STUDIES ON LIFE CYCLE AND POPULATION STRUCTURE OF JUTE SEMILOOPER (ANOMIS SABULIFERA GUENEE, LEPIDOPTERA, NOCTUIDAE) ON TOSA JUTE (CORCHORUS OLITORIUS L.) IN THE DISTRICT OF BARPETA, ASSAM, INDIA

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INTRODUCTION
Tosa jute (Corchorus olitorius L) is commonly culture by the farmers of Barpeta district. Jute Semilooper (Anomis sabulifera Guenee, Lepidoptera, Noctuidae) an insect pest causes heavy damage to this crop. Repeated damage by the pest Jute semilooper checks crop growth and induces profuse branching, resulting in ultimate reduction in fiber yield (Tripathi and Bhattacharya, 1963). The pods and unripe seeds are also being damaged by A. sabulifera, and the extent of damage varied between 30.50 and 37.50 per cent on important ruling varieties of C. olitorius (Singh and Das, 1979). Caterpillar of jute semilooper (Anomis sabulifera) is a major threat to jute crop (Dutta, 1958). Thus to control this pest farmers commonly use hazardous chemical pesticides. In nature numbers of biological agents are working as good controller of this devastator. These agents can be used efficiently for biological control of this pest (Awasthi, 2007). Hence the present work is aimed at to study the life cycle, population density, generations and agents of biological control of these insect pests.

MATERIALS AND METHODS
A plot of 4 Bigha Jute crop at Kalgachia was selected for population, generation and life cycle study during the year 2009. Population was counted through random sampling by using a 1 Sqm thread block at 10 different spots. Life cycle was studied both in field and laboratory conditions. 3 meter x 2.5 meter x 2 meters Nylon net fitted with wooden frame was used for study of life cycle in laboratory. Jute plants were kept in a water full bottle covered by nylon net to feed the larvae. Plants were identified by following Kanjilal (1997) and Gupta (1989). Insects were identified by following Lefroy (1978), Kumar and Nigam (1997) and Shukla and Upadhyay (2000). For identification of birds, book of Ali (2002) and Ali and Ripley (1989) were followed.

RESULTS AND DISCUSSION
Life cycle: Life cycle of this moth includes egg, 5- larval stages, pupa and adult. The fecundity of a healthy gravid mother is found to be 165 eggs. Eggs are laid singly on under leaf blades of the host plants. Structure and duration variations of different developmental stages of jute semilooper have shown in Table 1.

Population density: The population density of different larval stages of Anomis sabulifera Guenee on Corchorus olitorius L. has shown in Table 2.

Generation duration: There are six overlapping generations found during the study period. The generation durations of the Jute semilooper with periods have shown in the Table 3.

ABSTRACT
Jute Semilooper (Anomis sabulifera Guenee, Lepidoptera, Noctuidae) is a serious pest of Tosa Jute (Corchorus olitorius L.). Adults are gray moths with dark patches on fore wings and a pale gray margin at the tip. Pale cream colored eggs are laid under the leaves singly. Length of first instar and matured larva is 0.75 cm and 4.2 cm respectively. First instar larva is pale cream in color which, changes to pale green in second instar. Third, fourth and fifth instar larvae develop dark irregular patches on dorsal and lateral sides. Average larval duration is 17 days. During summer season, life cycle is completed within 21 - 30 days. Mature larvae pupate on leaves and stems of host plants and under the soil. In winter, pupa enters in diapauses. They complete 6 consecutive overlapping generations in a year. Niche competition with Bihar hairy caterpillar (Diacrisia oblique Walk) exerts pressure and reduces the population density of this insect. During peak season average density is 30 larvae per square. 3 Lepidoptera, 2 Pentatomid bugs and 1 Coleoptera share niche with Jute semilooper. 5 ants, 1 Pentatomid bug and 6 bird species efficiently predates on this insect pest.
Corchorus capsularis is Desi jute (B.

Table 1: Structure and duration variation of developmental stages of Anomis sabulifera guenee on Tosa jute (Corchorus olitorius L.)

