J. Agric. Sci. Mansoura Univ., 33(5): 3717 - 3723, 2008

EFFECT OF DIFFERENT TREE CARDINAL DIRECTIONS, TREE CORE AND LEAF SURFACES OF MANGO TREES ON THE DISTRIBUTION OF *Icerya seychellarum* (WESTWOOD) (HOMOPTERA, MARGARODIDE).

Abdel Aleem, R.Y.
Department of Economic Entomology and Pesticides, Fac. of Agric. Cairo univ. Giza- Egypt

ABSTRACT

The mealy-bug insect *I seycellarum* is a major insect pest which attacks mango trees and some ornamental plants in Egypt. Field investigation of the two successive years (2005-2006) showed that, tree core is the most favorable zone for insect population. The over all mean was 17.0 and 12.9 individuals / leaf during 2005 and 2006 respectively, while the lowest means were 10.6 and 9-6 individuals / leaf during 2005 and 2006, respectively. There were insignificant differences between directions, but highly significant differences between tree core and all tree directions. Highly significant differences between insect population averages of seasons within each direction. Autumn and Summer were the most favorable seasons for the insect activities and distribution, while Spring and Winter had the lowest population, Seasons could be arranged dissentingly in order to magnitude as follows: Autumn, Summer, Spring and Winter. Means of respective seasons were 24.2 , 13.1, 9.1 and 7.5 individuals / leaf in 2005 versus 15.7 , 14, 9.5 and 6.1 individuals / leaf in 2006. the insect prefer the lower leaf surface over the upper one (99.04%)

INTRODUCTION

I. seychellarum is a major insect pest of mango orchards and ornamental plants in Egypt as well as many of tropical and sub-tropical regions of the world. Some authors recorded the insect in different countries such as Newstead (1908) in Madagascar, Cockerell and Robinson (1915) in Philippines, Green (1916) in Zangibar, Dupont (1917) in Seychelles Island, Shiraki (1919) in Formosa, Birzi (1935) in Egypt, Fox-wilson (1939) in USA, Bedford (1965) in South Africa, also Ezz and Smhan (1965) recorded the insect directly on some ornamental plants in Egypt, near Suez, Srivastave (1975) in India, while Assem (1990) recorded that mango orchards had been heavy infested with *I. seychellarum*. At the same time Kinjo *et al.* (1996) recorded that the pest infested many host plants in Japan. Recently; Osman (2005) recorded four annual generations of the same pest. Newstead (1908) recorded that *I. seychellarum* attacked many host plants such as; *Albizzia* sp., Ovocado; *Persea amiericana*, Bread fruit, *Artocarpus inciaa*. Carton oil plant; *Codiaeum* sp., *Citrus* sp., Coconut; *Coccos muciferea.*, coffee, Eucalyptus ; *Eucalyptus* sp., Hoary pea; *Telphromia candida*, Jak fruit; A. *intogrifolia*, Maize; *Zea maiz* mango, *Mangifera indica*, Palm; *Verschuffeltis aplendieae*, *Rosea* sp., Tobacco, Tea pants; *Thea sinepais*. The aim of the present investigation is to study the effect of different tree cardinal directions, tree core and leaf surfaces of mango trees on the distribution of *I. seychellarum*.

MATERIALS AND METHODS

To study the distribution of the insect population on different tree directions and tree core. Samples of 250 mango leaves were collected from 10 mango trees (25 leaves each) from the terminal shoots of the tree directions in addition to the tree core. Adults and nymphs of the insect pest were counted in the laboratory on both leaf surfaces. Samples collected at the beginning and mid of each month throughout 2005 and 2006 . on the other side each direction represented by 50/ leaves. F. test analysis was applied to check the significance of the interaction between the insect population, seasons, both leaf surfaces and sampling direction (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

