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Abundance of leaf miner and some piercing sap sucking pests on some bean (*Phaseolus vulgaris* l.) Varieties.

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ABSTRACT

The field experiment was conducted during summer and winter seasons to evaluate seven varieties of beans (*Phaseolus vulgaris* L.) for their relative susceptibility against some sap sucking pests *Tetranychus urticae* Koch, *Bemisia tabaci* (Gennadieu), *Aphis craccivora* Koch, *Thrips tabaci* Lindquist and leaf miner, *Liriomyza trifolii* (Burgess). The tested bean varieties were: Medina (V_1), R9251 (V_2), Teresa (V_3), Luvalde (V_4), Al-Hanna (V_5), Alexandria (V_6) and Excalibur (V_7). None of the varieties escaped the infestation of all these pests. Generally the population of *T. urticae and T. tabaci* were higher in summer than in winter, while population of *B. tabaci* and *L. trifolii* were higher in winter. Relative susceptibility of bean plants changed according to plantation season as, V6, V6, V5, V6 and V3 hosted the less number of *T. urticae*, *B. tabaci*, *A. craccivora*, *T. tabaci* and *L. trifolii* in winter season, respectively. While in summer plantation, V5, V1, V4, V1 and V7 hosted the less number of the same pests, respectively.

Key words: *Tetranychus urticae*, *Bemisia tabaci*, *Thrips tabaci*, *Aphis craccivora*, *Liriomyza trifolii*, *Phaseolus vulgaris*, varieties.

INTRODUCTION

Bean plant, *Phaseolus vulgaris* L. is one of the most important leguminous vegetable crops in Egypt. It is considered of great nutritive value, containing relative high percentage of protein where consumed freshly as green pods or as dry seeds. Also its leaves encourage pest development, increased egg production and their longevity (Braikel and Post, 1959) which threatens both quality and quantity of the resultant yield and cause serious damage either directly by sucking plants juice or indirectly as vectors of virus diseases.

Beans are attacked by serious pests which reduce productivity and quality such as, the spider mite, *Tetranychus urticae* Koch, the whitefly, *Bemisia tabaci* Genn., the aphid, *Aphis craccivora* Koch, the trips, *Thrips tabaci* Lindquist and the leaf miner, *Liriomyza trifolii* (Burgess). The spider mite, *Tetranychus urticae* considered the major pest of vegetables causing great less in yield, the effect of which is reduce photosynthesis, transpiration (Golam, 2002).

Cardona *et al*. (2002), indicated that there is genetic variation for resistance to the melon thrips in beans that it is possible to screen for resistance to pest. Also, he identified genotypes with moderate level of resistance that can withstand damage under high levels of infestation.

Another pests (aphids, leaf miner and whitefly) are widely spread attacking a wide variety of agricultural crops and causing considerable damage, either directly by sucking plant juice or indirectly as vector transmitting plant diseases. (Carter, 1990). Damage by aphids is due to consumption of phloem sap, and then the excretion of

honey dew, which cover the leaves. Sooty molds may develop on this carbohydrates rich medium (Carter, 1990).

The choice of variety may be depend on market preference, farmers should emphasized cultivation of cultivars that show resistance to different pests and the effectiveness in population reduction should be given priority while selecting the variety among other properties. Some bean varieties exhibit natural resistance to certain insect pests.

The present study was carried out as a trial to throw light on the susceptibility of common beans varieties to pest's infestation.

MATERIALS AND METHODS

Two field experiments were conducted at Sennoures region in Fayoum Governorate for screening seven bean varieties: Medina (V_1), R9251 (V_2), Teresa (V_3), Luvalde (V_4), Al-Hanna (V_5), Alexandria (V_6) and Excalibur (V_7), in winter, 2009 and summer, 2010 plantation seasons. An area of about 2100 m^2 in each season was prepared and divided into 28 plots of 75 m^2 each, and then each variety was replicated four times. Plots were seeded on October 15, 2009 for winter plantation and on March 5, 2010 for summer plantation. Samples of 10 leaves per plot were picked every week randomly from the lower, middle and upper levels of plant. Each sample was kept in a tight closed plastic bag and transferred to the laboratory for examination. All experimental plots received the recommended normal agricultural practices and no insecticides were used.

