Influence of Different Potassium Fertilizer Levels as a Soil and Foliar Treatments on the Population Densities and Infestations of Certain Pests Infesting Cantaloupe

Abd-Allah, A. A. A. * and Ammar A. E. **

* Vegetable Pests Research Dept., Plant Protection Research Institute, Agric. Research Center, Dokki, Giza, Egypt

** Spray Technology Research Dept., Plant Protection Research Institute, Agric. Research Center, Dokki, Giza, Egypt

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Abstract: Two field experiments were conducted in both locations, Facous, Sharkia and El-Kassasien, Ismailia Governorates to have additional information on the effect of different levels of potassium fertilizer as a soil treatments at 96 unit K_2O as a recommended rate and compared with 72, 48, 24 and 0.0 unit (K_2O) treatments as well as different rates from potassein 37% K_2O (foliar spray) as follows 0.0, 2, 4, 6 and 8 liters respectively by using two types of sprayer tools. All such treatments were subjected to investigate its effect on the population of *Titranychus urtica, Thrips tabaci, Bemisia tabaci* and *Aphis gossypii* infesting cantaloupe variety REGAL (M442) F1 Hybrid under field conditions at newly reclaimed sandy soils during 2007 season. Results obtained showed the followings: 1) Using zero unit of potassium as a soil treatment + 8 liter potassein 37% as a foliar fertilizer for cantaloupe had a strong positive effect on the numbers of moving stages of *T.urtica*, nymphs and adults of *T.tabaci*, nymphs and pupae of *B.tabaci* and individuals / leaf of *A.gossypii* at the end of inspection date (June ,1) for Facous district by using conventional and Komatsou motor sprayers which recorded (8 and 3), (10 and 4.1), (25.5 and 1.1) and (1.1 and 1) individual / leaf at 8 L. potassein 37% respectively, while at El-Kassasien district in (June, 7) ', treatment with 24 unit of potassium + 6 liter potassein 37% occurred high effect which recorded (7 and 2.2), (4.2 and 1.2), (4 and 1.2) and (4 and 2.1) individ. /leaf respectively. 2) Highly significant differences were occurred in the average numbers of population of pests between the types of two compination sources of potassium (soil and foliar treatments). 3) Two strong peaks at Facous district in both of *T.urtica* (April 6 and May 5), *T.tabaci* (May, 11 and 25); *B.tabaci* (April, 27 and Jun; 1). and *A.gossypii* (April, 6 and May, 18) while at El-Kassasien district one peak only was found for *T.urtica* at May, 10, *T.tabaci*, *B.tabaci* at (May, 17) and *A.gossypii* at May, 24. This technique (foliar fertilizer + suitable sprayer) may be considered as one of the important factors among of integrated crop management (I.C.M.).

Keywords: Sprayer, droplet, droplet size and number, cantaloupe, potassium fertilizer, *Tetranychus urtica, Thrips tabaci, Bemisia tabaci, Aphis gossypii*

INTRODUCTION

The increase of crop yield per unit area through extensive research has become an argent necessity to increase production and provide food security without pesticides to the people. Cantaloupe, *Cucumis melo*, is one of the most popular cucurbitaceous crops. It is planted for its fruits which are locally consumed or exported to increase national income. Its cultivated area reached about 65000 feddans in 2002 season with production of 458000 tons. Most cantaloupe cultivations were in Nubbaria district, Behera, Alexandria and Ismailia Governorates. The organic farms of cantaloupe which using biological control (cultural control) become the hope to increase the exportation amount of cantaloupe.

The open field plantation in the newly reclaimed sandy areas is considered one of the important aims of agricultural strategy of Egypt. Mass production of fresh vegetable crops of good quality is the target of this strategy. Because this areas is large space and provides the optimal macroclimatic conditions for the pests, there is always need for using pesticides to ensure high production. Therefore, the hazards of the extensive use of pesticides, especially those associated with the populations of pests and their natural enemies, are expected to be more pronounced. Healthy plants may tolerate pests more than normal plants.

Therefore, the system of plant protecting liquid fertilizers (PPLF) plays an important role. They supply the plant with all nutrients, simultaneously, protect it against pathogens. Accordingly the use of synthetic pesticides could be decreased or even eliminated (Nowosielski *et al.*, 1988). This may be due to the importance of potassium in wall cell plant construction. In other words, potassium fertilization is very important to protect the plant from heavy infestation of broad bean fly (Mohamed, Zeinab *et al.*, 1991). Agricultural chemicals have contributed greatly to the stabilization of the quantity and quality of agricultural crops. However, many times applications and nonselective use of insecticides, that were harmful to natural enemies have caused problem of insecticide resistance and resurgence. Depends on the formerly information's, the development of a new technique to supplement or replace insecticide spray is necessary to control the piercing and sucking pests. The use of selective agrochemicals, not to harm natural enemies, may improve plant health and its defense system towards insect invasion. Introduction of soil or and foliar fertilizers may decrease the number of insecticidal sprays required to protect the economic plant form piercing sucking pests attack. At present, a great interest has been given to liquid foliar fertilizers in Egypt, that may contain potassium only.

The objective of this study is to determine the effect of partial substitution of chemical potassium as a soil fertilizer by potassium solution as a foliar fertilizer with the same recommended rates for cantaloupe production. The interactive effects on vegetative growth, development of plant system and its tolerance to pest infestation will be investigated.

MATERIALS AND METHODS

Two field experiments were carried in both locations, Facous district, Sharkia Governorate and El-Kassasien district, Ismailia Governorate, representing the newly reclaimed sandy soils, during growing season, i.e. 2007 of cantaloupe. The aim is to investigate cantaloupe response to foliar application of potassium using two methods of application and the plot area was estimated 42 m^2 (7 rows of 7 m length, 80 Cm width and 40 Cm distance between hills). Precautions had been done to prevent contamination or drift among fertilization treatments by separating each two subplots with an empty row. Cantaloupe, variety REGAL (M442) F_1 Hybrid was planted.

