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EFFECT OF DIFFERENT HOST PLANTS ON THE BIOLOGICAL ASPECTS OF THE CITRUS MEALYBUGS *Planococcus citri* RISSO. (Homopetra: PSEUDOCOCCIDAE)

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ABSTRACT

The present study were carried out to study the influence of different host plants on some biological characteristics of citrus mealybugs *Planococcus citri*. The experiments were carried out in the laboratory of the Economic Entomology Department, Faculty of Agriculture, Mansoura University under daily fluctuated temperature degrees of 28.4±3.1˚c and R. H. 70±5% on different host plants.

The total duration of immature stages (incubation period and nymphal stage) were the shortest when the citrus mealybug *P. citri* reared on guava followed by ficus and succari orange and represented by 24.7±2.90, 28.7±2.92 and 30.5±3.19 days with significant differences, respectively. Meanwhile, the longest duration of the developmental stages were recorded on mango and grapevine and represented by 32.7±3.41 and 33.7±3.66 days, respectively.

According to the survival rates as an index of suitability of different host plants, the suitability in decreasing order was on guava trees (0.78), ficus religiosa (0.74), succari orange (0.64), mango (0.60) and Grapevine (0.53).

The longest oviposition period, the longest adult longevity and the highest fecundity for adult females of *P. citri* were recorded when reared on guava followed by ficus religiosa and succari orange. Meanwhile the shortest oviposition period, the shortest adult longevity and the lowest fecundity for adult females of *P. citri* were recorded when reared on grapevine followed by mango.

INTRODUCTION

The different mealybug species are very injurious insect pests attacking different orchard crops and cause serious damage and finally affecting quantity and quality of the fruits economic loss in the crop (Soares *et al*. 1999 and Awadalla 2013).

The citrus mealybug *Planococcus citri* Risso (Homoptera: Pseudococcidae) is a polyphagous species know from all world region and attacks new shoots and leaves including different fruit tress in different countries as citrus, guava, mango, grapevine and ficus (Williams and Watson 1988; Blumberg *et al*. 1995; Correa *et al*. 2008 and Ahmed and Abd-Rabou 2010). The nymphs and females cause damage to host plants with their piercing – sucking mouth parts and excrete honey dew which provides a medium for the growth of black sooty mold fungi (Heinz *et al*. 2004). *P. citri* know as a transmitting of different plant viurus (Watson and Kubiriba 2005) and Goldasteh *et al*. (2009).

The citrus mealybug *P. citri* showed different degrees of preferability to citrus followed by guava and grape (Ahmed and Abd-Rabou 2010). Also, *Icerya seychellarum* recorded different degrees of preferability to ornamental palm and persimmon where the shortest developmental stage, the highest survival rates, the longest oviposition period, the adult longevity and the highest fecundity were recorded on ornamental palm and persimmon as a host plants (El-Sherbenie 2004; Abdel-Rahman *et al*. 2006; Abdel-aleem 2008 and Awadalla *et al*. 2015). The chemical analysis of *I. seychellarum* showed significantly different on crude protein, lipids and total carbohydrates when the insect reared on different host plants (Awadalla 2015).

The present studies has been conducted to study the biological aspects of the citrus mealybug *P. citri* under different host plants.

MATERIALS AND METHODS

The present study were conducted to evaluate the effect of several host plants on some biological aspects of *P. citri*. The experiments were conducted in the laboratory of the Economic Entomology Department, Faculty of Agriculture, Mansoura University under laboratory conditions of 28.4±3.1˚c and R. H. 70±5%.

Leaves from several host plants were highly infested with the citrus mealybug P.citri were chosen in the field and transferred to seadlings in the laboratory for the host plants. (succari orange (sweet orange), guava trees, mango, grapevine, and ficus religiosa). These seedlings were transplanted in pots under the laboratory conditions. For estimating the incubation period, newly laid eggs were isolated from ovipositing females. The ovisacs were carefully kept in Petri-dishes (9 cm diameter) and kept under the under the laboratory conditions.

The duration of the nymphal stage were studies under these conditions, newly hatched crawlers were transferred to each host plant seedling. Crawlers were reared on each host plant. And used twenty individuals as replecates. Investigations were daily carried out to record until the adult emergence. Also, the adult longevity and fecundity for *P. citri* were estimated for different host plants under laboratory conditions. also, the survival rates for the different instars of the *P. citri* were evaluated. during the whole experiments daily average temperatures and relative humidity were recorded.

By using one-way ANOVA. data were analyzed. Means were recorded at 0.05 probability level using Duncan's Multiple Range Test (CoStat, 2004).

