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Hadda Beetle: A Potential Devastator in Brinjal

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Abstract

Vegetables constitute an essential diet component for balanced nutrition. Brinjal is the principal vegetable crop originated from India, possessing wide range of medicinal properties. In India about 12.68 million MT of brinjal is produced annually and ranks second position in global trade. Lady beetles are well known for their role as predator of aphids, mealy bugs and other insect pests. However, there is one group of lady bird beetles which is feeding on brinjal rather than predator. These are hadda beetles belongs to the genus Epilachna with many species under the genus *viz., Henosepilachna vigintioctopunctata, E. dodecastigma, E. chrysomelina, E. similis, E. fluvosignata, E. sparsa* and *E. varivesta.* The grubs and adults cause injury to the plant by scraping lower epidermis leaving behind the uneaten veins showing characteristic skeletonized symptom. The damage can be reduced by proper monitoring, adoption of various integrated management strategies.

Introduction

Brinjal, *Solanum melongena* L. is considered as "King of vegetables" and also a staple protective vegetable food supplement in many countries. It is denoted in various names *viz*., eggplant, aubergine (French), begun (Bengali), badana (Kannada), vange (Marathi), kathiri (Tamil), baingan (Hindi) *etc*. *Solanum melongena* L. is amongst the top ten vegetable crops all over the world. India is the one among leading brinjal producing countries. The major brinjal producing states in India are Tamil Nadu, Orissa, Bihar, Karnataka, West Bengal, Andhra Pradesh, Karnataka and Uttar Pradesh. Owing to its low calorific value and high content of vitamins, minerals and other bioactive compounds needed for human health, it is highly preferred for consumption. Warm weather condition is well suited for its cultivation. Brinjal crop is maintained up to 140-150 days in field condition; hence it is subjected to the attack of wondrous number of insect and non-insect pests than other vegetables which results in uneconomical yield and quality. In India, more than 70 species of insect pests have been reported in brinjal crop. Hadda beetle, *Henosepilachna vigintioctopunctata* Fab. (Coleoptera: Coccinellidae) is one of the potential insect infesting brinjal crop. Besides brinjal, this beetle also breeds on other crops *viz*., potato, tomato, bitter gourd, pumpkin, nightshades, trumpet flower, tobacco *etc*. (Aola M. Richards, 1983). There are many species under the genus *viz., Henosepilachna vigintioctopunctata, E. dodecastigma, E. chrysomelina, E. similis, E. fluvosignata, E. sparsa* and *E. varivesta* which act as defoliators. In view of the lucrative returns from brinjal, farmers with limited land holding and resources they are forced to follow monoculture and intensive cultivation, which also exacerbates the survival of hadda beetle throughout the year. In this condition, the adequate knowledge on life stages,

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nature of damage as well as effect of favorable ecological conditions on its development are the preliminary pre-requisites to manage this beetle in effective way. This article provides information on the distribution, biology, damage symptoms and management tactics of hadda beetle.

Distribution

H. vigintioctopunctata is native of southeastern Asia primarily India, but has been accidentally introduced to other parts of the world, including Australia and New Zealand. It has also been recorded from Brazil and Argentina, beginning in 1996. In recent days, Epilachna beetle, *H. vigintioctopunctata* is concerned as the notorious insect pest that drastically reduces the yield of brinjal. At first this insect was originated in the far east of Russia and in late 20th century extended its range across many geographical regions. From 1890 onwards the records on epilachna beetle damage were found in eastern Australia. Epilachna species is very well distributed over India, Pakistan, Sri Lanka, Taiwan, Thailand, China, Japan, Southeast Asia, Sumatra, Bangladesh, East Indies, Northern Korea, Australia and United states (Figure 1). According to FAO data, brinjal is cultivated under 7,27,000 ha of land area with an annual production of 12.68 million MT with productivity of 17.44 MT/ha in India during the year 2019. This pest is more prevalent in 20 states across India including Tamil Nadu and also wide spread in Andaman and Nicobar Islands.

