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LIFE TABLES FOR WHITE FLY THE ASH WHITEFLY *SIPHONINUS PHILLYREAE* (HALIDAY) (HEMIPTERA: ALEYRODIDAE) ON CITRUS TREES IN BAGHDAD

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ABSTRACT

This study was conducted at the Faculty of Agriculture / University of Baghdad fields, during the period from June until October 2014. The present study aimed to study the life tables of whitefly *S. phillyreae*, where the density is high in March. To find out the main death factors that play a key role in the population dynamics of this pest, the results of the life tables showed that the mortality rate due to lack of fertile eggs, sex ratio and photoperiodism synchronization, which plays an important role in the fluctuation of high density the pest.The biotic factors limited impact on the immature stages. In spite of this, the importance of these biotic and abiotic factors in regulating the density of the population below the critical limit the economic level with continued high values of the tendency in the direction of the highest levels of up to 1.9-1.21 on citrus trees. The results of the life tables of the age group that the factors responsible in reducing the high number of insects, especially the photoperiodism synchronization and the death of the adult. And the guide tendency this pest during the period from June to October 2014, were 1.09, 11.21, 0.62, 0.89 and 1.21 in Baghdad governorate respectively. Therefore, it has become important to introduce natural enemies of insect native citizen of utmost necessity for integrated pest management and reduce the spread of pest to high levels.

KEYWORDS: guide tendency, natural enemies, photoperiodism synchronization.

INTRODUCTION

Increased importance of whiteflies Aleyrodidae lethal pests on many important economic plants, especially whitefly *Siphoninus phillyreae* after recording the broad spread in the Iraq in recent years, they infect different types of trees, especially the shoot, causing severe damage to citrus and other trees such as buckthorn and olive[1,2], Said [3] that this insect infect many plant families, including citrus plants and buckthorn. Has been interested in a tree buckthorn international attention as one of the unexploited fruit trees that have a promising future.[4]

whiteflies are small insect with wings covered with powder white, mouth parts are piercing sucking, gradual metamorphosis hatch eggs to stage nymph crawling a white with a bristles waxy white on the outer edge and active nymphs if the hatching of the eggs remain mobile for a short time and then find the appropriate place to feed and settle down and feed on leaf texture to become adults either pupa are found on the dorsal part structures resembling pipettes.[5]

Nymphs and adult insects suck plant juices and secrete honey dew on the leaves which leads to the growth of fungi and dust collected and thus effect on plant physiological processes, particularly the process of photosynthesis.

The importance of this insect and the seriousness of where they spread this study aimed to study the dynamics of insect numbers in Baghdad and the factors affecting them with the most determining factor in the responsibility for change in the numerical density by building tables with age life.

MATERIALS AND METHODS

Construction of life tables

Prepared a special life tables to white fly *S. phillyreae* on citrus trees in accordance with the program results, taking a random sample of the variety mentioned above every ten days to two sites for the period from June until October (2014).

Count the number of eggs that hatched and did not hatch, as well as live and dead each stage of the insect and access to the pupa stage individuals. identified factors of life death that included parasitism, predation, fungal infection) The cases in which the stages of the insect found dead without knowing the cause has been set within the field (unknown reasons), where extreme weather conditions play a key role.

Depend on building life table and put arrangement Morris and Miller tables,[6] which was developed by Harcourt[7] and includes the following columns:

X = age group then took the samples.

L × = the number of individuals living at the beginning of the age group.×

D × F = factor responsible for the death in the age group ×.

D x = number of dead individuals through age group.×

100q × = the percentage of dead individuals to the live.

S × = survival rate.

With add another column to life tables is the K-factor (the key factor), which represents the sum of the logarithm of the total mortality at each age group[8] according to the following equation: -

K=Log (Lx) - Log (Lx-1)

As:

K = relative contribution of each factor of death factors

Log (Lx) = logarithm the number of live individuals for the age group.×

Log (Lx-1) = logarithm the number of live individuals age group that follows the age group ×.

The total deaths through Generation mortality represented by the value of K was calculated from the sum of the values of K for all age groups this means that:

K = K1+K2+K3...+KN[9]

According to the expected number of eggs, and Trend index of the population (TI) and the rate of survival of the generation (SG) according to the equations developed by Harcourt[7]

Expected eggs = (Normal females ×2)/2×Maximum number of eggs / female

As:

Expected eggs = the expected number of eggs.

Normal female = natural female.

