Journal of Biological Control, 34(2): 161-163, 2020, DOI: 10.18311/jbc/2020/25849

Research Note

Record of nutgrass weevil, *Athesapeuta cyperi* Marshall (Coleoptera: Curculionidae) on *Cyperus rotundus* in Jute-based ecosystem

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ABSTRACT: Surveys for weed killers in jute-based crop ecosystem was conducted at the research farm of ICAR-CRIJAF, Barrackpore during 2018 and 2019 cropping season. The nutgrass weevil, *Athesapeuta cyperi* caused 46.67 – 85.00% dead hearts in *Cyperus rotundus* in the jute ecosystem. This is the first report of *A. cyperi* **o**n nutgrass in the jute ecosystem in West Bengal. This study throws a hope of using this weevil as a potential biocontrol agent against the most notorious weed the nut grass, which has been gradually developing resistance against many of the commonly used herbicides.

KEY WORDS: *Cyperus rotundus*, nutgrass weevil, jute

(Article chronicle: Received: 27-02-2020; Revised: 12-06-2020; Accepted: 16-06-2020)

Jute, *Corchorus* sp. (Family: Malvaceae) is an important commercial crop in eastern India covering West Bengal, Assam, Bihar, Odisha and Eastern Uttar Pradesh. It is prone to heavy weed infestation during early stage of its growth. The weed flora associated with jute includes all categories of weeds, *viz.*, grasses, sedges and broad leaved weeds and their infestation is a great obstacle for increasing the productivity of jute The magnitude of yield loss due to weeds ranged from 59-75% and the cost of weeding alone accounts for about 35.00% of the total cost of cultivation in jute (Ghorai, *et al.*, 2010). The grass and sedges are the main competing flora as compared to the broad leaved weeds. Some herbicides are effective in controlling grasses and broad leaved weeds, but not against the sedges (Tarundeep Kaur, *et al*., 2017). Among the sedges, nut grass, *Cyperus rotundus* (Cyperales: Cyperaceae) is the most obnoxious weed and it is very difficult to manage even by herbicides because of its biological adaptability as it propagates by tubers formed along with the underground rhizomes. Most of the herbicides tested earlier were reported to control annual grasses, but not the broad-leaved weeds and sedges like *C. rotundus* (Singh, *et al*., 2004).

However, most of the chemical herbicides provide poor or temporary control with adverse impacts on the environment. Hence, the biological weed control is the best option where it involves utilization of natural enemies for the management of certain weeds. During two consecutive rabi seasons (2018 & 2019) of jute seed crop, survey for weed killers in jute crop was conducted at the research farm of ICAR-CRIJAF, Barrackpore, Kolkata, (22°.45' N and 88°.26' E). It was observed that, most of the *C. rotundus* weeds turned yellow showing dead heart symptoms (Figure 2) and eventually died. Such weeds were scooped out without damaging the rhizomes, collected in plastic containers (27cm X 24 cm diameter) and covered with muslin cloth to check the escape of the adult weevils. The containers were maintained in the biocontrol laboratory. After the emergence from the pupae, the adult weevils were collected and preserved in 70.00% alcohol for identification. On the basis of the specimen identification report from former National Coordinator, Network Project on Insect Biosystematics, Division of Entomology, ICAR-Indian Agricultural Research Institute, New Delhi, the specimen was identified as nutgrass weevil, *Athesapeuta cyperi* Marshall (1928) (Coleoptera: Curculionidae). Earlier it has been reported by few authors infesting on sugarcane and *Cyperus* (William, 1931; Poinar, 1964; Marshall, 1928), later on Ibrahim (2003) reported that, *A. cyperi* caused 20.80% dead heart in *C. rotundus* weeds and over 70.00% damaged plants failed to regenerate. The weevil reduced the multiplicity of *Cyperus* plants by 37.70% in sorghum and 29.80% in okra crop. Recently Padmanabhan, *et al.* (2016) reported that *A. cyperi* is a minor pest on banana.

The activity of the *A. cyperi* as a weed killer was noticed from early October to mid-January (Standard weeks of 40 - 46) during two jute seed cropping season. Observations were made to record the dynamics of *A. cyperi* population at 10 days interval starting from 40 to 46 standard weeks on *C. rotundus* in quadrates of $1m^2$ area placed in 5 different spots in the crop field. The results indicated that *A. cyperi* is capable of causing 46.67% to 85.00% infestation on *C. Rotundus* (Figure 1). This extent of infestation for more than 30 days may result in significant reduction in nutgrass infestation in jute. The grub of *A. cyperi* feeds on the rhizome from inside and it pupates inside the rhizome (Figure 3), the grubs are creamy white in color (Figure 4). The exerate pupa is dull brown in color and the adult weevil looks like slender, shiny black with size of 3 to 5mm (Figure 5). The potential of this species can be exploited by generating the holistic information with respect to its biology for mass production and release. Although long back this species was imported to Hawaii for control of *C. rotundus* (Williams, 1931). Ibrahim (2003) studied the biology and other details of *A. cyperi* in different crops. In jute ecosystem, for the first time we confirm the severe incidence of nutgrass weevil, *A. cyperi*on *C. rotundus*.

CONCLUSION

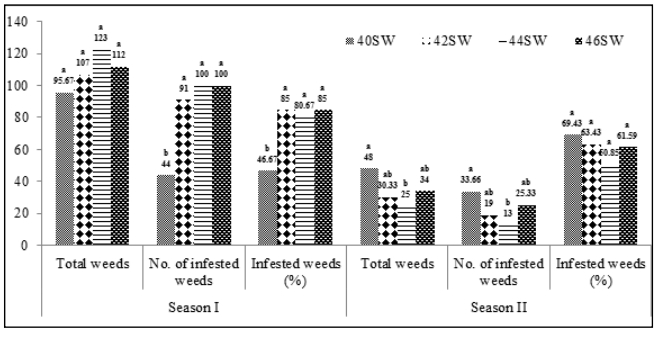

Fig. 1. Infestation of *Athesapeuta cyperi* on *Cyperus rotundus* at different Standard Weeks (SW) in jute crop (Different letters in a column have statistically significant difference, P<0.05, Duncan's multiple range test)

Fig. 2. Incidence of *Athesapeuta cyperi* on *Cyperus rotundus* in jute field (Inset: dead heart symptom of *C. rotundus*)

Fig. 3. *Athesapeuta cyperi* grub in *Cyperus* rhizome

Fig. 4. Grub of *Athesapeuta cyperi*

Fig. 5. *Athesapeuta cyperi* weevil

So far, no progress has been made in the direction of biological control of weeds in jute crop. Lack of identification of potential weed killers in the jute ecosystem is one of the reasons for this lacuna. Hence, *Athesapeuta cyperi* can be used as a potential biocontrol agent against *Cyperus rotundus* through conservation, augmentation and mass multiplication.

ACKNOWLEDGEMENT

The authors sincerely acknowledge Dr. V.V. Ramamurthy, Former National Coordinator, Network Project on Insect Biosystematics, Division of Entomology ICAR-Indian Agricultural Research Institute, New Delhi for identification of the species.

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