The experimental layout used was split plot in a randomized complete blocks design with three replications. Potassium fertilizer rates were arranged in the main plots, two types of tools were assigned to the subplots. The sub plot area was estimated 42m^2 (7 rows of 7m length, 80 Cm width and 40 Cm distance between hills. All normal fertilization practices were followed in due time except potassium treatments. Potassium fertilization was applied using two methods.

1. Soil application by potassium sulphate (48% K_2O) at the indicated units afterwards.
2. Foliar application by potassien containing 37% potassium and producted by Soil, Water and Environment Research Institute.

Accordingly potassium treatments were as follows:

T1: 96 unit potassium / fed. (soil treatment) + 0.0 potassein 37% (foliar fertilizer) = (NPK standard and 100 kg potassium sulphate (48% K_2O) = 48 unit potassium).

T2: 72 unit potassium / fed. (soil treatment) + 2.0 liter potassein 37% / fed.

T3: 48 unit potassium / fed (soil treatment) + 4 L. potassein 37% /fed. .

T.4: 24 unit potassium /fed. (soil treatment) + 6 liter potassein 37% / fed. .

T.5: 0.0 unit potassium / fed. (soil treat.) + 8 liter potassein 37% /fed. .

The plants received two sprays of potassien, 45 and 60 days after sowing. The spraying solution volume was calculated according to the plot size = 42m^2 and was applied at April, 23 and May, 7 respectively.

Sprayers Used

Knapsack motor sprayer (Komatsou), Spraying volume 105 L/fed.

Knapsack power sprayer is portable, flexible and high – efficient equipment for plant protection. It is suitable for use in prevention of plant diseases and controlling pests in large plantations and crop fields where cotton, wheat, paddy, fruit, etc. are planted. It can also be used for applying fertilizer and granular chemicals, etc. This machine can also be suited for use in mountain area, hilly land and old pieces of land (Table, 1).

Conventional sprayer (variable pressure), Spraying volume 227 L/fed.

Three cards were fixed on left, middle and right sides of cantaloupe plants. Water sensitive paper (Ciba – Geigy) was used in this work. All cards were collected and transferred carefully to the laboratory for measurement and calculation of the deposited droplets.

Table (1): Technical specification

Specifications	Name
	KT – 26A (Komatsou)
Net weight (kg)	11.5
Capacity of tank (L)	26.0
Volume ratio of mixture fuel between petrol and mobile oil	Determined by the oil instruction
Fan speed (r/min)	7500-8000
Engine model	1E 40 FP – 3Z
Flow rate No. (4) (L)	3
Swath width (m.)	3
Spraying volume (L/fed.)	105

Notice: speed of applicator with spraying was 2.4 km/h spray line

Determination of spray deposits:

Number and size of drops on cards were measured by using a special scaled monocular lens (Struben) with a magnification of x 15. Spot diameter corrected, by knowledge of the spread factor, and calculated to obtain the VMP and number of these droplets in one square centimeter NMD was recorded according to Gabir, 1975/ 95 as follows:-

$$\text{Actual droplet diameter}\,(\mu m) = \frac{\text{Stain diameter of droplet}}{\text{Spread factor}}$$

All the agricultural practices were applied except chemical control (insecticides) was not applied to avoid effect on the pest populations.

Randomized samples of 10 cantalopue whole leaves / replicate were investigated before foliar fertilizer of potassium and after treatments to record the number of undeveloped stages of *B.tabaci*, moving stages of *T.urtica*, ovispring of aphid, *A.gossypii* and nymphs & adult of *T.tabaci*.The predators of these pests were counted. The post-count was undertaken weekly. Aid of hand lens (20 x) were used in the field.

All the obtained data were statistically analyzed for variance according to Snedecor and Cochran (1967). The mean values were compared with L.S.D. at 0.05% level for each season.

RESULTS AND DISCUSSION

Good agricultural practices e.g. applications of major and minor nutrient elements by proper method to a plant may increase the defense of this plant towards the invasion of piercing and sucking pests (Hashem 1998). With this background in mind, it seemed worthy to clarify the relationship between nitrogen, phosphorus and potassium fertilizers addition either in soil from one side or foliar from one side and the piercing & sucking pests infestation to cantaloupe from the other side.

A variety of methods is recommended for the protection of cucurbits including cantaloupe grown in the open field, against pests. The methods include the use of liquid fertilizers (potassium sulphate 37%), to increase the tolerance of cantaloupe plants to pest invasion.

Survey of pests attacking cantaloupe:

Results of the survey conducted in the two different growing areas of cantaloupe showed many species of noticeably pests caused different levels of damage. Some of these considered pests caused negligible damage to the plants but others may cause high damage. These pests were *T.urtica*, *T.tabaci*, *B.tabaci* and *A.gossypii*. These results agree with El-Maghraby *et al.*, (1989) who stated that the most common pests recorded on cantaloupe were *T.tabaci*, *A.gossypii*, *B.tabaci* and the mite, *T.arabicus*.

Effect of the foliar fertilizer:

Data in Tables 2 & 3 showed that the effects of foliar fertilization treatments at different levels of potassium were statistically significant on infestation parameter at the two districts. The highest average number of *T.urtica* (27.13 and 20.39), *T.tabaci* (20.80 and 11.67), *B.tabaci* (22.29 and 12.09) and *A.gossypii* (8.2 and 7.14) individuals / leaf were recorded as a general means of NPK treatment for all dates of inspections at soil fertilizer level of potassium (96 unit / fed.) and without foliar fertilization for both districts respectively, except in El-Kassasien district for *A. gossypii* where the high average of general mean (7.64 individuals / leaf) was recorded in soil treatment level 75% K (72 unit potassium / fed. + foliar fertilizer by 2 L. potassein 37% / fed.) = (T2).

This result agree with those obtained by Abd- El-Malak Violete, (2006), who found that the check treatment (100% NPK), full recommended dose (40 N+ 22.5 P_2O_2 + 96 K_2O Kg/fed.) recorded the highest average number of *T.urtica*, *B.tabaci*, *A.gossypii* and *T.tabaci* infested *Jerusalem artichoke*.