<table>
<thead>
<tr>
<th>Stages</th>
<th>Size in cm</th>
<th>Duration in days</th>
<th>Average Duration</th>
<th>Color</th>
<th>Structural peculiarities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egg</td>
<td>0.04 x 0.025</td>
<td>2-5</td>
<td>3.25</td>
<td>Pale cream</td>
<td>Oval shaped</td>
</tr>
<tr>
<td>L1</td>
<td>0.75 x 0.07</td>
<td>2-3</td>
<td>2.75</td>
<td>Pale cream yellow</td>
<td>Transparent</td>
</tr>
<tr>
<td>L2</td>
<td>1.50 x 0.13</td>
<td>2.5-3.5</td>
<td>3.25</td>
<td>Pale cream yellow</td>
<td>Transparent</td>
</tr>
<tr>
<td>L3</td>
<td>2.5 x 0.15</td>
<td>2.9-3.75</td>
<td>3.3</td>
<td>Greenish with or without black stripes dorsally</td>
<td>Color mimic</td>
</tr>
<tr>
<td>L4</td>
<td>3.25 x 0.28</td>
<td>3.1-4.2</td>
<td>3.6</td>
<td>Deep green with or without black stripes dorsally</td>
<td>Color mimic</td>
</tr>
<tr>
<td>L5</td>
<td>4.20 x 0.30</td>
<td>3.5-4.5</td>
<td>4.0</td>
<td>Deep green with or without black stripes dorsally</td>
<td>Color mimic</td>
</tr>
<tr>
<td>Pupa</td>
<td>2.50 x 1.75</td>
<td>5-7</td>
<td>6.0</td>
<td>Dark brown</td>
<td>Conical</td>
</tr>
<tr>
<td>Adult</td>
<td>Ws 4.50</td>
<td>-</td>
<td>-</td>
<td>Deep gray with pale margin of fore wing</td>
<td>Abdomen conical, pointed tip</td>
</tr>
<tr>
<td>Female</td>
<td>Ws 4.60</td>
<td>-</td>
<td>-</td>
<td>Deep gray with pale margin of fore wing</td>
<td>Abdomen conical, blunt tip</td>
</tr>
</tbody>
</table>

N.B: Ws-Wing span, L-Larval stage.

Table 2: Population density/ Square meter of different larval stages of Anomis sabulifera Guenee on Corchorus olitorius L.

<table>
<thead>
<tr>
<th>Generations</th>
<th>1st Instar</th>
<th>2nd Instar</th>
<th>3rd Instar</th>
<th>4th Instar</th>
<th>5th Instar</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation 1</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Generation 2</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Generation 3</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>18</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>Generation 4</td>
<td>8</td>
<td>10</td>
<td>7</td>
<td>5</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Generation 5</td>
<td>10</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Generation 6</td>
<td>8</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Generation durations of Jute Semilooper

<table>
<thead>
<tr>
<th>Generations</th>
<th>Period</th>
<th>Duration in days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation 1</td>
<td>10th April – 6th May &amp; 20th April – 19th May</td>
<td>26-30</td>
</tr>
<tr>
<td>Generation 2</td>
<td>9th May- 22nd May</td>
<td>30-29</td>
</tr>
<tr>
<td>Generation 3</td>
<td>15th June – 16th July &amp; 25th June – 24th July</td>
<td>31-30</td>
</tr>
<tr>
<td>Generation 5</td>
<td>17th August – 10th Sep &amp; 4th Sep – 1st Oct</td>
<td>25-29</td>
</tr>
</tbody>
</table>

Host plants

A. Primary host plant: The only primary host plant is the Tosa jute (Corchorus olitorius, L., Tiliaceae).

B. Secondary host plant: The only secondary host plant found is Desi jute (Corchorus capsularis, L., Tiliaceae).

Associate insect pests on Tosa jute

The only other primary pest of Tosa jute plant is the Bihar hairy caterpillar (Diacrisia obliqua Wilk, Lepidoptera, Noctuidae). However, secondary insect pests are Jute weevil (Apion corchori Marshall (Coleoptera, Apionidae), Pentatomid bugs (Nezara viridula Linn. and Dolycolis indicus Stal), Caterpillars Thalassodes sp. (Lepidoptera, Geometridae) and Dasychira sp. (Lepidoptera, Lymantridae).

