EPILACHNA DODECASTIGMA (COLEOPTERA : COCCINELLIDAE) - A NOTORIOUS PEST OF RIBBED GOURD, LUFFA ACUTANGULA (L.)

J. N. Tiwari and R. K. Yadava
Department of Zoology, T.D. College, Jaunpur - 222 002, India.

(accepted 22 December 2007)

ABSTRACT – Host selection of Epilachna dodecastigma was surveyed in locality of Jaunpur, eastern part of U.P. The adult beetle is polyphagous and feeds mainly on the leaves and flowers of Luffa acutangula L. (Cucurbitaceae: Cucurbitales: Dicotyledon). The beetle feeds the parenchyma of leaves from the underside, leaving the upper epidermis intact. This gives the leaf a lacy 'skeletonized' appearance. The larvae (grubs) also eat the leaves and do much more damage than the adult beetles.

Key words: Epilachna dodecastigma, Luffa acutangula, longevity feeding stimulant, cucurbitacin.

INTRODUCTION

Scientific classification

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Animalia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phylum</td>
<td>Arthropoda</td>
</tr>
<tr>
<td>Class</td>
<td>Insecta</td>
</tr>
<tr>
<td>Order</td>
<td>Coleoptera</td>
</tr>
<tr>
<td>Family</td>
<td>Coccinellidae</td>
</tr>
<tr>
<td>Subfamily</td>
<td>Epilachniniae</td>
</tr>
<tr>
<td>Genus</td>
<td>Epilachna</td>
</tr>
<tr>
<td>Species</td>
<td>dodecastigma</td>
</tr>
<tr>
<td>Binomial name</td>
<td>Epilachna dodecastigma Mulsant</td>
</tr>
</tbody>
</table>

dioica, Cucurbita moschata, Lagenaria cisciraria and Luffa acutangula and thereby causing serious economic loss to the farmers and to the government exchequers. Shukla and Upadhyay (1985) have observed in tarai belt, Gorakhpur that the preferred food of this pest is leaf and flower of Luffa cyindrica.

MATERIALS AND METHODS

E. dodecastigma is a polyphagous notorious pest of cucurbitaceous vegetable crops in our locality, Jaunpur. During survey of incidence of this pest, we have found that the beetle was in maximum population on the crops of L. acutangula. For the study purpose, beetles were collected from vegetable fields situated nearby T.D. College agriculture farms. E. dodecastigma was kept in wooden cages (30 x 30 x 45 cm.) having fine meshed wire gauge from all sides. Fresh and moistened leaves of L. acutangula were daily provided for feeding. The beetle culture was maintained at 23 ± 1°C, 75-80 per cent relative humidity and 16 L-8D photoperiod.

The beetle lays eggs on Luffa acutangula leaves and the laid eggs were transferred regularly from the leaves in petridishes with the help of camel hair brush. The petridishes containing eggs were covered by a small piece of a glass plate. In the petridishes, fresh leaves were introduced at alternate days. This manifestation was continued till the pupation.

The newly formed pupae which were present on the Luffa acutangula. Leaves were gently transferred and kept in another wooden cage approximately in the batch of 55-60 pupae. After the termination of pupal period, the imago cracks and the newly emerged beetles were transferred in other separate cage for mating and egg laying.
RESULTS AND DISCUSSION