A. Effect of cardinal directions and tree core on the distribution of *I. seychellarum* population on mango trees:

The results obtaind during the year 2005, summarized in Tables 1 and 2 showed that the cardinal directions of the tree had insignificant effect on the distribution of the insect except the tree core which harbored with the highest mean number of insects 17.0 individuals / leaf, followed by the Western (13.3) and the lowest was the Northern direction which harbored 10.6 individuals / leaf. This distribution might be attributed to the pooled effect of the wind direction and the duration of leaves exposure to the sun rays. The analysis of variance showed that insignificant differences between direction, but highly significant differences were seen between months and insect populations. The results showed that October in which the highest mean number of insects (33.9) individuals / leaf , August (18.2) , March (10.9) and the lowest mean (6.0 individuals / leaf) in February. The results indicated that insignificant differences regarding the interactions between the cardinal directions within seasons. As shown in Table (2) seasons could be arranged due to their magnitude as follows: Autumn (24.2) which of the highest mean, Summer (13.1) , Spring (9.1) and Winter (7.5 individuals / leaf) which of the lowest mean. There were insignificant differences between cardinal directions among season except the tree core and the Northern direction. The highest average of insect population occurred at the tree core (31.6 individuals / leaf) followed dissentingly by the Western, Eastern, Southern and Northern directions. The respective scale densities reported that the average of insect individuals per leaf of such directions were 26.1 , 25.5, 25.4 and 16.2 individuals / leaf.

In Summer, the tree core hardboard the highest density of insect population, followed dissentingly by the Eastern, the Northern, the Southern and the Western directions where the respective averages number of insects were 17.4, 15.4 , 12.5, 10.6 and 9.6 individuals / leaf , respectively.

In Spring the highest average number of insects occurred at the tree core followed dissentingly by the Southern, Western, Eastern and Northern

directions. The averages of insect numbers in these directions were 11.3 10.1, 9.1, 7.9 and 7.3 individuals leaf, respectively.

In Winter the highest average of insects population occurred in the Southern direction, followed dissentingly by the Western, the tree core, the Eastern and Northern direction. The respective averages of insect population were 8.7 , 8.0, 7.6, 6.7 and 6.4 individuals / leaf, respectively.

Table (1): Average number of *I. seychellarum* / mango leaf in different tree directions and tree core during 2005.

	Directions					
Months	East	West	North	South	Tree core	Mean
Jan.	6.5	6.4	4.7	6.1	6.1	6.0
Feb.	5.6	6.5	4.2	7.5	6.3	6.0
Mar.	8.4	12.0	6.9	12.3	14.9	10.9
Apr.	6.4	9.5	6.3	11.8	8.5	8.5
May.	9.0	5.9	8.8	6.3	10.5	8.2
Jun.	13.8	7.8	10.4	10.2	15.3	11.6
Jul.	10.9	8.1	7.2	7.8	13.3	9.8
Aug.	21.72	12.9	18.0	13.4	25.0	18.2
Sep.	13.6	15.0	12.2	12.9	23.7	15.5
Oct.	33.5	34.2	22.1	35.7	44.1	33.9
Nov.	23.5	29.1	14.2	21.6	27.0	23.0
Dec.	8.2	11.2	10.2	12.5	10.4	10.5
Mean	13.5	13.3	10.6	13.2	17.0	13.5

Table (2): Mean number of *I. seychellarum* / mango leaf in different tree directions and tree core during different seasons of 2005 .

	Directions					
Seasons	East	West	North	South	Tree core	Mean
Winter	6.7	8.0	6.4	8.7	7.6	7.5
Spring	7.9	9.1	7.3	10.1	11.3	9.1
Summer	15.4	9.6	12.5	10.5	17.4	13.1
Autumn	23.5	26.1	16.2	24.4	31.6	24.2
Mean	13.4	13.2	10.6	13.2	17.0	13.5

"f" value 2.876 at 5%

In the second year of investigation 2006. as shown in Table (3) the highest mean of insect population was 19.8 individuals / leaf occurred in October, while the lowest mean was 4.9 individuals / leaf occurred in February. There were insignificant differences between the cardinal direction except the tree core which had the highest mean 12.9 individuals / leaf followed descendingly by the Northern 11.8 , the Western (11.0), the Southern (10.7) and Eastern direction with (9.6) individuals / leaf. Insignificant differences were obtained between directions or between interactions but seasonal results indicate highly significant differences, between seasons of the second year of investigation. It could be arranged descendingly due to their magnitude as follows: Autumn (15.7), Summer (14.0) Spring (9.5), and Winter (6.1 individuals/ leaf).

In general, it could be concluded that the cardinal directions of the tree had insignificant effect on the distribution of the insect population, but the tree core zone had significant differences within seasons on the distribution of the insects.

