

EFFECT OF DIFFERENT HOST PLANTS ON THE ATTRACTIVENESS THE MEALYBUG SPECIES AND THEIR ASSOCIATED PREDATORS AT MANSOURA DISTRICT

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ABSTRACT

The present study was carried out in the experimental farm belonging to the Faculty of Agriculture, Mansoura University to evaluate the attractiveness the mealybug species and their predators on the different host plants.

The obtained results revealed that *Icerya purchasi* Mask. attractive to mandarin trees as a host plant during the two years of study. Also, *Maconellicoccus hirsutus* (Green) attractive to hibiscus plants as a host plant during the two years. On the other hand, *Planococcus citri* (Risso) attractive to two host plants and guava trees was more favorable host plants followed by mandarin trees during the two successive years with significantly differences. Meanwhile, *Icerya aegyptiaca* Douglas attractive to three host plants and more favorable was the ficus trees. *Icerya seychellarum* Westwood recorded the highest attractiveness on guava trees followed by persimmon, ficus and mandarin during the first year and on persimmon trees followed by guava, ficus and in the last category mandarin trees during the second year of the study.

Regarding to the predatory insects, results revealed that *Rodolia cardinalis* Mulsant recorded the highest attractiveness to ficus and guava trees, *Nephus includens* Kirsch found the highest attractive to guava and hibiscus plants and the lowest attractive to mandarin trees and *Chrysoperla carnea* (Steph). showed the highest attractive to guava trees. While *Scymnus coccivora* (Aiyar) recorded only on hibiscus plants associated with the pink hibiscus mealybug *M. hirsutus* during the two successive years of study.

INTRODUCTION

Guava, *Psidium guajava* L. is grown extensively in the subtropical and tropical regions of the world. In Egypt, the main citrus species are oranges, mandarins and limes which represented more than 98.8% of the total area planted by citrus. There is an interest of increasing both cultivated area and production of persimmon *Diospyros kaki* L. in Egypt for commercial markets. Ornamental plants in the present are playing an important role in the modern life.

The different mealybug species are very injurious insect pests attacking these orchards, cause serious damage and finally affecting quantity and quality of the fruits and causes economic loss in the crop (Soares *et al.*1999 , Canhilal *et al.* 2001, El-Sherbenie 2004, Ibrahim 2005, Abdel-Mageed 2011, Ramadan 2011 and Elkady 2013).

The role of predatory insects in controlling the mealybug species in different fruits orchards has been studied by several investigators (Matsuka *et*

al. 1982, Prasad 1990, Canhilal *et al.* 2001, Ibrahim 2005 and Ramadan 2011).

Therefor, the objective of the present work was aimed to study the attractiveness of the mealybug species and their associated predatory insects to different host plants.

MATERIALS AND METHODS

The present studies were carried out in the experimental farm belonging to the Faculty of Agriculture, Mansoura University to evaluate the attractiveness of the main mealybug species to mandarin trees *Citrus reticulata*, guava trees *Psidium guajava* L. , Persimmon trees *Diospyros kaki* L. , ficus trees *Ficus nitida* L. and hibiscus plants *Hibiscus rosa-sinensis* L. as host plants also to evaluate the attractiveness of the main mealybug species and insect predators during the two successive years 2010/11 and 2011/12 to different host plants. No insecticides were applied during the two years of investigation.

Five trees of the same age and size from each host plants were chosen and used as replications. Samples were collected biweekly during the two successive years from the beginning of October 2010 till 15th of September 2012. Each sample consisted of 100 leaves and 25 branches were randomly collected from each host plants (20 leaves and 5 branches from each tree for the four directions and the middle of each tree). The collected leaves and branches from each host plant were taken to the laboratory in polyethylene bags for further investigation of the mealybug species and their associated predators. Because, the fruits of persimmon attacked by the mealybug species namely *I. seychellarum*, fifty fruits randomly visual examination biweekly and counted the mealybugs and the associated predators. The number of the mealybugs and their predators were counted. The insect predators which observed on each sample in spot close to the colonies of mealybugs were collected by an aspirator and counted. Also, the predator-prey ratio monthly were calculated for the host plants.