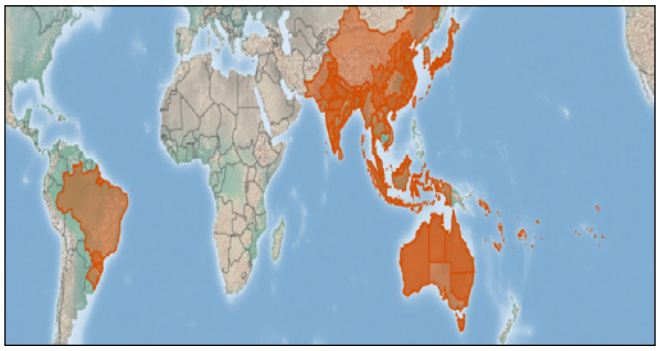

Figure 1: Hadda beetle distribution (Source: CABI, 2021)

Biology

The knowledge on life cycle of insects is the basic need to diagnose the different stages of insects. With this understanding, farmers can able to handle the pest by adopting various management tactics. The adult insects are brownish yellow to dark brown hemispherical, ranges about 5-8 mm long, head is partly hidden beneath the pronotum (neck). The adult is orange-red or brownish-yellow in colour and the body is covered with very few golden hairs (Figure 2). Each elytra (wing) is marked with 6 black spots in *H. dodecastigma* and 14 black spots in *H. vigintioctopunctata* of variable size and shape but the pair of spots by the midline of the second and fourth transverse rows may join together.

Figure 2: Adult beetle

Adults are strong fliers, due to their brilliant coloration it can easily be located on plants; usually female is bigger in size than males. The adult gravid female lays 200-370 elongated, pale-yellow to orange colour eggs in 4-6 clusters on the lower surface of leaves. In each cluster, average of 20-50 eggs are present. One adult female can able to lay maximum of 1400 eggs during its lifespan. Egg period ranges from 5 to 11 days. Newly hatched grubs are soft bodied, pale yellow in colour and covered with six longitudinal rows of stout branched spines on the back and sides. The body remains yellow and the tergites, tubercules, setae and legs become dark grey. Newly hatched grubs are gregarious in nature and later are non-gregarious. Grub undergoes four moultings grows to a length of 6-7 mm and become pupa within duration of 9-18 days. Pre-pupal period and pupal period lasts for 1-3 days and 3-5 days, respectively. The spiny skin of last larval instar sticks on the underside of leaves intact to the base of the pupa and undergoes pupation (Tara and Sonia, 2017). Pupation generally takes place on the upper parts of the shoots or lower surface of the leaves. Pupa is pale to dark yellow in colour with spines on the posterior end and is spineless in anterior end and its shape and size is similar to that of adults. Adults can survive up to 30-60 days. The pest complete 5-7 generations in one year preferably starting from March to October of every year (Figure 3).

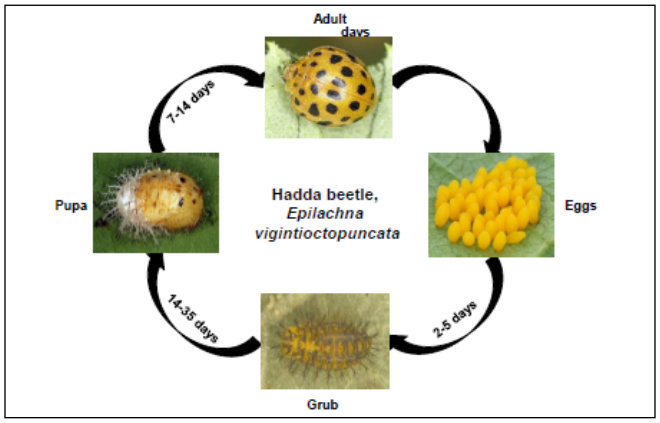

Figure 3: Life cycle of hadda beetle

Symptomology

The expression of feeding injury may differ between insect pests based on its feeding behaviour. From the damage symptoms, one can identify the presence of insect pest and its status of attack range. Hadda beetle grubs and adults are voracious feeders and highly destructive from transplanting to harvest by feeding the soft outer leaf tissues. Grubs usually congregates on the lower surface of the leaves and scrapes the parenchymatous tissue and lower epidermis leaving the upper epidermis intact and leaving "windows" in the leaves (Figure 4). Leaf tissue is eaten between the veins, sometimes being completely stripped to the midrib. When the leaf area completely damaged automatically it affects the photosynthesis. This affects the production of energy for plant growth and development and results weaker plants and delayed flower/ fruit setting. Plants compensates for loss of leaf area by producing new leaves, when it is young. But, severe defoliation may lead serious delay in fruit formation or death of the plant. Subsequently, the scrapped leaves dry up. In case of severe infestation, growth of the plant, formation and maturation of the fruit is hindered and finally it implicates on the reduction in yield.

