IMPACT OF PLANTING DATES ON INFESTATION OF COWPEA PLANTS WITH SOME PESTS

EL-KHAYAT, E.F.[1], F.A. EL-LAKWAH[1], G.H.H. RADY[1], MONA M. A. GHALLAB[2], B.S. WAHBA[2]

1. *Plant protection Department, Faculty of Agriculture, Moshtohor, Benha University*
2. *Plant Protection Research Institute, ARC, Dokki, Giza*

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Abstract

Two years of field studies were carried out to study the effect of three planting dates of cowpea, April 1st, 15th and 30th, on the levels of infestation by different pests, namely: *Tetranychus urticae, Tetranychus cucurbitacearum* and whitefly, *Bemisia tabaci* as well as *Thrips tabaci*. Also, the resultant yield was recorded.

Data revealed that the numbers of different stages of *T. urticae* were increased by delaying the planting date on cowpea plants. Plant cultivated on April, 1st, 15th and 30th harbored 0.48, 1.40 and 2.15 eggs, 0.42, 0.72 and 1.31 mobiles, 0.90, 2.11 and 3.46 totals / leaflet, respectively.

The earliest planting date harbored the fewest mean number of *T. cucurbitacearum*, eggs, mobiles and total (0.40, 0.03 and 0.43/leaflet, respectively).

Lately sowing correlated with plants showed the lowest infestation by different stages of white fly, *B. tabaci* [0.33 (eggs/leaflet), 0.12 (nymphs/leaflet) and 0.04 (pupae/leaflet), 0.03 (adult/plant) and 0.51 (individuals of total stages)].

The results included that the abundance of *Thrips tabaci* individuals increased only in the early planting date, mean rates of infestation in two seasons were (0.06, 0.05 and 0.02 nymphs, 0.01, 0.01 and 0.00 adult, 0.06, 0.05 and 0.02 individuals of total stages/leaflet respectively).

Finally, the sowing in the earliest date (April, 1st) lead to have the highest dry pods' yield and the lowest infestation by the spider mites, *T. urticae & T. cucurbitacearum.*

INTRODUCTION

Cowpea, *Vigna unguiculata* Sav. is considered one of the most important leguminous vegetable crops in Egypt.

Vegetable crops shelter several mite species, some of which are phytophagous causing qualitative and quantitative reduction in the yield (Abdel-Salam *et al.,* 1980). They could induce a pronounced effect on the vegetable plants. Among these injurious mites are *Tetranychus urticae* Koch, *T. cucurbitacearum* Sayed and *Eutetranychus orienlalis* Klein. The former species is the most injurious phytophagous mite on leguminous plants. It feeds on the plant sap causing serious damage according to the

rate of infestation. It is also the most abundant species on leaves of vegetable plants in both open field and plastic houses.

The whiteflies (Aleyrodidae) are plant sap sucking insects, when highly abundant, they are extremely injurious. High infestation cause leaf drop and may prevent the fruit maturation. These insects also produce sticky honeydew which causes damage to the crop (Perkins, 1983 & 1987). The whiteflies are minute, usually inconspicuous and many are extremely injurious. They are efficient vectors of plant viruses (Bock *et al.,* 1974).

The onion thrips, *Thrips tabaci* Lind. is well known as a serious pest of onion in Egypt. Nymphs and adults of this insect suck the plant sap (Chapman *et al.* 1947) and (Pearson, 1958) indicated that heavy thrips infestation to onion plants may cause sterility to the plant.

The present study was carried out to shed light on the effect of planting dates on the infestation by such cowpea pests and also on the resultant yield.

MATERIALS AND METHODS

Seeds of "Dokki 331" variety of cowpea were sown in two successive years 2007 and 2008 at three different planting dates, April 1st, 15th and 30th to evaluate the effect of sowing date on the infestation by the four sap sucking pests, *Tetranychus urticae, Tetranychus cucurbitacearum, Bemisia tabaci* and *Thrips tabaci* In each season, the experiment area (46.2 m^2) was divided into 9 plots, each of 4.2 m^2. Plots were distributed in a randomized complete block design with three replicates for each date. Normal agricultural practices of cowpea cultivation were followed. All plots received the normally recommended agricultural practices and no insecticides were applied in the experiment throughout the two seasons. At the end of each season, the dry pods of each planting date were picked and weighted to estimate the final yield.

