Short Communications بحوث مختصرة

CONTROL OF *HELIOTHIS* spp. ON CHICKPEA BY INSECT PATHOGENIC NUCLEAR POLYHEDROSIS VIRUS

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Abstract

Abdallay, A., K.M. Makkouk and C. Cardona. 1987. Control of *Heliothis* spp. on chickpea by insect pathogenic nuclear polyhedrosis virus. Arab J. Pl. Prot. 5:80 - 78.

A Nuclear Polyhedrosis Virus (NPV) commercial preparations and the chemical pesticide Nuvacron significantly suppressed *Heliothis* spp. larval population. However, Nuvacron was more suppressive than the viral application. When the feeding stimulant Coax was mixed with the viral pesticide it did not improve *Heliothis* control significantly as compared to viral pesticide alone. In addition, the feeding stimulant was found to be as suppressive as the viral pesticide. All viral and chemical pesticides failed to influence significantly the percentage of pod damage and seed yield.

Additional key words: *Heliothis* spp., chickpea, pathogenic virus.

Introduction

The pod borer, *Heliothis* spp. is one of the most important pests in many chickpea growing areas. Problems associated with chemical control of *Heliothis* such as toxicity, high cost of insecticides and emergence of insects resistant to insecticides could be avoided by using a selective and environmentaly compatible pest control technique. Accordingly an experiment for the control of *Heliothis* spp. on chickpea with different commercially available viral pesticides was conducted at the International Center for Agricultural Research in the Dry Areas, Aleppo, Syria.

Materials and Methods

Two commercial microbial insecticides for *Heliothis* spp. control were evaluated. Elcar (WP formulation of Baculovirus heliothis), produced by Sandoz Inc./San Diego, California, USA, and Viron /H (WP formulation of Baculovirus heliothis) produced by International Minerals and Chemicals corp., Libertyvlle , Illinois, USA, were used. Both products contained 4×10^9 polyhedral inclusion bodies (PIB) per gram. The cotton seed flour-based feeding stimulant Coax, was obtained from Traders Oil Mill Co., Forth worth, Tewas, USA.

Monocrotophos (0, 0-dimethyl -0- (2-methyl-carbonyl-1-methyl-vinyl) -phosphate) / (Nuvacron, Azodrin) a broad-spectrum insecticide, (OP ester) was compared with the above two microbial insecticides for its ability in controlling *Heliothis* spp. on chickpea. Nuvacron was developed by CIBA-GEICY limited, Basle, Switzerland.

To compare the efficacy of virus and chemical products for controlling *Heliothis* spp. in chickpea, a trial which had seven treatments was conducted on 2.5. 1985. The treatments were Elcar at 6×10^{11} PIB /ha; Elcar at 6×10^{11} PIB /ha + 2kg Coax /ha; Nuvacron at 380 (a.i.) g /ha; Coax 2 kg /ha and check (unsprayed). All treatments were replicated four times on plots of 10.2×2.45, (25 m^2) arranged in completely randomized design. The rows were 45cm apart with 10cm between plants. All treatments were applied four times, except treatments Viron /H and Viron /H + Coax which were sprayed only three times due to the limited amount of Viron /H available. The chemical treatment was applied 2 times due to the long lasting effect of the chemical. In the first application of all treatments, a total volume of 360 liters of water /ha was used. Due to an increase in size of chickpea plant, the total volume of water used was increased to 480 liters /ha in the subsequent applications.

Results and Discussion

Results showed that viral and chemical pesticides suppressed *Heliothis* spp. population below the untreated check. In addition, the adjuvant application was also found to be suppressive to the insect. The average number of *Heliothis* larvae in virus and Coax treated plots were significantly lower than those in the untreated check and higher than in the insecticide treated plots (Table 1). These results showed a little difference in mortality of *Heliothis* spp. when the adjuvant Coax was added to Elcar or Viron /H treatments. Although the mortality value for the Elcar + adjuvant, Viron /H + adjuvant combinations were slightly higher than for Elcar or Viron /H alone, but these differences were not significant ($P = 0.05$). All treatments failed to influence significantly the percentage of pod damage and seed yield. Data indicated unexpected high percent mortality when Coax alone was used.

