INSECTICIDAL ACTIVITY OF APRICOT SEED EXTRACT ON THE COTTON LEAFWORM, *SPODOPTERA LITTORALIS* (BOISD.)

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Abstract

Potential toxicity and biological effects of apricot seed extract were tested on the cotton leafworm, *S.littoralis*. Results indicated that the concentration 0.5% gave 6.67% mortality on larvae after 2 days of treatment and increased to 20% after 7 days. At 5% conc., mortalities were ranged from 53.34 to 71.11% in 2-7 days.

Concerning pupation and adult emergence, 0.1% conc. gave 40 and 26.67%, respectively. The corresponding figures were 6.67 and 2.22%, respectively with 5% conc. The untreated larvae gave 96.67% pupation and 93.33% moth emergence.

INTRODUCTION

The cotton leafworm, *S.littoralis* Boisd., is among important pests of field crops, vegetables and ornamentals in Egypt because of its wide range of hosts. The repeated and continuous use of chemical insecticides has led to development of resistant strains of insect pests, ecological imbalance and contamination of the environment. Thus, clearly marked improvements in the use of chemicals and other means for pest control are needed to reduce losses and cost of control. The use of biological control, natural products and chemicals offers a promising trend for the integrated control of pests.

The natural products proved to be promising on S.*littoralis* (Meisner *et al.* 1977; El-Sayed 1982/1983; Saleh *et al.* 1984; Abdalla 1986; Khadr et *al.* 1986). Brimer *et al.*, (1993) mentioned that an amygdalin is a cyanogenic glycoside occurring among others in almonds and bitter apricot seeds.

The present research aimed to throw light on the effects of apricot seed extract on mortality and development of *S.littoralis*.

MATERIALS AND METHODS

Preparation of apricot seed extract *Prunus armeniaca*: Apricot kerlnes were obtained by breaking the hard shell of seed, dried in the air and crushed into powder. Extraction was done by using solvent mixture of acetone and hexane (1: 1 by volume) in closed dark bottles for 2 hours on a shaker. After that, the mixture was left for 7 days at room temperature ($28 \pm 2^{o}C$). The extract was filtered through anhydrous sodium sulphate and concentrated in petri dish at room temperature.

The resulting crude extract showed a pale yellow oily liquid having a strong characteristic odour.

Azuma (1997) indicated that the apricot seeds are isolated, dried and extracted to give an oil, and the fattay acids consist of oleic acid, linolic acid, palmitic acid, stearic acid, palmitoleic acid, arachidonic acid, C_{18} fatty acids, C_{22} fatty acids and others.

Test insect: The susceptible strain of *S.littoralis* were reared in the laboratory at the Agricultural Research Station, Sabahia, Alexandria on castor oil leaves as described by El-Defrawi *et al.* (1964). The 4th instar larvae were selected for testing.

Bioassay tests: For testing insecticidal properties, the resulting extract was diluted with acetone giving serial concentrations. Equal sizes of castor-oil leaves were dipped for 10 sec. in each concentratation. After dryness, the treated leaves were placed in glass jars and offered to 10 larvae for each replicate. The control leaves were dipped in acetone. Three replicates were used for each concentration. After 1 day of feeding on leaves, the surviving larvae were transferred to clean glass jars containing sawdust and supplied daily with fresh castor oil leaves. Mortalities were recorded 2, 5 and 7 days post-treatment. Also, numbers of pupae and adult emergence were recorded for each concentration and control.

Data analysis: Data were subjected to analysis of variance (ANOVA) and means were separated by LSD test at 0.05 level (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Data in Table 1 show the toxic effects of apricot seed extract on the 4th instar larvae of *S.littoralis* after 2, 5 and 7 days of feeding on treated leaves. After 2 days, mortalities of larvae were 0,6.67, 11.11, 18.89 and 53.34% with the concentrations of 0.1, 0.5, 1, 2.5 and 5%, respectively. The corresponding figures were 13.34, 20,

34.45, 53.33 and 71.11% after 7 days, respectively. Significant differences were obtained among the grand means of concentrations as well as feeding period. The grand means of mortality were 8.89, 14.82, 22.22, 38.15 and 62.22 at the concentrations of 0.1, 0.5, 1, 2.5 and 5%, respectively. While, these means were 18, 31.33 and 38.45% after 2, 5 and 7 days of feeding, respectively. This indicates that the toxic effects depend on the concentration used and feeding period of larvae on treated leaves.