The lowest average mean numbers (mean of NPK) of the investigated pests at Facous district were recorded in zero potassium unit + 8 L. potassein 37% /fed. (T_5) except in the case of *B.tabaci* which was fertilized by (24 potassium unit + 6 L. potassein / fed.) = (T_4) which recorded the lowest average mean number (11.08 individuals / leaf). At El-Kassasien district, the lowest average number was recorded for *T.urtica* and *T.tabaci* at (T_4) (8.37 and 2.83 individuals/leaf) respectively, while *B.tabaci* and *A.gossypii* recorded the lowest mean average number at (T_5) which were 7.1 and 3.35 individuals/ leaf respectively.

This results agree with those obtained by El-Shemi *et al.*, (2002), who found that the bio-fertilizer Microbein + 50% from recommended dose (potassium 48% K_2O) offer a low infestation by *T.urtica*, *B.tabaci* and *M.persicae* infesting strawberry. Fawzy *et al.*, (2006) found that the population of mite infesting cantaloupe plants was 7.9 individuals /leaf at July, 21/ 2003 and ranged between 4.8 to 5.0 individuals/leaf at April, 20; 2004.

Population fluctuation of pests attacking cantaloupe:

Two spotted spider mite, T. urtica

The population fluctuation of the four sap-sucking pests was illustrated in Figure (1) at the two districts.

Generally, Facous district was characterized by the highest population of the 4 pests than El-Kassasien district. In Facous district of study (table 2), infestation with two spotted spider mite, *T.urtica* was generally low at the beginning of infestation on March, 9 (time of 1st inspection) which recorded 2.1, 0.0, 2.3, 3.2 and 2 moving stages / leaf in the treatments, T_1, T_2, T_3, T_4 and T_5 respectively.

But in El-Kassasien district (table 3) 1.1, 2, 5, 2 and 1 moving stages of the mite / leaf were recorded respectively. Then *T.urtica* was rapidly increased on the plants until reached 35.8 moving stages / leaf at April, 13 (the 1st peak in Facous district) and 35.6 moving stages/leaf at May, 10 (the 1st peak in El-Kassasien district).

Afterwards, the population levels at Facous district gradually decreased to reach 30.1 moving individual / leaf at April, 20 then increased again when reached 42.3 moving individual / leaf at May, 4 then gradually decreased until the end of inspections, while the population levels at El-Kassasien district, recorded 2nd peak at May, 5 when population reached 30.8 moving individual / leaf then gradually decreased till the end of season.

Thrips, T.tabaci

T.tabaci recorded two peacks in both of two districts, which recorded 35 and 40.1 individuals /leaf at May, 11 and 25 while at El-Kassasien district it recorded 26.5 and 14 individuals /leaf at May, 17 and Jun, 7 respectively.

These results agree with those obtained by Kamel *et. al.*, (2000) who found that , thrips (*T.babaci*) infestation was high from early May until mid-June, then was relatively lower until harvest by late July.

Whitefly, B.tabaci

The population of *B.tabaci* recorded one peak only for every district. The 1st one (Facous district) was recorded at the end of inspection in June, 1 (70.6 individuals / leaf), while the peak at El-Kassasien district was recorded at Jun., 7 (59.1 individuals / leaf).

Whitefly infestation increased progressively from first week of June at two districts. These results agree with those obtained by Kamel *et al.*, (2000), who found

that, whitefly, *B.tabaci* was increased progressively from mid june till the end July.

These results agree with those obtained by Boica-Junior –Al *et al.*, (2000) who stated that, the use of potassium chloride reduced the population density of whitefly, *B.tabaci* attacking common bean (*Phaseolus vulgaris*) cultivars.

Aphids, *A.gossypii*

The seasonal occurrence of aphids was investigated in cantaloupe field to increase the control efficiency of foliar fertilizer (T_1 to T_5). The patterns of aphid occurrence differed according to levels of the potassium fertilizer. There were three peacks in aphid population (April, 6, May, 18 and June, 1) in Facous district which recorded 8.1, 18 and 12.1 individuals/leaf respectively, whereas the two peacks in El-Kassasien district were around May, 3 and 24 which recorded 8.8 and 15.4 individuals/leaf respectively. Aphid increased rapidly between May, 4 to 18 at Facous district and between May, 10 to 24 at El-Kassasien district. These results agree with those obtained by Ehsan and Emden (2000), who found that, the highly level of potassium contradicted the development of aphid attacking wheat.

Zashckita - Rastenii (1991) stated that, a variety of methods is recommended for the protection of cucurbit plants in the open field against pests in the USSR. The methods include the use of liquid fertilizer (0.1% superphosphate extract with 0.5% potassium chloride solution), to increase resistance of cabbage to aphids.

Abd Allah (1999) found that, cucumber when fertilized by potassium as a foliar fertilizer (Stumo – Green) enhanced the defense system of plant and reduced white fly population.

Data in Tables 2 and 3 clearly showed that there were significant differences between T_2 and T_5 especially after dates of foliar fertilizer spraying. It's recorded (10 and 4) & (17.2 and 54) individual /leaf at Facous district (May, 11) and El-Kassasien district (May, 17 by conventional sprayer respectively. Whereas on using Komatsou motor sprayer, (8.8 and 2.2) & (7 and 3) individual /leaf respectively were recorded the same dates. This result may be contributed with biosynthesis in the leaves.

The result agree with those obtained by Wignarajah (1985), who showed that potassium is the predominant inorganic element in plants, with cytoplasmic concentrations exceeding 100 mM. On a dry weight basis, potassium often exceeds 1%. The K ions are known to be important in the activation of many enzymes of intermediary metabolism and biosynthesis. Also, potassium – deficient plants have reduced turgor and wilt very easily. Salem Nagwa *et al.*, (2005) found that, the effect of organic and chemical fertilizer separately reduced the fecundity to 26 nymphs /female on the bean plants cultivated in the soil treated with potassium sulphate.

