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Relative toxicity of seed extracts on rice weevil *Sitophilus oryzae*

Dr. Kusum Dang**Abstract**

Stored products are attacked by a number of insects. It causes heavy losses to the grains. *Sitophilus oryzae* is the major pest of stored grains. Insecticides can be used to protect the grain from infestation of insects. But synthetic pesticides lead to health hazards. So Biopesticides are required for grain storage purpose. Seed extracts of some plants possess insecticidal properties. In this investigation seed extract of *Annona squamosa*, *Glycine max*, *Helianthus annuus* and *Ricinus Communis* are used against rice weevil, *Sitophilus oryzae*. All the four seed extracts proved promising for control of *Sitophilus oryzae*.

Keywords: *Sitophilus*, rice weevil, seed extract, biopesticide

Introduction

A large amount of spoilage of grain takes place by biotic factors like insects, rodents, birds, mites and bacteria. Insects feed on all kinds of plants including them which constitute the main source of human food such as rice, wheat, jowar. Wheat forms the major constituent of our diet. So the availability of grain may go down considerably due to heavy losses caused by insects during storage. A Female rice weevil bores with the help of snout about one millimeter deep in the kernel. The hole is then plugged with gelatinous secretion. As the *Sitophilus oryzae* causes heavy losses to the stored grain, it was necessary to explore some insecticide to control this major pest. Toxic residues of insecticides are adversely affecting the mankind. So some Botanical is required to control the pest, which can control the pest and is not having the adverse effect to the living being consuming it.

Materials and Method

For conducting experiments, the test insect was reared at $27 \pm 2^\circ\text{C}$ temperature and $65 \pm$ percent relative humidity for proper maintenance of culture. Wheat was used as culture media for rearing the test insect in laboratory.

Four seed extracts were evaluated for Adulticidal effect. Seed extracts used were Castor (*Ricinus cammunis*), Custard Apple (*Annona squamosa*), Soybean (*Glycine max*) and Sunflower (*Helianthus annuus*). Powder of seeds was prepared by grinding the material in the mixer cum grinder. Then the extract was prepared by Soxhlet extraction. Extract was prepared in Petroleum ether. In the present investigation, Relative toxicity of four seed extracts was estimated. After 24 hours of application, the mortality count was recorded. Mortality count was recorded for five concentrations of botanicals. Mortality percentage was corrected by Abbot's formula. Data was subjected to probit analysis (Finney 1952) ^[2], So as to calculate LC_{50} (μl) values. LC_{50} (μl) Values were used to calculated relative toxicity.

Table 1: Relative toxicity of botanicals used.

S. No.	Common Name	Botanical Name	Plant part used	LC_{50} (μl)	Relative toxicity	Fiducial limit (μl)
1	Custard Apple	<i>Annona Squamosa</i>	Seed	23.7423	0.8453	26.8119 21.0241
2	Soybean	<i>Glycine max</i>	Seed	23.8878	0.8401	26.4727 21.5552
3	Sunflower	<i>Helianthus nnus</i>	Seed	20.0702	1.00	22.8774 17.6073
4	Castor	<i>Ricinus Communis</i>	Seed	111.800	0.1795	120.4000 103.9000

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Result and Discussion

The relative toxicity of the toxicants viz. *Annona squamosa*, Eucalyptus sp, *Glycine max* and *Helianthus annuus* and *Ricinus Communis* was recorded.

Result are summarized in Table-1. Results revealed that mortality was significantly higher in treatments than in control. Among all the botanicals used *Ricinus cammunis* seed extract was least toxic having LC₅₀ value 111.8 µl. Toxicity of all the botanicals used against *Sitophilus oryzae* is as following, estimated in terms of LC₅₀ value in µl.

Helianthus annuus (20.0702 µl) > *Annona squamoda* (23.742 µl) > *Glycine max* (23.8878 µl) > *Ricinus communis* (111.8 µl). All the botanical applications proved to be significantly superior to control.

Mahgoub and Ahmed (1996) [4] reported that petroleum ether extract of Castor seed oil proved highly toxic in contact application. Khalequzzman and Shaya (2006) [3] revealed that seed extract of custard apple possess insecticidal activity against pests.

Talukder (2006) listed 43 plant species as insect repellent and 37 plant species as grain protectant. Sharma and Meshram (2006) [6] used. *Acarus calamus* and *Syzygium aromaticum* effective to control *Sitophilus oryzae*.

Ahmed *et al.* (2010) [4] used Sunflower oil, Castor oil, leaf extract of Custard apple against the pest infestation. Treatment of custard apple leaf extract produced the most favourable results in respect of pest control. Singh *et al.* (2012) [7] used vegetable oil as biopesticides in grain protection and reported that *Ricinus communis* and *Glycine max* can be used successfully for pest control. Nighat begum *et al.* (2013) [5] reported that *Annona squamosa* has potential for pest management.

In the present experiment by taking toxicity of *Helianthus annuus* as standard, the relative toxicity of remaining three botanicals is calculated. Relative toxicity of *Annona squamosa*, *Glycine max* and *Ricinus Communis* is 0.8453, 0.8401 and 0.1795 respectively. So in the present investigation *Helianthus* proved to be most toxic, followed by *Annona squamosa*, *Glycine max* and *Ricinus communis*.

Conclusion

So the results of present experiment are also favoured by the investigations of various workers. In the present investigation seed extract of *Helianthus annuus*, *Annona squamosa*, *Glycine max* and *Ricinus cammunis* showed the potential to control the stored grain pest *Sitophilus oryzae*.

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