The number of movable stages and eggs (for spider mite), nymph and eggs (for whitefly), nymph and adults (for aphid and thrips) and larvae (for leaf miner) were recorded for each sample for twelve weeks in winter and eight week in summer plantations.

Statistical analysis:

Analysis of variance for each experiment was conducted to determine the significance between means of cultivars and the means were compared according to Duncan's multiple range tests (Snedecor and Cochran 1981).

RESULTS AND DISCUSSION

1 - Spider mite, *Tetranychus urticae* Koch

Data illustrated in figure (1) showed the infestation level of *T. urticae* on beans along winter plantation. As indicated in this study the spider mite started their activity by a few numbers in November and increased slowly until the mid of January then reach the maximum at the end of January.

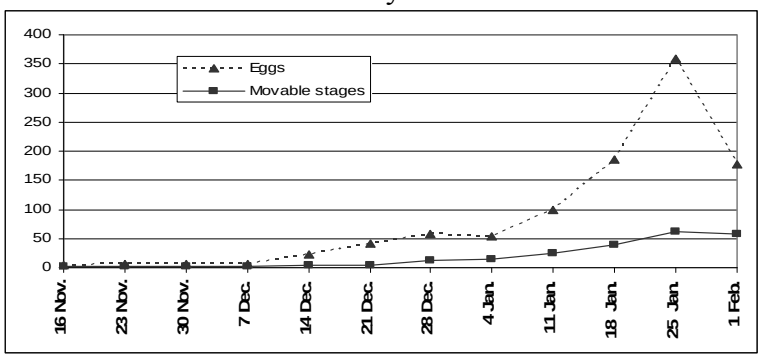

Fig.1. Fluctuation of *T. urticae* Eggs and movable stages on beans in the winter plantation

As it is shown in figure (2) taking LSD values in our consideration, V5 and V3 cultivars hosted significantly the highest mite infestation while the other cultivars hosted less infestation. The cultivar V6 hosted significantly the lowest mite infestation than other cultivars..

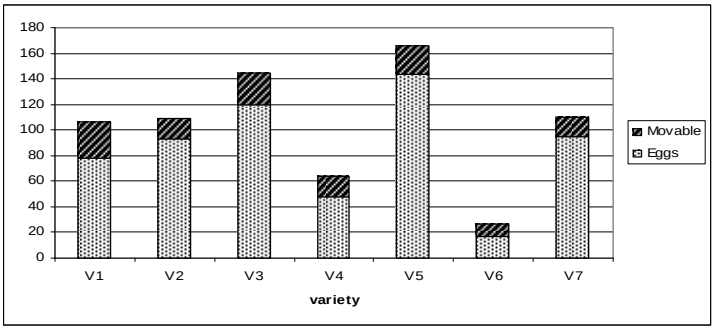

Fig. 2. Average numbers of *T. urticae* Eggs and movable stages on 7 bean varieties in the winter plantation

Figure (3) represents the infestation level of *T. urticae* on beans along summer season, mite keep low level of infestation until the end of April then increased to reach its maximum at the end of May. These results were in agreement to Abd El-Karim (2010) who reported that the mite population gradually increased from mid April and reached the maximum at the end of May.

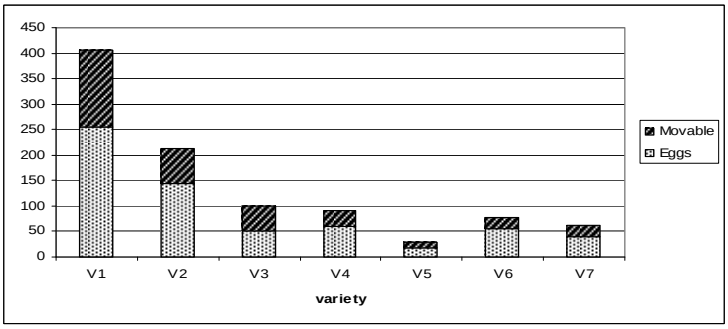

Fig. 3. Fluctuation of *T. urticae* Eggs and movable stages on beans in the summer plantation.