These results may be attributed to the favorable environmental conditions prevailing during Autumn moderate mean temperature 27.5 °C and moderate relative humidity 70%. On the other hand the unfavorable conditions prevailing during winter low mean temperature 15.4°C and 60% R.H. resulted in suppressing the population of the insect under investigation. As shown in Table (4) directions could be arranged according to order of magnitude in each season separately as follow: Autumn 20.9 tended to occur in the tree core followed by the Southern (15.5), Northern (14.5) Western (4.3) and lastly the Eastern directions (13.3) individuals / leaf. Highly significant differences was obtained between seasons within each direction as shown in tree core within Autumn, the averages could be arranged descendingly in order of magnitude as follows: Autumn (20.9), Summer (17.7), Spring (8.2) and lastly Winter (6.0) individuals /leaf. It seems that this distribution was attributed to moderate temperature and relative humidity.

In Summer the tree core also. Harbored the highest averages of insect population followed by the Northern, the Southern, the Western and lastly the Eastern direction the respective densities of insect associated with these directions were 17.7, 14.8, 13.2, 12.6 and 12.3 individuals / leaf , respectively.

In this regard Amin and Salem (1978) found that *Aonidella aurantii* tended to accumulated in a shady zones. Ali *et al.* (1987) and Abdel Aleem (1995) found that *leucaspis riccae* tended to occur more abundantly on the Northern Western side of the tree.

In Spring the highest averages of the insect density (13.1 individuals / leaf) was restricted to the Northern side followed by the Western (10.1), the Southern (8.9) , tree core (8.2) and the Eastern side (7.1) individuals / leaf

Table (3): Average number of *I. seychellarum* / mango leaf in different directions and tree core during 2006.

	Directions					
Months	**East**	**West**	**North**	**South**	**Tree core**	**Mean**
Jan.	6.3	5.2	2.2	6.7	4.8	5.0
Feb.	5.7	6.1	4.2	5.1	3.4	4.9
Mar.	9.7	11.2	14.1	12.2	12.8	12.0
Apr.	7.7	9.3	12.1	6.7	5.2	8.2
May	3.9	9.7	13.1	7.8	6.5	8.2
Jun.	12.2	12.3	18.7	14.4	16.0	14.7
Jul.	9.8	10.3	9.3	10.7	14.7	10.8
Aug.	14.9	15.2	16.4	14.6	22.3	16.7
Sep.	12.7	13.3	12.2	11.7	19.5	13.9
Oct.	16.8	17.4	19.1	20.4	25.3	19.8
Nov.	10.4	12.1	12.3	14.3	17.8	13.4
Dec.	5.6	9.3	7.4	9.2	9.7	8.2
Mean	9.6	11.0	11.8	10.7	12.9	11.2

In Winter, the highest averages of insect population (7.0 and 6.9 individuals/ leaf) were reported for the Southern and the Western directions, while the lowest ones were recorded at the Eastern and Northern directions (5.9 and 4.6 individuals / leaf) respectively. The picture of distribution in the previously mentioned directions and seasons were most probably produced by the effects of heat radiation of the sun rays and wind directions.

Table (4): Average number of *I. seychellarum* / mango leaf in different tree directions and tree core during different seasons of 2006.

	Directions					
Seasons	**East**	**West**	**North**	**South**	**Tree core**	**Mean**
Winter	5.9	6.9	4.6	7.0	6.0	6.0
Spring	7.1	10.1	13.1	8.9	8.02	9.5
Summer	12.3	12.6	14.8	13.2	17.7	14.0
Autumn	13.3	14.3	14.5	15.5	20.9	15.7
Mean	9.6	11.0	11.8	10.7	12.9	11.2

"f" value 2.654 at 5%

B. Distribution of the insect on both leaf surfaces:

In both samples of the two years the insect preferred the lower surface (5.17 individual / leaf) than the upper one (average 0.05 individual / leaf), table (5) Smoothness of the other leaf surface and light could be considered a negative responsible for that preference.

Table (5): Average monthly distribution of *I.seychellarum* on the upper and lower mango leaf surfaces during 2005-2006.

