POLLEN DARERSDY AND FORAGING BEHAVIOUR OF INSECT POLLINATORS IN CORIANDER

G MADHU VANDHI, B USHARANI*, K SURESH, C RAJAMANICKAM1 AND K SUJATHA2

Department of Agricultural Entomology; 1Department of Horticulture; 2Department of Seed Science and Technology, Agricultural College and Research Institute, Tamil Nadu Agricultural University, Madurai 625104, India
*Email: ushateja@yahoo.com (corresponding author)

ABSTRACT

This study on pollinator diversity and abundance of frequent floral visitors was conducted during on coriander during rabi 2019-20 in Lalapuram village of Kallikudi block, Madurai district. Coriander flowers were observed to be visited by 25 pollinators. Among the visitors, four species were hymenopterans belonging to Apis (16%) and six from Non-Apis spp. (24%) Four belonged to Lepidoptera and Diptera (16%), three from Hemiptera and Coleoptera (12%) and one from Araneae (4%). Among all these, Apis florea was the most dominant one among Apis spp. followed by Apis cerana indica and Tetragonula iridipennis. The foraging activity and Shannon-Weiner’s diversity index (2.78) was observed to be maximum during 1000-1200 hrs.

Key words: Coriander, pollinator diversity, abundance, Apis florea, A. cerana indica, Tetragonula iridipennis, Hymenoptera, Diptera, Lepidoptera, Shannon-Wiener index, foraging

The annual, aromatic herb coriander (Coriandrum sativum L.) belonging to the family Umbelliferae/Apiaaceae is important crop among the 20 seed spices. It is used for flavouring various cuisine items and essential oil of this crop has medicinal properties (Mandal and Mandal, 2015; Pathak et al., 2011). It has protandrous, hermaphrodite flowers (Nemeth and Szekely, 2000), and these are small, pinkish white, arranged in compound umbels (Shivashankara et al., 2015). These have strong fragrance which abundantly attracts the pollinators, and a large number of pollinating agents have been recorded. Of these, the honey bee species contribute more for coriander pollination (Ranjitha et al., 2019; Khalid, 2008). In addition to this, dipterans, lepidopterans, coleopterans ae also involved in increasing seed set. Being a cross pollinated crop, the important factor is pollinating agent for increasing seed yield. The knowledge on these are meagre and hence this study.

MATERIALS AND METHODS

The study was carried out at Lalapuram village (10°02’E,78°22‘N) of Kallikudi block, Madurai district. Local coriander variety was sown during November (rabi, 2019-20). The field with an area of 25 cents was kept free from chemical sprays throughout the flowering period. To study the pollinator fauna, visual counting of insects visiting flowers was done by randomly selecting sampling spots of 1m². The relative abundance of pollinators was calculated by visual counting of insect pollinators for five minutes in each sampling spots with five replications and counting was repeated at 0600 - 0800, 0800 - 1000, 1000 - 1200, 1200 - 1400, 1400 - 1600 and 1600 – 1800 hr of the day. The same observations were repeated at four days interval for four times at different floral densities. During observations, pollinators visiting the crop were collected, preserved in 70% ethanol and identified with available taxonomic keys. Calculation of diversity indices, species richness was done with Shannon-Weiner diversity ‘H’ index (Ghanshyam Kachhawa et al., 2020).

RESULTS AND DISCUSSION

A total of 25 flower visitors were found on coriander crop. Among the 25 pollinators visited, the order Hymenoptera with 10 species contributed maximum share followed by Diptera and Lepidoptera. While considering abundance, Hymenoptera shared a maximum of 40% (Apis spp.- 16% and non- Apis spp.- 24%), Diptera and Lepidoptera with 16% share, Coleoptera and Hemiptera with 12% share and Araneae with least share of 4% (Table 1). In order Hymenoptera, Apidae was the dominant family with four species. The study on foraging activity of major pollinators revealed that three species of Apis hymenopterans and two species of non Apis hymenopterans frequently visited the flowers. These were followed by the dipterans with...
three species. Chaudhary and Singh (2006) reported 34 species of flower visiting species on coriander with 18 families and 8 orders; these observed that the dipterans were more active than hymenopterans. Bhowmik et al. (2017) reported *Apis* spp. (66%) as the more abundant followed by dipterans (29%) and coleopterans (5%). The most abundant species among Hymenoptera was *A. florea* (2.60- 19.20/ m²/ 5min.) followed by *A. cerana indica* (2.80- 17.80/ m²/ 5min). The abundance of *A. florea* and *A. cerana indica* was maximum during 25% flowering (Table 2).

The study conducted by Ranjitha et al. (2019) also proves that the pollinator abundance was more during 25% flowering. *Apis florea* was the abundant pollinator among all the recorded frequent floral visitors. Sharma and Meena (2019) observed that *A. florea* was the most dominating species (34.1%) in semi arid region of Rajasthan. The peak abundance was observed during 10.00- 12.00 hr. The next abundant species were *A. cerana indica*, *T. iridipennis*, *Halictus sp.*, *Nomia* sp., *Syrphus ribesii*, *Cylindromyia* sp., *Pieris brassicae*, *Episyrphus balteatus* and *Rhynocoris fuscipes*. According to Painkra (2018), *A. cerana indica* was the dominant one. Considering all the pollinators maximum activity was found during 1000- 1200 hrs and least during 0600- 0800 hrs. Shannon-Weiner diversity ‘H’ index during 0600- 0800, 0800- 1000, 1000- 1200, 1200- 1400, 1400- 1600 and 1600- 1800hrs was found to be 2.12, 2.32, 2.78, 2.54, 2.49 and 1.94, respectively. These results agree with those of Yogapriya et al. (2019) where the Shannon’s diversity index was maximum during 1000- 1200 hr.