Figure 4: Scraping of leaf tissues

Management

• Intervening should be done during early crop period as it is prime requisites to keep hadda beetle at below threshold level and to maintain ecological balance.

• The yield loss caused by the insect pest can be effectively lowered by proper monitoring and practicing of pest management in integrated way. Moreover, this is advantageous to keep the pest below threshold leveland to maintain ecological balance.

• Removal of plant debris from a previous crop and maintenance of crop hygiene completely reduce the overwintering beetle population, moreover it may reduce early attack of new crop.

• Growing of resistant varieties like VRM 1, Pusa purple round, Pusa purple cluster and Black beauty will significantly bring down the pest and provide acceptable yield. The resistant varieties may vary region to region. Hence, details on the regional resistant varieties may be obtained from concerned State Universities or Agricultural Departments before planting.

• Application of neem cake @ 250 kg/ha (in 2 splits) in soil along the plant rows at 25 and 60 days after transplantation to confer general resistance to the crop.

• Spraying of freshly prepared neem cake extract @ 5% or neem oil @ 2% is helpful in reducing the beetle infestation.

• Proper and periodical thorough irrigation is required to keep the plants healthy and to minimize population levels.

• Collection and destruction of infested leaves, grubs, pupae and adult beetle can help to lowers the beetle incidence.

• Regular shaking of plants is done to dislodge grubs, pupae, adults and the felled stages of insects are destructed by using kerosenated water in the early morning.

• Erection of bird perches @ 10 /acre to facilitate the visits of predatory birds.

• Removal of alternate host plants like *Solanum nigrum* helps to reduce the major attack in main crop.

• Conservation of larval-pupal endo-parasitoid, *Pediobius foveolatus* and *Chrysocharis johnsoni* (Eulophidae: Hymenoptera) can check the rise of insect population, it preferably attacks the late instar larvae and pupae.

• Conservation of the predatory pentatomid bug, *Eocanthecona furcellata* and reduviid bug, *Rhinocoris fuscipes* can suppress the population of hadda beetle effectively at grub stage.

• Spraying of *Metarhizium anisopliae* (1×10^8 cfu/g) and neem based insecticide; Azadirachtin 10000 ppm @ 3 ml/l of water also protects the crop from this beetle damage.

• Keeping the beetle population below Economic Threshold Level *i.e.* average population including grubs or pupae @ 2 per leaf.

• Relaying upon insecticides is not a sole solution for the management of emergence and multiplication of insect pests. Management measures should be taken when the pest population crosses Economic Threshold Level (ETL).

• When hadda beetle crosses ETL, it is effectively managed by need based spraying of any one of the following chemical can be used:

✓ Chlorantraniliprole 18.5 SC @ 150 ml/ha
✓ Thiacloprid 21.7 SC @ 2 g/lit. of water
✓ Emamectin benzoate 5 SG @ 4 g/ 10 lit. of water

✓ Thiodicarb 75 WP @ 2 g/lit. of water
✓ Malathion 50 EC (2 ml/l of water)
✓ Quinalphos 25 EC (2 ml/l of water)
• Do not apply any synthetic insecticides just before harvest.

Conclusion

Most of the brinjal growers faces scandalous hadda beetle issues from planting to harvest. Learning about life style of beetle, developing field skills to assess the nature of damage logically paves way to overcome this beetle menace in brinjal; without using the synthetic chemical pesticides as a first remedy. Timely assessment is an essential step in planning and execution of primary integrated components like cultural, mechanical and biological tools, rather than direct dependence of precarious chemicals for the effective management of hadda beetle and pursuing a healthy, protective brinjal crop with productive yield.

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