Sampling technique

Sampling started 24 days after sowing of cowpea seeds and continued weekly until harvest for 11 weeks throughout the two years 2007 & 2008. Adults of *B. tabaci* were counted on 10 plants / replicate in the morning before sunrise when they are more stable on the undersides of leaves. Samples of 10 leaflets from each replicate were randomly picked from three levels of plant, then kept in tightly closed paper bags and transferred to the laboratory where the observed pests were counted in the same day by the aid of stereomicroscope. The total individuals of *T. urticae, T. cucurbitacearum* (eggs and moving stages), *B. tabaci* (eggs, nymph and pupal stages)

and *T. tabaci* (nymphs and adults) were estimated by counting the total numbers on the upper and lower surfaces of the leaflet.

Statistical analysis

Analysis of variance for each experiment was conducted by F test and the means were compared according to Duncan's multiple range tests (Snedecor and Cochran 1981). The back word regression analysis method was performed with the Program Proc. Reg. of SAS (SAS Institute Inc., 1988).

RESULTS AND DISCUSSION

Effect of Planting Date on Pests' Infestation to Cowpea Variety "Dokki 331"

1. *Tetranychus urticae* (Koch)

a) In 2007 season

Infestation by eggs, mobiles and their total population of the two spotted spider mites, *T. urticae* to cowpea leaves planted in three different dates "April, 1st, 15th and 30th" were tabulated in Table (1). The infestation by *T. urticae*, eggs, mobiles and total were heavier as the planting date was delayed, i.e., the heaviest infestation rates were recorded in the latest date "April, 30th", as the seasonal mean counts were 2.21, 1.33 and 3.54 / leaflet for eggs, mobiles and total population, respectively. These counts were higher than those recorded from intermediate planting date (1.61, 0.81 and 2.42/ leaflet) for the same stages mentioned before respectively. The slightest means of infestation by *T. urticae,* eggs, mobiles and total were recorded on plants of the earliest planting date "April, 1st" being 0.32, 0.32 and 0.64/leaflet, respectively.

Statistical analysis of the obtained data using "F" and "L.S.D." values indicated significant differences in the rate of infestation by *T. urticae,* eggs, mobiles and total stages to the three tested planting dates in 2007 season.

b) In 2008 season

Data showed in the same table that the population of *T. urticae*, eggs, mobile stages and total numbers on cowpea plants in the second season of study (2008) was increased by delaying the planting date. The first planting date (April, 1st) cowpea leaves harbored the lowest seasonal mean count of *T. urticae* 0.64, 0.52 and 1.16 / leaflet for eggs, mobiles and total stages, respectively. On the contrary, the latest date (April, 30th) recorded the highest population 2.09, 1.28 and 3.38 / leaflet for the same stages, respectively. Sowing on (April, 15th) led to intermediate infestation as a leaflet harbored mean of 1.18, 0.62 and 1.80 for eggs, mobile stages and total, respectively.

Statistical analysis of data show significant differences between the planting dates and infestation by *T. urticae* eggs, mobiles and total.

Table 1. Effect of planting dates on the populations of different stages of *Tetranychus urticae* (Koch) on the cowpea, "Dokki 331" variety during 2007 & 2008 seasons.

Planting Date	2007			2008		
	Eggs	Mobile	Total	Eggs	Mobile	Total
1st April	0.32 b	0.32 b	0.63 b	0.64 b	0.52 b	1.16 b
15 April	1.61 a	0.81 ab	2.42 ab	1.18 ab	0.62 ab	1.8 ab
30 April	2.21 a	1.33a	3.54 a	2.09 a	1.28 a	3.38 a
F	5.04	3.30	4.94	2.89	2.51	0.55
L.S.D. 0.05	**1.20**	**0.77**	**1.83**	**1.20**	**0.73**	**1.79**

LSD significant at 5% level

Data revealed that the numbers of different stages of *T. urticae* were increased by delaying the planting date on cowpea plants, this data go in line with the finding of Wahba (2000) who studied the effect of three planting dates on pest infestation to cowpea plants (Cream7 variety) and he proved that the earliest planting of cowpea "April 1st" led to lower infestation with *T. urticae* which harbored significantly lower numbers of pest (4.35 moving stages / leaflet), while the second and third planting dates April 15th and 30th revealed the higher infestation (4.45& 4.50 moving stages/leaflet), respectively.