Effect of sprayer type on the population density of 4 pests

Results in tables 3, 4 and 6 revealed that, cantaloupe cultivar had high variations between the two types of sprayer after both of two sprays until the end of inspection at two districts. Komatsou motor sprayer caused more decrease in population density of 4 pests than the conventional sprayers. This result was clearer at the end of inspection for two districts.

The population density of *T.urtica* recorded (17, 12, 18 and 8) moving stages /leaf using Komatsou and recorded (14.2, 8, 5.1 and 3) moving stage / leaf using conventional sprayer, while *T.tabaci* recorded (18, 15, 11.1, 10) and (7.8, 10, 5 and 4.1) individuals/leaf, *B.tabaci* recorded 62, 37, 28.4 and 25.5) and (26, 20, 14 and 11) individuals/leaf respectively. On the other hand, the decreased population density for *A.gossypii* was nearly after using two types of sprayers.

The same trend was obtained after using two types of sprayers at the last inspection of El-Kassasien district.

This findings due to the droplet spectrum deposited on leaves of cantaloupe plants, which proved to be sufficient in number and suitable in size and good distribution with Komatsou motor sprayer than Conventional sprayer. Komatsou motor sprayer gave droplet numbers ranged between 87 to 187 N/cm^2 and the size of droplets ranged between 250 to 321 µm. On the other hand, conventional sprayer gave poor droplets / cm^2 ranged between 53 to 13 N/cm^2 and bigger size droplets ranged between 480 to 610 µm.

That population density of natural enemies:

Data given in table 4 indicated clearly that average mean of individual numbers of five natural enemies in both districts / plot on cantaloupe under five treatments of different potassium levels (soil treatment and foliar fertilizer).

Concerning T_1, the highest average mean numbers of 1.19, 0.76, 0.76, 0.19 and 0.10 individual /plot were occurred by *Orius* spp., *Crysoperla carnae*, *Coccinella* spp., *Scolothrips longicornis* and *Ertmocerus mundus* at Facous district but it recorded 0.81, 0.33, 0.24, 0.19 and 0.06 individual /plot at El-Kassasien district respectively.

This phenomenon indicates clearly the drastic effect of foliar fertilizer levels (increasingly rate) application under field condition.

These results agree with those obtained by El-Maghraby, *et al.* (1989) who demonstrated the toxic effects of chemicals on predaceous and parasitic species in the tomato fields. Ali *et al.*, (2005) found that, the ladybird, *Coccinella septempunctata* was the most dominant common predator, but was present in only small numbers.

The yield

Data in table (5) generally showed that, fruit weight (Kg/plot) were deeply affected by treatments with different rates of potassium and followed by population density of infection with 4 pests. These findinges were found from data in table (5) which showed that, T_5 had the greatest values for fruit weight, while these parameters were deeply decreased by increasing of infection rate by 4 pests. T_5 gave the superior yield

Table (2): Effect of recommended rate of potassium (T_1) as a soil treatment compared with some substitution by different rates of (K) as a soil treatment and potassein 37% (T_2 to T_5) as a foliar fertilizers on the average numbers of *T.urtica* (moving stage), (nymphs & pupae) of *B.tabaci*, *T.tabaci* (individual/leaf) and (nymphs & adult) of *A.gossypii* at Facous district.