As it is illustrated in figure (4) V1 hosted significantly the highest population among all tested varieties in summer season, while V2 came the second variety. Other varieties hosted significantly less mite populations than V1 and V2. Comparing the two seasons, it could be concluded that the mite infested bean plants in the summer season more than the winter season.

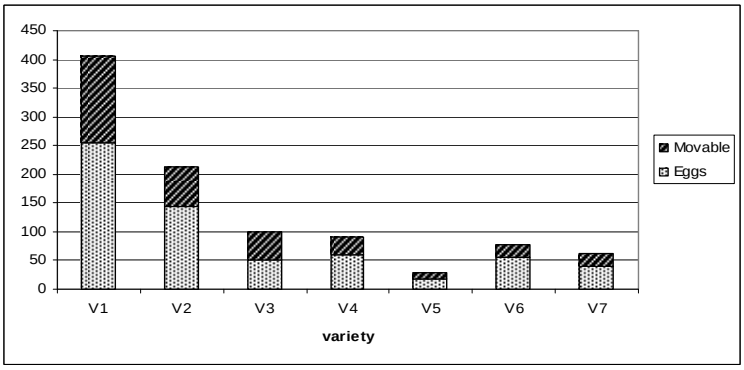

Fig.4. Average numbers of *T. urticae* Eggs and movable stages on 7 bean varieties in the summer plantation.

2 – Whitefly, *Bemisia tabaci* (Gennadieu).

Fluctuation abundance of *B. tabaci* in winter plantation which illustrated in figure (5) showed that *B. tabaci* started its activity in the mid of November and continued along all the season until the beginning of February.

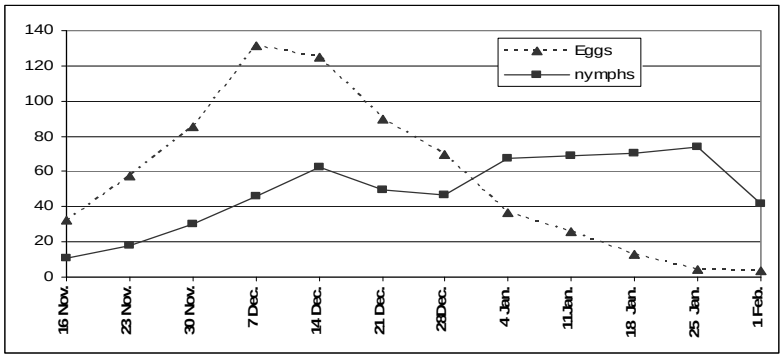

Fig.5. Fluctuation of *Bemisia tabaci* Eggs and nymphs on beans in the winter plantation.

Based on seasonal average of *B. tabaci* in winter plantation, as it is shown in figure (6) taking LSD values in our consideration, tested varieties could be categorized into three groups. The first group include V6, V1 and V7, was significantly the least susceptible to infestation. The second group include V5 and V2 was moderate while the third group, V3 and V4 received significantly the highest infestation of *B. tabaci*.

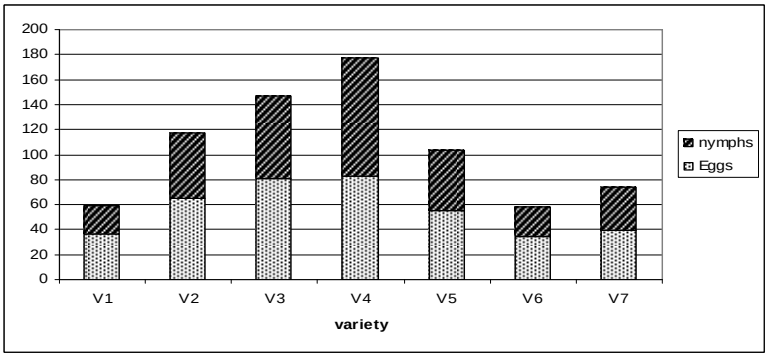

Fig.6.Average numbers of *Bemisia tabaci* Eggs and movable stages on 7 bean varieties in the winter plantation.

