

Effect of smoke treatment of plant *Peganum harmala* on the mortality of pest *Rhizopertha dominica* (Fab.) (Coleoptera: Bostrichiadae)



Zoology

KEYWORDS : Plant extract, stored grain pest, *Peganum harmala*, *Rhizopertha dominica*

Amandeep kaur Mann

Department of Zoology, Dungar College, Bikaner-334 001

MEERA SRIVASTAVA

Department of Zoology, Dungar College, Bikaner-334 001

ABSTRACT

Rhizopertha dominica is secondary pest of stored grains. Both the adults and grubs cause considerable damage to the grains under storage in tropical and sub-tropical parts including India. Many synthetic organic pesticides are used to control stored grain pest which results in damage to the environment. In the last decade, however, there has been an increasing interest in natural products particularly those of plant origin to control pest species. In view of this, the smoke of different parts of the plants, *Peganum harmala*. *Peganum harmala* was used against the *Rhizopertha dominica* and adult mortality was recorded after 48 hours of exposure. 20 adult insects were subjected to the smoke of various plant parts in chamber specially designed for this purpose. It was observed that the smoke treatment of the leaf of *Peganum harmala* causes 40-50% mortality in *Rhizopertha dominica* after 48 hours of treatment.

INTRODUCTION

The grain crops such as wheat, rice, barley, corn, soyabean are grown mainly in India because they are the largest livelihood provider in India. India is one of the world's largest agricultural economies. In India, post harvest losses are caused by the unscientific storage, insects, rodents, micro-organisms etc. account for 10% of total food production. About 500 species of common insects are associated with food grains. Seeds stored for more than six weeks must be protected against insect damage.

Rhizopertha dominica, the lesser grain borer is a cosmopolitan beetle of family Bostrichidae. It is reported to have originated from India but now has a world wide distribution. It is very destructive secondary pest of stored grains. This insect is a strong flier. The adults and larvae bore into the undamaged kernels of the grain reducing them to the hollow husk.

The management of stored grain pests has been typically carried out by chemical pesticides which have resulted in damage to the environment, pest resurgence, pest resistance to insecticides and lethal effect on target organisms. This has forced to change the approach of pest management and dictated the need for effective and biodegradable pest control strategy as an alternative to chemical pesticides. In the last decade, there has been an increasing interest in natural products, particularly those of plant origin.

The present study was carried out to evaluate pesticidal property of plant *Peganum harmala* against the pest *Rhizopertha dominica*.

Isolated incidences of resistance have been reported for *Rhizopertha dominica* (F.) {Haliscak and Beeman. 1983; Zettler and Cuperus, 1990}.

Throughout the world, there is a long history of plant materials being used for their insecticidal property given by the smoke treatment from the plant samples against the mosquitoes. Smoke is most widely used means of repelling mosquitoes and flies in rural areas.

The fumigation is another very effective technique of grain protection.

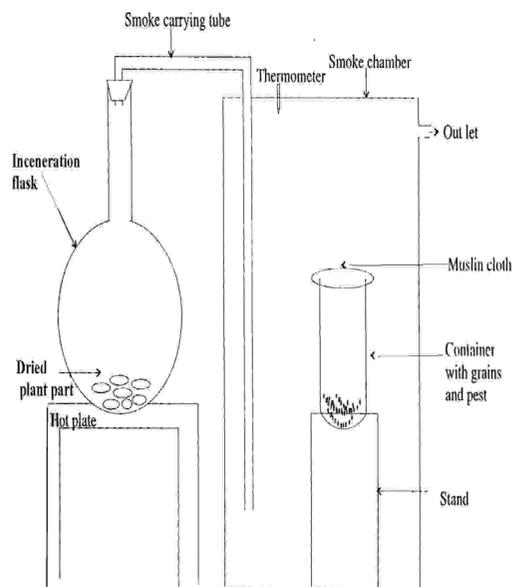


Fig 1. Schematic diagram of smoke treatment

MATERIALS AND METHODS

The pest insect *Rhizopertha dominica*, was cultured on host grains of *Sorghum bicolor* (jawar) at a temperature of $28 \pm 2^\circ\text{C}$ and 70% relative humidity. Different plant parts viz. leaf, stem, root and fruit of *Peganum harmala* collected from Bikaner were used for this study. The plant parts were separated and dried. The different dried plant parts were used for giving smoke treatment. For this purpose, a device was fabricated as shown in figure 1. The powder plant material was kept in the roasting container placed on a hot plate. From this container, a tube was taken to the fumigation chamber measuring 10 litres by volume. In the fumigation chamber, a beaker was kept containing 20 adult insects and it was covered by muslin cloth. The roasting container was heated causing incineration of the plant materials producing smoke. The smoke filled the fumigation chamber.

The number of dead insects was recorded as percent mortality after 24 hours and 48 hours of treatment.

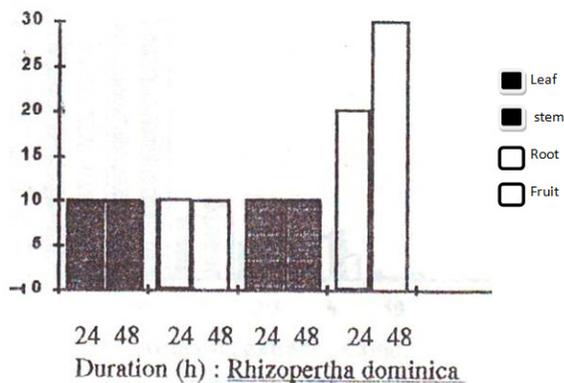


Figure.2

RESULTS AND DISCUSSION

The result as presented in figure 2., revealed following findings:

The results of smoke treatment of different plant parts of *Peganum harmala* on the pest have been presented graphically in

figure 2. The results showed that the maximum mortality of 70 was observed in the pest. The leaf, stem and root of *Peganum harmala* was found to be most effective causing highest adult mortality.

Even short time exposure of smoke of leaf, stem and root causes 70% mortality.

There is not much information on the use of smoke of plants/ plant products in pest management. Chopra *et al.* (1965) reported the smoke of *P.harmala* to be used in Punjab as a disinfectant and to keep off mosquitoes. The results suggest that this method of using smoke of plant material to control insect pest is effective. It emphasizes the need to explore and screen such plants, identify the toxic component and culture them. These plants being cheap, easily available and non - hazardous, can therefore be tried as an alternative to synthetic insecticides.

REFERENCE

Chopra, R.N., Badhwar, R.L. and Ghosh. S. 1965. Poisonous plants of India. Ind. Council of agric. Res, Delhi. pp. 631. | Zettler J.L. and Cuperus G.W. 1990. Pesticide resistance in *Tribolium castaneum* (Coleoptera: Tenebrionidae) and *Rhizopertha dominica* (Coleoptera: Bostrichidae) in wheat.

J. of Eco. Ent., 83 : 1677 – 1681. |