2. *Tetranychus cucurbitacearum*

a) In 2007 season

Regarding the data recorded in Table (2) which show mean counts of different stages of *T. cucurbitacearum* that infesting cowpea plants in three different planting dates in 2007, during this year of investigation, it was clear that the first planting date "April, 1st" harbored the fewest populations of eggs, 0.09 eggs / leaflet. On the contrary, the last planting date "April, 30th" suffered the highest infestation of *T. cucurbitacearum*, eggs 0.60/ leaflet but it was insignificantly higher than first planting date. Also, the second planting date "April 15th" showed seasonal mean populations of 0.49 eggs / leaflet and it was also insignificantly higher, than the first planting date but insignificantly lower than the third planting date.

Referring to the mobile stage of *T. cucurbitacearum*, the slight effect was 0.01 mobiles/leaflet followed with the third planting date, which harbored a seasonal mean counts 0.07 mobiles / leaflet, being significantly higher than the first date, while, the second planting date recorded the highest infestation with mean counts 0.12 mobiles/leaflet being significantly higher than two other plantations. The average total of *T. cucurbitacearum*, infesting leaves of cowpea plants planted in three different dates took the same trend as occurred in the case of eggs, i.e., increased infestation

as the planting date was delayed. The heaviest infestation, recorded was 0.67 individual / leaflet in the last planting date April, 30th, while the lowest mean infestation was 0.10 during the first planting date April 1st. Statistical analysis showed significant differences between means of *T. cucurbitacearum* population for the first planting date and the two other planting dates but insignificant between the second and third planting dates to the infestation by *T. cucurbitacearum,* eggs, mobiles and total stages.

Table 2. Effect of planting dates on the populations of different stages of Tetranychus cucurbitacearum on the cowpea, "Dokki 331" variety during 2007 & 2008 seasons.

Planting Date	2007			2008		
	Eggs	Mobile	Total	Eggs	Mobile	Total
1st April	0.09 b	0.01 b	0.10 b	0.71 a	0.06 a	0.76 a
15 April	0.49 a	0.12 a	0.61 a	0.42 a	0.08 a	0.51 a
30 April	0.60 a	0.07 a	0.67 a	0.55 a	0.06 a	0.62 a
F	4.90	9.42	5.65	0.55	0.58	0.42
L.S.D. 0.05	**0.340**	**0.048**	**0.368**	**0.53**	**0.048**	**0.556**

LSD significant at 5% level

b) In 2008 season

Also, Table (2) shows the mean counts of *T. cucurbitacearum* in the three planting dates. The heaviest infestation occurred on leaves of cowpea in the first planting date "April, 1st" with mean count 0.71 eggs/leaflet, being higher than the seasonal mean count of *T. cucurbitacearum* eggs recorded in the third planting date (0.55 eggs/leaflet) while the lowest infestation with *T. cucurbitacearum* eggs (0.42/leaflet) was recorded on cowpea leaves of the second planting date (April, 15th). Statistical analysis showed insignificant differences between means of the eggs for the 3 tested planting dates.

The infestation by *T. cucurbitacearum,* mobiles to cowpea were lower than those mentioned in the previous stage. The mean seasonal populations of *T. cucurbitacearum* recorded were 0.06, 0.08 and 0.06 moving stages/ leaflet for first, second and third planting dates, respectively. It was observed that the differences between the seasonal counts of the three planting dates were insignificant. The same trend of infestation by *T. cucurbitacearum* eggs to cowpea plants of different planting dates was also detected with the average total number of stages of the same pest. The fewest seasonal mean counts were always recorded from plants planted in the second planting date "April, 15th" showing 0.51 individuals/leaflet, opposite to 0.76 individuals/leaflet on plants planted in the first planting date to the infestation by *T.*

cucurbitacearum, eggs, mobiles and total stages. The differences between mean counts of the three plantation dates were not significant. Significant in differences were more obvious in the first season than in the second (F value were 4.90 & 0.55 for eggs, 9.42 & 0.58 for mobile stages and 5.65& 0.42 for total stages), respectively.

Our results is agree with that of Abd El-Karim (2010), he proved that the population of mite gradually increased from mid April (12 individuals & 33 eggs / 20 leaflets) reached to (592 individuals & 603 eggs / 20 leaflets) at the end of May for common bean infestation.

Also, Mohamed (2004) recorded a peak of *T. cucurbitacearum* during his study on Faba bean , in April 15th .