In summer plantation, as it is illustrated in figure (7) a little abundance was recorder in the first of the season in the mid of April then the population decreased until the end of the season.

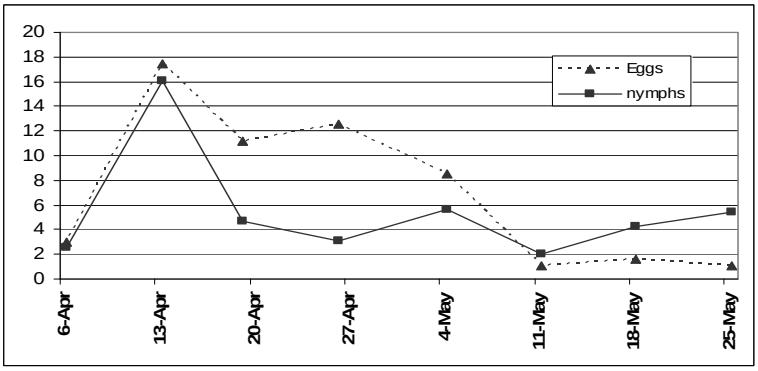

Fig.7. Fluctuation of Bemisia tabaci Eggs and nymphs on beans in the summer plantation.

Data in figure (8) revealed that V1 received the lowest population of *B. tabaci* while V4 received the highest population in summer plantation, but no significancy

was recorded. Generally, it could be observed that winter plantations received less amount of *B. tabaci* than summer plantation. These results fully agreed with El-Lakwah *et al*. (2010), who reported that the common bean infestation by *B. tabaci* as expressed as mean number of adults and immature stages increased gradually showed high rate of infestation in all plantations (early summer, summer and winter).

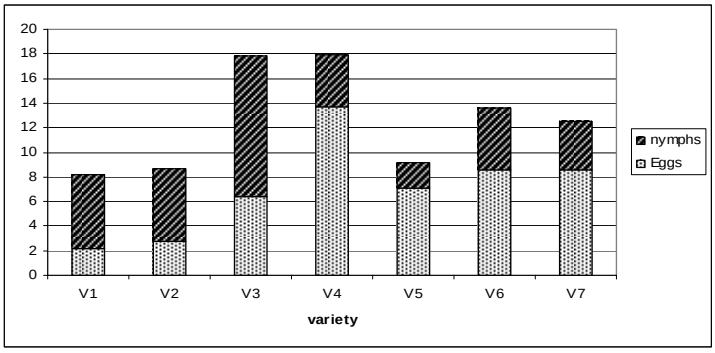

Fig.8.Average numbers of *Bemisia tabaci* Eggs and movable stages on 7 bean varieties in the summer plantation.

3 – Aphid, *Aphis craccivora* Koch

As it is illustrated in figure (9) *Aphis craccivora* started early on bean plants in winter plantation. The aphid recorded the highest abundance at begin of December with almost 40 individuals per leaf, then the population decreased gradually until the end of the season..

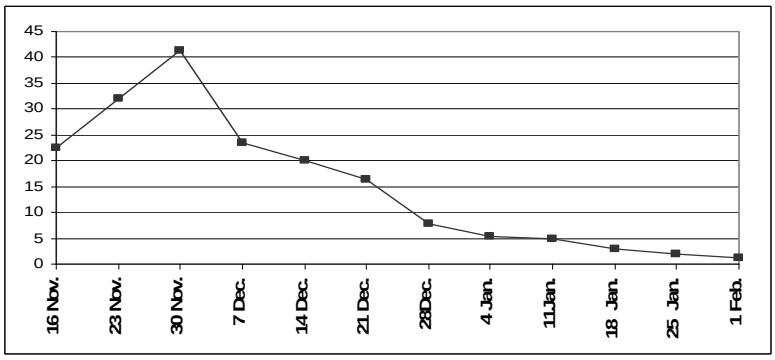

Fig.9. Fluctuation of *Aphis craccivora* on beans in the winter plantation

Relative susceptibility of certain bean varieties which is represented in figure (10), according to LSD values, V1 and V7 were significantly the most susceptible varieties. V5 was significantly, the lowest susceptible variety, while other varieties came in between. *Aphis craccivora* recorded rare abundance on bean plants in summer plantation as it is illustrated in figures (11, 12)

