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RESEARCH NOTE

Report on the incidence of apple and nut borer, *Citripestis eutraphera* (Meyrick) (Lepidoptera: Pyralidae) in cashew, *Anacardium occidentale* L. (Anacardiaceae) in South Gujarat

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ABSTRACT: This paper reports the incidence of mango fruit borer, *Citripestis eutraphera* (Meyrick) (Lepidoptera: Pyralidae) on cashew as apple and nut borer in South Gujarat. The moth lays eggs on rough areas of the fruits near the peduncle. Larvae after hatching scrapped the skin of the fruit or young nut and then bore into an immature apple as well as nuts and feeds on inner content. The damage was more frequent where two or more fruits touched each other. By considering the importance of this pest in cashew, there is need of further studies on its biology, seasonal incidence, natural enemies and management practices in Gujarat.

Keywords: *Citripestis eutraphera,* cashew, apple and nut borer

Cashew (*Anacardium occidentale*) is an important plantation crop with high export potential in India. Presently cashew is cultivated in 17 states of the country. The total area under cashew cultivation is 11.92 lakh ha with production of 7.81 lakh tonnes. In Gujarat area under cashew is 11.84 thousand ha with production of 7.01 thousand MT and 802 kg/ha productivity (Femina, 2024). The successful cultivation of cashew is constrained by number of biotic and abiotic factors. Among biotic factors, more than 190 species of insect and mite pests have been listed on cashew occurring in different cashew growing countries of the world (Sundararaju, 1984).

Invasive Alien Species (IAS) poses a serious threat to the vegetation of the area being invaded. They proliferate very quickly away from their native land probably due to the abundance of food and/or absence of a natural enemy they had in their native land. The mango fruit borer, *Citripestis eutraphera* is one of the IAS, which was earlier confined to Andaman Islands. According to records, *C. eutraphera,* described by Edward Meyrick in 1933 and was found restricted to the Andaman Islands on local endemic mango species, *Mangifera andamanica* L. belonging to the family Anacardiaceae (Bhumannavar, 1991). Later, Jacob *et al*. (2004) reported that *C. eutraphera* also became a major pest on cashew in the Andaman Islands. This borer was probably restricted to these Islands for almost 23 years until 2014 when it was reported from mainland India by Jayanthi *et al.* (2014) on cultivated mango species, *M. indica.* This species recently invaded and spread to mainland India and infested mango in Karnataka, Tamil Nadu, Kerala, Gujarat, parts of Maharashtra and Odisha (Krull, 2004; Jayanthi *et al.,* 2014; Hiremath *et al*., 2017; Bana *et al.*, 2018) and recently in Punjab (Singh *et al*., 2021). It also infested seedlings and grafts of cashew, *A. occidentale* in Kerala (Hiremath *et al*., 2017). Recorded infestation levels on mango fruits ranged from 2.46% to 64.00% in India during fruiting period in the surveyed region of Karnataka and Tamil Nadu (Soumya *et al*., 2016; Jayanthhi *et al.,* 2014).

Recently, the mango fruit borer, *C. eutraphera* became a pest on cashew as apple and nut borer in Gujarat. Mango is the main fruit crop of South Gujarat. The infestation of *C. eutraphera* was reported in Gujarat, where it caused significant damage in mango (Bana *et al*., 2018) and became a major pest. Now, *C. eutraphera* preferred cashew as additional host in South Gujarat ecosystem. The moth lays eggs (less than 1 mm in diameter) on rough areas of the fruits (Fig. B) and near the pedicels which was white in colour when first laid but change to red (Fig. A). Moreover the eggs were also observed near the attachment of apple and nut. The full grown larva measured about 20 mm in length (Fig. D). Pre-pupa observed light green in colour (Fig. E). Larvae pupate either in soil in form of earthen cocoon (Fig. G) or in fallen fruit (Fig. F). The site of pupation in soil was confirmed by laboratory rearing of infested fruit (Fig. W). Forewing of *C.eutraphera* was ground colour yellowish-grey, veins black scaled, with creamy white scales, with rusty red, cream, black fringe; hind wing ground colour dirty white with black scaling along veins anal area less black veined scales but with long dark, white hairs (Fig. H, I).

The nature of damage of the larvae of *C. eutraphera* was studied in respect to its feeding habit both under field and laboratory condition. Larvae after hatching scrapped the skin of the apple (Fig. C) and then bore an

immature apple as well as nuts (Fig. M, N), and feeds on internal content of apple (Fig. K) as well as on young developing nuts. Mostly the damage was seen at the attachment of apple and nut whereinlarva made entry by tunnelling along the jointed parts of the fruit (Fig. L). Larva completely devoured inner content of nut (Fig. S, T). Larva also entered from pedicel (Fig. P). The damage was more frequent where two or more fruits touched each other (Fig. O).

The infested apple and nuts become partially unfilled and dries up before full development and maturity of nuts. In infested fruits, bored holes filled with frass (Fig. M, N)and found blackened around the bored area (Fig. V).Generally 1 to 3 caterpillars were seen feeding either in the apple or nut, but there are reports stating that up to five larvae can occur in cashew apples and three in developing nuts. The exit hole allows ants, beetles, and occasionally microorganisms to enter the fruits and becomes rotted (Fig. U). Therefore, the damage caused by *C. eutraphera* in cashew caused a total loss of apple and nut quality and also made loss of seed germination.

Recently Kori Nagaraj *et al*. (2022) reported *C. eutraphera* as apple and nut borer in cashew, in maidan parts of Karnataka, India wherein they reported the extent of damage ranges from 10 to 16 percent on developing young cashew apples. According to them the moth lays eggs on tender vegetative shoots of cashew and after hatching the neonate larva initially bores into the terminal tender shoots, and seedlings/grafts in nursery. The larva damages vascular bundles inside the tender

Fig. A to W. A-Eggs (microscopic view), **B**-Eggs laid on rough surface;**C**-Early instar larva; **D**-Mature larva; **E**-Pre-pupa; **F**-Pupa; **G**- Earthen cocoon; **H**- Adult in resting stage; **I**- Adult (wing spanned); **J,K**- Damage in mature fruit (apple); **L**- Infestation mostly mostly observed at the point of attachment of apple and nut; **M-N** Bored holes filled with frass; **O**- Infestation at jointed fruit; **P**- infestation near peduncle; **Q**-Bored hole seen in mature nut; **R**- Larva tunneling in mature nut; **S**- Cross section of damaged nut; with larva inside; **T**- Cross section of healthy and damaged mature nut; **U**- Infested mature apple showed subsequent rotting; **V**- Blackened portion observed around the bored/scrapped area; **W**-Laboratory rearing of larvae.

shoots by excessive tunneling, throwing frass material and their excreta from the bored holes. This affects uptake of water and nutrient to upper terminal canopy, resulting in yellowing, drying of leaves and wilting of terminal shoots. The peak infestation of *C. eutraphera* as apple and nut borer of cashew was found during February to May, which coincides with apple and nut formation stage. These observations are in agreement with the findings of Kori Nagaraj *et al*. (2020), who reported that peak infestation of apple and nut borer, *C. eutraphera* was during peak summer months in Bangalore condition and also in maidan parts of Karnataka (Aswathanarayana Reddy *et al*., 2016). By considering the importance of this pest in cashew, there is need of further studies on its biology, seasonal incidence, natural enemies and management practices in Gujarat.

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