

Population Dynamics Of Some Insects Infesting Mangetout Peas At Different Plantation Dates

By

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ABSTRACT

The mangetout cultivar Oregon sugar Pod II was cultivated in the farm of El-Roda Co. west of Alex. in Nurabia. The field experiment compared the level of infestation of the four pests: the cotton leafworm, the spider mites, the leafminer, and the thrips. Each treatment was with four replicates. Each replicate (270 m²). Six plantation dates were compared for the levels of infestation. The climatic maximum and minimum average temperature, and relative humidity were recorded. Correlation coefficient between average temperature; relative humidity; and the infestation levels of the monitored four pests on the peas plants of mangetout were computed.

The data indicated significant positive correlation between the counts of cotton leafworm larvae or moths; or thrips infestation with minimum and maximum temperature average and relative humidity. On the contrary there was a negative correlation between levels of the spider mites or the leafminer infestation and these climatic parameters.

The effect of plantation dates revealed that late October and early November are the most optimum dates for planting where least levels of infestations were recorded. However, and because the mangetout crop is freshly needed all the season, therefore it will be cultivated successively every ten days. The present information will be helpful in predicting the required pest management program.

INTRODUCTION

Mangetout, is a new commodity growing very fast for consumption in the European market, especially in the United Kingdom; and now is crossing the line from the exotic category to the Luxury mainstream. It's popularity in recent years has encouraged many sources to export mangetout and, to provide it as much as the commodity could be available all year round. (Anonymous 1991).

There are several names for the Mangetout peas group: "Chinese peas", "Snow peas", "Sugar peas" and "Eat all". Super markets need to be supplied by this vegetable for a long season as possible. Scheduling plantation, for this reason, is needed to continue producing on long periods as long as it is possible.

Bethke and Parrella, (1985) showed that the leaf miner insect pest *Liriomyza trifolii* damages host foliage by two mechanisms: females produce leaf punctures (stipples) with their ovipositors, and also the larvae mine the mesophyll tissue. Stipples are of two types: small tubular punctures used for feeding by adults. Females have been observed feeding in the presence of foliage. (Zoebis and Schuster 1987. Schuster and Everett. 1983). Kumar et al., 1991 found that early (14 October) and late (21 November) sown crops were less damaged by the pest than those sown between these dates. The foliage of green peas in autumn is damaged by the larvae of *Spodoptera exigua*. Larvae of *Heliothis armigera* (*Helicoverpa armigera*) feed in spring on developing seeds of peas sown in winter (Daiber, 1994).

Spider mites are known as a major universal agricultural pests. This explains their economic importance and their regular chemical control leading to its possible build up of resistance to pesticides (Dittrich 1975, Granham and Helle 1985). Developmental data of the two spotted spider mite will generally vary with ecological conditions such as temperature, humidity, host plant, leaf age, etc. However, temperature is the most important limiting factor that influences the rate at which mites develop. The lower threshold for development is about 12°C, whereas maximum upper limit to the development is about 40°C, (Jeppson et al., 1975, Osborne et al., 1985).

Zayed et al., 1970 studied the attraction of male moths of the cotton leafworm *Spodoptera littoralis* by traps baited with virgin females. Campion (1974 and 1976) found that pheromone traps were more attractive than light traps with generally higher catches. Nesbitt et al., (1973), Campion et al., (1978), and Naser et al., (1978) also used the synthetic pheromone traps to monitor the field population of *S. littoralis* (Boids.).

Taman (1990) showed that an increase of one degree (1°C) of temperature in the mean daily maximum temperature was associated with an increase by 40.1 moths population per week in the average population. Similarly, the mean daily minimum temperature showed that an increase of 1°C. increased the average population by 24 moths per week. She concluded that daily maximum and minimum temperature; relative humidity; and barometric pressure were responsible for 23%, 30%, 38% and 39% respectively of the population density of cotton leaf worm moths in 1989 season.

Pod appearance is very important, because Mangetout is consumed as whole pods not just seeds. Screening the population of insects infesting the crop and its quality is a must to improve the yield and to increase the percentage of the exportable yield.

Thrips affect the quality of pods, making white spots contributing to the loss of 2-7% of the yield. (unpublished data).

The aim of the present investigation is to study the population dynamics of insects affecting the Mangetout plants in different planting dates, and its correlation with the environmental factors (Temperature and humidity).