3. Whitefly, *Bemisia tabaci* (Genn.)

a) In 2007 season

Infestation by *B. tabaci* immature & adult stages to cowpea leaves planted in three dates "April, 1st, 15th and 30th" in season 2007 are tabulated in Table (3). The infestation by *B. tabaci*, eggs, nymphs and their total recorded the heaviest rates in the second planting date (April, 15th) with mean counts 0.19, 0.09 and 0.32 leaflets, respectively. These counts were higher than those recorded from the earliest planting date 0.14 (eggs/leaflet), 0.07 (nymphs/leaflet) and 0.23 (Individuals of total stages). However, the lightest mean infestation by the previous stages were recorded on plants of the third planting date "April, 30th" being 0.11 (eggs / leaflet), 0.06 (nymphs/leaflet) and 0.20 (individuals of total stages). These mean counts were lower than those recorded on leaves of the two other plantations dates. In case of *B. tabaci*, pupae infestation, a low level of infestation was observed in the three planting dates with mean counts of 0.01, 0.02 and 0.01 pupae / leaflet for first, second and third planting dates, respectively. Also, the infestation by *B. tabaci*, the adults' recorded low levels of infestation with mean counts 0.02 adults / plant in the three planting dates.

Statistical analysis of data show insignificant differences between the planting dates and infestation by *B. tabaci* nymph, pupae and adult stages while eggs and total stages recorded significant differences.

b) In 2008 season

In the same table show relative population densities of *B. tabaci* on cowpea variety (Dokki 331) in three planting dates (April, 1st, 15th and 30th). The infestations of whitefly, *B. tabaci* recorded were higher in season 2008 than 2007 season, also indicating immature & total stages of *B. tabaci* to three planted plants by the same direction of infesting level.

The lowest infestation levels by *B. tabaci* immature & totals occurred on third planting date (April, 30th) which harbored a seasonal mean counts 0.55, 0.18, 0.07/leaflet for eggs, nymphs and pupae, respectively, and 0.82 individuals of total stages. On the other hand, the highest infestation by the pest recorded on the second planting date (April, 15th) being 1.61, 0.32 and 0.17/leaflet for the previous stages, respectively, and 2.15 individual of total stages, while, first planting date show intermediate rate of infestations by immature and totals throughout this season with mean counts 0.80, 0.21and 0.13/leaflet for eggs, nymphs and pupae, respectively, and 1.20 individuals of total stages. The infestations by *B. tabaci*, adults trend to descend by delaying the planting date being 0.06, 0.05 and 0.03 adults/plant for first, second and third planting dates, respectively.

Table 3. Effect of planting dates on the populations of different stages of Bemisia tabaci (Genn.) on the cowpea, "Dokki 331" variety during 2007 & 2008 seasons.

Planting Date	2007					2008				
	Eggs	Nymph	Pupae	Adult	Total	Eggs	Nymph	Pupae	Adult	Total
1st April	0.14ab	0.07 a	0.01 a	0.02 a	0.24ab	0.80b	0.21ab	0.13ab	0.06a	1.20b
15 April	0.19 a	0.09 a	0.02 a	0.02 a	0.32a	1.61a	0.32a	0.17a	0.05a	2.15 a
30 April	0.11 b	0.06 a	0.01 a	0.02 a	0.20b	0.55b	0.18b	0.07b	0.03a	0.82 c
F	2.73	0.56	1.03	0.41	3.01	23.75	2.59	3.13	0.82	29.40
L.S.D. 0.05	**0.07**	**0.05**	**0.02**	**0.02**	**0.09**	**0.32**	**0.13**	**0.08**	**0.05**	**0.35**

LSD significant at 5% level

Statistical analysis of data show significant differences between planting dates and infestation by *B. tabaci* except for adults show insignificant differences.

The third planting date April 30th in the two seasons 2007 and 2008 harbored lower number of *B. tabaci* in all its stages than the first and second planting dates "April, 1st and 15th. This indicating that the third planting date is more resistant to whitefly infestation than the two other planting dates which be considered as more susceptible to whitefly infestation. This data in agreement with Paiva and Goulart (1995), they studied the fluctuation of *B. tabaci* population on bean plants and recorded the peak of the pest always in early sowing date (March) while later sowing date (April) recorded the fewest infestation.

Moreover, Shalaby (1998) stated in his study that the late planting date (March 30th) of common bean, *Phaseolus vulgaris* L. received the lowest infestation of *B. tabaci* stages in Qualubia Governorate (Egypt), while the earliest planting dates, March 1st and 15th were associated with the highest infestation rates by this pest species.