Pests	Sprayer	*Tetranychus urtica*					*Thrips tabaci*					*Bemisia tabaci*					*Aphis gossypii*					L.S.D. 0.05%
Dates		T_1	T_2	T_3	T_4	T_5	T_1	T_2	T_3	T_4	T_5	T_1	T_2	T_3	T_4	T_5	T_1	T_2	T_3	T_4	T_5	
9.3.2007		2.1 cd	0 h	2.3c	3.2a	2.0d	0.0h	1.2ef	0.0h	0.5g	2.1cd	0.0h	2.8b	1.3e	1.2ef	2.0d	0.0h	2.2cd	1.0f	1.1ef	1.0f	0.192
16.3.2007		4.6 c	3.0 e	7.0a	6.0b	7.0a	0.0I	2.0g	0.0I	2.0g	2.0g	2.6f	5.8b	3.0e	4.0d	0.0i	2.0g	4.4c	3.0e	3.2e	1.1h	0.248
23.3.2007		6 d	7.6b	10.1a	7.2c	6.1d	1.2J	2.8h	0.0K	3.8f	1.2j	1.8i	4.0f	2.0i	4.0f	3.3g	3.8f	6.2d	5.1e	5.0e	3.0h	0.288
30.3.2007		10.5 d	12.1c	14.5b	21.0a	15.0b	5.0I	7.0g	2.0L	5.0I	4.0j	3.1k	6.2h	8.6ef	9.0e	8.0f	6.2h	8.0f	5.5i	7.1g	2.8k	0.643
6.4.2007		22.6 c	20.2d	23.1c	24.1b	26.0a	3.3m	8.8I	7.7JK	16.1f	12.2h	7.0kl	6.2L	9.0i	18.2e	16.8f	8.1ij	1.7f	14.2g	17.0f	9.0i	0.994
13.4.2007		35.8 b	25.2e	34.0c	39.2a	30.3d	6.6O	11.0m	12.2L	21.0fg	17.1jk	9.3m	8.0b	20.2gh	22.0f	20.0gh	7.0no	19.0hi	18.1ij	16.1k	10.1n	1.27
20.4.2007	*	30.1 a	22.6b	22.2b	20.2c	21.0c	13.2f	12.3f	10.1g	16.8d	12.8f	13.0f	6.0j	16.0d	10.0g	14.4e	3.6k	7.7i	6.8ij	8.8h	8.7h	0.964
	**	30.1 a	20.3c	26.0b	12.4e	11.4f	13.2e	10.1g	9.1h	15.0d	11.0f	13.0e	4.1k	12.4e	8.0i	13.0e	3.6k	7.1j	8.2i	9.1h	7.1j	0.845
27.4.2007	*	37.6 a	27.0b	13.8g	8.0j	9.1I	22.0e	16.1f	19.2d	17.2e	10.0i	16.2f	5.1L	8.0J	7.3j	1.9h	4.4Lm	6.2k	4.0m	3.8m	5.1L	0.971
	**	37.6 a	22.0b	16.2c	9.4g	13.0de	22.0b	12.9def	13.3d	12.2ef	9.6g	16.2c	4.0L	7.0I	8.0h	12.0f	4.4L	4.1L	5.5jk	4.8kl	5.8j	0.869
4.5.2007	*	42.3 a	33.0b	10.2fgh	3.6k	12.1d	29.4c	10.0fgh	6.5J	9.1hi	10.2fgh	11.2def	9.8gh	11.8de	10.0efg	10.2fgh	10.0fgh	8.2i	6.1j	4.2k	6.0j	1.634
	**	42.3 a	23.2c	8.0gh	4.2k	10.3f	29.4b	13.2d	7.4hI	7.0i	6.0j	11.2e	3.0L	6.2J	4.1k	8.29g	10.0f	4.0k	3.1L	2.0m	3.7kl	0.741
11.5.2007	*	40.1 a	37.8b	8.6I	5.3k	7.0j	35.0c	6.2jk	4.2L	2.2m	5.2k	23.3d	20.8e	16.0f	12.1g	9.7h	12.1g	10.0h	7.0j	2.6m	4.0L	0.957
	**	40.1 a	27.2c	7.0g	2.0j	6.2g	35.0b	8.4f	3.0I	4.4h	2.0j	23.3d	3.2I	2.8IJ	2.8ij	6.29g	12.1e	8.8f	3.2i	2.1j	2.8ij	0.802
18.5.2007	*	28.0 c	18e	4.1k	6.1Ij	6.0hI	30.0b	7.3gh	8.0g	2.0L	5.2j	33.0a	30.0b	22.0d	17.2e	17.1e	18.0e	9.1f	6.1ij	2.0L	3.0L	0.959
	**	28.0 c	12.1e	3.0L	2.4Ln	2.8L	30.0b	3.8k	4.1k	2.1m	5.0j	33.0a	12.2e	11.2f	8.0h	7.1i	18.0d	9.0g	4.2k	0.0n	4.1k	0.632
25.5.2007	*	22.2 e	10 gh	1.0KL	8.2I	2.1K	40.1c	15.0f	11.0g	6.0J	9.8h	54.0a	44.0b	28.0d	22.6e	22.8e	7.8i	6.6j	1.2k	0.0L	2.1k	1.079
	**	22.2 e	10.1e	5.2I	6.2h	5.0I	40.1b	3.2j	7.7g	3.3J	8.1g	54.0a	17.1d	17.0d	10.0e	9.0f	7.8g	5.2i	5.1i	0.0L	2.2k	0.871
1.6.2007	*	20.0 e	17.0g	12.0I	18.0g	8.0L	28.2d	18.0g	15.0h	11.1ij	10.0jk	70.0a	62.0b	37.3c	28.4d	25.5f	12.1i	9.1kL	4.4m	1.2n	1.1n	1.365
	**	20.0 e	14.2f	8.0J	5.1L	3.0M	28.2c	7.8j	10.0I	5.0L	4.1L	70.0a	26.0d	20.0e	14.0f	11.0h	12.1g	7.1k	4.2k	1.0n	1.0n	0.976
Means		27.13	15.38	11.82	10.59	10.17	20.8	8.86	7.53	8.09	7.38	22.29	14.02	12.99	11.08	11.41	8.2	7.95	5.8	4.61	9.25	

* Conventional sprayer ** Knapsack motor sprayer (Komatsou)

able (3): Effect of recommended rate of potassium (T_1) as a soil treatment compared with some substitution by different rates of (K) as a soil treatment and potassein 37% (T_2 to T_5) as a foliar fertilizers on the average numbers of *T.urtica* (moving stage), (nymphs & pupae) of *B.tabaci*, *T.tabaci* (individual/leaf) and (nymphs & adult) of *A.gossypii* at El-Kassasien district.