Max. No. of eggs / female = highest number of eggs set by the female.

The Trend Index population (TI) has by and in accordance with the following equation:

T.I.=N2/N1

As:

N1 = number of eggs set by the females of the current generation.

N2 = number of eggs laid by a female for the next generation (new).

The (SG) survival rate was as according to the following equation:

SG=N3/N1

As:

N1 = the number of eggs laid by the females of the first generation.

N3 = number of females resulting from the current generation.

RESULTS AND DISCUSSION

The building full of life tables for ages groups of white flies on citrus *S. phillyreae* in order to know the dynamics of the population from month to month, to determine the factors responsible for the change in population density, which may be factor suppresses maintains the numbers at a balanced level or low, or vice versa may occur rise to high levels. Given the partial overlap in the number of generations of the insect and the large of their numbers, Monthly data to build a monthly life tables have been adopted in accordance with the program of sampling every ten days for the period from June until November 2014 at the study site in Baghdad. Evident from the results table (1) for the month of June 2014 for the study site in Baghdad that the percentage of mortality in the egg stage was 15%, And occupied not fertilize eggs second factor in reducing the percentage of hatching after predation, which occupied the most important place in the reduced hatchability. As well as the role of some of the vital factors of parasitism fungus on eggs by mortality was 9.37%, With the total value of the relative contribution of death was due to the factors referred to (K-value) was 0.454. He also notes the importance of variation death biotic factors (predation and parasitism) and abiotic factors of annihilation in reducing the number of live nymphs because of the death reached 35.85, 13.13 and 4.11% respectively, with the relative contribution to the total was 0.501.

[10] explained that natural enemies is one of the important factors in the events of changes in population density of insects piercing sucking a defoliant that most stages sitting not appear any resistance against its enemies and the complex interactions between the variable elements in the agricultural ecosystem often helps in the stability of the pest community below the level of damage Economic,[11] also pointed to the importance of the internal parasite *Encarsia opulent* in reducing the population density of the insect *Aleurocanthus woglumi* between 1986-1987, With[12] confirmed kill predators that between 50-70% of the eggs and nymphs citrus black fly, noting that the predator alone is not enough to reduce the insect population due to high their fertility in excess of losses due to predation. Also be noted from the table above mentioned factors that annihilation of the biotic factors to pupa stage were very few despite the entry fungus killed an additional factor, the total relative contribution of death was (K-value) 0.624, It was the result of light synchronization, which was measured by the impact

in the egg laying rates (maximum and minimum) by the insect an important role in the influence a population density of the insect and the value of the K was 0.850, Which exceeds the impact of the rest of the other factors mentioned above.

Pointed[7] to the potential energy of eggs laying of insects depends on the synchronization of light and is considered one of the most important functions, And the effect of such a factor in female insect caused the reduction of the number of eggs laid by 1% to record second after the factors responsible for the extermination of adult. The most important factors in the change in the population density of the pest where the natural females exposed to many factors, including predation by predatory insects, birds or death due to weather conditions or failure completeness mating as well as the severity of overcrowding or to migrate to other places because of storms.

That the separation of such factors from each other is not easy as our settings lacking definitive evidence about the role of each of them carefully and despite the impact of the factors mentioned have a tendency guide pointed to a significant increase in the rate of insect numbers in a place where the study was 1.09.

The table (2) shows the results for the month of July that the maximum and minimum temperatures rates for the study site in Baghdad was 43 and 27 ° C and relative humidity 37%, respectively (Fig. 1), relatively high for what it was from the climatic conditions in the previous month, Which had dropped them natural enemies activity at standard rates to go down mortality rates to immature stages of the insect (eggs, nymphs and pupae) as the value of k were 0.451, 0.471 and 0.481, respectively, compared to their value in the month that preceded, The lower the value of the adults as well for their level because of other factors referred to above was 0.502, which led to an increase in the tendency guide to 11.21.

It was noted in the table (3) for the month of August, the increase death rates significantly from the previous month height of population density due to high temperatures Great to 44 ° C and lesser to 38 ° C and relative humidity to 43%, they were the relative contribution of the values of the death for the k value for the immature stages of insect (eggs, nymphs and pupae) and convergent were 0.304, 0.310 and 0.311 respectively. With equal to the effect of each of the factors of adult death and synchronization of light achieved the highest rate was 0.325, The impact of those factors combined have seemed clear to the population density of the insect as the guide tendency was 0.62 to an increase in the number of insect decline.