Table 1. Toxicity of apricot seed extract to the 4th instar larvae of *S.littoralis*.

Conc. %	Mortality (%) at indicated days after feeding			Grand means
	2	5	7	
0.1	0	13.34	13.34	8.89 c
0.5	6.67	17.78	20	14.82 c
1	11.11	21.11	34.45	22.22 bc
2.5	18.89	42.22	53.33	38.15 b
5	53.34	62.22	71.11	62.22 a
Grand means	18 B	31.33 A	38.45 A	29.26

Means followed by the same letter are not significantly different at 0.05 level by LSD test.

Also, apricot seed extract affected larval development as indicated in Table 2. Percentages of pupation ranged from 40 to 6.67% at the concentrations of 0.1-5%. Significant differences were obtained among the concentrations and control. Results also showed significantly reduction of moth emergence in comparison with the control, giving the means of 26.67, 17.78, 6.67 and 2.22% moth emergence at the concentrations of 0.1, 0.5, 1, 2.5 and 5%, respctively. The control gave 96.67 and 93.33% of pupation and adult emergence, respectively.

Nout *et al.* (1995) stated that amygdalin is a cyanogenic glycoside occurring among others in almonds and bitter apricot seeds. They also reported that utilization of seeds for human or animal nutrition requires adequate detoxification, then selected filamentous fungi and yeasts were tested for their ability to decompose amygdalin. Gandhi *et al.* (1997) mentioned that wild apricot pomace (WAP) contains low levels of cyanogenic glycoside-amygdalin which inhibited growth of rat and any toxin present in it, e.g., amygdalin could be detoxified by wetting with water. Also, phenolic compounds, quercetin 3-glycosides and procyanidins have been detected in nine apricot cultivars (Radi *et al.*, 1997).

From the foregoing results, apricot seed extract showed toxic effects and reduction in pupation as well as adult emergence of *S.littoralis* depending on the concentrations and days after feeding. These effects attributed to present amygdalin in apricot seed extract.

Therefore, use of apricot seed extract as natural product may be a suitable method for protecting plants from *S.littoralis* in IPM programmes.

Table 2. Effect of apricot seed extract on development of *S.littoralis*.

Conc. (%)	Pupation (%)	Adult emergemce (%)
Control	96.67 a	93.33 a
0.1	40 b	26.67 b
0.5	24.33 b	17.78 b
1	10 c	6.67 c
2.5	7.78 c	6.67 c
5	6.67 c	2.22 c

Means followed by the same letter are not significantly different at 0.05 level by LSD test.

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فعالية مستخلص بذور المشمش كمبيد حشرى ضد دودة ورق القطن

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تستهدف التجربة دراسة التأثير السام والبيولوجى لمستخلص بذور المشمش ضد دودة ورق القطن وبالتالى إمكانية إستخدام ذلك المستخلص فى مكافحة الآفات الزراعية.

وأظهرت النتائج موت ٦,٦٧٪ لليرقات المغذاة علي أوراق الخروع المعاملة بالتركيز ٠,٥٪ بعد يومين من تلك المعاملة، ثم زادت تلك السمية إلي ٢٠٪ بعد ٧ أيام. وعند التركيز ٥٪ تراوحت قيم نسبة الموت المئوية من ٥٣,٣٤ إلي ٧١,١١٪ خلال ٢ - ٧ أيام من المعاملة.

كذلك أظهرت النتائج فعالية المستخلص ضد تكوين العذاري والحشرات الكاملة، حيث أعطي التركيز ٠,١٪ كلا من ٤٠ و ٢٦,٦٧٪ لتكوين العذارى وخروج الفراشات علي التوالى.

وانخفضت تلك القيم إلى ٦,٦٧ و٢٠,٢٢٪ عند تركيز ٥٪ على التوالى، بينما في الكونترول أعطت ٩٦,٦٧ و ٩٣,٣٣٪ لتكوين العذارى وخروج الفراشات علي التوالى.