INTERNATIONAL JOURNAL OF PHARMACEUTICAL RESEARCH AND DEVELOPMENT (IJPRD)
Platform for Pharmaceutical Researches & Innovative Ideas
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INSECTICIDAL ACTIVITY OF ACETONE CRUDE EXTRACT OF *SPHAERANTHUS INDICUS* LIN. (FAMILY-ASTERACEAE) *CALLOSOBRUCHES MACULATUS*

Priyam Singh[1*], Rajni Shrivastava

[1]Department of Zoology, Govt. P.G. College, BHEL, Bhopal (M.P.)

ABSTRACT

Multiple drug resistance has developed due to indiscriminate use of commercial pesticides commonly used as treatment of pests making it a global growing problem. Present study showed the biopesticidal activity S. indicus. At 3% concentration of acetone extract of S. indicus showed highest mortality of C. maculatus (90%). Preliminary phytochemistry and TLC reported the presence of terpenes in biologically active fractions. IR and HPLC spectra of Sphaeranthus indicus showed the presence of 5 membered lactone, bilactonic, l-borneol, l-carvone, sesquiterpene, cycloartenol steroid and taraxasterol. The crude extract from the indigenous plant can prove a potent biopesticide against C. maculatus.

Keywords: Mortality, terpenes, lactone, sesquiterpene

Correspondence to Author

Priyam Singh

Department of Zoology, Govt. P.G. College, BHEL, Bhopal (M.P.)

Email: priyam.singh32@gmail.com

INTRODUCTION

Nature has been a source of medicinal agents since time immemorial the importance of herbs in the management of human ailments cannot be over emphasized. Recently, multiple drug resistance has developed due to indiscriminate use of commercial pesticides commonly used as treatment of pests making it a global growing problem. The most important of the bioactive compounds of plants are terpenoids, flavonoids, tannins, and phenolic com pounds.

MATERIALS AND METHODS

The whole plants of *S. indicus* were collected from areas around District Raisen, M.P. in India. Powdered (40-60-mesh) plant materials were taken for extraction using petroleum ether and acetone in Soxhlet apparatus. The filtered extract was concentrated under reduced pressure in a vaccum evaporator below 40°C.

Phytochemical screening

Phytochemical screening were performed to assess the qualitative chemical composition of different crude extracts using commonly employed precipitation and coloration reactions to identify

the major secondary metabolites like alkaloids, terpenes, flavonoids, saponins, steroids, phenolic compounds, tannins and aminoacids. The phytochemical analyses were carried out using standard procedures (Sofowara, 1993 and Trease *et.al*., 1989).

TLC on silica gel G 60 F_{254} separated the different components in the solvent system benzene:ethyl acetate. For laboratory culture of test insect the pulse beetles were collected from the godowns and grain market of Bhopal, (M.P.) in India during different seasons. For the experimental bioassays different pulses were sterilized before experiments. The infected seeds of pulses were kept in separate bottles for rearing of *C. maculatus* maintained at 27±2°C and Rh 75±10% with the usual 14:10L.D. photoperiod. After the emergence, the adults were separated and kept in different glass vials for experimental bioassays.

Statistical analysis

Mortality was observed after 24 hrs. and 72 hrs. and collected mortality was calculated by Abbott's Formula (Abbott's 1925). Experiment was carried out in triplicates and mean values were calculated with EXCEL program from MS office package.

ACKNOWLEDGEMENT

The authors would like to thank Principal, Govt. BHEL College, Bhopal (M.P) for providing the necessary facilities to carryout this study.

RESULTS AND DISCUSSION

Biological Activity of Plant Extracts

P. ether and acetone extract of *S.indicus* also showed toxic effect on beetles. P.ether extract of S.indicus showed 98.33% mortality of *C.maculatus* beetles at 3.0% concentration table (1). Acetone extract of *S.indicus* also caused 96.66% & 90.00% mortality at 3.0 concentration within 24 hrs. duration.

Table-1: Insecticidal action of *S. insicus* extract against *C. maculatus*

S.No.	Extract	Conc. %	Mortality *S. indicus* *C.maculatus*
1	Acetone	1.0	26.66
		1.5	38.33
		2.0	53.33
		2.5	76.66
		3.0	90.00
2	P.ether	1.0	40.00
		1.5	51.66
		2.0	66.66
		2.5	80.00
		3.0	98.33

Control mortality was 0.0-3.33% in all two extracts. The values are the average of three replicates each with 20 insects

Table 2:- Statistical analysis of data of acetone extract of *Sphaeranthus indicus* against *Callosobruchus maculatus*

S.no.	Concentration of extract %	24hrs.adult Mortality %	Regression equation y=a+bx	Regression co-efficient (b)	Heterogenecity χ^2(n-2)	LC_{50} %	LC_{90} %	Variance (v)	SD	SE	χ^2	P
1	1.0	26.66	y=−5.09+2.41x	2.41	9.07(3)	1.8	3.2	0.0032162	0.0567	±0.025	9.07	<0.025
2	1.5	38.33										
3	2.0	53.33										
4	2.5	76.66										
5	3.0	90.00										

Spectral analysis showed the presence of aromatic compound, bi-lactone, 5-membered lactone in both the acetone extracts of *Adhatoda vasica* and *S. indicus*.

IR spectrum of *Sphaeranthus indicus* revealed the absorptions at 3433.8 cm^{-1} (-OH); 2927.9 cm^{-1} (C-H, Aromatic); 1708.2 cm^{-1} (C=O, 5membered lactone); 1370.1 cm^{-1} (CH_3 bend); 1453.2 cm^{-1} (Bilactonic, CH_2 bend, C=C); 1219.4 cm^{-1} (C=O); 967.6 cm^{-1} (C-O); 766.8 cm^{-1} (C-H bend); 670.1 cm^{-1} (RCH=CHR); 3687.0 cm^{-1} (-OH stretching, Phenolic).

HPLC of *S. indicus* confirms the presence of monoterpenes: l-Borneol, l-carvone, sesquiterpene lactone, triterpenoid: ursolic acid methyl ester, taraxasterol, primulagenin as the trimethylsilyl ether and steroid: cycloartenol steroid. Above results showed that plant extracts of *Sphaeranthus indicus* can cause mortality in beetles so it can be used for the management of pulse beetles *C. maculatus*.

Sprayed insecticides may drift from the area to which it is applied and into wildlife areas, especially when it is sprayed aerially (Palmer et. al., 2007).Recent efforts to reduce broad spectrum toxins added to the environment have brought biological insecticides back into vogue. The present study states that the crude extract from the indigenous plants can prove a potent biopesticide against *C. maculatus*.

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