The average number of *Heliothis* spp. larvae in virus treated plots were significantly lower than those in the untreated check. This is in agreement with the findings of Nagarkatti (1981) who demonstrated that Elcar or other viral insecticides can effectively suppress *Heliothis* spp. population. However, the results obtained in this study were not in agreement with what was reported by the above author who stated that microbial pesticides compared favorably with chemical insecticides. The difference may be due to the late application of the first treatment in this study. A number of medium size larvae were observed before the first application. It has been found earlier that microbial pesticides can better replace chemical insecticides when the virus application is timed to coincide with hatching of high egg population. Furthermore, larvae emerging from eggs shortly after the viral insecticide application are more likely to ingest a lethal virus inoculum dose than when emerged before virus application. According to Mckinley (1982), to control *Heliothis* spp. larvae by virus, crop selection was important. According to Ignoffo (1981) the half life of sprayed virus is less than two days on cotton, whereas the hald life of the same virus on tomato and sorghum is more than 30 days. Chemical nature of plants surface and protection from ultraviolet light are the primary components of the microenvironment of a plant that affect the life span of a virus.

The use of Coax, a feeding stimulant and virus protectant together with microbial insecticide was not found very beneficial. This result is not in agreement with that of Luttrell *et al.* (1983) who reported that the effectiveness of virus in controlling *Heliothis* spp. was increased when microbial insecticides were mixed with Coax. The difference in the crop used might account for the difference in the results obtained. Most researchers have worked with cotton which is different from chickpea with regard to its effect on virus stability and survival. Coax might be a beneficial adjuvant when sprayed on cotton but not on chickpea. This was confirmed by the findings of Heimpel (1977) who mentioned that an adjuvant which protects the virus on cotton may not be effective on other crops.

The reason that all treatments failed to significantly influence the percentage of pod damaged and yield could be due to the fact that the population of *Heliothis* in chickpea field where this study was done was below the economic threshold.

There was a numerical difference in overall yield of chickpea treated with chemical and viral insecticides. This difference could be due to the infestation of chickpea with other pests mainly the leafminer, *Liriomyza cicerina* (Rond.) which were eliminated from the plots treated with Nuvacron and remained in virus-treated plots, since the virus is specific to *Heliothis*.

The reason for toxicity of Coax of *Heliothis* spp. was not clear. It was found in separate studies that four sprays of Elcar was as effective as six sprays which could be due to the very low level of *Heliothis* population towards the end of the growing season. The use of higher virus concentrations and pH levels in the spray mixture was not found beneficial.

Table 1. Suppression of *Heliothis* spp. by virus and chemical pesticides and the effect on pod damage and seed yield of chickpea.

Treatment	Rate /ha	No. of larvae per plot ($25m^2$)	% damaged pods	Seed yield[b] g /plot (25 m2)
Elcar	6×10^{11} PIB[a]	72.2 b	4.0 a	1274.0 a
Viron /H	6×10^{11} PIB	70.0 b	2.4 a	1445.7 a
Elcar + Coax	6×10^{11} PIB + 2kg	66.8 b	6.0 a	1344.0 a
Viron / H + Coax	6×10^{11} PIB + 2kg	65.0 b	2.0 a	1325.7 a
Chemical	380 g (a.i.)	12.6 a	1.2 a	1517.0 a
Coax	2kg	60.0 b	4.0 a	1350.0 a
Check		98.8 c	4.0 a	1226.5 a

Values within a column not followed by the same letter differed signicantly (P = 0.05) by the Duncan's multiple Range Test.
a) Polyhedral inclusion bodies (PIB).
b) Yield of only 9.2 m of each four central rows were harvested.

الملخص

عبد اللاي، عبدالله، خالد مكوك وسيزار كاردونا. 1987. مكافحة حشرة ثاقبة قرون الحمص باستعمال مبيدات فيروسية. مجلة وقاية النبات العربية 5: 80 - 78.

عند استعمال محضر تجاري من مبيد فيروسي ومبيد كيميائي (نوفاكرون) أمكن تخفيض عدد اليرقات لحشرة ثاقبة قرون الحمص. إلا أن المبيد الكيميائي كان أكثر تأثيراً من المبيد الفيروسي. عند استعمال خليط من الجاذب الحشري كواكس والمبيد الفيروسي لم يكن هناك تأثير معنوي لاستعمال الجاذب مقارنة باستعمال المبيد الفيروسي فقط. يضاف إلى ذلك بأن الأثر المثبط على يرقات الحشرة للجاذب كان مساوياً لأثر المبيد الفيروسي. لم يكن هناك تأثير معنوي في تخفيض النسبة المئوية للقرون المصابة أو الإنتاج العام للمحصول من البذور عند استعمال كلٍ من المبيد الفيروسي أو المبيد الكيميائي.

كلمات مفتاحية: ديدان قرون الحمص (أنواع الهيليوسيس)، حمص، فيروسات ممرضة.

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