

Control of Lesser Grain Borer by using *Argemone mexicana* Leaf Powder

Shrivastava Leena¹ and Khandekar C.D.²

Principal, Sagar College, Pipalda, Kota, Rajasthan, India¹

Former Principal, Government College, Kota (RHES), Rajasthan, India²

leenashrivastava31@gmail.com

Abstract: In the storage various insect pests associated with wheat seeds specially lesser grain borer *Rhizopertha dominica* (Fab.). Many synthetic pesticides were used to control this insect pest but these pesticides causing health hazard problems. These harmful effects of synthetic pesticides may be solved with the use of plant products as seed protectant. Therefore, the present investigations were carried out in the laboratory to study the control of lesser grain borer by using *Argemone Mexicana* leaf powder Results revealed that leaf powder of this test plant was found more effective for larvae whereas less effective for adults giving LD_{50} value (01.0340) and (02.9120) respectively.

Keywords: Wheat grains, Lesser grain borer, *Argemone mexicana*, *Rhizopertha dominica* (Fab.) Leaf powder

I. INTRODUCTION

Wheat is an important crop in the country. Wheat grains are stored for food, feed and seed purposes. In storage various insect pests associated with seeds specially lesser grain borer, *Rhizopertha dominica* (Fab.) is one of the most devastating pests of stored grains both at larval and adult stages [1]. It attacks the seeds by laying eggs on seed surface and in severe infestation maximum seed holes and larvae live within the seed may be seen which affects the quantity and quality. Every year it has been destroying our stored products. In view of the typical biology of this insect the protection of grains against its infestation has been posing a severe problem. Many synthetic pesticides were being used in the management of insect infestation of food commodities. [2,3,4,5]. But choice of a chemical to control pests without causing health hazards is of great importance. They have raised serious ecological and economical problems and also contribute towards the development of resistance in the target species [6]. For centuries the stored grain pests have been controlled by using plant origin pesticides [7,8,9,10]. But information is inadequate on the control of stored grain pest *Rhizopertha dominica* (Fab.) by using plant powders [11,12,13,14]. In rural areas of the country dried neem leaves has been used with grains for storage. *Argemone mexicana* (satyanashi) leaves have also shown significant insecticidal property [15,16] The present investigations were therefore carried out to study the control of lesser grain borer by using *Argemone mexicana* leaf powder.

II. MATERIAL AND METHOD

Adults and larvae of *Rhizopertha dominica* (Fab.) were used as test insect in this experiment. Leaves of *Argemone mexicana*, dried in a shady place, were powdered and sieved. The various dosages of this plant powder were weighed, to determine the toxicity on the basis of LD_{50} values. During the experiment *Argemone mexicana* leaf powder in required quantity was evenly spread in a petri dish. Twenty newly emerged adult test insects were released in each petri dish. Petri dish was covered with a piece of muslin cloth and tied with rubber band, then kept as such in suitable environmental conditions for twenty-four hours. Aforementioned method was also repeated for the determination of toxicity of *Argemone mexicana* leaf powder against larvae of *Rhizopertha dominica* (Fab.). All the experiments were carried out in the laboratory at $31 \pm 2^{\circ}$ C and $70 \pm 5\%$ relative humidity. Mortality counts were taken 24 hours after the treatment. Experiments were repeated three times.

III. LITERATURE REVIEW

Pandey et.al. (1976) used some plant powders, oils and extracts as grain protectants against pulse beetle. They found that powdered caner drupes, sadabahar leaf powder, garlic and neem oil effectively protect gram seeds. Bowryet.al. (1984) tested powders of neem, mustard, mahua and some other plant powders for their effect against rice weevil and observed neem and linseed cake powder was most effective in comparison to mustard, castor and mahua. Sachan (1987) tested neem kernel powder, neem oil, mahua oil and neem leaf powder against bruchus pest damaging pigeon pea grains in storage, they found neem oil and mahua oil were very effective in controlling the Pest. Savitri and Subbarao (1976) used some neem seed kernel powder against *Rhizopertha dominica* and *Sitophilus cerealella*, they noted that neem seed kernel powder mixed directly with paddy at 1 and 2% get significant in decreasing oviposition by *Rhizopertha dominica* and *Sitophilus cerealella* respectively. Sharma et.al. (1989) showed mortality of *Rhizopertha dominica* (Fab.) at the lowest dose of neem kernel powder in stored grains. They obtained that more than 70% mortality of *Rhizopertha dominica* at the lowest dose of 0.5 g neem kernel powder and 64% mortality of *Sitophilus oryzae*. Patelet.al. (1993) assessed the efficacy of powdered neem seed kernel in the control of *Rhizopertha dominica* (Fab.) in stored wheat in the laboratory, and noted neem seed kernel powder was effective in reducing the seed damage. Kumaret.al. (1999) studied the powdered leaves of tobacco plants were effective on the population behaviour of *Rhizopertha dominica* (Fab.) a stored grain pest. Pandey et. al. (1981) reported effectiveness of *Melia azedarach* was greater than *Argemone mexicana* seed and leaves against painted bug. Cortez-Rocha and Sanchez-Marinez (1993) evaluated the efficacy of plant powders including *Argemone mexicana* against *Z. subfasciatus* in stored pinto beans and found *M. azedarach* 93.33%, *A. mexicana* seeds 93.33% and *A. mexicana* leaves 86.66% mortality after 24 hours in laboratory.