On the other hand, data obtained by Abd El-Karim (2010) in Fayoum recorded the population of *B. tabaci* in mid April in few numbers and increased to reach its peak (46 nymphs / 20 leaflets) in the third week of May then the population sharply decreased in late May (17 nymphs / 20 leaflets).

4. *Thrips tabaci*

a) In 2007 season

The relative population densities of *T. tabaci* nymphs and adults that infested leaves of cowpea variety (Dokki 331) after sowing three planting dates during 2007 season were shown in Table (4). During the first season, the infestation by *T. tabaci* nymphs decreased by delaying the planting date. As for the first planting date (April, 1st), cowpea leaves harbored the highest seasonal mean count of *T. tabaci* (0.08 nymphs/leaflet) while the latest date (April, 30th) recorded the lowest populations (0.01 nymphs/leaflet) this mean that the third planting date was opposite to infestation by *T. tabaci* nymphs. Sowing on April, 15th led to intermediate infestation, as a leaflet harbored a mean count of 0.06 nymphs.

Data show that there was no infestation to the cowpea leaves by *T. tabaci* adults in the three planting dates. This is mean that three planting date to infestation by adults were opposed. Statistical analysis of data show significant differences between planting dates with their infestation by *T. tabaci* nymphs.

Table 4. Effect of planting dates on the populations of different stages of Thrips tabaci on the cowpea, "Dokki 331" variety during 2007 & 2008 seasons.

Planting Date	2007			2008		
	Nymph	Adult	Total	Nymph	Adult	Total
1st April	0.08 a	0	0.08 a	0.03 a	0.01 a	0.04 a
15 April	0.06 a	0	0.06 a	0.03 a	0.01 a	0.04 a
30 April	0.01 b	0	0.01 b	0.02 a	0.00 a	0.02 a
F	6.68	0.0	6.68	0.41	1.01	078
L.S.D. 0.05	**0.04**	**0.0**	**0.04**	**0.03**	**0.01**	**0.03**

LSD significant at 5% level

b) In 2008 season

Infestation by nymphs & adults of *T. tabaci* to cowpea leaves planted in three different dates (April, 1st, 15th and 30th) in 2008 are tabulated in the same Table (4).

Infestation by *T. tabaci*, nymphs adults and total population were higher on leaves in the first and second planting date (April, 1st and April, 15th) as the seasonal mean counts were 0.03 & 0.03 nymphs/leaflet, 0.01 & 0.01 adults / leaflet and 0.04 & 0.04 individuals/leaflet for their total, respectively. These counts were higher than

those recorded from the last planting date 0.02, 0.00 and 0.02/leaflet for nymphs, adults and total numbers, respectively.

Statistical analysis show, insignificant differences between tested planting dates, to infestations.

The population of *T. tabaci* started at the mid of April in little number and increased to reach peak in the third week of May, the result obtained by Helal *et al.* (1996) had the same trend as our result, they indicated that the mean number of *T. tabaci* appeared at May 4th increased gradually to reach its maximum level of infestation during the mid of May, then it was disappeared at the end of May.

Also, Wahba (2000) studied the infestation of cowpea plant (Cream7, variety) by thrips in three planting dates April 1st, 15th and 30th, he proved that the least infestation rates by thrips were recorded in the late planting date.

5. (A) Effect of three different dates on the resultant yield

Data tabulated in Table (5) show that cowpea plants of Dokki 331 variety which sown in the first date (April, 1st) revealed the highest weight of dry pods throughout 2007 and 2008 (0.68 and 1.02 tons/fed. resp.) followed by plants which sown in the second planting date (April, 15th) (0.46 and 0.68 ton/fed.) being insignificantly lower than the first planting date and insignificantly higher than the third planting date. The last planting date (April, 30th) had the lowest weight of dry pods throughout the same mentioned seasons (0.36 and 0.54 tons/fed. respectively) being significantly lower than the first planting date and insignificantly lower than the second planting date.

Table 5. Effect of different planting dates on dry pods' yield (ton/fed.) of cowpea, Dokkii 331 variety during 2007 & 2008 seasons.

