New record of *Aulacophora foveicollis* on *Clerodendrum indicum* (L.) Kuntze from North East India

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**ABSTRACT**  
*Aulacophora foveicollis*, a polyphagous pest of more than 81 plant species is known for its voracious feeding habit. Studies on occurrence and population density of this pest were carried out under field conditions at Assam Agricultural University, Jorhat. Correlation studies revealed that population density of *A. foveicollis* showed significant negative correlation with maximum temperature and significant positive correlation with evening relative humidity. Multiple regression equations were developed for *A. foveicollis* to predict their seasonal incidence under the agro climatic conditions of Jorhat.

**Key words:** *Aulacophora foveicollis*, Correlation, Multiple regression, Polyphagous, Seasonal incidence.

**INTRODUCTION**  
Out of 342 to 369 species of the genus *Clerodendrum*, *Clerodendrum indicum* (L) Kuntze, a shrub (Lamiaceae: Lamiales) is native to India having preference to sunny situation and moist soil. This particular shrub is gaining importance as well as demand because of its ethno-medical uses and anti-inflammatory, anti-rheumatism, anti-bronchitis and febrifuge properties (Shrivastava and Patel, 2007). This plant is attacked by many herbivore however *Aulacophora foveicollis* Lucas (Coleoptera: Chrysomelidae) which is a polyphagous pest of more than 81 plant species including fruit plants, is the most serious one. It feeds voraciously on different parts of the plant *viz.*, leaves, flower buds and flowers which may reach up to 35-75% at seedling stage; in some cases the losses caused by this pest have been reported to 30-100% in the field (Rashid *et al.*, 2014). It is interesting to see population build up of this pest in sub tropical humid region. Keeping in view the above mentioned points the present investigation was made an attempt to record the population build up of *A. foveicollis* on *C. indicum* and pattern of leaf damage during March to June, 2013.

**MATERIALS AND METHODS**  
**Location:** The field studies were carried out in the Herbal garden of the Department of Agronomy, Assam Agricultural University, Jorhat during January to December, 2013.

**Method of survey:** Fixed plot survey was carried out to record the pest population during January to December, 2013. The observations were made at weekly interval.

**Sampling and observations:** For sampling, five plants were selected randomly in each plot from the selected surveyed area. The populations of the pest *A. foveicollis* were assessed by visual observation and by counting the infested leaves covering top, middle and bottom canopy on randomly selected plants. The infested samples were collected separately in polythene bags and brought to the laboratory where these samples were observed under the stereo-binocular microscope for further study.

**Seasonal incidence:** Seasonal incidence of *A. foveicolis* on *C. indicum* was recorded at weekly interval by adopting plant inspection method of sampling. Data were recorded in terms of number of insects/plant.

**RESULTS AND DISCUSSION**  
*Aulacophora foveicollis* was found feeding on the leaves of *C. indicum* plants predominantly from March to June, 2013 with maximum population of 2 beetles/plant recorded in the month of May, 2013. At mature stage of the crop the adults caused damage to the leaves and tender parts by scraping the epidermal layer in a very characteristic manner leaving a netted pattern. The incidence of *A. foveicollis* resulted in complete defoliation. The pest fed on the leaves from the margin, gradually moved towards the mid rib, giving a zig zag pattern (Plate 1 and 2). During heavy infestation no leaves could be seen and even the mid ribs of the leaves were eaten up by the pest. As a result of heavy infestation the plants dried and withered up. The results are in close proximity with Saljoqi, Khan (2007) and Hassan *et al.* (2012) who reported this pest from Peshawar and Bangladesh as one of the most important constraints to cucurbit production capable of causing 30-100 per cent yield loss.

