



E-ISSN: 2320-7078

P-ISSN: 2349-6800

[www.entomoljournal.com](http://www.entomoljournal.com)

JEZS 2020; 8(6): 811-813

© 2020 JEZS

Received: 17-08-2020

Accepted: 20-10-2020

**Dr. Kusum Dang**Associate professor, Department  
of Zoology, Govt. P.G. College,  
Kota, Rajasthan, India**Deepti Rela**Student, Department of Zoology,  
Govt. P.G. College, Kota,  
Rajasthan, India

## Ecofriendly management of stored grain pest *Rhyzopertha dominica* Fab. (Coleoptera: Bostrichidae)

**Dr. Kusum Dang and Deepti Rela**

### Abstract

Present work deals with the efforts to explore new grain protectants from the plants against *Rhyzopertha dominica*. Leaf powder of *Calotropis procera*, *Cassia fistula* and *Langana Cumara* and seed powder of *Brassica campestris* and *Linum usitatissimum* are used against *Rhyzopertha dominica*. Among all of leaf powders used *Cassia fistula* leaf powder proved most toxic to *Rhyzopertha dominica*. A highly significant mortality percentage was observed in both the treatments with seed powders of *Brassica campestris* and *Linum usitatissimum*.

**Keywords:** Ecofriendly management, *Rhyzopertha dominica*, wheat

### Introduction

Safe storage of agricultural produces/grains is a global problem. Storage of agricultural products particularly cereals, pulses, oilseeds, spices and nuts for a long duration is associated with the losses in quality, quantity, monetary and goodwill values. A considerable amount of storage products is damaged by insects. Wheat is especially vulnerable of insect infestation because it is harvested in mid-summer, when stored-product insects are active within and outside storage facilities. Lesser grain borer (*Rhyzopertha dominica*) is capable of infesting all small grains and develops more rapidly in damaged than in whole grain. The adult lesser grain borer chews grain voraciously causing damage which may facilitate infestation by a secondary pest. As the *Rhyzopertha dominica* causes heavy loss to the grain, so it is necessary to control the insect to protect the grain. Various chemicals have been used to protect grain against *Rhyzopertha dominica*. Insects develop resistance against them and even they are not biodegradable, so there is requirement of cheap, easy to use and readily available effective methods for safe storage of wheat. Studies of Dakshinamurthy *et al.* (1992) [3] revealed that a dosage of neem leaf powder (1:2000 by weight) would prevent infestation by an effective fumigant to control storage pest. Present work deals with the efforts to explore new grain protectants from the plants against *Rhyzopertha dominica*. Leaf powder of *Calotropis procera*, *Cassia fistula* and *Lantana camara* and seed powder of *Brassica campestris* (Var. Sarson) and *Linum usitatissimum* (Linseed) are used against *Rhyzopertha dominica*.

### Materials and Methods

For conducting experiment test insects were reared at  $26 \pm 2^\circ$  C temperature and  $65 \pm 2$  percent relative humidity. Wheat grains were used as culture medium. Mass rearing of insects was done in glass bottles covered with Muslin cloth. Five plants were evaluated for their adult mortality and repellent action against lesser grain borer, *Rhyzopertha dominica*. Liseed (*Linum usitatissimum*) seeds and Mustard (*Brassica campestris* (var sarson)) seeds were taken. Powder of seeds was prepared by grinding the material in a mixer cum grinder. Powders are stored in air tight glass jar. Leaves of *Calotropis procera*, *Cassia fistula* and *Lantana camara* were collected. Fresh leaves were washed with water, dried in shade and dried leaves were powdered in a mixer cum grinder. This leaf powder is stored in air tight glass jar. This leaf powder was then used in experiments. In the present investigation percentage mortality of adult beetle with the plant powders was studied. After 24 hours the mortality count was recorded. The mortality count for each botanical was recorded at different concentrations replicated thrice, along with a set of control experiment. The mortality percentage was corrected by Abbot's (1925) formula.

