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INSECTICIDAL PROPERTY OF FLAVINOID ISOLATED FROM *TEPHROSIA PURPURIA*

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ABSTRACT

Flavinoid glycosides fraction FR-1 and FR-2 were isolated from *Tephrosia purpuria*. These were used in five different concentrations. They showed more than 90 mortality within 24 hr. period to *Callosobruchus maculatus* grubs, which feeds upon *Phaseolus mungo* .The plant used in the present study is of medicinal value, which has yielded some toxic ingredients as insecticidal compound.

Key words: Flavinoid, Glycoside, *Callosobruchus macutatus, Tephrosia purpuria.*

INTRODUCTION

Stored grains pests causes severe damage to the pulses, when they are kept in the stored houses or godowns. The edible value of the grains is also affected by the damage caused by the pulse beetles. *Callosobruchus maculatus* is stored grains pest of family Bruchide, Coleopetra of class : Insecta.

Numbers of insecticides are fumigating agents, which are used to control stored grain pests, but due to several ill effects associated with the continuous use of these chemical pesticides and their long term persistency in the ecosystem, it was felt necessary to save these commodities from the attack of bruchus by some ecofriendly alternatives.

Therefore, in the present study, a compound was isolated from a medicinal plant, *Tephrosia purpuria*, which is used as a medicine for cough, cold and bronchial asthma[1]. This plant is a shrub that is distributed through out the country. It has been practiced by the people of remote areas as folklore medicine for sever cough, cold and throat infections.

There are our continuous efforts for last many years to provide ecofriendly means of insecticidal agents. Diwan and Saxena[2,3] have reported the phagodeterrant and insecticidal

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activity of *sphearanthes indicus* and *eclipta alba*, which have shown promising results. The other important works in the field of the plant based insecticides are by Rathore and Sharma[4], Jha[5], Dwivedi and Bhati[6], Baby[7] and Saxena *et al.*[8]

This paper reports the isolation and characterization of flavonoid from *Tephrosia perpuria* family Leguminosae as insecticidal agent against *Callosobruchus maculatus.*

EXPERIMENTAL

Material and methods

Plant material

Tephrosia purpuria, which is a shrub, was collected from the local surroundings of Vidisha District of Madhya Pradesh. After proper identification by the botanist of the institution, a voucher specimen was kept in herbarium record of the Laboratory at Sr. No. 8. The powdered material about 2 kg was soxhlated in polar solvents to get the flavinoidal compound.

Experimental design

For this experiment, the newly emerged adult female beetles were separated and 1 µL dose of the extract was applied topically to them. Then they were released in the petri dishes containing 20 g treated seeds. Untreated males of the same age in 1 : 1 ratio were introduced into the same petri dishes for observing mating behavior. The oviposition, rate of egg laying (Fecundity) and percent of hatching (Fertility) rates were also observed. Parallel controls were made throughout the experiment. Visual observations were noticed on the behavioral response of bruchus due to the effect of plant extracts as well as laboratory cultured normal ones. All the experiments were conducted in the insectary maintained at *ad libitum*.

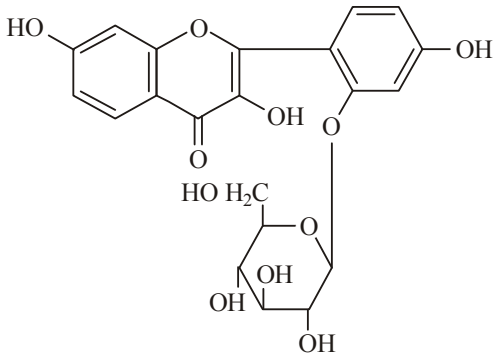
RESULTS AND DISCUSSION

Isolation and characterization

The biologically active compound was separated from the crude extract by column chromatography and TLC using solvent system referred by Harborney[9], for polar compound.

It was light greenish amorphous powder separated as fraction one from column. It was blackish green colored compound with R_f 0.94 on TLC, which was followed by acid hydrolysis, methylation and glycoside test.

