

APPLICATION OF INTERCROPPING FOR REDUCING SOME CAULIFLOWER INSECTS

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ABSTRACT

Effects of intercropping cauliflower with cabbage or radish on the population of aphids (*Myzus persicae* Sulz., *Aphis gossypii* Glover & *Brevicoryne brassicae* L.), white cabbage butterfly (*Artogeia rapae* L.) and the diamond-back moth (*Plutella xylostella* L.) were studied during two successive winter seasons (2005-2006) and (2006-2007). Results showed significantly effect for reducing infestation with the insect pests of cauliflower intercropped. Intercropping with cabbage reduced aphids and *A. rapae* populations than the monoculture. While intercropping with radish, the *P. xylostella* population was reduced than the monoculture.

High numbers of aphids and *A. rapae* were detected in December during both seasons. While, November was the preferred month for *P. xylostella*.

Keywords : Cauliflower, intercropping.

INTRODUCTION

There have been many studies performed to test the hypothesis that vegetational diversity in the form of intercropping will result in a lower pest attack than in monocrop. The intercrop, experiments have studied a wide range of insect species under different of field conditions. The intercropping system work, generally, in two ways : (1) the insect is less likely to find its host plant because of some kind of confusion (chemical or physical), (2) after having found a host plant, the insect is more likely to leave that patch because of frequent encounters with non-host plant individuals. In many cases, it has been shown that insects colonize monocultures and polyculture to the same extent (Rämert & Ekborn, 1996). Certain crop combinations in the intercropping system may increase damage (Tantawi *et al.*, 1992).

The farmer grow certain crops together to increase their economic income per unit area. Several advantages have been attributed to this polyculture system, one of them being lower susceptibility to pests and diseases. This has been discussed by many authors. In Egypt, Omar *et al.* (1993), El-Khouly *et al.* (1994) and Gabr and Sourial (2001); in Ghana, Trimbilla and Nyako (2001); in Germany, Lehumhus *et al.* (1995); and in Poland, Legutowska and Tomczyk (1999).

The aim of this study is to investigate the effect of intercropping cauliflower with cabbage or radish on the population of aphids (*Myzus persicae* Sulz., *Aphis gossypii* Glover & *Brevicoryne brassicae* L.) and two specialist moth species, *A. rapae* L. and *P. xylostella* L.

MATERIALS AND METHODS

Experiments were carried out at Kaha Agric. Res. Station of Plant Protection, Qalyubia Governorate, from Oct. 2005 to Jan. 2006 and from Oct. 2006 to Jan. 2007.

Intercropping system was applied to study the effect on aphids, *A. rapae* and *P. xylostella* populations in the absence of any insecticides treatment, and of the same agricultural practices. Cauliflower and cabbage were transplanted on the 2nd of October 2005 and 1st October 2006 for first and second seasons. Radish seeds were sowed a week after planting. The plot area was 24 m² (each row of 5 m long and 0.6 m width), consists of 8 rows, where 6 rows were cultivated and edged with one row uncultivated from each sides as a barrier between treated plots. Each treatment was replicated 3 times. The treatments were :

T1 = cauliflower as monoculture. (6 rows + 2 rows).

T2 = cauliflower intercropped with cabbage (3 rows of cauliflower alternated with 3 rows of cabbage + 2 rows).and T3 = cauliflower intercropped with radish (3 rows of cauliflower alternated with 3 rows of radish + 2 rows).

The sample was taken weekly, five leaves were picked randomly from each plant replicate and put in a separate paper bag for each treatment. Numbers of aphids and lepidopterous larvae were recorded for each replicate. Data was statistically analyzed for one way ANOVA and compared at 5 % level of probability.

RESULTS AND DISCUSSION

Data in Table (1) showed significant effect of intercropping cauliflower with cabbage and radish on the population of the tested insects as follow :

A- Effect of intercropping on aphid populations :

Cauliflower was infested with three species of aphids (*Myzus persicae* Sulz., *Aphis gossypii* Glov. and *Brevicoryne brassicae* L.), in different ranges throughout the season. The average number of aphids per plant was high when cauliflower was intercropped with radish represented by 706.6 and 723.4 individuals/leaf during the first and second season, respectively, than with the sole cauliflower culture represented by 632.0 and 662.6 ind./leaf. On the other side, aphid numbers were reduced to 240.4 and 283.8 ind./leaf, respectively when intercropped with cabbage.