Results indicated in a table (4) for the month of September to the effect of biotic and abiotic factors on the rates numbers of insect rising percentage of death to rates more than a month of August especially for the two-stages nymphs and pupae, but the egg stage was the impact of these factors it was not bad by leading to lower death rates for the month that preceded, The synchronization of the light and the factors of adult death great influence in the death of the insect where the values of k were 0.350 and 0.351, respectively, a tendency guide have achieved increasing in the numbers of insect was 0.91.

As noted in Table (5) low temperatures in October to relatively low levels and was a maximum temperature of 34 ° C and the degree minimum temperature was 18.9 ° C and relative humidity are high was 41%, which is considered an important factor in influencing the immature stages of insect, However, we note almost tendency guide to retain the value of their level with a slight decrease of 0.89 demonstrating the essential role of the maximum and minimum temperatures and relative humidity in determining the tendency guide of the population to rise and decline on factors affect the death of the insect in general.

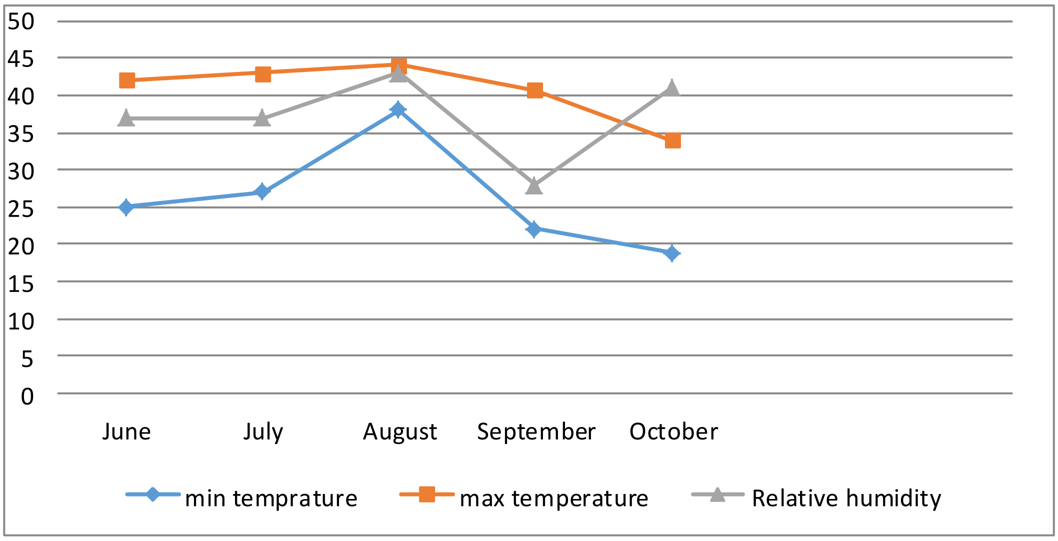

Figure (1) Rates of temperatures and relative humidity in Baghdad governorate for the period of June-October 2014

Table (1): The life table of whitefly *S. phillyreae* on citrus trees in Baghdad for the month of June 2014

X	Lx	dxf	dx	100qx	Sx	K-value
Eggs (N_1)	160	Infertility	21	15	0.85	0.454
		Predators	25	16	0.84	
		fungus	15	9.37	0.90	
			61	40.37	0.86	
Nymphs (1-3)	99	Parasitoid	35	35.85	0.65	0.501
		Predators	13	13.13	0.87	
		A biotic factors	11	4.11	0.89	
			59	53.09	0.80	
Pupae	40	Parasitoid	9	22.5	0.76	0.624
		Predators	7	17.5	0.82	
		Fungus	4	10	0.90	
			20	50	0.83	
Adult	20	Sex ♀♀(75%) ratio	5	25	0.75	0.769
Females x2(N_3)	15	Photoperiodism	19.80	1	0.95	0.850
Normal females x2	9.8	Adult mortality	9.72	99.85	0.15	1.135
Generation totals	0.08		174.52			4.33

0.07 = (S.G.) ، 1.09= (T.I.) ،175 = (N_2) Actual eggs، ، 1190= Expt. Eggs

Table (2): The life table of whitefly *S. phillyreae* on citrus trees in Baghdad for the month of July 2014