The chemical structure of flavanols includes 3-hydroxyflavanones or dihydroflavonols. They contain two asymmetric carbon atoms. Flavanols differed from flavanones by the presence of peaks in their mass spectra. It has been demonstrated that flavanols exhibit a base peak for $[M\ 57]^+$ ion whereas a peak for the $[M\ 43]^+$ ion is typical of flavones. It should be noted that an alcoholic solution of flavanols at room temperature can undergo cis-trans epimerization to form a new isomeric compound. The tentative structure of compound was elucidated as $C_{12}H_{20}O_{11}$.



3, 7, 4' -Trihydroxy 2'-O-β–D-glucopryranosyl flavone
Molecular formula $C_{12}H_{20}O_{11}$
Molecular weight 448
m.p. 220-222°C

The compound 3, 7, 4' -trihydroxy 2'-O-β-D -glucopyranosyl flavone was identified by CoTLC with authentic sample and structure was established by comparison of measured UV, NMR and mass spectral data with spectroscopic data available from literature. 3, 7, 4' -Trihydroxy 2'-O-β-D -glucopyranosyl flavone showed ^1H and ^{13}C NMR data in full agreement. Several such compounds have been isolated from plants of different families. The ^1H NMR, ^{13}C NMR structure of flavonoid obtained by them have 3 protons coupled with doubled doublets.

Table 1: Weight and percentage loss after drying

Description	Weight (g)
Wt. of plant material in wet fresh condition	200
Wt. of plant material after drying condition	120
Loss in weight on drying	200-120 = 80
Percentage loss after drying	40 %

Table 2: Percentage yield of *Tephrosia purpuria* using different solvents in Soxhlet apparatus

Solvent used	Wt. of powdered material	Vol. of solvent	Vol. of extract	Character of extract	% Yield
90% Ethanol	120 g	750 mL	7.16 mL	Greenish yellow in semisolid state	5.96
Water	120 g	500 mL	8.00 mL	Greenish yellow diminished in semisolid state	6.66

Table 3: TLC of 90% alcoholic extracts of plant *Tephrosia purpuria*

Solvent system	Visual light	Iodine chamber	value	Fraction
EtOAc: CCl_4 (1:1)	Blackish geen	Dark green	0.94	FR-1
$CHCl_3$: MeOH (2 : 1)	Olive green	Dark green	0.84	FR-2

The isolated fraction FR-1 and FR-2 were used against the grub of *C. maculates*. The grubs were reared on seeds of *Phaseolus mungo* treated with five different concentrations of each fraction. Biostatistical analysis using prohibit analysis of Finney[10], gave 24 hrs. LC value as 2.23 % and 1.6 %, respectively in fraction FR-1 and FR-2. The other parameters such as chi square test, regression equation and variance are reported in Table 4.

The results, therefore, indicate the toxic effect of the compound on the grubs, but no effect was observed on non-target organism. The findings of the present study is in conformity of views expressed in previous reports, using two different plant extracts by Diwan and Saxena[2,3]. Rathore and Sharma[4] have given the management of Bruchids in infestation in pulses. Dixit and Saxena[11,12] have reported similar activity in some plants against *C. Chinensis.* Saxena and Yadav[13] also expressed the efficiency of indigenous plant extract as disrupter of insects reproduction growth.

The findings of the present paper are based on toxic ingredient, present in the plant *T. purpuria* in the from of flavinoids and glycosides, which inhibit not only the growth of the grub but causes mortality up to 90% extent. This plant extract may be used for pulse grain protection, which can minimize the effect of attack of bruchus on variety of pulses.

Table 4: Biostatistical analysis of extracts of *Tephrosia purpuria* against *Callosobruchus maculatus*

Extract	Conc. (%)	24hr. Mortality	Regression (y=a+bx)	Regression coefficent	Heterog-enicity X^2 (n-2)	LC_{50}	LC_{90}	Variance	95% Fiducial limit
FR-1	1.0	14	y = 9.228 + 3.273 x	3.723	1.364 (3)	2.23	5.41	0.097	UL = 0.418
	1.5	26							LL = 0.034
	2.0	40							
	2.5	54							
	3.0	73							
FR-2	1.0	24	y = -10.43 3.697 x	3.697	1.514 (3)	1.60	3.00	0.00123	UL = 0.353
	1.5	53							LL = 0.030
	2.0	66							
	2.5	77							
	3.0	90							

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