Pests	Sprayer	*Tetranychus urtica*					*Thrips tabaci*					*Bemisia tabaci*					*Aphis gossypii*					L.S.D. 0.05%
Dates		T_1	T_2	T_3	T_4	T_5	T_1	T_2	T_3	T_4	T_5	T_1	T_2	T_3	T_4	T_5	T_1	T_2	T_3	T_4	T_5	
15.3.2007		1.1d	2.0c	5.0a	2.0c	1.0d	0.0f	1.0d	0.0f	0.0f	1.0d	1.0d	0.0f	0.2e	2.2b	1.0d	0.0f	0.0f	1.0d	1.0d	0.0f	0.161
22.3.2007		3.0e	6.2b	6.8a	4.6c	2.1f	0.0h	0.0h	1g	1g	0.0h	3.0e	2.1f	4.0d	6.0b	3.0e	0.0h	2.0f	4.0d	3.0e	0.0h	0.212
29.3.2007		4.6g	8.8c	10.0b	9.1c	6.5d	0.0k	1.0J	0.0k	1J	1.1J	5.6e	5.0p	9.1c	12.1a	4.0h	0.0k	1.0g	3.3h	5.5e	2.0I	0.332
5.4.2007		3.2k	17.1a	15.8b	10.2f	11.0e	1.1n	0.0O	2.1m	0.0O	0.0O	5.1I	6.2h	12.0d	15.0c	4.0J	1.1n	2.8kl	7.0g	6.0h	2.4Lm	0.509
12.4.2007		9.1f	14.1e	19.1b	17.8c	15.3d	1.8Lm	2.0L	3.0k	2.1no	0.0O	8.8fg	7.0h	19.8b	23.8a	7.0h	2.0I	5.1j	6.0I	3.2g	1.0mn	0.896
19.4.2007		15.2e	19.8cd	20.0c	16.2e	18.8d	5.0Lm	5.0ki	6.6jk	2.0p	3.8no	14.0f	10.8hi	27.1b	33.0a	12.0g	2.8pp	6.8j	10.2i	11.4gh	4.3mn	1.021
26.4.2007	*	22.1a	20.1b	18.1c	12.1f	17.1d	9.6g	8.0h	7.0hi	1.9k	1.0k	15.1e	11.2f	20.0b	22.4a	10.0g	7.0hi	8.0h	6.1i	5.1j	2.0k	0.989
	**	22.1a	15.1d	10.1f	7.6h	12.1e	9.6fg	6.0i	5.2j	2.0L	3.6k	15.1d	10.0f	19.0b	16.0c	9.0g	7.0h	4.1k	5.0j	4.0k	1.0m	0.836
3.5.2007	*	24.3a	22.8b	15.6e	10.1g	12.0f	11.8f	8.8h	7.8i	4.6k	3.5L	19.2c	16.6d	22.6b	16.6d	12.0f	8.8h	12.6f	6.0j	4.1kl	2.6m	0.938
	**	24.3a	17.1c	13.4d	10.9f	10.9f	11.8e	6.1i	4.0k	2.0m	1.1n	19.2b	11.2ef	17.0c	10.4f	8.0h	8.8g	5.0j	7.8h	3.0L	2.0m	0.770
10.5.2007	*	35.6a	20.2b	14.6f	7.1hi	11.0j	19.0c	14.0f	10.8g	3.8m	4.8klm	16.2e	20.1b	17.4d	8.0h	7.0hi	6.1ij	10.2g	5.0kl	4.1Ln	5.6jk	0.99
	**	35.6a	12.2e	10.2f	5.1j	6.8i	19.0b	5.1i	2.1L	2.1L	1.0n	16.2c	15.3d	12.4e	8.6gh	8.0h	6.1i	9.0g	4.2k	3.0i	1.0m	0.866
17.5.2007	*	29.6a	18.1e	11.1h	6.0j	8.1i	26.5b	20.8d	16.3f	8.8i	3.6k	22.5c	14.7g	10.3h	8.1i	6.0j	10.h6	17.2f	6.1j	3.2k	5.4j	1.116
	**	29.6a	12.0e	9.1g	4.1j	7.1h	26.5b	9.0g	5.2i	3.1k	3.4jk	22.5c	16.2d	12.0e	9.1g	7.0h	10.6f	7.0h	4.0k	5.0i	3.0jk	0.834
24.5.2007	*	30.8a	20.5b	13.5e	9.0h	12.0f	20.1b	12.0f	10.6g	5.8k	7.1ij	30.9g	15.0d	12.2f	6.2jk	7.0ij	15.4d	18.4c	12.6f	9.6h	7.8i	0.89
	**	30.8a	15.1d	12.0e	10.1f	10.2f	20.1b	7.1h	4.1k	3.2kl	5.6ij	30.9a	17.8c	10.0f	4.0k	6.0i	15.4d	8.1g	8.1g	5.1j	3.0L	0.772
31.5.2007	*	25.31b	19.3c	15.1e	10.0i	16.0d	12.19g	8.2j	12.8g	5.6L	7.2k	39.2a	12.29g	13.8f	10.6i	10.0i	12.5g	11.2h	10.1i	5.0L	8.6j	0.779
	**	25.31b	13.6c	9.0g	6.2j	7.4i	12.19d	6.0j	5.0k	2.1m	4.2L	39.2a	11.6e	8.0h	4.7kl	6.0j	12.5d	10.2f	7.0i	4.6L	5.2k	0.595
7.6.2007	*	18.1b	14.1c	12.0e	7.0i	13.1d	14.0c	10.8f	8.9g	4.2k	6.5ij	59.10a	8.98g	9.6g	4.0k	11.f0	8.0h	8.0h	6.6ij	4.0k	6.0j	0.716
	**	18.1b	8.0d	3.8g	2.2i	4.0g	14.0c	3.0h	2.0i	1.2j	2.0i	59.10a	8.0d	7.0e	1.2j	2.0i	8.0d	8.1f	6.0f	2.1i	4.0g	0.497
Means		20.39	14.84	12.22	8.37	10.13	11.67	6.73	5.73	2.83	3.24	22.10	11.0	13.18	11.19	7.1	7.14	7.64	4.38	4.85	3.35	

* Conventional sprayer ** Knapsack motor sprayer (Komatsou)

Table (4): Effect of some different rates from potassium fertilizer (T_1 to T_5) on occurrence the natural enemies on cantaloupe plants at Facous and El-Kassasien districts.

Predators & Parasitoids	Districts											
	Facous district						El-Kassasien district					
	T_1	T_2	T_3	T_4	T_5	L.S.D.$_{0.05\%}$	T_1	T_2	T_3	T_4	T_5	L.S.D.$_{0.05}$%
Orius spp	1.19 [a]	0.67 [b]	0.43 [d]	0.57 [c]	0.24 [e]	0.018	0.81 [a]	0.33 [a]	0.24 [b]	0.33 [a]	0.1 [c]	0.023
Crysoperla carnae	0.76 [a]	0.57 [b]	0.24 [d]	0.33 [c]	0.19 [e]	0.018	0.33 [a]	0.29 [b]	0.1 [d]	0.24 [c]	0.05 [e]	0.027
Coccinella spp.	0.76 [a]	0.24 [b]	0.1 [c]	0.19 [d]	0.1 [e]	0.018	0.24 [a]	0.1 [b]	0.0 [d]	0.05 [c]	0.0 [d]	0.014
Scolothrips longicornis	0.19 [a]	0.19 [a]	0.1 [b]	0.1 [b]	0.1 [b]	0.018	0.19 [a]	0.0 [c]	0.05 [b]	0.6 [c]	0.0 [c]	0.199
Ertmocerus mundus	1.1 [a]	0.05 [b]	0.05 [b]	0.09 [c]	0.0 [c]	0.014	0.06 [a]	0.0 [c]	0.0 [c]	0.05 [b]	0.04 [b]	0.014

Table (5): Yield (kg) / plot (42 m^2) of cantaloupe plants as affected with different rates from potassium fertilizer (T_1 to T_5) Facous and El-Kassasien districts.

