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Monitoring and Characterization of Insecticide Resistance in the Cotton

Leafworm, *Spodoptera littoralis* (Boisd.) (Lepidoptera: Noctuidae)

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, **Volume 8, Issue 4, December 2005, Pages 397–410** [Journal of Asia-Pacific Entomology](#)

Abstract

Resistance to several classes of insecticides was diagnosed in the cotton leafworm (CLW), *Spodoptera littoralis* (Boisd.), from cotton fields in the Nile Delta Egypt through 2002-2004 seasons. Two types of laboratory bioassays were used for the detection of insecticide resistance. Leaf-dip larval bioassay and discriminating concentration (LC_{50} for susceptible laboratory strain) technique revealed the presence of resistance to insecticides tested. Both larval and adult stages showed relatively similar response to most insecticides tested. However, the glass vial-discriminating concentration technique is particularly more useful when resistance is related to the target -site insensitivity rather than to increased metabolism. The pattern of reversion of resistance to five insecticides was determined in two field strains that have been released from continuous insecticide application and then reared under laboratory conditions for 6-8 generations in the absence of insecticide pressure. It was considered that losing of resistance to Cypermethrin in both resistant field strains seemed to be quicker than other insecticides tested, in which resistance ratios decreased from 47.7-fold (F_0 - parents) to 17.8- fold (F_6 generation) in MNF- strain, and from 38.5- fold (F_0 -parents) to 10.7- fold (F_6 generation) in KPR-strain. On the other hand, biochemical assays indicated that both MNF- and KFR- field strains, expressed higher levels of acetylcholinesterase (AChE) activity by 13.2- and 8.4-times, respectively, than that of the susceptible strain. AChE activity was sharply decreased to 1.01- and 1.92- times in MNF- and KFR-strains, respectively, compared to that of susceptible strain, following insect rearing for six successive generations without insecticide pressure. Esterases activity was also decreased 2.02-times (F_0) to 1.41 (F_6) in MNF-strain and from 2.0-times (F_0) to 1.21 -times (F_6) in KFR-strain, compared to that of susceptible strain. On the other hand, analysis of esterases by native Polyacrylamide gel electrophoresis (PAGE) confirmed the association between esterases activity and resistance to insecticides tested in both field strains.

Key Words: acetylcholinesterase; discriminating vial technique; esterase;
insecticide resistance; resistance reversion; *Spodoptera littoralis*

Insecticidal Activity And Chemical Composition Of Extracts Derived From *Annona Squamosa* Linn. (Annonaceae) Against Three Insect Species.

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Published in: 10th Arab Congress of Plant Protection, 26-30 October, 2009

Abstract

The insecticidal properties of methanol extracts derived from leaves and seeds of the Custard Apple, *Annona squamosa* (Annonaceae), were tested on three insect species, i.e. cotton leafworm, *Spodoptera littoralis*; cowpea weevil, *Callosobruchus maculatus*; and house fly, *Musca domestica*. The bioassay tests for both crude extracts and purified fractions were examined for their toxicity and inhibitory growth effects, whereas phytochemical analysis was done by GC/MS analysis. Crude seed extracts showed high toxicity against *C. maculatus* adults, *M. domestica* larvae and *S. littoralis* larvae with 48 hour LC₅₀'s of 0.67, 1.29, and 1.67 %, respectively. Feeding assay showed that sublethal concentrations (LC₂₅ and LC₅₀) of both seed and leaf extracts showed deterrent effects, in a concentrationdependent manner, on larvae of *S. littoralis* and *M. domestica*. Pupation rate and fecundity of the adult females were significantly decreased, at LC₅₀, compared to the control treatment. The insecticidal properties of the fractions eluted from methanol extracts of *A. squamosa* seeds and leaves were also evaluated against three insect species. The LC₅₀ data of eluted fractions from *A. squamosa* extracts showed high toxicity against 4th *S. littoralis* instar, 2nd *M. domestica* instar, and *C. maculatus* adults. The biological activity of the most effective fractions was evaluated against the insect species tested. Pupation, adult emergence and fecundity were remarkably inhibited at LC₅₀s of *A. squamosa* extracts in both *S. littoralis* and *M. domestica*. GC/MS analysis of *A. squamosa* extracts demonstrated the presence of some phytochemicals (phthalic acid esters, alkaloids, terpenes, and fatty acids) which may provide the insecticidal properties of these extracts against tested organisms. Phthalic acid esters were found to be the most bioactive components in the eluted fraction of methanolic extract from *A. squamosa* seeds and leaves.

PHYTOCHEMISTRY AND ANTIMICROBIAL PROPERTIES OF METHANOL EXTRACTS OF SELECTED PLANT SPECIES

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ABSTRACT:

Methanolic extracts of three plant species, Custard apple, *Annona squamosa* L.; Madagascan periwinkle, *Catharanthus roseus* syn. *Vinca rosus*, and Conyza, *Pluchea dioscoridis* (L.) DC., were screened for their phytochemical and antimicrobial properties. Two Gram-positive bacteria (*Bacillus subtilis* and *Streptomyces* spp.) and three fungi strains (*Fusarium oxysporum*, *Macrophomina phaseolina* and *Aspergillus niger*) were used for evaluation of antimicrobial properties of selected plant extracts. The agar gel diffusion method was used to assay for the antimicrobial properties on the test isolate. The methanol extract from *Conyza dioscoridis* leaves was superior to other tested extracts showing an obvious inhibitory effect on the growth of bacterial isolates. The results of inhibitory activity of tested extracts against *Streptomyces* spp. indicated that *C. dioscoridis* extract showed the highest zone of growth inhibition occurred after 48 h of treatment with a zone diameter of 27.0 mm at a concentration of 1.0 % and of 20.0 mm at a concentration of 0.5%. However, the most antifungal activity was observed in methanol extract of *Annona squamosa* seeds, at concentration of 1.0%, against *Fusarium oxysporum* showing inhibition zone with a diameter of 44.0 mm, while at concentration of 0.5 %, the growth inhibition occurred with a zone of 19.0 mm. The extract from *Catharanthus roseus* leaves, at 1.0%, showed also an obvious inhibitory effect, where the zone diameter of growth inhibition was 22.0 mm. GC/MS analysis of tested plant extracts demonstrates the presence of some phytochemicals (phythalic acid esters, alkaloids, terpenes, and fatty acids) which may provide the antimicrobial properties of these extracts against tested organisms.

Key words: Antimicrobial activity, *Annona squamosa*, *Catharanthus roseus*, *Pluchea dioscoridis*, Phytochemical comp