Study of Some Biological Parameters of Mealybug Phenacoccus solenopsis (Tinsley) (Hemiptera: Pseudococcidae) As an Exotic Pest on Hibiscus rosa-sinensis In Iraq

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Abstract: The biology of cotton mealybug Phenacoccus solenopsis (Tinsley) was studied when the insect collected from Hibiscus rosa-sinensis plant in September 2014 in Iraq. The insect was an exotic and new pest in Iraq, at first it was widespread on ornamental plants then it infects many agricultural crops like sunflower and eggplants. The mean of female fecundity was 623.3 eggs under perfect conditions, however The sexual reproduction produce male more than the parthenogenesis, there were two pairs of dark black coloured spots on dorsal surface of female body and two pairs of waxy filaments at the end of male body.

Keywords: Biology, Hemiptera, Iraq, Mealybug, Phenacoccus solenopsis.

I. Introduction

The Solenopsis mealybug Phenacoccus solenopsis recorded as anew insect pest on ornamental plant Lantana camara as well as other host plant for the first time in Iraq during August 2014 (Abdulrassoul et al., 2015). Those insects distributed word wide on cotton, vegetables, fruits, ornamental plants and weeds (Dhwan et al., 2007, wang et al., 2010). P. solenopsis orginally reported on ornamentals and fruit crops in New Mexico (Tinsley, 1898). Then it spread to Caribbean and Ecuador (Ben –Dov, 1994), Chile (Larain, 2002), Argentina (Granara de Willink, 2003), Brazil (Culik and Guallan, 2005), Pakistan (Abbas et al., 2005), India (Yousuf et al., 2007), Nigeria (Akintola and Ande, 2008), Sri Lanka (Prishanthini and Laxmi, 2009), Australia (Adin, 2010), Egypt (Abd-Rubou et al., 2010), Indonesia (Munniappan et al., 2011), Iran (Moghdad and Bagheri, 2011), Cyprus (Eppo, 2011), Turkey (Kaydan et al., 2013), Japan (Takana and Tabata, 2014) and Iraq (Abdulrassoul et al., 2015).

The cotton mealybug P. solenopsis is a polyphagous insect feeding on more than 200 plant species assigned to approximately 60 families such as Asteraceae, Euphorbiaceae, Fabaceae, Malvaceae and Solanaceae. As an important insect pest, this insect has an economic and environmental impact. Large population of mealybug cause general weakening, defoliation and death of susceptible plants by sucking sap from leaves, twig, stem, roots and fruiting bodies, and indirectly by serving as reectors of plant diseases, honeydew deposition causes growth of sooty moulds and other secondary infections that decreases Photosynthesis and reduces the marketability of plant products (Ibrahim et al., 2015).

The mealybug insects has many traits make it a serious pest like the body covered with mealy wax seccion reduced the insecticide effects and save it from natural enemies attack, as well as, the highly spreading because of diversity of reproduction manners and various host plant (Alrubeaee and ALObaidy, 2014). The goal of this study was to know the biology, behavior and life cycle of this insects on Hibiscus rosa-sinensis under laboratory conditions.

II. Materials And Methods

2.1 Preparation of insect colonies

Adults of mealybug females were collected from Hibiscus rosa-sinensis plant in home garden in al-Mansoor and brought to the insect laboratory at Plant Protection Department, College of Agriculture, University of Baghdad in September 2014. 30 crawlers were placed on Hibiscus rosa-sinensis leaves in petridishes (9 cm dia. × 1 cm ht.) containing wet cotton with help of soft hair brush for each of the life history parameter, for that individual leaves with petioles of same size were collected from plants, which didn’t exposed to pesticide application and free from mealybug infestation, were washed with tap water, dried and used as food source. The leaf petiole were wrapped with cotton wool dipped in water to keep the leaves wet. Each leaf was infested with an adult female and observed daily under microscope till egg laying (Nikam et al., 2010).

