BIOLOGY OF THE WHITEFLY, Kanakarajiella cardamomi (David & Subramaniam) (ALEYROIDIDAE : HOMOPTERA) ON CARDAMOM

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ABSTRACT: The cardamom whitefly, Kanakarajiella (=Diaeurodes) cardamomi (David and Subramaniam) has become a major threat to cardamom, Elettaria cardamomum Maton., an important spice crop in India. Biology of this whitefly was studied on three cultivars namely, Mysore, Malabar and Vazhukka during July-August, 1991. Kanakarajiella cardamomi thrived well on all the three cultivars and laid on average 102.5, 115.4 and 102.0 eggs on Mysore, Malabar and Vazhukka cultivars respectively. Unmated females laid viable eggs and the parthenotes were female offsprings. The average longevity of male was 7.4, 7.7 and 7.3 days and the female was 9.5, 10.6 and 9.3 days on Mysore, Malabar and Vazhukka cultivars respectively. It completed the life cycle in 51.7, 50.1 and 53.0 days, respectively on Mysore, Malabar and Vazhukka cultivars.

Key Words: Cardamom whitefly, Elettaria cardamomum, Kanakarajiella cardamomi.

INTRODUCTION

The Cardamom whitefly, Kanakarajiella cardamomi (David and Subramaniam) (Aleyroididae : Homoptera) was first described by David and Subramaniam (1976) as Diaeurodes cardamomi on cardamom and later, David and Sundararaj (1993) accommodated it under a new genus, Kanakarajiella. The whitefly was considered a minor pest on cardamom (Butani, 1984) but it become a major pest in certain area of Idukki District in Kerala (Muraleedharan, 1985). Since, this whitefly is a new pest on cardamom biology on three cultivars of cardamom viz., Mysore, Malabar and Vazhukka is reported here.

MATERIALS AND METHODS

Biology of K. cardamomi was studied at the Indian Cardamom Research Institute (Spices Board), Myladumpara, Kerala during July-August, 1991. A stock culture of the whitefly was maintained on 12-18 month old cardamom seedlings of cv. Mysore. To study the adult longevity and fecundity, a pair of newly emerged male and female whiteflies were released into a microcage (4 x 2 cm glass tube) that was clipped on to a host leaf. The eggs laid by the female were recorded at 24 hours interval using a 10 X hand lens to study the fecundity. Newly emerged unmated females of the whitefly were confined to a microcage with a portion of cardamom leaf and

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allowed to oviposit for 24 hours. The eggs laid were counted and allowed for further development to determine the sex of the parthenotes.

Life history of *K. cardamomi* was studied by confining male and female whiteflies in a transparent (6 x 4 cm) plastic cage clipped on to the host leaf for oviposition and then they were removed after 24 hours. Eggs were observed regularly using a 10 X lens up to hatching and the nymphs for moulting to different instars till adult emergence. All the experiments were replicated 10 times on each of the three cultivars namely *Mysore, Malabar* and *Vazhukka* cultivars, respectively. Longevity of male had no significant difference in the three cultivars whereas the longevity of female had a significant difference in the three cultivars (Table 1).

Female *K. cardamomi* laid on an average 102.5, 115.4 and 102.0 eggs on *Mysore, Malabar* and *Vazhukka* cultivars. The female whitefly preferred *Malabar* cultivar for oviposition as significantly higher number of eggs were laid on *Malabar* (Table 1). Such variations in the fecundity had been reported in the whitefly *B. tabaci* on aubergine (brinjal), *Lantana camara* and tomato (Sharaf, 1984), on cotton, prickly chaff and country bean (Rajam, 1987).