MATERIALS AND METHODS

The present investigation was carried out at the Farm of EL-RODA Co. 60 Kilometer south west of Alexandria, in the new reclaimed area of Nubaria, under drip irrigation conditions in the two successive seasons of 1998-1999 and 1999-2000. The used cultivar was Oregon

sugar Pod II. The peas plants were poled using wooden stalks with nets to let the plants climb on it and to keep it straight up.

Six plantation dates were compared in this study:- 20th August., 1st, 10th., 20th., of September and 1st., 10th. Of October. The treatments were randomly planted each in four replicates. Each experimental unit consists of three rows 100x.9m (270 m²).

The levels of infestation was measured by direct count on the spot every four days according to the procedure by -(Nassef et al., 1996) using ten leaves samples taken randomly from different levels of the plants. The recorded insect infestation included the cotton leaf worm larvae (*Spodoptera littoralis*), the two spotted spider mites (*Tetranychus spp.*), the leaf miner (*Liriomyza spp.*).

Besides Thrips (*Thrips tabaci*) was counted by inspecting ten flowers every four days. A pheromone trap per each experimental plot was used to record the cotton leaf worm adults every four days.

Daily records of average temperature and relative humidity during the inspection periods were obtained from the Meteorological Department, A.R.C.

The data of the mean number of infestation on the four replicates were used to study the difference of infestation level among the six planting dates studied, and the population dynamics, and to calculate the correlation coefficient with temperature (average-minimum-maximum) and relative humidity. (mean for 4 days).

Analysis of variance and correlation coefficient was carried out according to (Snedecor and Cochran 1981).

RESULT AND DISCUSSION

Population dynamics

Figures 1 and 2 show that the cotton leaf worm larva number increased starting from September and reached its peak in October and then goes down at the first week of December. With the first plantation dates the most affected plants of the late date of planting.

Fig : (1) Population dynamics of cotton leaf worm (Larvae) (*Spodoptera littoralis*) infesting Mangetout plants grown in six different planting dates in 1998- 1999 season (Larvae /10 leaves).

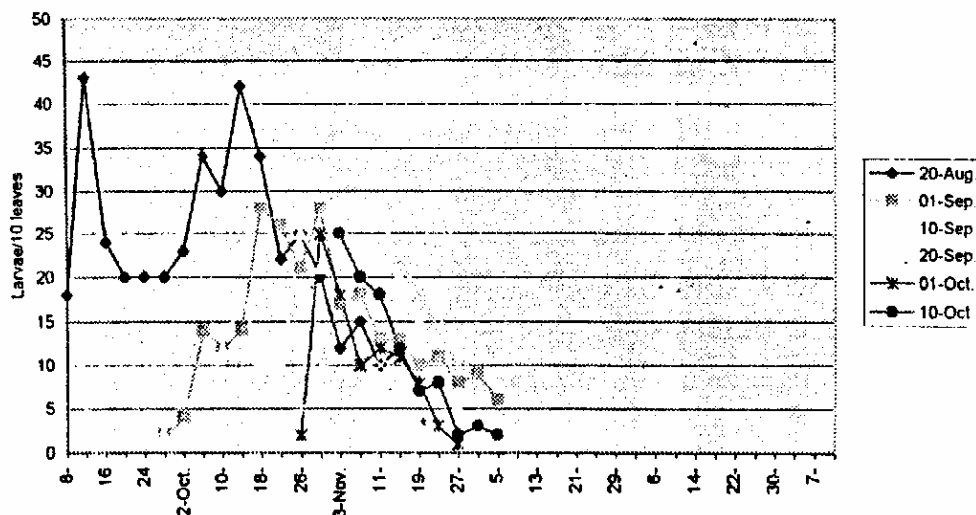


Fig : (2) Population dynamics of cotton leaf worm (Larvae) (*Spodoptera littoralis*) infesting Mangetout plants grown in six different planting dates in 1999 -2000 season (Larvae /10 leaves).