	U			L			%L
Months	**2005**	**2006**	**Mean**	**2005**	**2006**	**Mean**	
Jan.	0.13	0.20	0.17	2.0	2.76	2.40	93.4
Feb.	0.26	0.07	0.17	2.17	3.0	2.70	94.1
Mar.	0.0	0.13	0.07	4.08	6.37	5.73	98.8
Apr.	0.0	0.0	0.0	2.94	4.07	3.51	100
May	0.0	0.0	0.0	2.75	4.75	3.75	100
Jun.	0.0	0.0	0.0	4.05	4.45	4.25	100
Jul.	0.0	0.0	0.0	2.21	3.31	3.27	100
Aug.	0.0	0.0	0.0	7.8	9.5	8.65	100
Sep.	0.0	0.0	0.0	6.30	7.20	6.75	100
Oct.	0.0	0.0	0.0	14.73	15.22	14.98	100
Nov.	0.09	0.14	0.11	7.82	9.50	8.66	96.7
Dec.	0.12	0.07	0.09	2.65	2.19	2.42	96.5
Mean			0.05			5.17	99.04

REFERENCES

Abdel Aleem , R.y. (1995): Effect of different levels of trees, different cardinal directions and leaf surfaces on the distribution of *leucaspis riccae* Targ. in correlation with the year seasons. J. Agric. Sci., Mansura Univ. 20(8): 3881-3887.

Ali, A.G., M. R. Saleh and Z. Kamal (1987): Distribution and abundance of *leucaspis riccae* Targ. On olive trees in Egypt. Bull. Soc. Ent. Egypt, 87 : 35-42.

Amin, A.H. and Y.S. Salem (1978): Population studies on the scale insect species *Parlatoria zizyphus* (Lucas), a new pest of citrus tree in Egypt. 4th Conf. Pest Control, NRC, Cairo, 40-48

Assem, S.M. (1990): *Survey and Ecological studies on some insects. Attacking certain ornamental plants*. Ph.D. Thesis, Fac. Of Agric. Cairo Univ. 202 pp.

Bedford, E.C.G (1965): An attempt to control the Seychelles scale, *Icerya seychellarum* (Homoptera: coccidae) in South Africa by introducing *Cryptochaetum monophlebi* S kuse (Diptera: cryptochaetidae) J. Ent. Soc. Southern Africa 28: 155-165.

Brizi, A. (1935): Legislative and administration measures. Inter. Bull. of Plant Protection 9: 58-76.

Cockerell., T.D. and Robinson (1915): Descriptions and records of Coccidae Bull. Amer. Mus. Nat. Hist. 34: 423-428.

Dupont, P.R. (1917): Insect notes Curator, report on botanic station, seychelles M.S. Colonial office, 104pp.

Ezz, A. I and M.A. Samhan (1965): A margarodid new to UAR (Homoptera: Coccidae) Agr. Res. Rev. 26 (3): 117-118.

Fox- Wilson, G.(1939): Insect pest of the genus Rhododendron. Inter. Kong. Fur Entomologie (Berlin) 7:2296: 2323.

Green, E. (1916): Report on some Coccidae from Zangibar, Aders. Bull.Ent. Res. (UK), 6(4): 375-376.

Kinjo, M. Nakasone, F., Higa, Y., Nagamine, M., Kawai, S. and T., Kondo (1996): Scale insects on mango in Oki Nawa Prefecture. Proc. of the assoc. for Plant Prot. of Kyushu (Japan) 42: 125-127.

Newstead, R. (1908): on the gum – lace insect of Madagascar, and other Coccids affecting the Citrus and Tobacco in the Island. Quar. J. Inst. of Commer. research in the Tropics Univ. of Liverpool 3: 3-13.

Osman, E. A.(2005): *Studies on some Homopterous pest infesting mulberry trees in relation with bombyx mori (Lepidoptera, Bombycidae) silk production*. Ph. D. thesis Fac. Age. Cairo Univ. Egypt.

Shiraki, T. (1919): Insect pests of the tea plant in Formosa Rept. Proce. 3rd Ent. Meeting, Pusa, Calcutta, 626-669.

Srivastava, O.S. (1975) : First record of Icerya *seychellarum* (Westwood) (Homoptera, Margarodidae) infesting cartons form Madhya Pradesh. Indian, J. Ent., 35 (4) 341: 348.

Steel R.G.D. and J.H. Torrie (1980): Principles and Procedures of statistics. McGraw Hill Kogakusha, LTD. , pp 633.

تأثير الاتجاهات المختلفة للشجرة ، منطقة قلب الشجرة و سطحى الورقة لاشجار المانجو على توزيع اعداد حشرة البسق الدقيقى *Icerya seychellarum* التابعة لرتبة متشابهة الاجنحة – عائلة البق الدقيقى (Homoptera, Margarodidae).