As shown in Fig. (1), the aphid populations appeared firstly with low numbers and increased gradually then decreased at the end of the season. Two peaks were detected for cauliflower intercropped with cabbage (T2), the highest one represented by 36.8 and 36.6 ind./leaf on the 19th and 26th of December. in the 1st and 2nd seasons, When intercropped with radish, three peaks were recorded in both seasons, the highest peak was 83.8 and 84.0 ind./leaf on 19th and 26th December. for the 1st and 2nd seasons. Monoculture treatment in first season had 4 peaks where 74.4 ind./leaf was the highest record; three peaks in the 2nd season of 82.0 ind./leaf, both record were at the

end of December, which was the characteristic month of high aphid populations followed by January

B- Effect of intercropping on population of lepidopteran species :

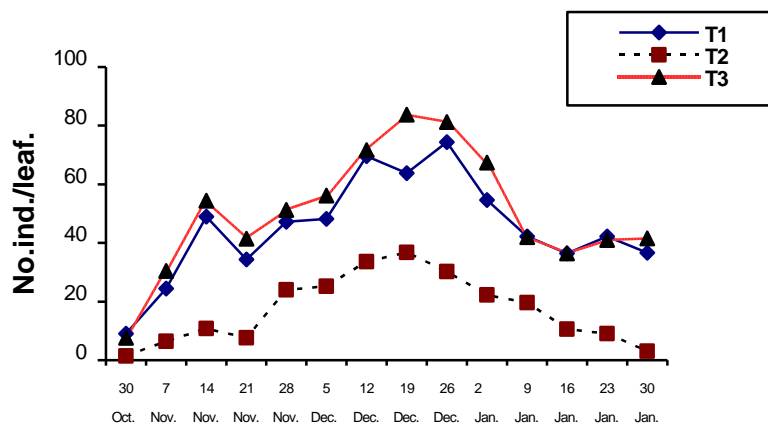
The population of *A. rapae* and *P. xylostella* larvae in cauliflower fields were affected by the intercropping system (Table, 1). The level of *A. rapae* population was higher on cauliflower monoculture (11.0 and 12.6 ind./leaf) than those intercropped with cabbage (5.8 and 5.2 individuals/ leaf) or radish.(7.8 and 8.0 individuals/ leaf) in 1st and 2nd seasons Also, *P. xylostella* population was relatively high in the monoculture treatment. In comparison with intercropping system. As shown in Figs. (2 & 3), the highest number of *A. rapae* and *P. xylostella* was recorded during December and November. Also, Fig. (2) indicated that *A. rapae* population in cauliflower monoculture was characterized with three peaks in first season and two peaks in the second one. The highest peak of *A. rapae* in the monoculture treatment in the two seasons was 2.0 larvae/leaf at the end of December. While, was 1.2 larvae/leaf for both seasons when intercropped with radish. Also, the highest peak of *A. rapae* in 1st and 2nd season on cauliflower with cabbage was 1.0 and 0.8 larva/leaf at the end of December and beginning of January.

Two peaks of *P. xylostella* larvae characterized the monoculture treatment were showed in Fig. (3), the highest record was 1.2 and 1.6 larvae/leaf at the end of November in the two seasons. Also, two peaks observed when intercropped with radish of 0.8 and 1.2 larvae/leaf for the 1st and the 2nd season, respectively. While, two peaks in the first season were recorded when cauliflower intercropped with cabbage and three peaks in the 2nd one.

The other studies showed reduction of insect population when cauliflower intercropped with tomato, their was a significant reduction of eggs of *P. xylostella* (Kandoria *et al.*, 1999). Also, broccoli intercropped with tomato, the number of early instar of *A. rapae* where greater in the monoculture compared to the intercropped one. While the contrast, the instar were significantly higher in intercropped broccoli (Hooks and Johnson, 2001).

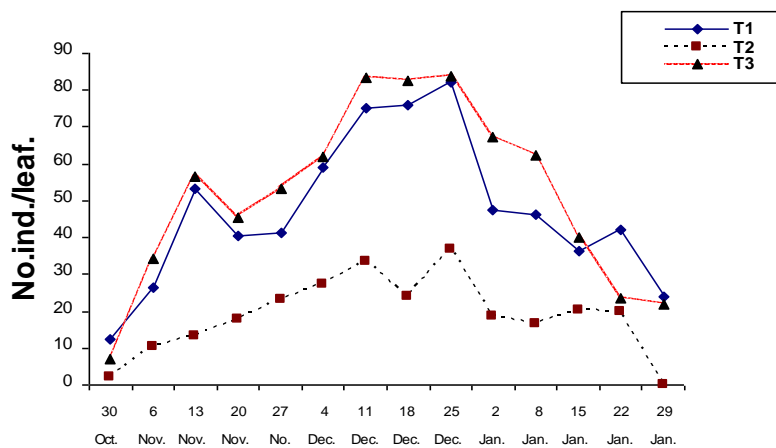
Table (1). Effect of intercropping cauliflower with cabbage and radish on the population of aphids, *A. rapae* and *P. xylostella* during 2005/2006 (A) and 2006/2007 (B) seasons.