Treatments	Districts									
	Facous district					El-Kassasien district				
	Yield /Kg/ plot	Average mean number of 4 pests from all dates of inspection (Table 1)				Yield /Kg/ plot	Average mean number of 4 pests from all dates of inspection (Table 2)			
		T.urtica	*T.tabaci*	*B.tabaci*	*A.gossypii*		*T.urtica*	*T.tabaci*	*B.tabaci*	*A.gossypii*
T_1	150 [c]	27.13 [a]	20.8 [a]	22.29 [a]	8.2 [a]	138 [d]	20.39 [a]	11.67 [a]	22.1 [a]	7.14 [b]
T_2	154 [b]	15.38 [b]	8.86 [b]	14.02 [b]	7.95 [b]	143.5 [c]	14.84 [b]	6.73 [b]	11 [d]	7.64 [a]
T_3	158.9 [a]	11.82 [c]	7.53 [d]	12.99 [c]	5.8 [c]	150 [b]	12.22 [c]	5.73 [c]	13.18 [b]	4.38 [d]
T_4	160 [a]	10.59 [d]	8.09 [c]	11.08 [d]	4.61 [d]	156.8 [a]	8.37 [d]	2.83 [e]	11.19 [c]	4.85 [c]
T_5	162 [a]	10.17 [e]	7.38 [d]	11.41 [d]	4.25 [d]	150 [b]	10.13 [e]	3.24 [d]	7.1 [e]	3.35 [e]
L.S.D.$_{0.05\%}$	3.044	0.203	0.215	0.53	0.842	3.297	0.571	0.182	0.098	0.164

Table (6): Spray coverage on cantaloupe plants, by different dosage from potassein using two sprayers against piercing sucking pests at Facous and El-Kassasien districts.

Equipment		Knapsack motor sprayer (Komatsou)								Conventional sprayer							
Spraying volume (L/fed.)		105								227							
Dose of potassein (L/fed.)		2		4		6		8		2		4		6		8	
Spray date	Districts	*	**	*	**	*	**	*	**	*	**	*	**	*	**	*	**
20/4/2007	1	250	170	3.1	105	303	97	309	93	480	53	520	30	525	17	535	23
23/4/2007	2	270	155	285	114	294	103	300	92	500	32	530	28	525	19	510	25
3/5/2007	1	290	187	291	118	300	103	321	87	530	17	600	15	520	17	530	29
7/5/2007	2	295	155	285	123	305	100	315	88	510	22	575	18	600	13	610	19

* = VMD = volume mean diameter (mean 3 cards) ** = N/cm (mean 3 cards north middle south)

1= Facous district 2= El-Kassasien district.

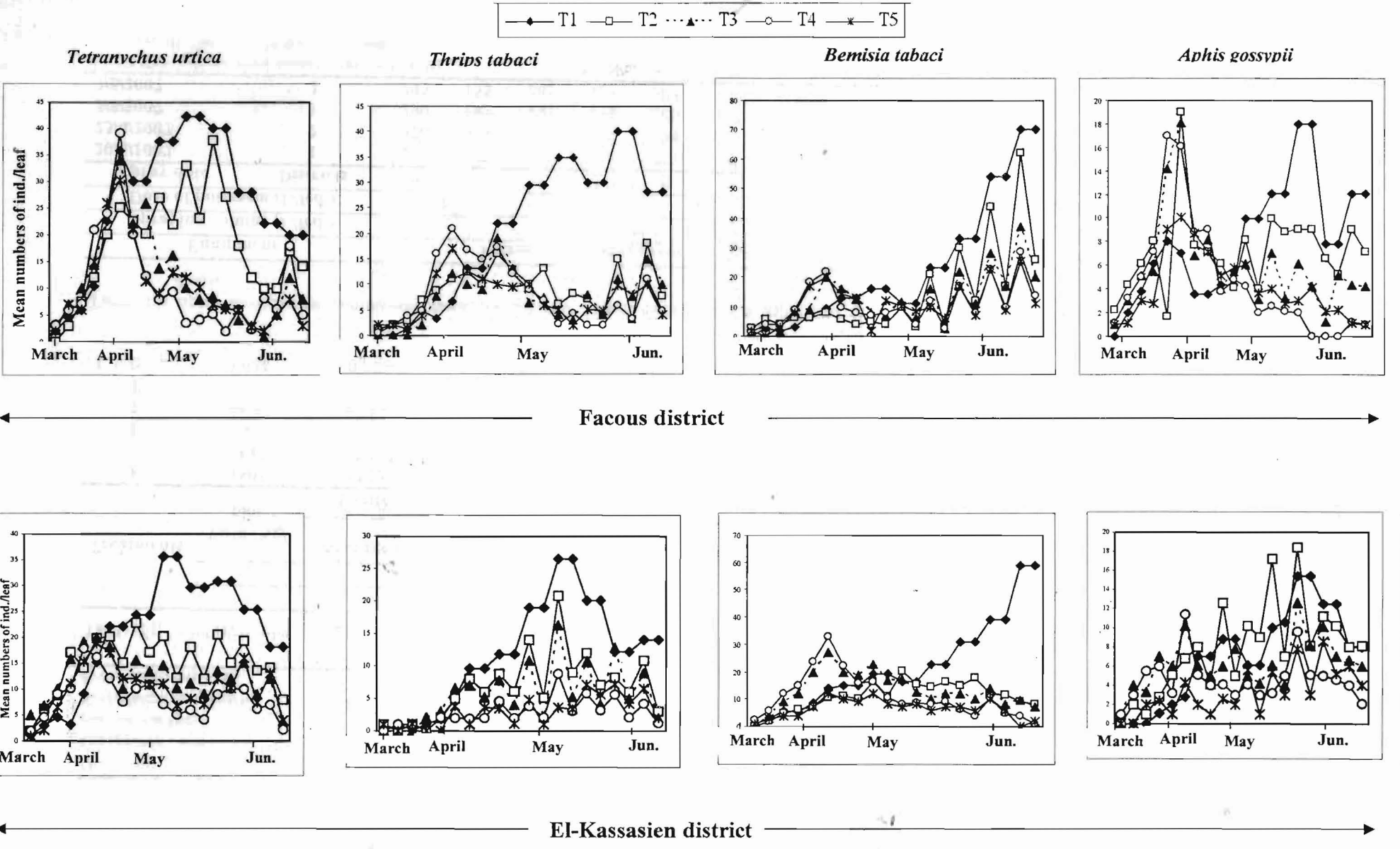

Figure (1): Population fluctuation of four pests on cantaloupe variety Regal 442 (from March to Jun.) under five different levels of potassium as a soil and foliar fertilizer treatments (T_1 to T_5) at Facous and El-Kassaisen districts.