X	Lx	dxf	dx	100qx	Sx	K-value
Eggs (N_1)	175	Infertility	23	15	0.85	0.451
		Predators	13	7.43	0.93	
		Fungus	3	1.71	0.98	
			39	24.14	0.92	
Nymphs (1-3)	136	Parasitoid	8	5.88	0.94	0.471
		Predators	6	4.41	0.96	
		Fungus	2	1.47	0.99	
			16	11.76	0.96	
Pupae	120	Parasitoid	8	6.67	0.93	0.481
		Predators	9	7.5	0.93	
		Fungus	5	4.16	0.96	
			22	18.33	0.94	
Adult	98	Sex ratio♀♀ (75%)	24.5	25	0.75	0.502
Females x2(N_3)	73.5	Photoperiodism	7.35	1	0.99	0.536
Normal females x2	66.5	Adult mortality	65.82	0.50	0.99	0.549
Generation totals	0.68		174.67			2.99

0.04 = (S.G.) ، 11.21= (T.I.) ،1961 = (N_2) Actual eggs ، 3936= Expt. Eggs

Table (3): The life table of whitefly *S. phillyreae* on citrus trees in Baghdad for the month of August 2014

X	Lx	dxf	dx	100qx	Sx	K-value
Eggs (N_1)	1961	Infertility	255	15	0.85	0.304
		Predators	33	1.68	0.98	
		Fungus	6	0.31	0.99	
			294	16.99	0.94	
Nymphs (1-3)	1667	Parasitoid	18	1.08	0.99	0.310
		Predators	9	0.54	0.99	
		A biotic factor	5	0.30	0.99	
			32	1.92	0.99	
Pupae	1635	Parasitoid	10	0.61	0.99	0.311
		Predators	7	0.43	099	
		A biotic factor	11	0.67	0.99	
			28	1.71	0.99	
Adult	1607	Sex ratio♀♀ (75%)	402	25	0.75	0.312
Females x2(N_3)	1205	Photoperiodism	0.13	1	0.99	0.325
Normal females x2	1205	Adult mortality	1204	0.013	0.99	0.325
Generation totals	1		1960			1.887

1.6 = (S.G.) ، 0.62 = (T.I.) ، 1208 = (N_2) Actual eggs ،95617 = Expt. Eggs

Table (4): The life table of whitefly *S. phillyreae* on citrus trees in Baghdad for the month of September 2014

X	Lx	dxf	dx	100qx	Sx	K-value
Eggs (N_1)	1208	Infertility	157	15	0.85	0.325
		Predators	23	1.91	0.98	
		Fungus	10	0.83	0.99	
			190	17.74	0.96	
Nymphs (1-3)	1018	Parasitoids	21	2.06	0.98	0.332
		Predators	12	1.18	0.99	
		A biotic factor	8	0.79	0.99	
			41	4.03	0.99	
Pupae	977	Parasitoids	13	1.33	0.98	0.335
		Predators	8	0.82	0.99	
		A biotic factor	12	1.23	0.99	
			33	3.38	0.99	
Adult	944	Sex ratio♀♀ (75%)	236	25	0.75	0.336
Females x2(N_3)	708	Photoperiodism	7.08	1	0.92	0.350
Normal females x2	701	Adult mortality	694	0.19	0.99	0.351
Generation totals	7		1194			2.029

1.71 = (S.G.) ، 0.89 = (T.I.) ،1073 = (N_2) Actual eggs ، 5617= Expt. Eggs

Table (5): The life table of whitefly *S. phillyreae* on citrus trees in Baghdad for the month of October 2014

X	Lx	dxf	dx	100qx	Sx	K-value
Eggs (N_1)	1073	Infertility	15	0.85	0.85	0.329
		Predators	37	3.45	0.97	
		Fungus	20	1.86	0.98	
			72	6.61	0.93	
Nymphs (1-3)	1001	Parasitoid	24	2.40	0.99	0.333
		Predators	15	1.50	0.99	
		A biotic factor	10	0.99	0.99	
			49			
Pupae	952	Parasitoid	15	1.58	0.99	0.336
		Predators	9	0.95	0.99	
		A biotic factor	15	0.58	0.99	
			39	3.11	0.99	
Adult	913	Sex ratio♀♀ (75%)	228	25	0.75	0.338
Females x2(N_3)	685	Photoperiodism	6.85	1	0.99	0.353
Normal females x2	678	Adult mortality	671	0.02	0.99	0.398
Generation totals	7		1066			2.155

1.57 = (S.G.) ، 1.20 = (T.I.) ،1285 = (N_2) Actual eggs ، 54324 = Expt. Eggs

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