

Entomotoxic Potential of *Senna auriculata* Against the Red Flour Beetle (*Tribolium castaneum*)

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Abstract

Stored grain pests damage the protein content of seed grain & percentage of seed germination too which are controlled by use of chemical pesticides, which are responsible for pollution and a number of health problems in humans and animals. So, scientists are always searching for alternative ways to control pests that impair sustained agriculture. (Mahmood-Ur-Rahman, Tayyaba Shaheen, 2014).

Table No.1 Types of stored grain insect pests Based on feeding habits

Primary pest	Secondary pest
Internal feeders	External feeders
Penetrate & infest grains	Feed on cut or broken seeds
specialized mouthparts & feeding habits to pierce the outer layer of grain or seed and feed on their inner contents	Mouthparts are adapted for chewing and grinding food particles
Example- Indian meal moth larvae and flour beetles	Example- Weevils, saw-toothed grain beetle
Damage- loss of quantity, quality, and loss of germination	Damage- ball formation and webbing besides the deterioration of grains, fungal activity and moisture migration

(Weaver et al., 2005; Harush et al., 2021; Atanda et al., 2018; Maciej Serda et al., 2022; Tripathi, 2018; Deshwal et al., 2020; Edde, 2012)

Storage pests deteriorate grains by reduction in weight, quality, vigour and the germination of the grains causing loss of its market value. An estimated one third of global agricultural production is destroyed annually by over 20,000 species of insect pests in field and storage (Mariapackiam and Ignacimuthu, 2008).

Farmers are mainly depending on insecticides for their crop protection endeavours (Dhaliwal and Koul, 2010). This over and improper use has developed genetic resistant pest species and many harmful effects like, toxic residues, environmental pollution, health hazards and reduction in non-target organisms (M.Ramanan, N.Muthukumaran, 2019).

Use of plant derivatives can be an alternative strategy to control pest and disease. [Talukder F. A. 2006], because of faster degradation, less toxicity to mammals, easy and inexpensive production as crude, or as partially purified extracts [T. Apondjou, L. A. Adler 2002].

Plants produce a wide variety of phytochemical constituents, which are secondary metabolites and are used either directly or indirectly in the pharmaceutical industry. *Senna auriculata* is a multipurpose plant. Following image shows properties of *Senna*.

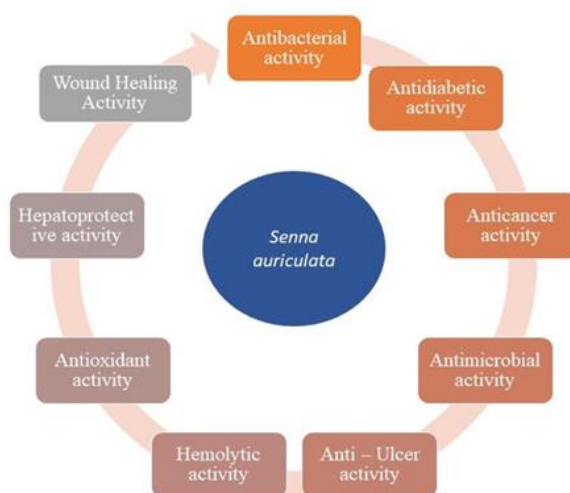


Figure 1. Pharmacological Activities of *S. Auriculata* Plants

Material Methods

Selection of the *Senna auriculata* plant is due to easy availability. Harvested Leaves of the plant are shade-dried for fifteen days, then a fine powder was prepared from leaves and extracted in ethanol using the Soxhlet apparatus -

- 5gm powder were extracted with 200ml ethanol and 3 cycles of Soxhlet method were run.
- Extracted solution was kept in water bath for evaporation of solvent for

complete drying and stored in refrigerator for further process.

- A stock solution at concentration of 200 mg/ml is prepared.
- Following table shows the concentration and volumes of doses applied, number of insects exposed to dose and mortality.



Figure 2. Plant Parts of *S. auriculata*

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Observation

Table No.2 concentration and volumes of doses applied, number of insects exposed to dose and mortality

Concentration & volume of extract applied		Insect mortality				
		1 st day	2 nd day	3 rd day	4 th day	5 th day
Control -0.5 ml ethanol (3 jars with 50 individuals each)		00	02	00	01	00
		01	01	02	01	01
		03	00	01	00	00
5mg/ml	3 jars with 50 individuals each and 0.5 ml extract	07	10	07	12	14
		05	08	07	11	19
		08	12	11	19	-
10mg/ml		07	09	06	10	18

25mg/ml		08	13	13	16	-
		08	11	14	17	-
		10	15	18	07	-
		15	15	20	-	-
		12	15	18	05	-

Result

The mortality of *Tribolium castaneum* increased with concentration and exposure time. At concentration of 5mg/ml, mortality was gradual over five days. At 10mg/ml, higher mortality was observed, especially toward the fifth day. The highest mortality occurred at 15mg/ml, particularly during the first three days. Comparatively, the 25mg/ml, concentration showed the greatest insecticidal effect, indicating dose-dependent toxicity.

Conclusion and Discussion

The present study was carried out on the *Tribolium castaneum* to check the efficacy of *Senna auriculata* as an insecticide. *Senna auriculata* leaves extract showed a higher level of insecticidal activity against *Tribolium castaneum*. The traditional plant products have proved to be highly effective in controlling the stored grain pest *Tribolium castaneum*. The use of extract is an inexpensive and effective method. But further study is needed to isolate and identify the active principal component of the product, and to assess both its cost-benefit ratio and its ability to control insect stored grain. [Ms.C. Shunmugadevi, 2018]

Also, *Senna Auriculata* leaves extract shows toxicity against *Tribolium castaneum*. Hence it may have insecticidal property.

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