Cropping system	Aphids		<i>A. rapae</i>		<i>P. xylostella</i>	
	A	B	A	B	A	B
Cauliflower (T1)	632.0	662.6	11.0	12.6	9.6	13.6
Cauliflower/ Cabbage (T2)	240.4	283.8	5.8	5.2	6.8	8.8
Cauliflower/ Radish (T3)	706.6	723.4	7.8	8.0	5.4	7.4
"F"	213298.25	74460.6	45.866	174.412	48.985	144.207
L.S.D. _{0.05}	6.144	9.891	4.388	3.205	3.462	3.068



2005 to 2006 seasons.

First season



2006 to 2007 seasons

Second season

Fig. (1): Fluctuation of aphid populations on cauliflower in the 3 treatments during 1st and 2nd seasons.

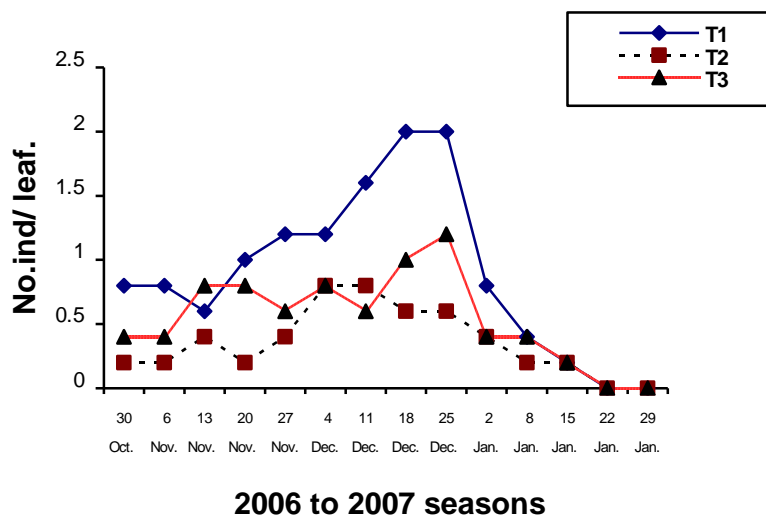
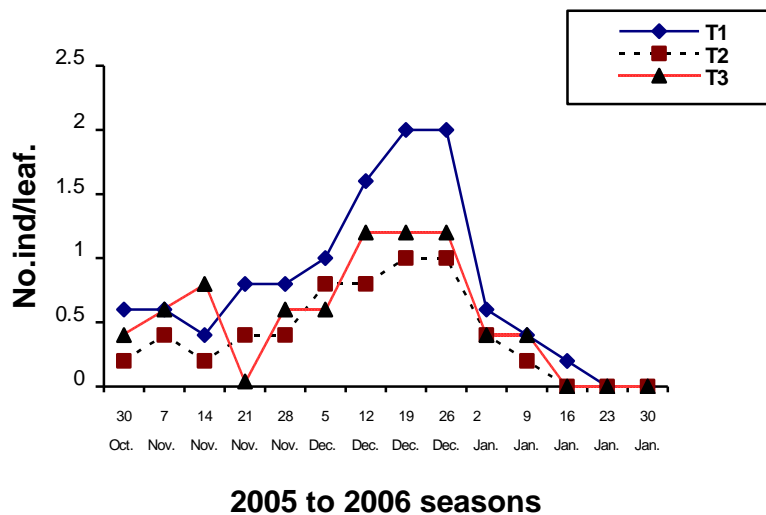
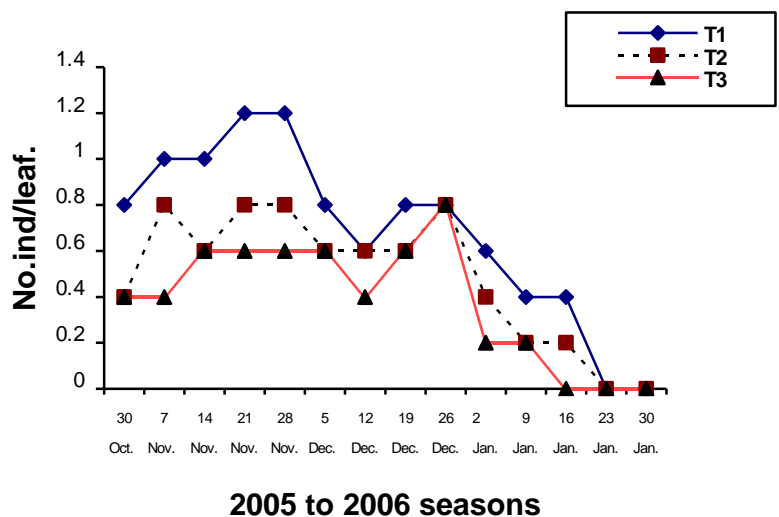
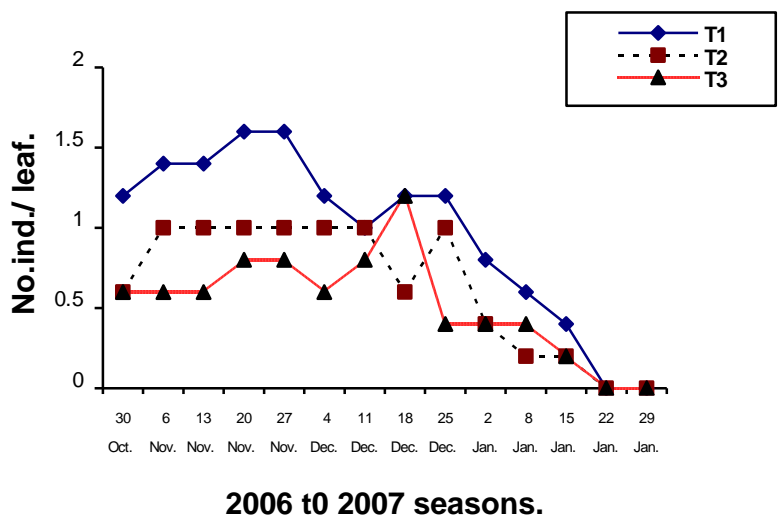