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2.2 Study of biological parameters

The time of egg laying was recorded, the eggs were counted and put on the plant leaves. The eggs incubation period, emerged nymph, nymphal stages and its duration, pupal period of male, male age after emergence from Cocoon, pre-oviposition, oviposition and post-oviposition periods of female, fecundity and longevity of female and male were recorded, separately.

2.3 Data analysis

Data were statistically analysed using statistical software Genestat 2013 with Compelet Randomized Deizin.

III. Results And Discussion

The biology of *Phenacoccus solenopsis* is presented in Table 1. The temperature of experiment was 35±2°C and it was the best conditions for the Pest development.

Table 1: Biological Parameters of *Phenacoccus solenopsis* (Tinsley) on *Hibiscus rosa-sinensis* (L.) under laboratory conditions.

<table>
<thead>
<tr>
<th>Biological Parameters (Day)</th>
<th>Mean</th>
<th>Range</th>
<th>DS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incubation Period</td>
<td>2.33</td>
<td>1</td>
<td>0.57</td>
</tr>
<tr>
<td>First Nymphal Stage</td>
<td>4.5</td>
<td>1.4</td>
<td>0.72</td>
</tr>
<tr>
<td>Second Nymphal Stage</td>
<td>4.7</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Third Nymphal Stage</td>
<td>4.4</td>
<td>0.7</td>
<td>0.36</td>
</tr>
<tr>
<td>Pupal Period</td>
<td>7.6</td>
<td>0.5</td>
<td>0.26</td>
</tr>
<tr>
<td>Pre-oviposition Period</td>
<td>6.7</td>
<td>0.7</td>
<td>0.36</td>
</tr>
<tr>
<td>Oviposition Period</td>
<td>14</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Post-oviposition Period</td>
<td>6.76</td>
<td>0.9</td>
<td>0.49</td>
</tr>
<tr>
<td>Fecundity (no. of eggs laid/female)</td>
<td>623.3</td>
<td>110</td>
<td>55.08</td>
</tr>
<tr>
<td>Longevity for Male</td>
<td>2.66</td>
<td>1</td>
<td>0.57</td>
</tr>
<tr>
<td>Longevity for Female</td>
<td>27.47</td>
<td>2.6</td>
<td>1.32</td>
</tr>
</tbody>
</table>

The female laid the eggs on the *Hibiscus rosa-sinensis* leaves, the eggs colored light yellow with oval shape laid in a cottony ovisac from the end of female abdomen it were covered with the wax secretion, the female laid 623.3 eggs gradually as a mean through her life and this is called the Fecundity. The eggs hatching to the nymphs after 2.33 days incubation period, the new nymphs looked like the eggs in the beginning of the hatching. However, it was bigger and mobile. its color changed to the white because of the wax substances which was similarly to meal covered the nymph body so for this reason the insect called Mealbug.

The nymphs leave the eggs sac and go away from their mother and it called crawells, and that because of it started to look for suitable place for live and feeding. There are three instars for nymphs, the period of first, second and third instar was 4.5, 4.7, 4.4 days, respectively. After that the nymphs growing to be male or female, the adult female of *P. solenopsis* were wingless and oblong in shape with yellow in colour, having two pairs of black spots on dorsal side of body region, the colour of head, thorax, antenna and legs was yellowish-brown, whereas abdominal region pale yellow (Fig. 1). The observation on preoviposition, oviposition, and post oviposition periods of *P. solenopsis* were 6.70, 6.76, 6.76 days, respectively. Longevity of female 27.47 days (Table 1). The male start forming cylindrical silky cocoon with white color which were stick on the cover of petridish or the plant leaf (Fig 1). The Pupa remained in the cocoon for 7.6 days and then the male was emergence from the cocoon and it lives for 2.66 days and died. The present study is first report on biology of *P. solenopsis* from Iraq. However, majority of observations match with the biological features of *P. solenopsis* on *Hibiscus rosa-sinensis* as explained by Akintola and Ande (2008).
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(Hemiptera:

Figure 1: Insect life stage
A. Insect colony
B. Second nymphal instar
C. Third nymphal instar
D. Female adult
E. Ventral surface of female
F. Cottony ovisac
G. Male
H. Male cocoon

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References

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