IV. RESULT AND DISCUSSION

All the experiments were conducted under laboratory conditions. The data in respect of toxicity of *Argemone mexicana* leaf powder against adults and larvae of *Rhizopertha dominica* (Fab.) are presented in table. It is evident from the results of these experiments that leaf powder of *Argemone mexicana* was found more toxic for larvae giving LD₅₀ value (01.0340), while this seed protectant was found less toxic for adults of *Rhizopertha dominica* (Fab.) giving LD₅₀ value (02.9120) after twenty-four hours of the treatments. The order of toxicity of *Argemone mexicana* leaf powder as seed protectant under investigations as follows. Larvae (01.0340) > Adults (02.9120)

Table 1: Toxicity of *Argemone mexicana* leaf powder against *Rhizopertha dominica* (Fab.).

S.No.	Life Stage	Heterogeneity	Regression Equation	LD ₅₀
1.	Adults	2.5758	Y = 2.1028 x - 2.2844	02.9120
2.	Larvae	3.5683	Y = 1.6359 x - 0.0687	01.0340

IV. CONCLUSION

From the results obtained, it has been concluded that leaf powder of *Argemone mexicana* is effective and easy to apply seed protectant against adults and larvae of lesser grain borer *Rhizopertha dominica* (Fab.). It can be used as an alternative to synthetic insecticides for the control of this noxious pest.

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REFERENCES

- [1]. Raju.P. (1984). The staggering storage losses causes and extent pest, 18,35-37
- [2]. Shrivastava, B.P. and Dadhich, S.R. (1975). Laboratory evaluation of malathion used as protectant for the prevention of damage by pulse beetle to stored grain (*Cicer arietinum*) Part II. Persistence of malathion residue. *Bull. Grain. Tech.* 13(3): 151-158

- [3]. Yadav, T.D., Pawar, C.S., Khanna, S.C. and Sing, S. (1980). Toxicity of organophosphorus insecticides against stored product beetles. *India J. Ent.* 42 (4):28-33.
- [4]. Ramzan, M. and Chahal, B.S. (1987). Evaluation of synthetic pyrethroids for the protection of stored wheat grains against storage pests. *International Pest Control*, 29(2): 42-44.
- [5]. Shrivastava, S. (1996). Toxicity and joint action of some insecticides on *Sitophilus oryzae* (L.). *Ph.D. Thesis*. 39-44.
- [6]. Georghiou, G.P. and Tylor, C.E. (1986). Factors influencing the evaluation of resistance. In: National Research council O/s committee on strategies for the management of pesticide. Resistance past population ed. Pesticide resistance strategies and Tactics for management. *National Academy press. Washington DC* pp 167-69.
- [7]. Pandey, N.D., Singh, S.A. and Tewari, G.C. (1976). Use of some plant powders, oils, and extracts as protectants against pulse beetle. *C. chinensis* (Linn.). *Ind.J. Ent.* 38(2):110-113.
- [8]. Bowry, S.K., Pandey, N.D. and Tripathi. R.A. (1984). Evaluation of certain oilseed cake powders as grain protectant against *Sitophilus oryzae* (Linn.). *Ind.J. Ent.* 46(2): 196-200.
- [9]. Sachan, J.N. (1987). AllIndia coordinated pulse improvement project report Pp.96-97.
- [10]. Paneru, R.B., Patourel, G.N.J. and Kennedy, S.H. (1997). Toxicity of *Acorus calamus* rhizome powder from Eastern Nepal to *Sitophilus granarium* (L.) and *Sitophilus oryzae* (L.). *Crop Protection*. 16(8)759-763.
- [11]. Savitri, P. and Subbarao, C. (1976). Studies on the admixture of neem seed kernel powder with paddy in the control of important pest of paddy. *Andhra Agri. J.* 23 (3&4): 137-143.
- [12]. Sharma, M. M., Mathur, N. M. and Shrivastava, R. P. (1989). Effectiveness of neem kernel powder against lesser grain borer, *Rhizopertha dominica* (Fab.) and rice weevil *Sitophilus oryzae* (L.). *Ind. J. Appl. Ent.* 3:59-60.
- [13]. Patel, K. P., Valand, V. M. and Patel, S. N. (1993). Powder of neem seed kernel for control of lesser grain borer (*Rhizopertha dominica*) in wheat (*Triticum aestivum*). *Ind. J. Agri. Sc.* 63 (1): 754-755.
- [14]. Kumar, A., Verma, A. K., Tripathi, G. K. and Kumar, A. (1999). Effect of tobacco on the multiplication behaviour of *Rhizopertha dominica* (F.) in stored wheat. *Neo Botanica* 7(1): 33-34.
- [15]. Pandey, U. K., Pandey, M., Chauhan, S. P. S. (1981). Insecticidal properties of some plant material extracts against painted bug *Bagrada cruciferarum* (Kirk). *Ind. J. Ent.* 43 (4): 404-407.
- [16]. Cortez-Rocha, M. O. and Sanchez- Martinez, R. T. (1993). Plant powder as stored grain protectants against *Zabrotes subfasciatus* (B.). *South Western Entomologist*. 18 (1): 73-75