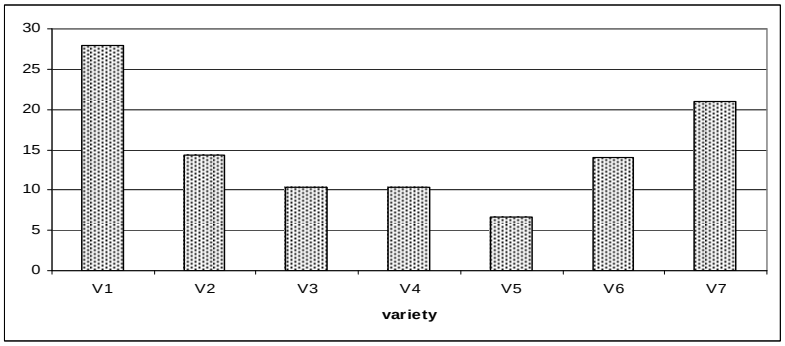

Fig.10. Average numbers of *Aphis craccivora* on 7 bean varieties in the winter plantation.

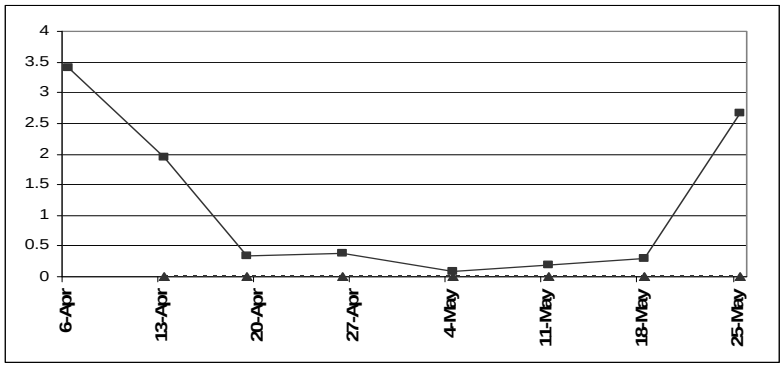

Fig.11. Fluctuation of *Aphis craccivora* on beans in the summer plantation.

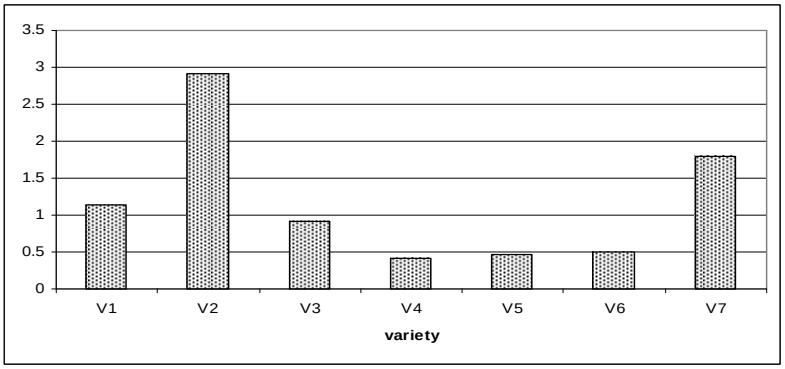

Fig.12. Average numbers of *Aphis craccivora* on 7 bean varieties in the summer plantation.

4. Thrips, *Thrips tabaci* Lindquist.

low abundance of *Thrips tabaci* was recorder in winter plantation on bean plants (figure 13&14).