**Corresponding Author:****Dr. Kusum Dang**Associate professor, Department  
of zoology, Govt. P.G. College,  
Kota, Rajasthan, India

## Result and Discussion

Plant powders of *Brassica campestris*, *Cassia fistula*, *Calotropis procera*, *Lantana camara* and *Linum usitatissimum* were found effective for control of *Rhyzopertha dominica*. These powders were mixed with the wheat grains at five different rates. Leaf powders were mixed at the rate of 2g, 4g, 6g, 8g and 10g in 20g of wheat. Mortality count was done after 24 hours. Among all the leaf powders used *Cassia*

*fistula* leaf powder was most toxic to *Rhyzopertha dominica* showing 80% mortality with 10g (50% concentration w/w) of leaf powder. *Lantana camara* leaf powder was least toxic, showing 58.3333% mortality with 10g (50% concentration w/w) of leaf powder. 10g (50% concentration w/w) of *Calotropis procera* leaf powder was also found very effective showing 75% mortality of *Rhyzopertha dominica* adults after 24 hours of exposure.

**Table 1:** Corrected Percentage Mortality of Leaf Powders at Various Concentrations.

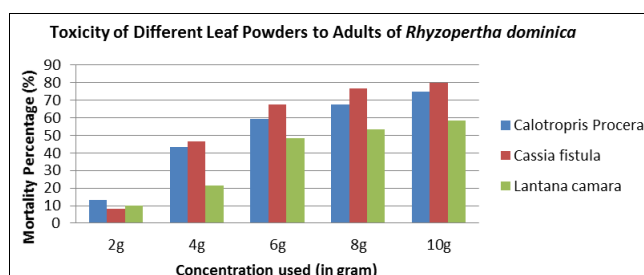
S. No.	Name of Botanicals	Corrected Percentage Mortality at Different Concentrations				
		2g	4g	6g	8g	10g
1	<i>Calotropis procera</i>	13.3333%	43.3333%	59.3220%	67.7965%	75.00%
2	<i>Cassia fistula</i>	8.3333%	46.5517%	67.7765%	76.6666%	80.00%
3	<i>Lantana camara</i>	10.1688%	21.6666%	48.3333%	53.3333%	58.3333%

**Table 2:** Corrected Percentage Mortality of Seed Powders at Various Concentrations.

S. No.	Name of Botanicals	Corrected Percentage Mortality at Different Concentrations				
		1g	3g	5g	7g	9g
1	<i>Brassica campestris</i> (Var. Sarson)	16.6666%	26.6666%	31.6666%	58.3333%	65.00%
2	<i>Linum usitatissimum</i>	16.6666%	50.00%	73.3333%	76.6666%	81.6666%

*Calotropis procera* also proved toxic to the *Rhyzopertha dominica*, with the range of 13.3333% to 75% mortality at different concentrations of botanical (Table-1). Results of present investigations are supported by Swain and Baral (2004) [9]. They reported that leaf dust of *Calotropis procera* showed good efficiency in controlling the insects *Sitophilus oryzae* and *Callosobruchus chinensis*.

*Cassia fistula* was highly toxic among the leaf powder with the range of 8.3333% to 80% mortality after 24 hours of treatment of wheat seeds with varying concentrations of botanical (Table-1). Laboratory experiments were conducted by Dwivedi and Yadav to study the effect of seed extract of *Cassia fistula* on the eggs of rice moth. Results revealed that inhibition of egg hatching increased with the increase in concentration of plant extract. From the results obtained in present investigation it can be concluded that *Cassia fistula* leaf powder can be applied as effective grain protectant against the *Rhyzopertha dominica* as it provided 80% mortality of test insect at 50% concentration (w/w).

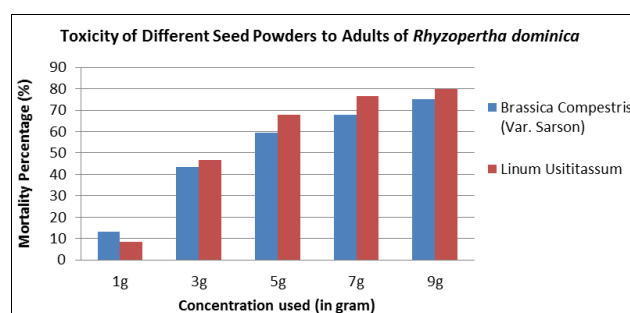


**Fig 1:** Toxicity of Different Leaf Powders to Adults of *Rhyzopertha dominica*

In this experiment *Lantana camara* was least toxic with the range of 10.1688% to 58.3333% mortality after 24 hours of treatment at different concentrations (Table-1) *Lantana camara* leaf powder was reported effective by Rao et al. (1998) [6] against the *Sitophilus oryzae* at the dose of 3 and 5 gm/kg. Mulungu et al. (2007) [5] studied the effectiveness to leaf powder of *Lantana camara* against the infestation of maize weevil *Sitophilus zeamays* on stored maize grain. Plant products performed well in the reduction of live insects during maize storage as compared to the no insecticidal

application. Results of all the above discussed findings are in favour of present study.