Costat software program (2004) was used to compute the effect of these different host plants on the attractiveness the mealybug species and their associated predators.

RESULTS AND DISCUSSION

1. The first year:-

Data arranged in Table (1) showed that the average numbers of the mealybug species attacking different host plants during 2010/11 at Mansoura district. It can be noticed that, *I. purchasi* attractive to mandarin trees only as a host plant with an average of 51.8 ± 12.6 indiv. / 100 leaves, no other mealybug species were recorded on this host plant and *M. hirsutus* also attractive to hibiscus plants only as host plant (205.0 ± 24.4 indiv.). Meanwhile, *P. citri* attacking two host plants and recorded the highest attractiveness on guava trees (179.5 ± 23.3 indiv.) followed by mandarin (153.6 ± 23.6 indiv.)

with significantly difference. *I. aegyptiaca* showed attacking three host plants and the highest attractiveness on ficus trees followed by guava trees and mandarin trees and represented by 167.6 ± 27.5 , 90.2 ± 14.1 and 64.3 ± 13.9 indiv. / 100 leaves, respectively with highly significant differences. Moreover, *I. seychellarum* found to attacking four host plants with the highest attractiveness on guava trees followed by persimmon, ficus and in the last category mandarin and represented by 156.1 ± 26.6 , 100.8 ± 23.5 , 100.3 ± 17.3 and 37.0 ± 9.8 indiv. / 100 leaves, respectively. Statistical analysis revealed to a highly significant differences between the four host plants according to *I. seychellarum* during the first year of study at Mansoura district Table (1).

Regarding to the predatory insects data illustrated in Table (1) showed that the average number of these predators associated with the mealybug species and inhabiting different host plants during the first year 2010/11 at Mansoura district. It can be noticed that, the coccinellid predator *R. cardinalis* recorded the highest attractiveness on ficus trees (27.6 ± 5.4 indiv.) followed by guava trees, persimmon trees and mandarin trees and represented by 15.4 ± 2.5 , 11.4 ± 2.9 and 8.6 ± 1.9 indiv. /100 leaves, respectively with highly significant differences. Moreover, the coccinellid predator *N. includens* found to highest attractive to hibiscus plants (8.9 ± 1.9 indiv.) followed by guava trees (6.8 ± 1.2 indiv.), ficus trees (6.1 ± 1.5 indiv.) and the lowest attractive to mandarin trees (4.4 ± 0.9 indiv.) with highly significant differences. Meanwhile, the chrysopid predator *C. carnea* found attractive to guava trees followed by ficus trees and mandarin trees followed by ficus trees and mandarin with an average of 8.5 ± 1.3 , 7.8 ± 1.8 and 6.4 ± 1.4 indiv./100 leaves with in significantly differences, respectively. On the other hand, the coccinellid predator *S. coccivora* attractive to only hibiscus plants with an average of 2.8 ± 0.6 indiv. during the first year 2010/11 at Mansoura district.

Table (1): Influence of different host plants on the attractiveness the mealybug species during year 2010/11 at Mansoura district.

Host plant	Guava trees	Mandarin trees	Persimmon trees	Ficus trees	Hibiscus trees
Insects					
Mealybug species					
<i>P. citri</i>	179.5 ± 23.3 a	153.6 ± 23.8 b	0.00	0.00	0.00
<i>I. Purchasi</i>	0.00	51.8 ± 12.6	0.00	0.00	0.00
<i>I. egyptiaca</i>	90.2 ± 14.1 b	64.3 ± 13.9 b	0.00	167.6 ± 27.5 a	0.00
<i>I. seychellarum</i>	156.1 ± 26.6 a	37.0 ± 9.8 c	100.8 ± 23.5 b	100.3 ± 17.3 b	0.00
<i>M. hirsutus</i>	0.00	0.00	0.00	0.00	205.0 ± 24.4
Predatory insects					
<i>R. cardinalis</i>	15.4 ± 2.5 b	8.6 ± 1.9 c	11.4 ± 2.9 b	27.6 ± 5.4 a	0.00
<i>N. includens</i>	6.8 ± 1.2 b	4.4 ± 0.9 c	0.00	6.1 ± 1.8 a	8.9 ± 1.9 a
<i>C. casnea</i>	8.5 ± 1.3 a	6.4 ± 1.4 a	0.00	7.8 ± 1.8 a	0.00
<i>S. coccivora</i>	0.00	0.00	0.00	0.00	2.8 ± 0.6

Means followed by the same letter in a row are not significantly difference at 0.05 level of probability (Duncan's Multiple Range Test).