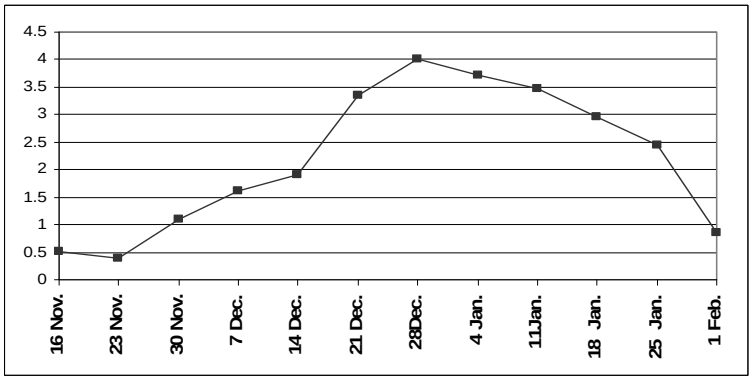

Fig.13.Fluctuation of *Thrips tabaci* on beans in the winter plantation.

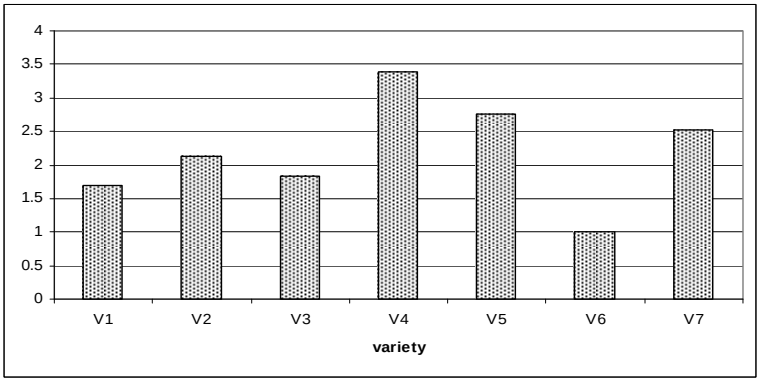

Fig.14.Average numbers of *Thrips tabaci* on 7 bean varieties in the winter plantation.

In summer plantation, thrips recorded higher abundance as infestation started in the beginning of the season and increased gradually until reach its maximum in mid of may(Fig. 15).

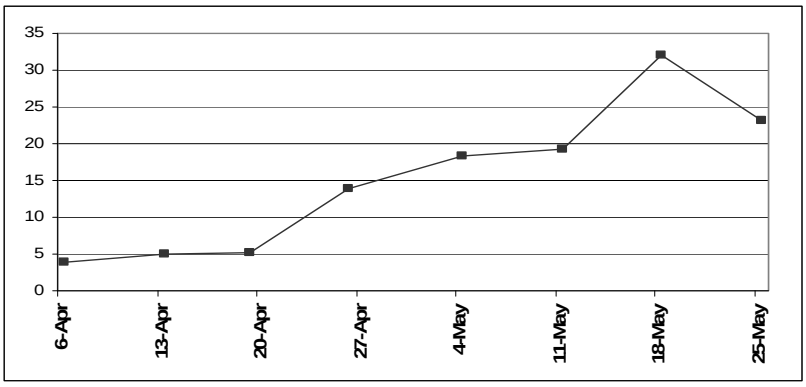

Fig.15.Fluctuation of *Thrips tabaci* on beans in the summer plantation.

The cultivar V1 recorded the lowest population of thips which was significantly less than V6 and V3 which recorded the highest population (Fig. 16). The result of El-Lakwah *et al*. (2010), had the same trend as our result; in which the average number of *T. tabaci* were started at the first of April in few number and increased to reach peak in mid and end of May. Also, this finding agree to that obtained by Helal *et al*. (1996) who 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.