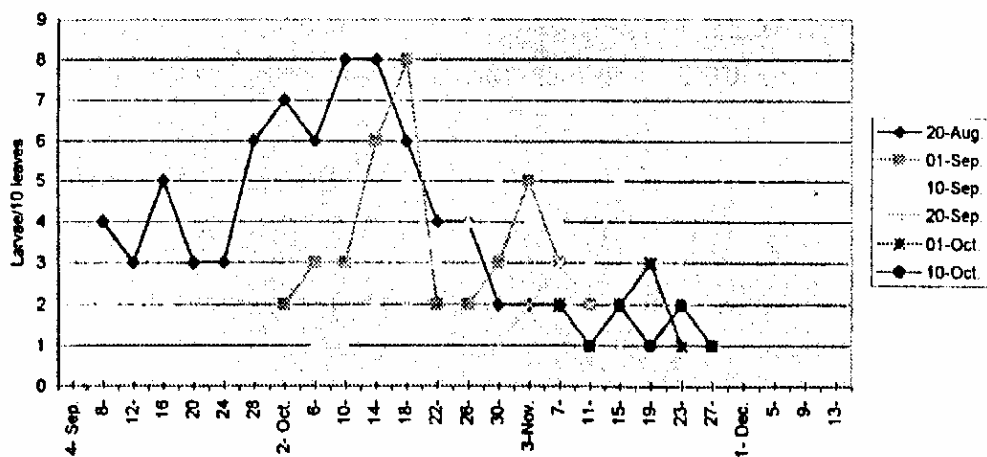


Fig.: (3) Population dynamics of Cotton leaf Worm (adults) (*Spodoptera littoralis*) trapped in pheromon traps in Mangetout plants grown in six different planting dates in 1998/1999 (Adult /Trap / day).

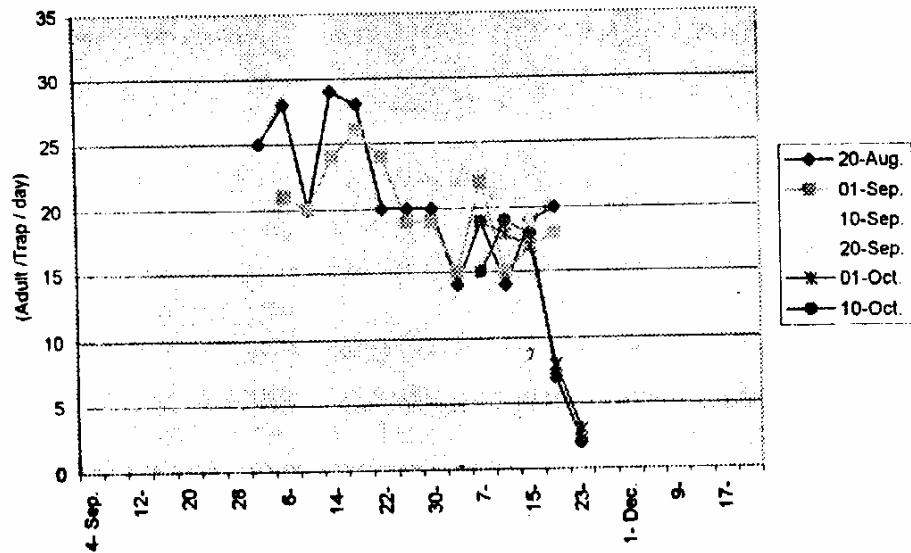
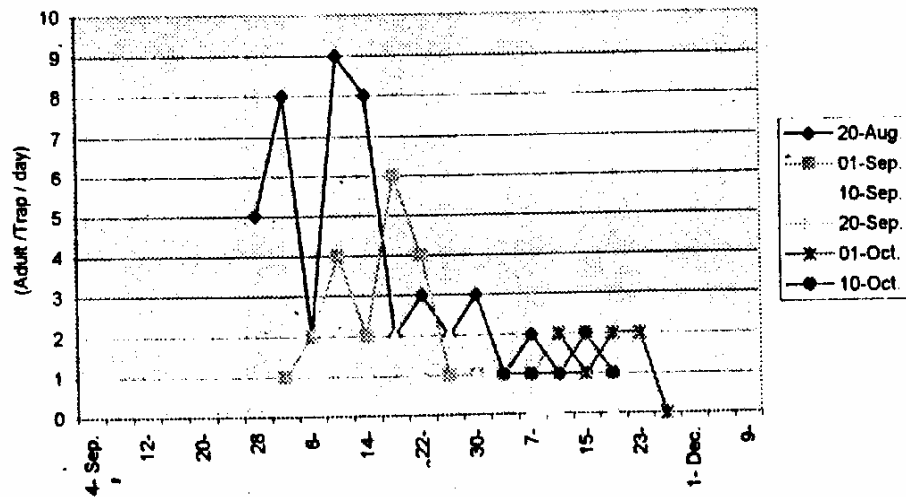