RESULTS AND DISCUSSION

As shown in Table (1) data indicated that, the incubation periods in all tested host plants took the same period and represented by 5.2±0.51 days under insectary conditions of 28.4±3.1 °c and R.H.70±5% without significant differences.

Data represented in Table (1) showed that, the shortest nymphal instars for the citrus mealybug *P. citri* when reared on guava as a host plant and represented by 5.3±0.57 , 5.8±0.73 and 8.4±1.09 days for first, second and third nymphal instars, respectively . On the other hand, the longest nymphal instars of *P. citri* when reared on grapevine and respresent by 7.6±0.9, 9.3±0.83 and 11.6±1.42 days for the three nymphal instars of *P. citri*, respectively. Statistical analysis revealed that, there were significantly differences according to different host plants for the three nymphal instars of *P. citri*.

As aconclusion , data obtained in the Table (1) indicated that, the total duration of developmental stages (incubation period and nymphal stage) were the shortest when the citrus mealybug *P. citri* reared on guava followed by ficus and succari orange and represented by 24.7±2.90, 28.7±2.92 and 30.5±3.19 days with signicant differences, respectively. Meanwhile, the longest duration of the immature stages were recorded on mango and grape vine and represented by 32.7±3.41 and 33.7±3.66 days, respectively.

Tab.(1) Duration of the developmental stages of the citrus mealybug *P. citri* under fluctuated daily temperature degree 28.4 ± 3.1 ºC and R.H. 70 ± 5 % on different host plants.

Host plant	Duration					
	Incubation period	Nymphal instars				development period
		firsr	second	third	nymphal stage	
Succari orange	5.2 ± 0.51a	6.8 ± 0.76ab	8.1±0.81ab	10.4±1.11ab	25.3±2.68ab	30.5±3.19ab
Guava	5.2 ± 0.51a	5.3± 0.57b	5.8 ±0.73b	8.4 ±1.09b	19.5±2.39b	24.7±2.9b
Mango	5.2 ± 0.51a	7.1 ± 0.88a	8.8±0.79a	11.6 ±1.24a	27.5±2.91a	32.7 ±3.41a
Grape vine	5.2 ± 0.51a	7.6 ± 0.9a	9.3 ± 0.83a	11.6±1.42a	28.5±3.15a	33.7 ±3.66a
Ficus religiosa	5.2 ± 0.51a	6.5 ±0.61ab	7.2±0.83ab	9.8 ±0.97ab	23.5±2.41b	28.7±2.92b

Means followed by the same letters in a column are not significantly differences at 0.05 level

Data obtained in Table (2) indicated that, the survival rates for the three nymphal instars were the highest on guava and represented by 0.88, 0.93 and 0.95, respectively. Ficus religiosa as a host plant for *P. citri* came in the second category and represented by 0.88, 0.90 and 0.93 respectively. Moreover, succari orange as a host plant for *P. citri* ranked the third category and represented by 0.84, 0.85 and 0.88, respectively.

The percentage of survival for the nymphal stage of *P. citri* was the highest on guava followed by ficus religiosa and succari orange and the lowest, rates were found on mango and grape vine as a host plants. According to the survival rates as an index of suitability of different host plants, the suitability in decreasing order was on guava trees (0.78), ficus religiosa (0.74), succari orange (0.64) , mango (0.60) and grapevine (0.53).

Tab. (2) Survival rates for the nymphal instars of the citrus mealybug *P. citri* under fluctuated daily temperature degrees 28.4±3.1 and R. H. 70±5% on different host plants

Host plant	Nymphal stage			Total
	first	second	third	
Soccari orange	0.84	0.85	0.88	0.64
Guava	0.88	0.93	0.95	0.78
Mango	0.82	0.85	0.85	0.60
Grapevine	0.79	0.79	0.84	0.53
Ficus religiosa	0.88	0.90	0.93	0.74

Data illustrated in Table (3) showed that the ovipositional period of the citrus mealybug *P. citri* when reared on different host plants under insectary conditions of 28.4±3.1 °c and R.H. 70±5%. Pre-oviposition period was the shortest on mango and grapevine with insignificantly differences. Meanwhile, the longest oviposition period was recorded on guava trees (13.2±1.75 days) followed by ficus religiosa (12.1±1.66 days) and succari orange (11.3±1.54 days) and the shortest oviposition period on grapevine (9.2±0.86 days) with significantly differences.