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The infestation of A. foveicollis was recorded from March to June, 2013. Data on population density of A. foveicollis are presented in Table 1. The population of A. foveicollis commenced from March, 2013 (0.04 adult/plant) till June, 2013 (0.11 adult/plant). The highest population of A. foveicollis was recorded during the month of May, 2013 with an average of 1.22 adults/plant followed by April, 2013 (0.93 adult/plant) (Table 1). The data pertaining to correlation between population density of A. foveicollis with meteorological parameters are presented in Table 2. Correlation studies during the year 2013 showed that the population density of A. foveicollis had significant (P<0.01) negative correlation with maximum temperature (r=-0.625) and bright sun shine hours (r=-0.525); whereas it showed significant (P<0.01) positive correlation with morning relative humidity (r=0.775) (Table 2). The minimum temperature (r=0.091), evening relative humidity (r=0.447), rainfall amount (r=0.043) and number of rainy days (r=0.287) showed positive correlation but had non-significant relationship with population density of A. foveicollis (Table 2). The best fit multiple regression equation was established to forecast the population density of A. foveicollis with meteorological parameters. The multiple regression analysis between population density of A. foveicollis as dependent variables (Y) and meteorological parameters viz., maximum temperature, minimum temperature, morning relative humidity, evening relative humidity, rainfall amount, number of rainy days and bright sun shine hours as independent variables are presented in Table 3. The results revealed that maximum temperature, morning relative humidity, evening relative humidity, rainfall amount, number of rainy days and bright sun shine hours determined the population density of A. Foveicollis in concert with R² = 0.804 (80.4%) and adjusted R² = 0.667 during 2013 (Table 3). The multiple regression equation Y=-7.94-8.24 x Tmax+ 0.10 x RH (mor) + 2.13 x RH (eve) - 8.39 x RF+0.18 x RD+0.12 x BSSH expressed the magnitude of the relationship during 2013.


Table 1: Population density of Aulacophora foveicollis Lucas on C. indicum (L.) Kuntze at Herbal garden during 2013

<table>
<thead>
<tr>
<th>Period</th>
<th>Adult/plant (Mean±SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>March’13</td>
<td>0.04±0.07 (0.60)</td>
</tr>
<tr>
<td>April’13</td>
<td>0.93±0.57 (1.47)</td>
</tr>
<tr>
<td>May’13</td>
<td>1.22±0.19 (1.59)</td>
</tr>
<tr>
<td>June’13</td>
<td>0.11±0.22 (0.66)</td>
</tr>
</tbody>
</table>

Data are mean of 4 observations / month taken at weekly interval from 5 randomly selected plants.

Table 2: Correlation between population density of Aulacophora foveicollis Lucas and meteorological parameters during 2013

<table>
<thead>
<tr>
<th>Pest</th>
<th>Temp (°C)</th>
<th>RH (%)</th>
<th>Rainfall (mm)</th>
<th>No. of Rainy days</th>
<th>BSSH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. foveicollis</td>
<td>Max. -0.625**</td>
<td>Min. 0.091</td>
<td>Mor. 0.775**</td>
<td>Eve. 0.447</td>
<td>RD 0.043</td>
</tr>
</tbody>
</table>

**= Significant at 1%  *= Significant at 5%
Table 3: Multiple regression equation of meteorological parameters with population density of *Aulacophora foveicollis* Lucas during 2013

<table>
<thead>
<tr>
<th>Multiple regression equation</th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>F-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Y = -7.94 - 8.24^{<em>}T_{\text{max}} + 2.13^{</em>}R_{\text{H (mor)}} - 8.39^{<em>}R_{\text{F}} + 0.18^{</em>}R_{\text{D}} + 0.12^{*}B_{\text{SSS}}$</td>
<td>0.804</td>
<td>0.667</td>
<td>6.852</td>
</tr>
</tbody>
</table>

$T_{\text{max}} = $ Maximum temperature, $T_{\text{min}} = $ Minimum temperature, $R_{\text{H (mor)}} = $ Morning relative humidity, $R_{\text{H (eve)}} = $ Evening relative humidity, $R_{\text{F}} = $ Rainfall, $R_{\text{D}} = $ Number of rainy days and $B_{\text{SSS}} = $ Bright sun shine hours

(1982) reported *Aulacophora foveicollis* larvae and adults were most active at temperature between 27 to 32°C, but they were unable to survive at temperature exceeding 35.2°C on cucumber and bitter gourd. Among different species of pumpkin beetles, incidence of adult stage of red pumpkin beetle (RPB), *Aulacophora foveicollis* (Lucas) on different cucurbitaceous have been reported by various workers (Nath, 1964; Nath and Thakur, 1965). Shinde and Purohit (1978) studied the population build up of red pumpkin beetle in Madhya Pradesh and reported highest number (75 beetles/5 sweepings/week) in April. Also, Pareek and Kavadia (1986) studied the seasonal incidence of this pest at two locations in Rajasthan which revealed that the beetle appeared first in the middle of March. Correlation studies during the year 2013 showed that the population density of *A. foveicollis* Lucas had significant negative correlation with maximum temperature and bright sun shine hours; whereas it showed significant positive correlation with morning relative humidity. Khan et al. (2012) reported that the population of *A. foveicollis* increases gradually with the progress of time up to May and decreases thereafter. The highest population of red pumpkin beetle was recorded in the month of May.

REFERENCES