Fig.: (4) Population dynamics of Cotton leaf Worm (adults) (*Spodoptera littoralis*) trapped in pheromon traps in Mangetout plants grown in six different planting dates in 1999/2000 (Adult /Trap / day).



Figures 3 and 4 indicated that the population of adults trapped in pheromone traps at different planting dates, was high in October and gradually comes down showing a peak in September and first of October.

Figures 5 and 6 for two spotted spider mite, the first four planting dates in 98-99 season and first two season in 1999- 2000 season have their own peaks but other population dynamics was increasing gradually in December and January but did not reach the numbers of peaks of the first planting dates.

All the plants in different planting dates showed increased numbers of two spotted spider mites gradually in Dec., Jan and Feb.

Figures 7 and 8 showed that leaf miner population started at the first week of Nov. in 98/99 and second weeks of Oct in 99-2000 season.

Figures 9 and 10 for Trips, Late of December and first of January started to affect plants of magnetout, the number increased in the successive season till the end of the season.

Table (1) Correlation coefficient between average Temperature and relative humidity and number of pests affecting mangetout peas in 1998-1999 season.

Insect	Temperature			Relative humidity
	Average	Minimum	Maximum	
Cotton leaf worm (larvae)	0.571	0.578	0.474	0.255
Cotton leaf worm (Adult)	0.369	0.366	0.401	0.269
Mites	-0.876	-0.876	-0.778	-0.466
Leaf miner	-0.562	-0.518	-0.482	-0.162
Thrips	-0.669	0.614	0.686	0.500

Fig.(5) Population dynamics of Two Spotted Spider mites (*Tetranychus urticae*) infesting Mangetout plant grown in six different planting dates in 1998-1999 season (Living adult \ 10 Leaves)

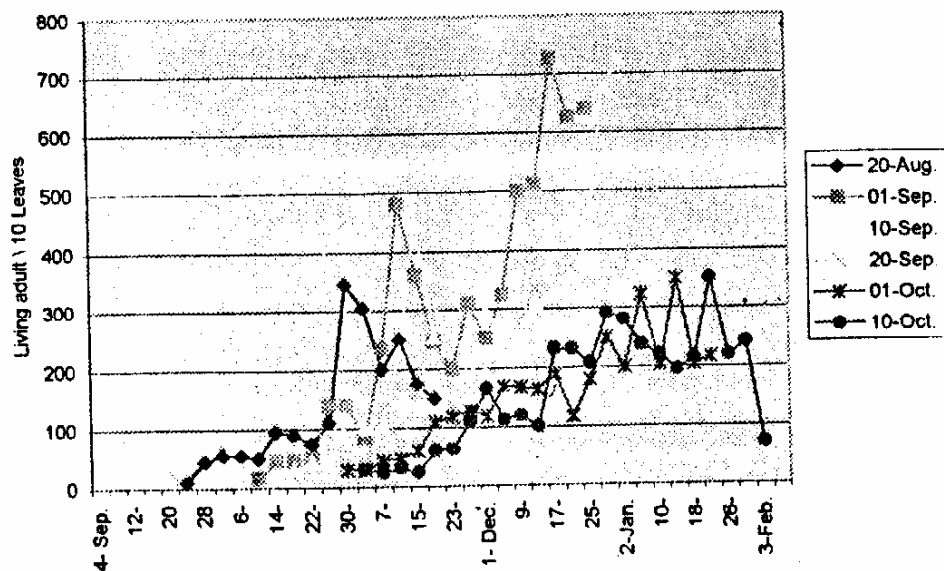


Fig.(6) Population dynamics of Two Spotted Spider mites (*Tetranychus urticae*) infesting Mangetout plants grown in six different planting dates in 1999/2000 season (Living adult \ 10 Leaves)

