

Research Article

Biological Control of Diacrisia - Obliqua through *Azadiracta indica* Extract

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ABSTRACT

The present study was conducted with the main aim to provide biopesticidal control of agricultural pest through plant products of *azadiracta indica*. The culture of pest Diacrisia-obliqua walker was made on soybean leaves. Plant material was collected and crude was extracted in different solvents. The Diacrisia-obliqua when treated with extract of *Azadiracta indica*, containing compound Azadiractin, was moulted into headless pupae and ultimately died. Azadiractin caused morphological changes in the guminile stages.

INTRODUCTION

In recent years the use of synthetic insecticides in crop protection programmes around the world has resulted in disturbances of the environment, pest resurgences, pest resistance pesticides and lethal effect to non target organisms in the agro-ecosystems in addition to direct toxicity to users. Therefore, it has now become necessary to search for the alternative means of pest control, which which can minimize the use of synthetic pesticides. Botanical pesticides are the important alternatives to minimize or replace the use of synthetic pesticides as they possess an array of properties including toxicity to the pests, repellency, antifeedance, insect growth regulatory activities against pests of agriculture importance. During last two decades, more than 5000 plants have been tested for juvenile hormone activities against various insects, Zooral and Slama (1970); Slama (1973); Supavarn et al., (1974); Jenning and Ottridge (1979); Brooks et al., (1979); Hilfnowy et al., (1990). Fruit extract of *Azadiracta indica* elicit a variety of effects in insects such as antifeedant, growth retardation, reduced fecundity, moulting disorders and changes in behavior. (Schmidt et al., 1998; Abou Fakh Hammad et al., 2001; Bancho., 2003; Wandscheer et al., 2004.)

Recently there has been a major concern for promotion of botanical-environment friendly pesticides, microbial sprays and insect growth regulators amidst other control measures such as beneficial insects and all necessitate an integration of supervised control (Senthil Nathan et al., 2004). Recent studies stimulated the investigation of insecticide properties of plant derived extracts and concluded that they

are environmentally safe, degradable and target specific.

MATERIALS AND METHODS

Culture of Diacrisia-obliqua walker:- The hairy caterpillar Diacrisia-obliqua walker is an important and destructive pest of a variety of crops. The caterpillar feeds gregariously on parenchymatous cells and ultimately whole leaf is destroyed. The larvae collected from cabbage and cauliflower fields at vidisha district, were reared on fresh soybean leaves in the laboratory at $27^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and $75 \pm 5\%$ R.H.. Second instar larvae measuring $5.00 \text{ mm} \pm 0.1$ were used for bioassay studies.

The ripened fruits and leaves were collected from the surrounding of vidisha district M.P. in months of May – Jul. and Oct. – Nov. respectively. The plant material was washed, dried and powdered in domestic grinder. The extract was obtained by extraction method in water and ethanol separately. The ethanolic extract was re-extracted successively with solvents at increasing polarity viz. Hexane, Chloroform and Methanol. Each extract was filtered through waltman's filter paper and stored at 10°C .

BIOLOGICAL TESTING

Sexually immature adult mesh (7 days old) reared on soybean leaves were starved for 16 hours at $30^{\circ}\text{C} \pm 2^{\circ}\text{C}$ before releasing them on treated leaf pieces ($7.5 \times 7.5 \text{ cm}$). The leaf pieces of the said size were punched from a fixed place of soybean leaves to avoid variation. The leaf pieces were dipped in formulated extracts for about two seconds. Treated leaf pieces after drying under fan were offered to hairy caterpillar contained in glass

jars (15 × 10 cm). Jars were covered with muslin cloths and kept at 30°C. Five replications (one larvae/leaf piece) were made for each treatment. A set of control for experiment treated with respective solvents were also made. A set of same number of replication without treatment was also kept to know the extent of shrinkage of leaf pieces at the above temperature. After 24 hrs uneaten area left in glass in both treatment and controls were measured by putting a graph paper and percentage feeding was worked out. The crude extracts obtained through different solvents were put on TLC plates to find out the active compounds present in them. Characterization of biologically active

compounds was carried out by spectrometric identification methods as mentioned in the books of 'Spectrometric identification of organic compounds' by Robert M Silverstein 1974.

OBSERVATIONS AND RESULTS

During the course of present study an attempt was made to observe the juvenile hormone effect of plant compounds on *Diacrasia-obliqua*. The effect of 'Azadirachtin' pure compound obtained from plant *Azadirachta* on the fourth instar larvae of *Diacrasia-obliqua*. The Juvenile thus obtained indicated the headless pupae.

Effect of Azadirachtin (AZA) and Juvenile hormone (JHA) analogue on 4th instar larvae of *D. oblique*

Treatments	No.	%age larvae transformed into			Larval period in days
		Permanent larvae	Larval pupal intermediates	Headless pupae	
Control	15 each	100	—	—	9.13±1.06
A	20	100	—	—	12.72±2.32
B	18	—	—	100	6.72±0.75
C	36	55.5	44.5	—	9.80±2.12
D	20	100	—	—	0.9±1.83

Treatment - Control: 5µl acetone or 2µl ethanol, A: 2µg AZA, B: 5µg JHA, C: 2µg AZA + 5µg JHA, and D: 5µg AZA.

Larval pupal intermediate and permanent larvae transformed after the treatment of larval period in days have also been noticed when prolonged in three cases and it was described in treatment group 'B'. the details of the treatment and doses in each treatment as well as control have been given in above table, it was observed that only group 'C' 44.5% larvae were transformed into larval pupal intermediate. This is also quite clear from table that in group 'B' the pupae was emerged after treatment of larvae were headless or their head was poorly developed.

The effect of *Azadirachta indica* compound also caused some morphological changes in the treated larvae. The treated larvae shows the retarded growth which could not pupate and ultimately died. Thus *Azadirachta indica* a well known Indian plant have shown promising results as biopesticides.

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