GLOBAL WARMING IN RELATION TO THE OCCURRENCE OF MEDICINAL PLANT, OCIMUM BASILICUM LINN. AND ITS TINGID BUG MONANTHIA GLOBULIFERA WALKER

S.C. Dhiman1 and Pooja Bhardwaj2
1Department of Zoology, M.S. College, Saharanpur, 247001
2Department of Botany, KL DAV PG College, Roorkee.
Email: bhardwaj.pooja11@gmail.com

Ocimum basilicum belongs to family Lamaceae and is a summer, herbaceous annual plant, of tropical and warm areas, such as India, Africa and Southern Asia. The minimum temperature for the growth of sweet basil has been determined to be 10.9°C and maximum temperature is 29.1°C. Climate change is affecting medicinal and aromatic plants around the world and could ultimately lead to losses of some key species. Global warming enhance the CO2 assimilation in plant and increase the plant temperature and plant need more water and in lack of more water, the plant wilt up and get dried. Heavy shading strongly reduces total volatile oil content in fresh leaves. Monanthia globulifera, a phytophagous bug, damages this plant. Infestation of Monanthia globulifera on Ocimum basilicum lasts from April to October. Climate change increase the population of Monanthia globulifera and this bug will affect the plant for long time, which will result ultimately death of the plant.

The progressive gradual rise of the earth's surface temperature caused by green house effect is mainly responsible for changes in global climate patterns. Global warming is a complicated and multifaceted problem which is also affecting plants and insect life activities. Monanthia globulifera Walker (Heteroptera: Tingidae) is a phytosuccivorous bug. Their bodies are usually brown or black but their wings are partially transparent and lace like in architexure, hence, called as "lace wings bug". It has been observed infesting economically important medicinal plant Ocimum basilicum.

Basil is an annual herb, 2-3 ft. tall with green stem, which are square in cross section. Basil has opposite leaves, 5-10cm. long and tiny purple or white flower arranged in flattened whorls in encircle. The basil is a native of tropical Asia and is cultivated in Southern Europe, Egypt, Indonesia and California. The plant grows in full sun or hot climates, light and partial shade. The plant easily grows in kitchen garden, windowsill. Its leaves are used as a flavouring agent and preparation of chutnies. Essential oil obtaind from this plant has many medicinal potential including anthelminthic properties. Increase in earth temperature by global warming and green house effect, population of Monanthia globulifera is raising many folds which is causing extensive damage to this medicinal plant Ocimum basilicum. This bug infests the plant until the death of plant. Though on other plants inrelation to global warming a good work has been carried out1. Some researchers believe that the effect of temperature on insects largely overwhelms the effect of other enviornmental factor2 other researcher have found that moisture and CO2 effect on insects can be potentially important consideration in a global climate change setting3-5. Lower winter moulting of insects due to warmer winter temperature could be important in increasing insect population6 has been discussed.

MATERIALS AND METHODS

For recording the effect of different temperature levels and activity of adults, one week old adults were kept in hurricane glass lantern chimneys, covered at top by fine muslin cloth. A healthy plant of O. basilicum was also
placed in the chimney as food for the adults. A cotton swab dipped into distilled water was also kept into a glass vial to maintain necessary humidity. The chimney was kept in the temperature and humidity control cabinet. The data are presented in the table-1.

RESULTS AND DISCUSSION

*Monanthia globulifera* is a tiny, 3-6mm long, dorsally ventrally flattened and some what triangular insect. It has been observed infesting few plants of labiatae family such as *Ocimum basilicum, O. santum* and *Mentha arvensis* plants. The field observations showed that the *Monanthia globulifera* caused damage by sucking plant sap from soft tissue and inject watery saliva. The salivary enzyme cause wilting of the plant. During penetration it is more likely to take on intercellular path causing damage to the plant tissue in rout. After few days these leaves turns brownish and dried up and fall down. In heavy infestation, entire *Ocimum basilicum* plant appears as it has been brunt or leaf turn decolorized and punctured.

Temperature and humidity both climatic factors influence the population built up and survivality of insects. Global warming increases temperature of earth’s surface there by helping in an increase of *Monanthia globulifera* population which will affect plant growth adversely. Infestation of *Monanthia globulifera* on *Ocimum basilicum* last from April to October. Female lays their eggs inside the larger vein on lower leaf surface. The eggs hatch in about

### TABLE-1 Effect of different temperature levels on the activity of *Monanthia globulifera*

<table>
<thead>
<tr>
<th>STATUS</th>
<th>EFFECT OF DIFFERENT TEMPERATURE LEVELS (IN °C) ON THE ACTIVITY OF <em>MONANTHIA GLOBULIFERA</em></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>MALE</td>
<td>-</td>
</tr>
<tr>
<td>FEMALE</td>
<td>-</td>
</tr>
<tr>
<td>INSTARS</td>
<td></td>
</tr>
<tr>
<td>I&lt;sup&gt;st&lt;/sup&gt;</td>
<td>-</td>
</tr>
<tr>
<td>I&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>-</td>
</tr>
<tr>
<td>I&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>-</td>
</tr>
<tr>
<td>I&lt;sup&gt;th&lt;/sup&gt;</td>
<td>-</td>
</tr>
<tr>
<td>V&lt;sup&gt;th&lt;/sup&gt;</td>
<td>-</td>
</tr>
</tbody>
</table>

Inactivity= -  Less activity = +  Moderate activity = ++  High activity = +++
a week and nymph cluster together and feed on the leaf and soft stem. Each nymph shade its skin (moults) five times before the adult stage. It takes usually three to four week to complete life cycle.

The data of Table -1 clearly depict that global warming increase the temperature and decrease the time for
reproduction of *Monanthia globulifera*. Optimum temperature for maximum activity of *Monanthia globulifera* is observed 27°C to 30°C at higher temperature 35°C - 40°C. Activates decreases 40°C and above temperature leads to their death. (Plate-1) They are moderate active at 10°C to 15°C and less active at 5°C. No activity has been recorded at 0°C. The growth of sweet basil has been determined to be 10.9°C and maximum temperature is 29.1°C. The observations shows that the global warming directly influence the growth of *Ocimum basilicum* and activity of it pest *Monanthia globulifera*.

REFERENCES