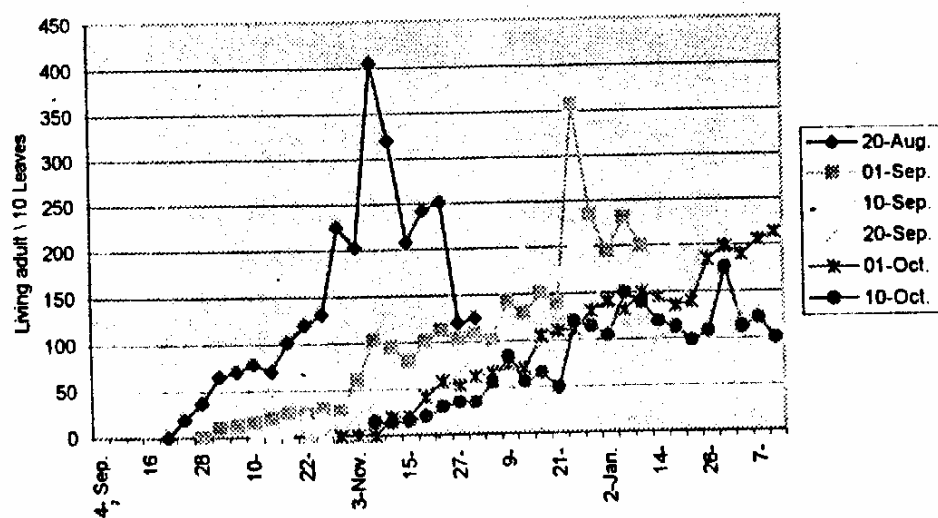


Fig : (7) Population dynamics of leafminer (*Liriomyza trifolii*) infesting Mangetout plants grown in six different planting dates in 1998- 1999 season (larvae / 10 leaves).

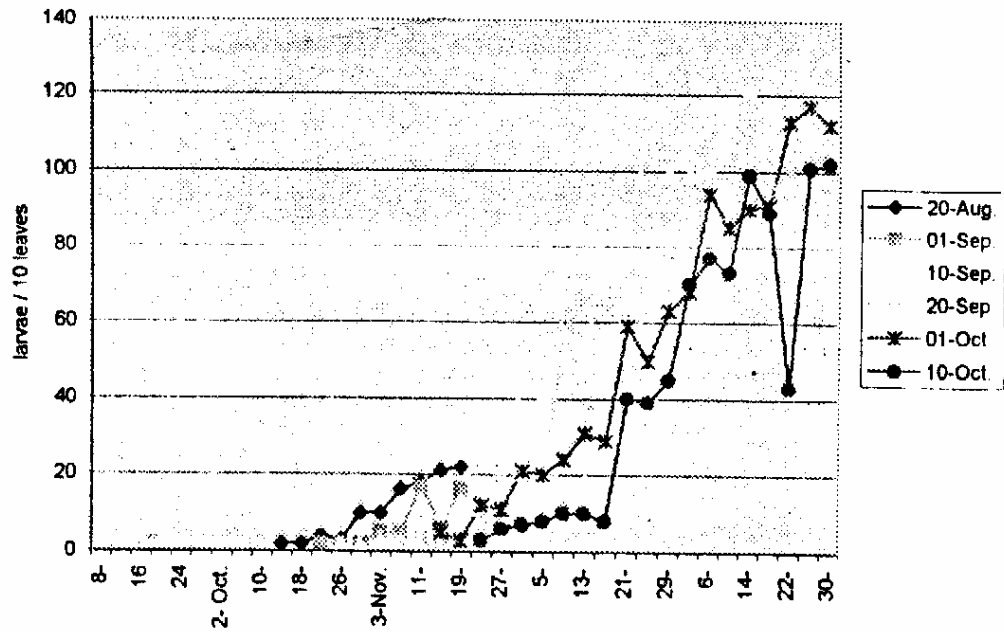
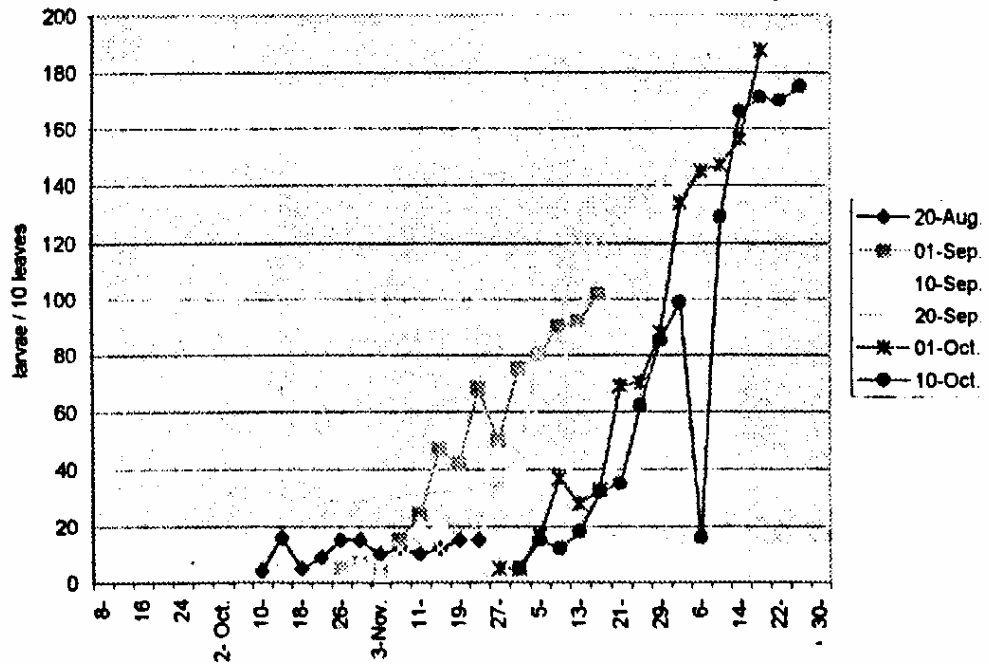