Planting date	Weight of dry pods/feddan	
	2007	2008
1st April	0.68	1.02
15 April	0.46	0.68
30 April	0.36	0.54
L.S.D. 0.05	**0.28**	**0.42**

The same result was recorded by Wahba (2000), he studied the effect of the three planting dates on the rate of infestation by different pests and on the yield production. He proved that the highest yield was associated with the sowing in the first planting date (285.75 kg. / Feddan) followed by the third planting date (256.96 kg. / Feddan), while the sowing in the second planting date was recorded the lowest yield of dry pods (218.64 kg. / Feddan).

(B) Effect on yield by different stages of pest attack cowpea variety, Dokki 331 which planted in three different dates

a) In 2007 season

As shown in Table (6) 54% of the total variation could be followed the accepted variable X_1 due to their significant contribution to variation on dry pods' yield. While 46% could be due to the removable variables, X_2, X_3, X_4, X_5 and X_6. X_1 had been accepted by the lowest CP and Mse.

The best predication equation was: $\hat{y} = 0.659\text{-}0.018$

b) In 2008 season

Data are presented in Table (7) show the stepwise regression for selected variables: X_1 was accepted variable due to their significant connection to variation in dry pods' yield, whereas 33% of the total variation could be attributed to this variable. The remainder of the total variation could be due to removable variables X_2, X_3, X_4, X_5 and X_6. The accepted X_1 had the lowest CP and Mse with values -0.46 and 0.051, respectively. The best predication equation was: $\hat{y} = 0.959\text{-}0.024$.

Table 6. Statistical parameters of the effect of different stages of four sap sucking pests on the yield of the three planting dates during 2007 season

Step	Variable removed	Action	Variables		Multiple		R^2 change	Multiple R^2 Adj.	Significant probability	CP	MSE	Regression equation					
			+ in/- out	Included	R	R^2						b_0	b_{X1}	b_{X2}	b_{X3}	b_{X4}	b_{X5}
Zero	0		+o	5	0.73	0.53		-0.08		7.00	0.031	0.658	-0.015	-0.035	0.013	-0.192	0.049
1	2	Removed	-1	5	0.77	0.60	0.06	0.19	0.96	4.00	0.024	0.669	-0.015	-0.033		-0.188	0.047
2	3	Removed	-2	4	0.77	0.59	-0.01	0.34	0.79	2.07	0.019	0.659	-0.17			-0.188	0.046
3	6	Removed	-3	3	0.75	0.57	-0.02	0.42	0.65	0.21	0.017	0.694	-0.017			-0.198	
4	5	Removed	-4	1	0.74	0.54	-0.02	0.48	0.59	-1.62	0.015	0.659	-0.018*				
5	1		-5	1	0.00	0.00	0.54	0.00	0.02	0.42	0.029	0.498					

Table 7. Statistical parameters of the effect of different stages of four sap sucking pests on the yield of the three planting dates during 2008 season

Step	Variable removed	Action	Variables		Multiple		R^2 change	Multiple R^2 Adj.	Significant probability	CP	MSE	Regression equation						
			+ in/- out	Included	R	R^2						b_0	b_{X1}	b_{X2}	b_{X3}	b_{X4}	b_{X5}	b_{X6}
Zero	0		+6	6	0.84	0.70		-0.19		7.00	0.079	0.823	-0.025	0.057	-0.067	0.253	0.445	0.111
1	6	Removed	-1	5	0.84	0.70	0.00	0.21	0.94	5.01	0.053	0.827	-0.025	0.057	-0.067	0.259	0.446	
2	2	Removed	-2	4	0.84	0.70	0.00	0.40	0.87	3.03	0.040	0.834	-0.024		-0.065	0.271	0.492	
3	3	Removed	-3	3	0.79	0.62	-0.08	0.39	0.32	1.58	0.041	0.635	-0.023			0.259	0.603	
4	4	Removed	-4	2	0.72	0.52	-0.10	0.36	0.29	0.24	0.043	0.820	-0.026				0.524	
5	5	Removed	-5	1	0.57	0.33	-0.19	0.23	0.16	-0.46	0.051	0.959	-0.024*					
6	1		-6	0	0.00	0.00	-0.33	0..00	0.10	-0.27	0.067	0.747						

	Variable name entered or removed in analysis	
1	*Tetranychus urticae*	"Mobile"
2	*Tetranychus cucurbitacearum*	"Mobile"
3	*Bemisia tabaci*	"nymph"
4	*Bemisia tabaci*	"adult"
5	*Thrips tabaci*	"nymph"
6	*Thrips tabaci*	"adult"

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تأثير مواعيد الزراعة على إصابة نباتات اللوبيا ببعض الآفات