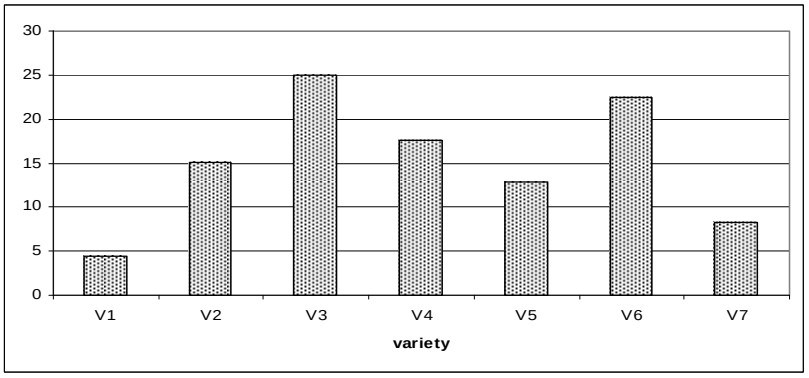

Fig.16.Average numbers of *Thrips tabaci* on 7 bean varieties in the summer plantation.

5 –leaf miner, *Liriomyza trifolii* (Burgess)

As it is illustrated in figure (17), the leaf miner, *L. trifolii* attacked beans plants in winter plantation along all the season but it reached its maximum abundance at the end of December.

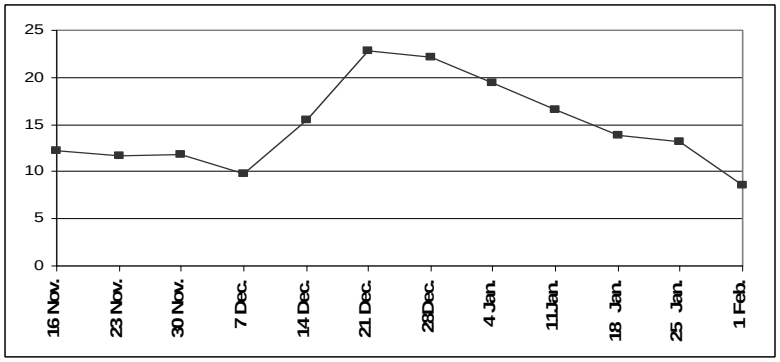

Fig.17. Fluctuation of *Liriomyza trifolii* on beans in the winter plantation.

Relative susceptibility was recorded and presented in figure (18). Based on LSD value, V4 and V5 were significantly the most attractant varieties while V3 and V1 were significantly the lowest attractant varieties.

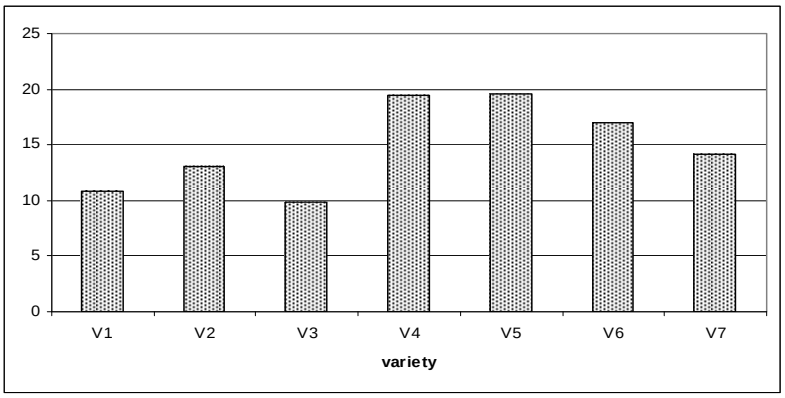

Fig.18.Average numbers of *Liriomyza trifolii* on 7 bean varieties in the winter plantation.

A little abundance of *L. trifolii* was recorded at the beginning of the Summer season and disappeared before the end of April as it is represented in figure (19&20), so it could be neglected as a pest in summer season.

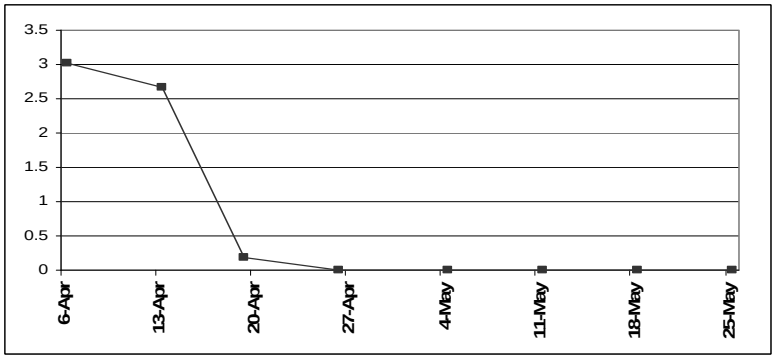

Fig.19.Fluctuation of *Liriomyza trifolii* on beans in the summer plantation.