ربيع يحي عبد العليم
قسم الحشرات الاقتصادية والمبيدات – كلية الزراعة – جامعة القاهرة – الجيزة – مصر

تعتبر حشرة البق الدقيقي *Icerya seychellarum* من الافات الحشرية الرئيسية التي تصيب أشجار المانجو وبعض نباتات الزينة في مصر.

أجريت دراسة حقلية لمدة عاملين كاملين (٢٠٠٥- ٢٠٠٦) لدراسة تاثير الاتجاهات المختلفة الرئيسية للشجرة (الشرق – الغرب- الجنوب – الشمال) منطقة قلب الشجرة وسطحي الورقة علي توزيع اعداد الافة خلال الفصول الرئيسية الأربعة (الشتاء – الربيع – الصيف- الخريف)

ولقد أوضحت الدراسة النتائج الآتية :

اولاً : ليست هناك فروق معنوية بين متوسطات أعداد الحشرة بالنسبة للاتجاهات الرئيسية الأربعة حيث تتوزع أعداد الحشرة توزيعاً متقارباً علي الجوانب المختلفة للشجرة فى حين ظهرت هناك فروق عالية المعنوية بين هذه المتوسطات ومتوسط التعداد في قلب الشجرة وقد بلغت هذه المتوسطات (لعام ٢٠٠٥) ١٧,٥ ، ١٣,٤ ، ١٣,٢، ١٠,٦ فرد/ الورقة لكل من قلب الشجرة، الجهة الشرقية، الجهة الجنوبية ، الجهة الغربية والجهة الشمالية علي التوالي يقابلها ١٢,٩، ٩,٦، ١١، ١١,٨، ١٠,٧ فرد/ الورقة لعام ٢٠٠٦ على التوالي.

ثانيا : منطقة قلب الشجرة هي المنقطة المفضلة للحشرة حيث بلغ المتوسط العام لها (عام ٢٠٠٥) ١٧ فرد/ الورقة بينما بلغ هذا المتوسط ١٢,٩ فرد/ الورقة في عام ٢٠٠٦. بينما سجل اقل متوسط لتعداد الحشرة ١٠,٦ فرد/ الورقة علي الجهة الشمالية للشجرة لعام ٢٠٠٥ في حين بلغ هذا المتوسط ٩,٦ فرد /الورقة في الجهة الشرقية للشجرة لعام ٢٠٠٦.

ثالثاً : هناك فروق عالية المعنوية بين متوسطات تعداد الافة بين الفصول المناخية المختلفة لكل جهة من جهات تواجد الحشرة علي الاشجار وعلى ذلك يمكن ترتيب الفصول المناخية تنازلياً حسب كثافة التعداد كالاتى : فصل الخريف ،الصيف ، الربيع والشتاء حيث بلغ المتوسط العام لكل منها ٢٤,٢ ، ١٣,١ ، ٩,١ و ٧,٥ فرد/ الورقة (لعام ٢٠٠٥) يقابلها ١٥,٧ ، ١٤ ، ٩,٥ ، ٦,١ فرد/ الورقة فى عام ٢٠٠٦ على التوالي .

رابعا : فصل الخريف والصيف هما افضل الفصول بالنسبة لانشطة الحشرة وتوزيع أعدادها حيث بلغ المتوسط العام ٢٤,٢، ١٣,١ فرد / الورقة يقابله ١٥,٧ و١٤ فرد / الورقة لعام ٢٠٠٦ علي التوالي (متوسط درجات الحرارة ٢٧,٥°م ، ٧٠% رطوبة نسبية). بينما فصل الربيع والشتاء هما الأقل في المتوسط العام لتعداد الحشرة حيث بلغ ٩,١ ، ٧,٥ فرد/ الورقة في عام ٢٠٠٥، ٩,٥ ، ٦,١ فرد / الورقة لعام ٢٠٠٦ علي التوالي (متوسط درجات الحرارة ١٥,٤ و ٦٠% رطوبة نسبية). الحشرة تفضل السطح السفلي للورقة مقارنة بالسطح العلوي حيث بلغت نسبة تواجدها علي السطح السفلي ٩٩,٠٤% علي مدار عامى الدراسة.