Fig (8) Population dynamics of leafminer (*Liriomyza trifolii*) infesting Mangetout plants grown in six different planting dates in 1999-2000 season (larvae / 10 leaves).



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Fig : (9) Population dynamics of Thrips (Thrips tapaci) infesting Mangetout plants grown in six different dates in 1998- 1999 (Adult / 10 Flowers).

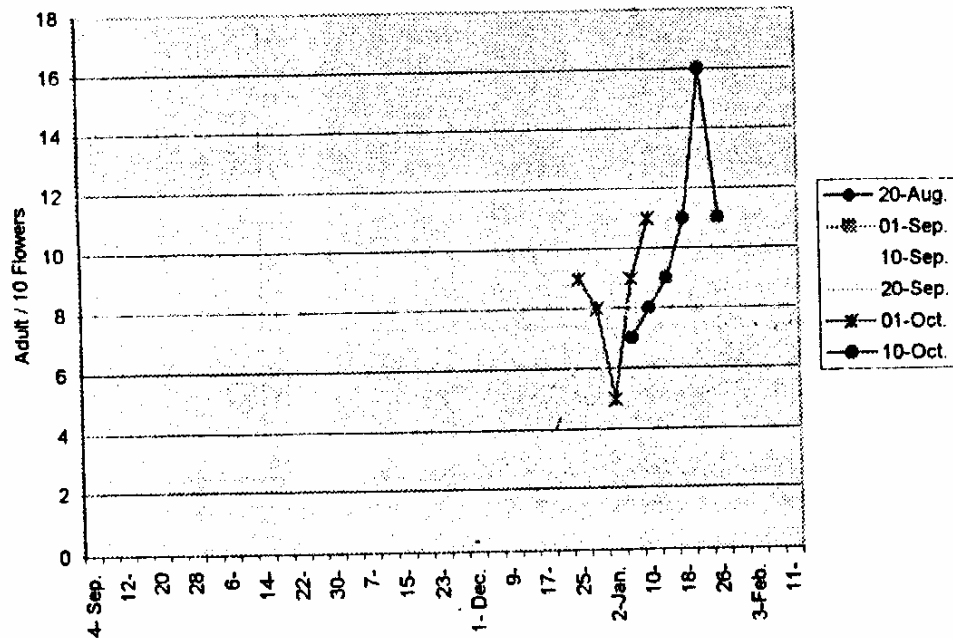
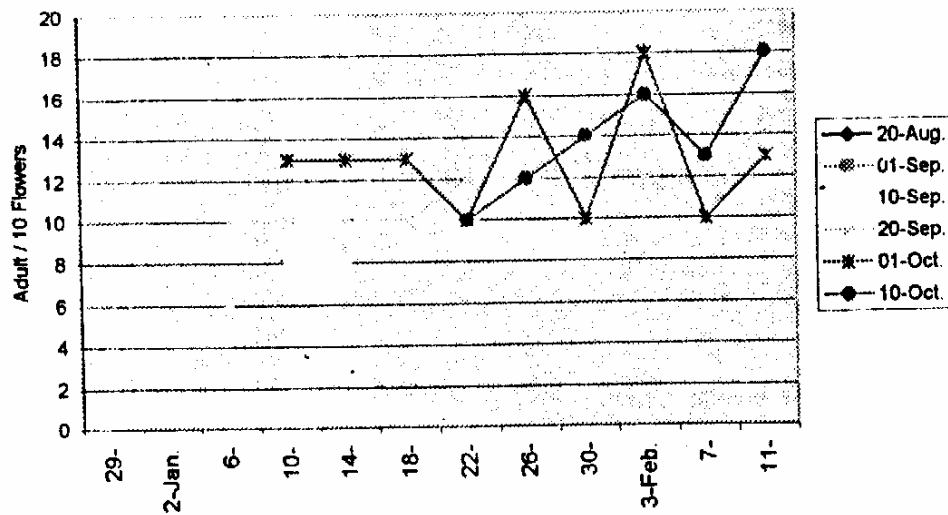