Fig. (2): Fluctuation of *A. rapae* populations on cauliflower in the 3 treatments during 1st and 2nd seasons.



First season



Second season

Fig. (3): Fluctuation of *P. xylostella* populations on cauliflower in the 3 treatments during 1st and 2nd seasons.

The using of plants had deleterious influence on insect showed a reduction in the population of eggs. In Mauritius, Facknath (2001) used coriander, garlic and tomato to reduce influence of *P. xylostella* and aphid on cabbage. Timbilla and Nyako (2001), using onion with cabbage for controlling *P. xylostella* in Hawaii.

Other investigators used clover with cabbage for reducing insect population. These studies depends on distance between plants. Armstrong *et al.* (1998); in Germany, Lehnhus *et al.* (1995) found that clover reduce aphids but not with most lepidopteran, they concluded that more study are needed to control the interacting effects such as plant quality on dispersion ability. Åsman (2001) deduced that oviposition of *Plutella* was reduced on cabbage with high clover which act as camouflaged the host plant. Åsman *et al.* (2001) deduced that, intercropping experiments have studied a wide variety of insects under a variety of field conditions. One explanation for the variation in results might be that different insects group respond differently to vegetation diversity depending on their life cycle and behaviour

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استخدام التعميل لتقليل بعض الحشرات على نبات القنب فيوليت شكرى جرجس عبد الملاك و بدر الصباح عبد المنعم فتوح معهد بحوث وقاية النباتات، مركز البحوث الزراعية، الدقى - الجيزة.

تم دراسة تأثير تعميل نباتات القنب مع الكرنب والفجل على تعداد حشرات المنّ (منّ الخوخ، منّ القطن، منّ الصليبيات)، وفراشتى أبودقيق الكرنب *Artogeia rapae* L. وذات الظهر الماسى *Plutella xylostella* L. خلال موسمين شتويين متتاليين (٢٠٠٥-٢٠٠٦)، (٢٠٠٦-٢٠٠٧).

أظهرت النتائج تأثير معنوى فى خفض الإصابة نتيجة تعميل القنب. فإن التعميل مع الكرنب قلل من تعداد المنّ و *A. rapae* عنه فى زراعات القنب المنفردة. بينما التعميل مع الفجل أدى إلى خفض تعداد *P. xylostella* أيضا عن الزراعة المنفردة. كان أعلى مستوى لتعداد الحشرات هو الموسم الثانى. وكان أعلى تعداد للمنّ و *A. rapae* خلال الموسمين ملحوظا فى شهر ديسمبر. بينما كان شهر نوفمبر هو المفضل لحشرة *P. xylostella*.