Agents for biological control

Insects that can efficiently control caterpillar of jute semilooper are Small domestic red ant (Dorylus orientalis Westw. (Hymenoptera, Formicidae), Black ant (Crematogaster dollyh MN), Land ant (Monomorium indicum Forel, Monomorium destructor Jerd. and Monomorium gracillimum sm.) and a beautifully colored oval shaped Pentatomid bug (Canthecona sp.).

Among birds, Red vented bul- bul (Pycnonotus cener R.), Red whiskered bulbul (Pycnonotus jocosus R.), Black headed Oriole (Oriolus xanthornus R.), Eurasian gold ore (Oriolus oriolus RML.), Jungle Myna (Acrolotheres fuscus R.), Blue throated Barbet (Megalaima asiatica R), Indian treepie (Dendrocitta vagabunda R), Common Myna (Acrolotheres tristis R), Asian pied starling (Sturnus contra R), and Common Tailor bird (Orthotomus sutorius R.) can efficiently control the caterpillars in field conditions. The house lizard can also feed efficiently the newly emerge adults as well as those attracted by light during night in houses.

DISCUSSION

Kabir SM H(2011) has carried extensive studies on jute pests and reported Jute hairy caterpillar (Spilosoma obliqua), Jute semi-looper (Anomis sabulifera), Jute stem weevil (Apion corchori), Field cricket (Brachytrephe portensious), Yellow mite (Polyphagotarsonemus latus), Indigo caterpillar (Spodoptera exigua), Black hairy caterpillar (Pericallia ricini), Cut worm (Spodoptera litura), Pod borer (Earias cupriviridis), Stick insect (Scopula emmisaria), Red mite (Ferisia pseudococcus), Jute Aphid (Apis gossypii), Termite (Macrotermes obesi), Odontotermes obesus), Stem girdler (Nupsera bicolor), Leaf beetle (Luperomorpha vittata ), Hooded hooper (Otinotus elongatus) and Leaf miner (Trachys pacifica) as important pests on Tosa jute (Corchorus olitorius L) and among these Jute hairy caterpillar (Spilosoma obliqua), Jute semilooper (Anomis sabulifera) are the serious devastator of Chorcorus olitorious. Tosa Jute (Corchorus olitorius L.), Das et al., 1999 reported Jute Semilooper (Anomis sabulifera Guenee), Stem-weevil (Apion corchori Marshall), Yellow mite (Polyphagotarsonemus latus (Banks), Hairy caterpillar (Spilosoma obliqua Walker) and the leaf eating caterpillar (Spodoptera exigua Hübner) as primary pest of Tosa jute. The Jute-semilooper has been reported to occur in all the jute-growing tracts and is the most important foliage pest of the crop (Tripathi and Ghose, 1964; Das and Singh, 1976; Singh and Das, 1979; Das, 1985). Copulation takes place after 2-3 days of adult emergence and thereafter the female lays eggs singly on ventral leaf blade of the host plant. Life cycle completes within 23-33 days depending on the seasonal variations climatic conditions, population density and inter and intra specific niche competition. Larval duration of 16.9 days is similar with the
findings of Shukla and Upadhyay 2000. Table 2 indicates that the population density of the larval stages shows ascending order from generation-1 and reached at peak in generation-4 and thereafter reduces gradually. This is due to overlapping of generations and denudation of the host plants due to competition of the associated insects on jute plants.

Table 3 indicates that \textit{Anomis sabulifera} Guenee has six overlapping generations on Tosa jute plant in a year. Duration of a generation varies from 24 – 31 days. The duration of the 4\textsuperscript{th} generation found minimum (24-29 days). The maximum duration is of 31-30 days in third generation.

**REFERENCES**


Lefroy, H.M.19780. Indian Insect Life, 4\textsuperscript{th} Indian Reprint, To day and Tomorrows Printers and Publishers, New Delhi-5: p. 786.


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