Fig : (10) Population dynamics of Thrips (Thrips tapaci) infesting Mangetout plants grown in six different dates in 1999 - 2000 (Adult / 10 Flowers).



The simultaneous effect of some factors on the population densities of insects infesting the Mangetout plants:-

The Correlation coefficient analysis for these independent variables was worked out. The results are shown in Table (1) and Table (2) represents the original climatic data of the factors included in this investigation.

Table (2): Average monthly temperature (average minimum and maximum) and relative humidity for the period September 1998 to March 1999.

	Average	Temperature(°C)		Relative Humidity
		Minimum	Maximum	
September 98	27.0	22.3	29.9	73.7
October 98	25.0	19.1	27.8	72.0
November 98	20.5	15.1	24.1	66.4
December 98	17.7	10.0	20.4	62.1
January 99	14.3	9.8	18.2	60.4
February 99	15.4	8.8	18.3	60.0
March 99	18.1	11.5	20.5	58.1

The data indicated that cotton leafworm larvae and adult average number were significantly correlated with minimum and maximum temperature and this was parallel with the findings of Taman (1990) where she found that the minimum temperature and max. temperature contribute 23 and 30% of the number of the cotton leaf worm moths respectively.

For Mites: the data showed that temperature and relative humidity were significantly negative correlated with the number of the two spotted spider mites affecting Mangetout plants. On the other hand relative humidity was not significantly correlated with the number of leaf-miner, while it was highly correlated with maximum temperature.

Table (3) : Effect of planting date on number of insects affecting mangetout plants in 1998-1999 and 1999-2000 seasons .

Planting Date	Cotton Leaf worm (Larvae per ten leaves)		Cotton Leaf worm (Adult per ten flowers)	
	1998-1999	1999-2000	1998-1999	1999-2000
20 th August	22.8 a	4.56 a	21.23 a	3.60 a
1 th September	14.11 b	3.45 a	20.00 a	2.08 ab
10 th September	14.39 b	3.17 ab	20.77 ab	1.60 b
20 th September	13.77 b	2.0 bc	17.5 ab	1.00 b
1 th October	10.00 b	1.67 c	13.0 b	1.80 b
10 th October	10.70 b	1.40 c	12.2 b	1.2 b
L.S.D	6.618	1.5	5.08	1081

Planting Date	Leaf miner Larvae per ten leaves		Tow spotted spider mites (Adult per ten leaves)		Thrips (Adult per ten flowers)	
	1998-1999	1999-2000	1998-1999	1999-2000	1998-1999	1999-2000
20 th August	108 c	2408 a	134 b	155.0 a	--	--
1 th Septem	31.88 bc	16.09 b	296 a	108.2 b	--	--
10 th Septem	51.33 ab	12.30 c	270.3 a	112.8 b	--	8.4 b
20 th Septem	57.36 a	4.00 d	266.9 a	97.5 b	6.83	11.4 ab
1 th October	54.9 ab	3.30 c	155.9 b	114.9 b	9.43	12.8 ab
10 th October	46.1 ab	2.20 f	160.1 b	81.9 b	10.3	13.8 a
L.S.D	27.72	1.50	94.57	41.22	N.S	4.5

Numbers having the same letter do not significantly differ from each other at 0.05 level

N.S = Not Significant

Minimum and maximum temperature and R.H. showed high significant correlation with number of thrips adults attacking mangetout flowers.