*E. dodecastigma* is a notorious polyphagous pest damaging important cucurbitaceous vegetable crops viz. *Luffa acutangula*, *L. cylindrica*, *Trichosanthes dioica*, *Cucurbita moschata* and *Lagenaria siceraria* and thereby causing serious economic loss to the farmers and to the government exchequers. Shukla and Upadhyay (1985) have observed that the preferred food of this pest is the leaf and flower of *L. cylindrica*. Contrary to this, we have observed that this beetle prefers leaves and flowers of *Luffa acutangula*. Hirano (1960), Hsiao (1985), Fujiyama and Kataoka (2002), Fujiyama *et al* (2003) and Noubijski *et al* (2004) have described about the food preference and host plant selection in a phytocaphagous lady beetle, *Epilachna vigintioctomaculata*. They reported that the beetle feeds mainly on potato, *Solanum tuberosum* leaves. The methanol extracts of potato leaves show feeding stimulative effects on the adult of the beetle. The feeding stimulants were isolated and identified as methyl linolenate. Although methyl linolenate alone was inactive, it acted synergistically with sugars. Methyl linolenate maximized the feeding activity of sugars at the concentration contained in the potato leaves. It is suggested that methyl linolenate plays an important role in the host selection of *E. vigintioctomaculata*. They further reported that in host plant selection by phytocaphagous insects, the chemical and physical properties of plants are important. In particular, gustatory and olfactory response by herbivorous insects to plant chemicals are considered to be important factors when finding and accepting a plant host. Linamarin, Lotastrin and Phaseolunatin were feeding stimulants of *E. variivestis* (Nayer
and Frenkle, 1963). Cucurbitacins contained specifically in cucurbitaceous plants, acted as feeding stimulants for *E. admirabilis*, *E. bioisduvali*, *E. vingtiocopunctata* and *E. vingtiocotomaculata* (Abe and Matsuda, 2000). *E. vingtiocotomaculata* is one of the solanaceous lady beetles, is known to be noxious insect for potato plants, *Solanum tuberassum*. Until the present, only ‘Cucurbitacin’, contained specifically in cucurbitaceous plants have been reported as feeding stimulants for the beetle. However, except for one cucurbitaceous plant, *Scirpopecon bryoniaefolius* (Katakura, 1975), host plants of *E. vingtiocotomaculata* are primarily restricted to solanaceous plants. Therefore, other substances in solanaceous plants should stimulate the feeding of the beetle.

Richards and Filewood (1990) reported that leaves and fruits are preferred by *E. vingtiocotopuctata*. Flowers especially pollens are preferred by *E. cucurbitae*. According to them, food preference is influenced by odour, taste, vision, and age of the plant. It is also influenced by thickness of leaves and the proportion of cutefibres, parenchymatous tissue and water content present.

The beetle *Epilachna dodecastigma* eats the leaves of *L. acutangula*. This cucurbitaceous vegetable crop *L. acutangula* may have also “cucurbitacin” compound due to which it is attracted more towards the leaves and flowers of this crop. *E. dodecastigma* eats the tender parenchyma of the leaves from the underside, leaving the upper epidermis intact. This gives the leaf a lacy, “skeletonized” appearance (fig. 1). The tissue that remains, gives the leaf a ‘lacy appearance’. Damaged tissue of the leaves will die and turn brown due to which plants become weaker and yield is retarded. The larvae also eat the leaves and they do much more damage than the adults.

The adult beetle is oval in shape, orange in colour, bearing 12 black spots on the dorsal surface of the body (on both elytra) and 8.0 millimeters long. Roberts and Guillebeau (2007) have observed the structure of mexican bean beetle, *E. varivestis* Muls. and have reported that this beetle is also oval in shape and orange to copper-coloured with 16 black spots on the dorsal side (both elytra) of the body.

*Epilachna dodecastigma* survives for about 37 ± 2 days. The body size of the female is larger than the male. Adult females and males start copulation on day 4 after emergence. They copulate many times during sexual life as has been observed during culture maintenance in the laboratory. Copulation period lasts for about 5 to 30 minutes. First batch of eggs are laid after 3 days after the start of copulation.

Total eggs laid by female is about 390 ± 5. The eggs are yellowish about 1.4 millimeter in length and glued in clusters of upto 70-75 on the under side of the leaves. The eggs hatch and the larvae (grubs) emerge. The fully developed larvae are usually yellow, spiny, approximately 26 rows in both sides of the body and pill-shaped (see fig. 1). Similar findings have been reported in *Epilachna varivestis* by Roberts and Guillebeau (2007). Each larva is approximately 1.5 millimeter in length when first emerge and grows upto 1.0 cm. long before pupation. During maintenance of the culture in the laboratory, we have observed that the full grown larva attaches its anal segment to the under side of the leaf and hangs there to pupate.

**REFERENCES**