A highly significant mortality percentage was observed in both the treatments with seed powders of *Brassica campestris* and *Linum usitatissimum*. (Table-2) The highest corrected mortality percentage with 10g of *Brassica campestris* and *Linum usitatissimum* in 20g of wheat were 65.00% and 81.6666% after 24 hours of treatment. The mortality in *Linum usitatissimum* seed powder was significantly higher than mortality recorded in grains treated with *Brassica campestris* seed powder almost in all the concentrations (w/w) used.



**Fig 2:** Toxicity of Different Seed Powders to Adults of *Rhyzopertha dominica*

The corrected adult mortality percentage with *Linum usitatissimum* at 1g, 3g, 5g, 7g and 9g seed powder in 20g of wheat was 16.6666% respectively while the corrected mortality percentage damage by adult *Sitophilus oryzae* to 10 percent compared with 72 percent in untreated control, over a 90 days storage period with *Brassica campestris* seed powder at 1g, 3g, 5g, 7g and 9g in 20g wheat was 16.6666%, 26.6666%, 31.6666%, 58.3333% and 65.00% respectively. In present investigation *Brassica campestris* was most effective as grain protectant against the test insects. At the Lc95 concentration *Brassica* seed extracts gave a bioresidual activity in killing *Rhyzopertha dominica* adults upto 4 weeks (AI-Mojel et al., 2000). Singh and Mall (1991) [8] observed the good potential of *Linum usitatissimum* oil. 1 ml/kg linseed oil admixed with wheat, reduced grain.

The results obtained in this study indicate good potential of using the locally available plants in storage pest management

systems. These botanicals are readily available, safe to apply and can be afforded by resource poor farmers. Also further trials are recommended on a wide range of storage insect pest to adequately advise the farmers.

### Acknowledgement

Our profound gratitude to the principal, Government College, Kota for providing the necessary facilities. We are also grateful to Mrs. Sandhya Singh, HOD, Zoology Department, Government College, and Kota.

### References

1. Abbott WS. A method of computing the effectiveness of an insecticide. *J Econ. Ent* 1925;18:265-267.
2. Al-Moajel NH, El-Baki SMA. *Brassica campestris* seed extracts as protectants to wheat grains against the lesser grain borer *Rhyzopertha dominica* (F). *Annals of Agricultural Sciences Cairo* 2000;45(1):353-362.
3. Dakshinamurthy A, Goel SC. Insect management in grain and seed storage of wheat using non-hazardous materials, *Bioecology and Control of Insect Pests* 1992,265-268.
4. Dwivedi SC, Yadav A. Ovicidal effect of 5 semiarid plant seed extracts on the eggs of ricemoth. *Corcyra cephalonica*, *Asian J Exp. Sci* 2006;20(2):327-330.
5. Mulungu LS, Lupenza SUWM, Reuben, Misangu RN. Evaluation of botanical products as stored grain protectant against maize weevil, *Sitophilus zeamays* (L.) on maize, *J Entomol* 2007;4:258-262.
6. Rao CVR, Sarangi RK. Control of *Sitophilus oryzae* (L.) through certain plant products, *Indian Journal of Plant Protection* 1998;26(2):182-185.
7. Shukla AC, Shahi SK, Dikshit A. *Eucalyptus pauciflora*- A potential source of sustainable, eco-friendly storage pesticide, *Biotechnology of microbes and sustainable utilization*, 2002, 93-107.
8. Singh YP, Mall NP. Various grain protectants on germination and damage of wheat grains by *Sitophilus oryzae* Linn, *Bulletin of Grain Technology* 1991;29(1):50-54.
9. Swain TK, Baral K. Effect of certain plant products on some stored grain pests. *Journal of Applied zoological researches* 2004;15(2):229-231.