Effect of Plantation date:-

Table (3) present the different mean number of the four pests infesting mangetout plants in six different Plantation dates. The data showed that the planting date affect significantly the rate of infestation for the studied insects except for the Thrips (*Thrips tabaci*) in 1998-1999 season where it did not differ significantly.

Cotton leaf worm (larvae): Results in (Table 3) showed that planting on 20th of August showed the highest infested plants in the two seasons, followed by 1st September date. This trend was the same for the cotton leaf worm adult moths; (Table 3).

Leaf miner : The highest infested plants were of the 20th of September in 98/99 season without any significant differences with 1st of Oct., 10th of Sept. and 10th of October. Meanwhile in 1999-2000 season the rate of infestation gradually decreased, significantly, from the first planting date until the latest date.

Two Spotted spider mites:-

The three planting dates of September showed that the highest significant plants in the 98/99 season. Meanwhile, the 20th of Aug. planting date was significantly the highest in the 99/2000 season.

Thrips:

The first three plantation dates did not show any infestation with Thrips but the other three planting dates were with no significant difference, in 98/99 season. For the 99-2000 season the latest date of planting showed the highest infestation followed by 1st of Oct., 20th Sept. 10th of Sept. respectively. The least number of insects infesting plants was detected from the 10th Sept. Planting date.

Finally it can be concluded that the levels of infestation vary according to the date of plantation and the associated climatic. Mangetout crop is freshly needed all the season, therefore it will be planted successively every 10 days. The present data and information

will be helpful in predicting the required pest management program for each period.

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الملخص العربي

ديناميكية بعض العشائر الحشرية التي تصيب محصول البسلة السكرية المنزرعة في
مواعيد مختلفة

د. نعمة ابراهيم نصير

معهد وقاية النبات بالدقى . محطة البحوث الصباحية. اسكندرية

تمت زراعة صنف البسلة السكرية اوريجون شوجر بود II في مزرعة شركة
الروضة للتنمية الزراعية غرب الاسكندرية بالنوبارية وذلك خلال موسمي ٩٨-٩٩ ، ٩٩-٩٩-
٢٠٠٠ .

تمت تجارب الحقل لمقارنة مستوى الاصابة لاربع افات وهي : دودة ورق القطن -
العنكبوت الاحمر - صانعات الانفاق - التربس .

قورنت شدة الاصابة لمئة مواعيد زراعة وذلك في اربع مكررات في وحدات
تجريبية مساحة كل وحدة ٢٢٧٠م² سجلت درجة الحرارة القصوى والذنيا ومتوسط الحرارة
وايضا الرطوبة النسبية للجو وقدر معامل تلازم بينهما وبين مستوى الاصابة بالاربعة افات
تحت الدراسة على نباتات البسلة السكرية . اظهرت النتائج علاقة تلازم معنوية موجبة بين
عدد يرقات دودة ورق القطن والفرشات وايضا حشرة التربس ودرجة الحرارة الذنيا
والقصوى ومتوسط الحرارة وايضا الرطوبة النسبية في المقابل كانت هناك علاقة تلازم سلبية
بين مستوى الاصابة بالعنكبوت الاحمر وصانعات الانفاق وتلك العوامل الجوية.

دراسة تأثير موعد الزراعة اوضح ان الزراعة في اخر اكتوبر ولوئل نوفمبر كلنت
احسن المواعيد في تسجيل اقل درجة اصابة. ولان محصول البسلة السكرية مطلوب تصديوه
على مدار الموسم بأكمله فانه يمكن زراعته بنجاح في عروات كل عشرة ايام مع الاستعانة
بنتائج هذا البحث في التنبؤ بالاصابة ووضع برنامج مكافحة المناسب.