BNHS 257/ 2014.

Bionomics

Eggs: (Fig 1B)

Egg laid in petiole of water hyacinth were collected by dissecting petiole. The eggs are whitish, ovoid and about 0.75 mm in length. Eggs hatched in a week at 30°C.

Larva: (Fig 1C)

Newly hatched larvae mine toward base of petiole, occur singly, feed on arenchyma. The larvae are white or cream colored with yellow orange head. Larvae pass through 3 instars. Larval period varies between 6-7 weeks.

Pupa: (Fig 1D)

Pupation takes place under water attached to living roots. The fully developed larvae burrow out of the petiole and move to the upper root zone just under the surface of water. They cut off small lateral rootlets to make a ball (cocoon) around them. This cocoon remains attached to roots. Adults emerge within 3-4 weeks.

Adult: (Fig 1E)

The adults emerge out by splitting the cocoon and climbing on to the emergent leaves of the plant to feed and mate (Fig.1 F). Males are smaller than females 5-6 mm long, brown, light tan colored, hide underneath of petiole whorl. Elytra marking-short and long, midway along the elytra, generally of equal length, border furrow with narrow curvature. Scale coloration forms a chevron or 'V' shape across entire elytra. The female begin to lay eggs within few days. A single female lays up to 300 eggs. Adults feed on epidermal tissue of leaf but do not make holes on



Fig 1C. Larvae

lamina males are less in number than females. Adults are nocturnal.

Present study reveals that the larval stage is most

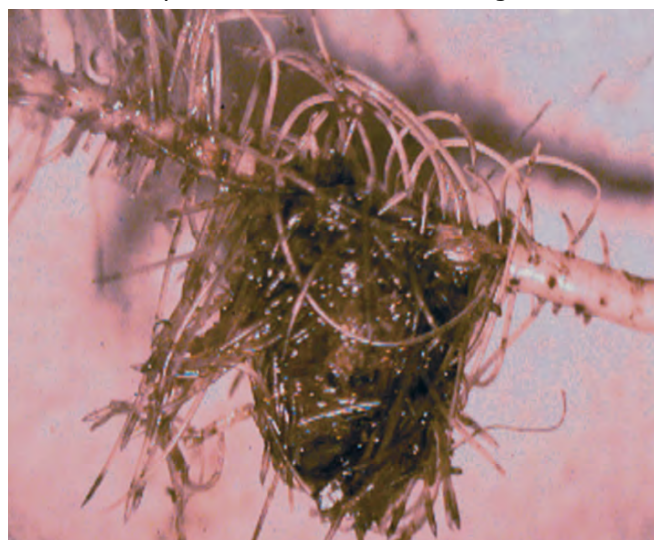


Fig 1D. Pupa (cocoon)

destructive and effectively kills the plant. Heavy feeding by adult weevils on lamina leads curling and desiccation. The arenchyma consumed by adults making small cavities near tip of petiole from where lamina expands (Fig1 G). This invites other



Fig 1E. Adult *N. bruchi*



Fig 1F. Mating



Fig 1G. Infested petiole of water hyacinth

saprophytes that leads to necrosis and lamina drops down. Soon after the dense mat of water hyacinth started to fragment, with patches and water becoming visible between the plants. Areas of new growth and smallest plants are affected first. Eventually the size of the mat decreased and the area of open water increases. This clearly confirms that *N. bruchi* is an effective and classical biocontrol agent of water hyacinth.

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References

- Deloach, C.J. and H.A. Cordo (1983).** Control of *Water hyacinth* by *Neochetina bruchi* (Coleoptera: Curculionidae: Bagoini) in Argentina. *Environ. Entomol.* 12: 19-23.
- Gopal, B. (1987).** *Water hyacinth (Aquatic Plant Studies 1)*. Elsevier, Amsterdam, 471pp.

Gopal, B. and K.P. Sharma (1981). *Water hyacinth (Eichhornia crassipes); The most troublesome weed of the world*. Hindasia Publishers, New Delhi, p. 129.

Holm, L., D. Plucknett, J. Pancho and J. Herberger (1977). *The World's Worst Weeds: Distribution and Biology*. University Press, Honolulu, Hawaii. p.609

Jayant, K. (1988). Biological control of water hyacinth in India by release of the exotic weevil *Neochetena bruchi* *Current Science* 57, 968-970.

Jayant, K. and S. Nagarkatti (1987). Host-specificity of *Neochetina bruchi* Hustache (Coleoptera: Curculionidae) introduced into India for biological control of water hyacinth. *Entomon*, 12: 385-390.

Patel, S. (2012). Threats, management and envisaged utilizations of aquatic weed *Eichhornia crassipes*: an overview *Reviews in Environmental Science and Biotechnology* 11, 249-259.

Tellez, T., E. Lopez, G. Granado, E. Perez, R. Lopez, J. Guzman (2008). The water hyacinth, *Eichhornia crassipes*: an invasive plant in the Guadiana River Basin (Spain). *Aquatic Invasions* 3, 42-53.

Vila, M., J. Espinar, M. Hejda, P. Hulme, V. Jarošík, J. Maron, J. Ergl, U. Schaffner, Y. Sun and P. Pyšek (2011). Ecological impacts of invasive alien plants: a meta-analysis of their effects on species, communities and ecosystems. *Ecology Letters* 14, 702-708.