The study confirmed that *K. cardamomi* can reproduce parthenogenetically. A single unmated female laid 113-115 viable eggs (on cultivar *Malabar*) and the parthenotes were female offsprings i.e., thelytokous parthenogenetic reproduction. Thelytokous parthenogenesis has

**RESULTS AND DISCUSSION**

a) Adult longevity and fecundity

Male *K. cardamomi* thrived for 7.4, 7.7 and 7.3 days whereas females 9.5, 10.6 and 9.3 days when reared on *Mysore, Malabar* and *Vazhukka* cultivars, respectively. Longevity of male had no significant difference in the three cultivars whereas the longevity of female had a significant difference in the three cultivars (Table 1).

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**Table 1. Biology of the whitefly *Kanakarajiella cardamomi* on three cardamom cultivars**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Mean duration in days**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Mysore</em></td>
</tr>
<tr>
<td>Adult Fecundity*</td>
<td>102.5</td>
</tr>
<tr>
<td>Longevity : Male</td>
<td>7.4</td>
</tr>
<tr>
<td>Female</td>
<td>9.5</td>
</tr>
<tr>
<td>Egg Period</td>
<td>15.7</td>
</tr>
<tr>
<td>First instar</td>
<td>7.6</td>
</tr>
<tr>
<td>Second instar</td>
<td>7.6</td>
</tr>
<tr>
<td>Third instar</td>
<td>6.4</td>
</tr>
<tr>
<td>Total nymphal period</td>
<td>21.3</td>
</tr>
<tr>
<td>Fourth instar / pupa</td>
<td>14.7</td>
</tr>
<tr>
<td>Total life cycle period</td>
<td>51.7</td>
</tr>
</tbody>
</table>

* Number of eggs laid per female
** Mean of ten replications
NS = Non Significant

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also been reported in *T. vaporariorum* (Westwood (Hargreaves, 1915; Williams, 1917) and *Parabemisia myricae* (Kuwana) (Uygun et al., 1990). However, unmated females of *B. tabaci* (Husain and Trehan, 1933; Sharaf, 1984) and *A. woglumi* Dowell et al., 1981) produced male offspring i.e. arrhenotokous parthenogenesis.

b) Life history

Eggs were laid singly. Freshly laid eggs were pale yellow turning light brown prior to hatching. The crawlers emerged through a longitudinal slit in the egg shell. The mean egg period lasted for 15.7, 15.4 and 15.9 days respectively on *Mysore*, *Malabar* and *Vazhukka* cultivars (Table 1).

Nymph

There were three nymphal instars, the first instar nymph or crawler was active and wanders on the leaf surface till it selects a proper feeding site for settlement. This stage lasted for 7.6, 6.9 and 7.6 days on *Mysore*, *Malabar* and *Vazhukka* cultivars respectively (Table 1). Second and third instar nymphs were sedentary, the second nymphal stage lasted for 7.6, 6.5 and 6.9 days and third instar lasted for 6.4, 6.6 and 6.7 days respectively on *Mysore*, *Malabar* and *Vazhukka* cultivars respectively.

Pupa

The pupa was thin, flat and light yellow during early stages and latter turned to deep yellow. The prominent red eyes, slightly convex and elevated nature of the body are distinguishing features. After completion of development adult whitely came out of the pupal case through an inverted 'T' shaped moulding suture leaving pupal case on the leaf surface.

Duration of life cycle from egg to adult was maximum (53.0 days) on *Vazhukka* and minimum (50.1 days) on *Malabar* and on *Mysore* it was 51.7 days. Statistical analysis revealed that duration of first and second instar stage had a significant difference in the three cultivars, whereas, egg, third instar, total nymphal period and pupal period had no significant difference in the three cultivars. However, the total development period had a significant difference in three cultivars (Table 1). Variations on the biology of other whiteflies on different host plants were reported by Lenteren and Noldus (1990) for *T. vaporariorum*. Coudriet et al. (1985); Rajam (1987); Mohanty and Basu (1986) for *B. tabaci*. However, Lenteren and Noldus (1990) compiled the information on development times of *T. vaporariorum* on nine host plants and reported substantial variability in developmental periods even among the same host plant at similar temperatures.

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REFERENCES


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