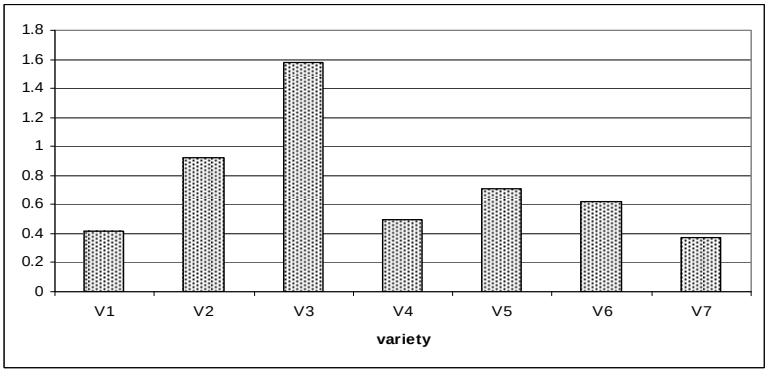

Fig.20. Average numbers of *Liriomyza trifolii* on 7 bean varieties in the summer plantation

General overview on the time distribution of the pests along the winter plantation indicated that, *A. craccivora* attacked bean plants in the beginning of the summer season while *T. urticae* attacked beans later before the end of the season. *B. tabaci* and *L. trifolii* attacked beans almost along of all the season while *T. tabaci* slightly attacked beans in winter season. In summer season, *B. tabaci* slightly attacked bean plant at the beginning of the season while *T. urticae* and *T. tabaci* attacked before the end of the season. *A. craccivora* and *L. trifolii* could be neglected in summer season.

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ARABIC SUMMARY

الوفرة العددية لناخرات الاوراق و بعض الآفات الثاقبة الماصة على بعض أصناف الفاصوليا (*PHASEOLUS VULGARIS* L.)

مارجريت عدلي رزق، منى محمد أحمد غلاب، نادية حنا حبشي، إيهاب مصطفى بكر
معهد بحوث وقاية النباتات- مركز البحوث الزراعية – الدقى- جيزة.

أجريت دراسة حقلية خلال فصلي الصيف و الشتاء بغرض تقييم الحساسية النسبية لسبعة أصناف من نبات الفاصوليا (*Phaseolus vulgaris* L.) ضد بعض الآفات الثاقبة الماصة وهي العنكبوت الأحمر *Tetranychus urticae* ، الذباب الأبيض *Bemisia tabaci*، المن *Aphis craccivora*، التربس *Thrips tabaci* و ناخرة الاوراق *Liriomyza trifolii*. أجريت الاختبارات على الأصناف: مدينة (V_1) ، R9251 (V_2)، تريسا (V_3) ، لافالد (V_4) ، الهنا (V_5) ، الكساندريا (V_6) و إكساليبر(V_7) . لم تنج أي من الأصناف المختبرة من الإصابة بالآفات تحت الدراسة. بصفة عامة كان تعداد كلاً من العنكبوت الأحمر و التربس أعلى في الموسم الصيفي بينما كان تعداد الذبابة البيضاء و ناخرات الأوراق أعلى في الموسم الشتوي. اختلفت الحساسية النسبية للأصناف المختبرة بناء على الموسم ففي الموسم الشتوي كانت الأصناف V6، V6، V5، V6 و V3 اقل الأصناف إصابة بكل من العنكبوت الاحمر و الذبابة البيضاء و المن و التربس و ناخرات الاوراق، على الترتيب. بينما في الموسم الصيفي كانت الأصناف V5، V1، V4، V1 و V7 اقل الأصناف إصابة بنفس الآفات على الترتيب.