which recorded 162 and 150 Kg/plot at Facous and El-Kassasien district respectively. These findings agree with those obtained by Farise *et al.* (2004), Allam and El-Shikha (2005), and El-Kady *et al.* (1988) who reported that, the increasing of potassium fertilizer led to increasing in different crops and decreasing in pest infestation. Also, El-Rafie Khirate (1999) Reported that, potassium sulfate, 60 units / K_2O) gave low population of *B.tabaci* infesting tomato plants and higher yield.

Finally, it could be conducted that foregoing results indicated the possibility of controlling the 4 pests in cantaloupe fields by two types of fertilizers together as a soil treatment fertilization by 48 potassium unit/ fed. only and gave the rest dose of potassium by foliar fertilizer with 4 L. potassein 37% or any other of potassium as a foliar fertilizer in the market

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تأثير مستويات مختلفة من التسميد البوتاسى كمعاملة أرضية ورش ورقى على كثافة تعداد بعض الآفات التى تصيب الكنتالوب

*عاطف عبد الفتاح أحمد عبد الله – **عبد المجيد السيد عمار
* قسم بحوث آفات الخضر - ** قسم بحوث تكنولوجيا الرش
**معهد بحوث وقاية النباتات – مركز البحوث الزراعية –الدقى – جيزة – مصر

تعد الآفات الثاقبة والماصة من الآفات الخطيرة التى تصيب محاصيل الخضر فى مصر خاصة الكنتالوب وفى عديد من التطبيقات تستوجب الاستخدام المبكر للمبيدات الحشرية للحد من تعداد هذه الآفات على الكنتالوب، وهذه المعاملات تكون ذو أثر ضار على الأعداء الحيوية ونسلها المتواجد فى حقول الكنتالوب "وهلاك الكائنات النافعة وينتج عنه زيادة تعداد الآفات التى تضطرنا إلى زيادة استخدام المبيدات خلال الموسم ولكى نتجنب الاستخدام المبكر للمبيدات وما يتبعه من تأثيرات ضارة يجب علينا لمكافحة هذه الآفات اللجوء لطرق المكافحة غير الكيماوية وذلك بإنتاج نباتات سليمة صحياً.

وقد أجريت تجربتان حقليتان لإضافة بعض المعلومات عن المستويات المختلفة من التسميد البوتاسى كتسميد أرضى بمعدلات تتراوح بين صفر إلى ٩٦ وحدة كبريتات بوتاسيوم/ وحدة تجريبية مقسمة على دفعتين و ، أو تسميد ورقى يتراوح بين صفر إلى ثمانية لترات / وحدة تجريبية مقسمة على دفعتين.

وكذلك استخدام صورتى التسميد معاً وتأثيرهما على تعداد كلاً من العنكبوت الأحمر ذو البقعتين وتربس القطن وذبابة الطماطم البيضاء ومن القطن التى تصيب الكنتالوب صنف ريجال م ٤٤٢ تحت ظروف الأراضي الرملية المستصلحة حديثاً خلال موسم٢٠٠٧م فى كلاً من مركز فاقوس – محافظة الشرقية ومركز القصاصين – محافظة الإسماعيلية.

وقد أوضحت النتائج المتحصل عليها ما يلى:

١- أن استخدام سماد بوتاسى أرضى بمعدل (٤٨ وحده بو٢ أ) واستخدام ٨ لتر سماد ورقى بوتاسين ٣٧% على الكنتالوب ينتج عنه زيادة التأثير على الأفراد المتحركة من العنكبوت الأحمر والحشرات الكاملة والحوريات للتربس والأطوار غير الكاملة للذبابة البيضاء وأفراد المن حتى آخر تاريخ فحص فى أول يونيو فى مركز فاقوس وذلك باستخدام الرشاشة العادية وموتور الرش كوماتسو. والتى سجلت (٨ ، ٣) : (١٠ ، ٤,١) ، (٢٥,٥، ١١) و (١,١ ، ١) فرد / ورقة باستخدام ٨ لتر بوتاسين ٣٧% على التوالى ، بينما فى مركز القصاصين بعد فحص (٨ يونيو) باستخدام ٢٤ وحدة بوتاسيوم (سماد أرضى) + ٦ لتر بوتاسين ٣٧%. حققت تأثير عالى مسجلة (٧ ، ٢,٢) ، (٤,٢، ١,٢) ، (٤ ١,٢) و (٤، ٢,١) فرد / ورقة على التوالى.

٢- حصل اختلافات معنوية عالية بين تأثير مصدرى البوتاسيوم (الأرضى والرش الورقى) خاصة بين المعاملتين T_2 ,T_5 على مستوى الآفات الأربعة.

٣- حدوث قمتين فى تعداد كل من العنكبوت الأحمر (٦ أبريل ، ٥ مايو) ، تربس القطن (١١، ٢٥ مايو).

والذبابة البيضاء (٢٧ أبريل، أول يونيو) ومن القطن (٦ أبريل، ١٨ مايو) بينما حدثت قمة واحدة لكل حشرة فى مركز القصاصين كالتالى: أكاروس (١٠ مايو) ، تربس القطن والذبابة البيضاء (١٧ مايو) وأخيراً من القطن فى (٢٤ مايو) وهذه الطريقة (استخدام السماد الورقى مع آلة الرش المناسبة) يمكن اعتبارها واحدة من أهم العوامل التى يجب أن تتضمنها سياسة الإدارة المتكاملة للمحصول.