2. The second year:-

Data illustrated in Table (2) showed that the average numbers of the mealybugs species infesting different host plants during 2011/12 at Mansoura district. It can be noticed that, also during the second year *I. purchasi* attractive to mandarin trees as a host plant (79.5 ± 16.3 indiv.) and *M. hirsutus* attractive to hibiscus plants only has a host plant (207.4 ± 24.9 indiv.). while, *P. citri* attacked two host plants and recorded the highest attractiveness on guava trees (260.9 ± 29.5 indiv.) followed by mandarin trees (205.5 ± 32.4 indiv.) with significantly differences. *I. aegyptiaca* showed attacking three host plants and recorded the highest attractiveness on ficus trees followed by mandarin trees and guava tree and represented by 225.8 ± 31.6 , 102.3 ± 17.5 and 85.8 ± 11.5 indiv./ 100 leaves, respectively with highly significant differences. Moreover, *I. seychellarum* found to infesting four host plants with the highest attractiveness on persimmon followed by guava trees, ficus trees and in the last category on mandarin and represented by 237.3 ± 44.9 , 170.5 ± 27.3 , 168.7 ± 26.1 and 50.5 ± 11.1 indiv. / 100 leaves, respectively. Statistical analysis revealed to a highly significant differences between the four host plants according to *I. seychellarum* during the second year at Mansoura district.

Data represented in Table (2) showed that the average numbers of the predatory insects associated with the mealybug species and inhabiting different host plants during the second year 2011/12 at Mansoura district. It can be noticed that, the coccinellid predator *R. cardinalis* recorded the highest attractiveness to guava trees followed by mandarin, ficus and persimmon trees with an average of 22.5 ± 3.2 , 19.7 ± 3.2 , 16.5 ± 2.4 and 11.6 ± 2.0 indiv./100 leaves, respectively with highly significant differences. Moreover, the coccinellid predator *N. includens* found to highest attractive to guava trees (14.6 ± 2.2 indiv.) followed by hibiscus plants (10.3 ± 1.5 indiv.), ficus trees (8.2 ± 1.4 indiv.) and lowest attractive to mandarin trees (5.4 ± 1.0 indiv.) with highly significant differences. Meanwhile, the chrysopid predator *C. carnea* found attractive to guava trees followed by mandarin and the lowest ficus trees with an average of 16.1 ± 2.8 , 8.5 ± 1.7 and 7.4 ± 1.5 indiv./100 leaves with significant differences, respectively. On the other hand, the coccinellid predator *S. Coccivora* attractive to only hibiscus plants with an average of 3.8 ± 0.7 indiv./100 leaves during the second year 2011/12.

As a conclusion, the obtained data in Table (1 and 2) revealed that, *I. purchasi* attractive to mandarin only as a host plant during the two years. Also, *M. hirsutus* attractive to hibiscus plants only as a host plant during the two years of investigation. On the other hand, *P. citri* attractive to two host plants and guava trees was more favorable host plants followed by mandarin trees during the two successive years with significant differences. Meanwhile, *I. aegyptiaca* attractive to three host plants and more favorable was the ficus trees during the two years. *I. seychellarum* recorded the highest attractiveness on guava trees followed by persimmon, ficus and mandarin during the first year and on persimmon trees followed by guava, ficus and in

the last category mandarin trees during the second year of the study. Regarding to the predatory insects, results revealed that *R. cardinalis* recorded the highest attractiveness to ficus and guava trees, *N. includens* found the highest attractive to guava and hibiscus plants and the lowest attractive to mandarin trees and *C. casnea* showed the highest attractive to guava trees. While *S. Coccivora* recorded only on hibiscus plants associated with the pink hibiscus mealybug *M. hirsutus* during the two successive years.