عزت فرج الخياط [١] ، فارس أمين اللقوة[١] ، جـاد حمادة حسن راضى[١] ،
منى محمد أحمد غلاب[٢] ، باسـم صـبرى وهبـه[٢]

١. *قسم وقاية النبات – كلية الزراعة – جامعة بنها*
٢. *معهد بحوث وقاية النبات – مركز البحوث الزراعية – الدقى – الجيزة*

تعتبر اللوبيا من أهم المحاصيل البقولية المزروعة في مصر بالحقل المفتوح وتحت الصوب. ازدادت المساحة المنزرعة بها خلال السنتين الأخيرة خاصة فى أراضي الاستصلاح الجديـدة للاسـتهلاك المحلـي والتصدير للأسواق الدولية.

أظهرت الدراسة الحالية خلال الموسمين ٢٠٠٧ /٢٠٠٨ في مزرعة كلية الزراعة التجريبية بمشتهر تأثير ميعاد الزراعة على معدل الإصابة بالعنكبوت الأحمروالأخـضر (البـيض والأطـوار المتحركـة) *Tetranychus urticae, T. cucurbitaceurum* ، والذبابة البيضاء *Bemisia tabaci* (البيض و الحوريات و العذراى والحشرة الكاملة) ، و التربس *Thrips tabaci* (حوريات وحشرات كاملـة) وأيـضاً على المحصول الناتج، وكان ملخص النتائج كالتالي:

١- Tetranychus urticae

أظهرت البيانات أن أعداد الأطوار المختلفة من *T.urticae* ازدادت بتأخير ميعاد الزراعـة علـى نباتات اللوبيا. فقد سجلت الإصابة في النباتات المزروعة في أول ونصف وآخـر إبريـل (٠,٤٨، ١,٤٠ ، ٢,١٥ بيض)، (٠,٤٢ ، ٠,٧٢ ، ١,٣١ أطوار متحركـة) ، (٠,٩٠ ، ٢,١١ ، ٣,٤٦ إجمـالي أطـوار / وريقة تقريبا) .

٢- T.cucurbitacearum

أعطى ميعاد الزراعة المبكر أقل متوسط أعداد من بيض، وأطوار متحركة ، وإجمالي أطـوار مـن *T.cucurbitacearum* (٠,٤ ، ٠,٠٣ ، ٠,٤٣/ وريقة تقريباً) من ناحية أخري أعطـى ميعـاد الزراعـة المتأخرة أقل إصابة لطور البيض وإجمالي الأطوار فقط (٠,٠٥٨ ، ٠,٦٥ / وريقة تقريباً) بينمـا ارتبطـت الأطوار المتحركة بالميعاد المتوسط (٠,١٠ / وريقة).

٣- الذبابة البيضاء B.tabaci :

كان ميعاد الزراعة المتأخرة الأقل إصابة بالأطوار المختلفة من الذبابة البيـضاء *B.tabaci* ٠,٣٣ (بيض) ، ٠,١٢ (حوريات) ، ٠,٤ (عذراء / وريقة) ، ٠,٣ (حشرة كاملة/ نبـات) ، ٠,٥١ (فـرداً مـن إجمالي الأطوار) بينما أظهر ميعاد الزراعة المتوسط أعلي إصابة لنفس أطوار الذبابة البيـضاء B.*tabaci* ، ٠,٩٠ (بيض) ، ٠,٢١ (حوريات) ٠,١٠(عذراء / وريقة) ، ٠,٠٤ (حشرة/ نبات) ، ١,٢٤ (فـرداً مـن إجمالي الأطوار).

٤- التربس *Thrips tabaci* :

احتوت النتائج أن الإصابة بالتربس *T.tabaci* ازدادت فقط في ميعاد الزراعة المبكر . وكان متوسط معدل الإصابة (٠,٠٦ ، ٠,٠٥ ، ٠,٠٢ حوريات) ، (٠,٠١ ، ٠,٠١ ، صـفر حـشرة كاملـة)، (٠,٠٦ ، ٠,٠٥، ٠,٠٢ فرداً من إجمالي الأطوار / وريقة) تقريباً.

أظهرت النتائج أن ميعاد الزراعة المبكر (أول أبريل) كان أفضل ميعاد حيث كان الأقل في مـستوى الإصابة بنوعي العنكبوت الأحمر والأخضر و أعطى أعلي محصول من القرون الجافة.