### Table 1. Pollinator fauna recorded on coriander during 2019- 20

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Pollinators</th>
<th>Family</th>
<th>Order</th>
<th>Abundance %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><em>Apis cerana indica</em> L. F.</td>
<td>Apidae</td>
<td><em>Apis-</em></td>
<td>24</td>
</tr>
<tr>
<td>2.</td>
<td><em>Apis florea</em> F.</td>
<td>Apidae</td>
<td>Hymenoptera</td>
<td>16</td>
</tr>
<tr>
<td>3.</td>
<td><em>Andrena</em> sp.</td>
<td>Apidae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td><em>Tetragonula iridipennis</em> F.</td>
<td>Apidae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td><em>Halictus</em> sp.</td>
<td>Halictidae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td><em>Nomia</em> sp.</td>
<td>Halictidae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td><em>Chrysis</em> sp.</td>
<td>Chrysididae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td><em>Paranicistocerus fulvipes</em></td>
<td>Vespidae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td><em>Monomorium pharaonis</em> L. F.</td>
<td>Formicidae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td><em>Camponotus</em> sp.</td>
<td>Formicidae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td><em>Agonoscelis nubilis</em> F.</td>
<td>Pentatomidae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td><em>Ryhorcoris fuscipes</em> F.</td>
<td>Reduviidae</td>
<td>Hemiptera</td>
<td>12</td>
</tr>
<tr>
<td>13.</td>
<td><em>Geocoris</em> sp.</td>
<td>Geocoridae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td><em>Cylindromyia</em> sp.</td>
<td>Tachinidae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td><em>Musca domestica</em> L.</td>
<td>Muscidae</td>
<td>Diptera</td>
<td>16</td>
</tr>
<tr>
<td>16.</td>
<td><em>Syphus ribesii</em> L.</td>
<td>Syrphidae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td><em>Episyrphus balteatus</em> De Geer</td>
<td>Syrphidae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td><em>Menochilus sexmaculatus</em> F.</td>
<td>Coccinellida</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td><em>Coccinella septempunctata</em> L.</td>
<td>Coccinellida</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td><em>Aulacophora foveicolis</em> Lucas</td>
<td>Chrysomelida</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td><em>Pieris brassicae</em> L.</td>
<td>Pieridae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td><em>Acraea terpiscore</em> L.</td>
<td>Nymphalidae</td>
<td>Lepidoptera</td>
<td>16</td>
</tr>
<tr>
<td>23.</td>
<td><em>Danaus chrysippus</em> L.</td>
<td>Nymphalidae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td><em>Eretrictocerap</em> sp.</td>
<td>Scytididae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td><em>Argiope aemula</em> Walckenaer</td>
<td>Araneidae</td>
<td>Araneae</td>
<td>4</td>
</tr>
</tbody>
</table>

### REFERENCES


Ghanshyam Kachhawa, Santosh Kumar Charan, Ramdayal Chaudhary. 2020. Diversity and pollination probability of insect pollinators...
Table 2. Relative abundance of major pollinators in coriander

<table>
<thead>
<tr>
<th>Time</th>
<th>Relative abundance (No. of insects/ 5 min/ m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Apis florea</td>
</tr>
<tr>
<td>0600-0800</td>
<td>2.60 ± 0.37</td>
</tr>
<tr>
<td>0800-1000</td>
<td>14.40 ± 0.51</td>
</tr>
<tr>
<td>1000-1200</td>
<td>10.00 ± 0.32</td>
</tr>
<tr>
<td>1200-1400</td>
<td>8.60 ± 1.33</td>
</tr>
<tr>
<td>1400-1600</td>
<td>15.00 ± 1.30</td>
</tr>
<tr>
<td>1000-1200</td>
<td>12.80 ± 1.44</td>
</tr>
<tr>
<td>1200-1400</td>
<td>15.00 ± 1.03</td>
</tr>
<tr>
<td>1400-0600</td>
<td>9.40 ± 0.51</td>
</tr>
<tr>
<td>0600-0800</td>
<td>3.00 ± 0.32</td>
</tr>
<tr>
<td>0800-1000</td>
<td>10.40 ± 0.93</td>
</tr>
<tr>
<td>1000-1200</td>
<td>16.20 ± 0.49</td>
</tr>
<tr>
<td>1200-1400</td>
<td>17.20 ± 1.07</td>
</tr>
<tr>
<td>1400-1600</td>
<td>10.60 ± 1.21</td>
</tr>
<tr>
<td>1600-1800</td>
<td>10.00 ± 0.71</td>
</tr>
</tbody>
</table>

Each value is mean of five observations; Mean ± S.E


(Manuscript Received: December, 2020; Revised: January, 2021; Accepted: January, 2021; Online Published: May, 2021)

Online published (Preview) in www.entosocindia.org Ref. No. e20410