These results are in agreement with those of Elkady (2013) who found that, clemantine mandarin and Balady mandarin were the least infested citrus species by *P. citri* while, Sour orange and lemon were the heaviest species attacked by the insect. According to Copland *et al.*, (1993) studied the searching behavior of adults of the coccinellid predator *N. reunioni* on six host plants infested with *P. citri*. They found the predator was most active on citrus host plants and least active on passiflora. Also, Abdel-Mageed (2005) suggested that *R. cardinalis* females exhibited high preferability to ficus leaves extract followed by guava and kaki extracts she added that, *I. seychellarum* on ortho plants not attacked by the predator females.

Table (2): Influence of different host plants on the attractiveness the mealybug species during year 2011/12 at Mansoura district.

Host plant Insects	Guava trees	Mandarin trees	Persimmon trees	Ficus trees	Hibiscus trees
Mealybug species					
<i>P. citri</i>	260.9± 29.5 a	205.5± 32.4 b	0.00	0.00	0.00
<i>I. Purchasi</i>	0.00	79.5± 16.3	0.00	0.00	0.00
<i>I. egyptiaca</i>	85.8± 11.5 c	102.3± 17.5	0.00	225.8±31.6a	0.00
<i>I. seychellarum</i>	170.5± 27.3 b	50.5± 11.1 c	237.3± 44.9	168.7±26.1 b	0.00
<i>M. hirsutus</i>	0.00	0.00	0.00	0.00	207.4± 24.9
Predatory insects					
<i>R. cardinalis</i>	22.5± 3.2 a	19.7± 3.2 ab	11.6± 2.0 c	16.5± 2.4 b	0.00
<i>N. includens</i>	14.6± 2.2 a	5.4± 1.0 c	0.00	8.2± 1.4 b	10.3± 1.5 ab
<i>C. casnea</i>	16.1± 2.8 a	8.5± 1.7 b	0.00	7.4± 1.5 b	0.00
<i>S. coccivora</i>	0.00	0.00	0.00	0.00	3.8± 0.7

Means followed by the same letter in a row are not significantly difference at 0.05 level of probability (Duncan's Multiple Range Test).

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تأثير العوائل النباتية المختلفة على جذب أنواع البق الدقيقي والمفترسات الحشرية المرتبطة بها في منطقة المنصورة

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* أجريت هذه الدراسة بالمزرعة البحثية التابعة لكلية الزراعة- جامعة المنصورة وذلك لتقدير إنجذاب انواع البق الدقيقي والمفترسات للعوائل النباتية المختلفة .
* أظهرت النتائج أن البق الدقيقي الأسترالى يجذب فقط لأشجار اليوسفى كعائل نباتى خلال سنتى الدراسة وأيضاً بق الهبسكس الدقيقي يجذب لنباتات الهبسكس كعائل نباتى خلال فترة الدراسة. من ناحية أخرى بق الموالح الدقيقي وجد أن أشجار الجوافة أكثر تفضيلاً له يليه أشجار اليوسفى خلال سنتى الدراسة مع وجود إختلاف معنوى بينما البق الدقيقي المصرى يجذب لثلاثة عوائل نباتية وكان أكثر تفضيلاً لأشجار الفيكس خلال سنتى الدراسة. أما البق الدقيقي السيشلارم قد سجلت أشجار الجوافة أكثر جذباً له يليها أشجار الكاكى والفيكس وقد جاء اليوسفى فى المرتبة الأخيرة .
* بالنظر إلى المفترسات الحشرية اظهرت النتائج أن المفترس أبو العيد فيداليا سجل أعلى جذباً على أشجار الفيكس و الجوافة والمفترس أبو العيد *N. includens* فقد وجد أكثر جذباً على أشجار الجوافة والهبسكس واقل جذباً على أشجار اليوسفى أما المفترس أسد المن الأخضر سجل أكثر جذباً على أشجار الجوافة بينما المفترس أبو العيد *S. coccivora* فقد وجد فقط على نباتات الهبسكس مرتبطاً ببق الهبسكس الدقيقي خلال سنتى الدراسة .

قام بتحكيم البحث

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