Data arranged in Table (3) cleard that, the longest adult longevity was on guava followed by ficus religiosa and succari orange while, the shortest adult longevity was recorded on grape vine followed by mango.

As a conclusion, the longest oviposition period, the longest adult longevity and the highest fecundity for adult females of *P. citri* were recorded when reared on guava followed by ficus religiosa and succari orange. Meanwhile the shortest oviposition period , the shortest adult longevity and the lowest fecundity for adult females of *P. citri* were recorded when reared on grapevine followed by mango.

These results agree with those of Awadalla *et al* (2015), they recorded the survival rates of *I. seychellarum* reared an ornamental palm was the highest and on mango was the lowest rate. They also reported that, the shortest oviposition period, the shortest adult longevity and lowest fecundity of the adult females of *I. seychellarum* were found when the insect reread on mango. While, Ahmed and Abd-Rabou (2010) state that, the citrus mealybug *P. citri* showed different degrees of preferability of citrus followed by guava and Grapevine. On the other hand, Awadalla (2015) suggested that, the chemical analysis of *the seychellarum* mealybug showed significant differance on crude protein, lipids and total carbohydrates when *I. seychellarum* fed on several host plants.

Tab. (3) The ovipositional periods, adult longevity and number of eggs per female of the citrus mealybug *P. citri* under fluctuated daily temperature degree 28.4 ± 3.1 ºC and R.H. 70 ± 5 % on different host plants.

Host plant	Ovipositional periods			Adult longevity	No. egg /f.
	Pre-oviposition period	Oviposition period	Post oviposition		
Soccari orange	5.6 ± 0.85a	11.3 ± 1.54ab	2.9 ± 0.85ab	19.8 ± 2.97ab	107.4 ± 5.61ab
guava	6.3 ± 0.91a	13.2 ± 1.75a	3.7 ± 0.66a	23.2 ± 3.32a	136.7 ± 5.6a
mango	5.1 ± 0.67a	9.6 ± 1.33a	2.6 ± 0.55ab	17.3 ± 2.55b	83.3 ± 4.57b
Grape vine	5.6 ± 0.92a	9.2 ± 0.86b	1.9 ± 0.41b	16.7 ± 3.72b	64.7 ± 3.92c
Ficus religiosa	5.9 ± 0.89a	12.1 ± 1.66a	3.1 ± 0.61a	21.1 ± 3.16a	122.5 ± 6.2a

Means followed by the same letters in a column are not significantly differences at 0.05 level of probability (Duncan's multiple rang test)

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تأثير العوائل النباتية المختلفة على الصفات البيولوجية لبق الموالح الدقيقي

ليلى عبد الستار البطران ، سمير صالح عوض الله ، حسن محمد فتحي و محمد قاسم شريف
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- أجريت الدراسة المعملية بمعمل الحشرات الاقتصادية – كلية الزراعة – جامعة المنصورة لدراسة الصفات البيولوجية لبق الموالح الدقيقي *Planococcus citri* تحت الظروف المعملية من درجات الحرارة ٢٨.٤ ± ٣.١ م° ورطوبة نسبية ٧٠ ± ٥% على العوائل النباتية المختلفة.
- أظهرت النتائج أن الاطوار غير الكاملة (فترة حضانة البيضه وطور الحورية) كانت أقصر فترة عند تربية بق الموالح الدقيقي على الجوافه يليها الفيكس والبرتقال السكري حيث كانت ٢٤.٧ ± ٢.٩٠ ، ٢٨.٧ ± ٢.٩٢ ، ٣٠.٥ ± ٣.١٩ يوم على التوالي ، بينما أطول فترة كانت عند تربية بق الموالح الدقيقي على المانجو يليه العنب حيث كانت ٣٣.٧±٣.٦ و ٣٢.٧±٣.٤ يوم على التوالي.
- طبقا لمعدل البقاء كمؤثر لمدى ملائمة العوائل النباتية المختلفة يمكن ترتيب العوائل النباتية تنازلياً. الجوافة (٠.٧٨) ، الفيكس (٠.٧٤) ، البرتقال السكري(٠.٦٤) ، المانجو(٠.٦٠) وأخيرا العنب (٠.٥٣).
- أوضحت النتائج ان أطول فترة وضع للبيض ، أطول فترة حياة للحشرة ، أعلى معدل وضع للبيض كانت عند تربية الحشرة على أشجار الجوافة يليها الفيكس والبرتقال السكري بينما كانت أقصر فترة وضع بيض وأقصر فترة حياة للحشرة واقل معدل وضع للبيض كانت عند تربية الحشرة على العنب يليها المانجو.