



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

KEYWORDS

Plant extract, stored grain pest, *Aerva tomentosa*, *Rhizopertha dominica*

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ABSTRACT *Rhizopertha dominica* is major pest of pulses and cereals. Both the adults and grubs cause considerable damage to the grains under storage in tropical and sub-tropical parts including India. The management of stored grain pest has been typically carried out synthetic organic pesticides which resulted 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 the pest species. In view of this, the smoke of different parts (root, stem, leaf and fruit) of plant *Aerva tomentosa* was used against the pest *R. dominica* and adult mortality was recorded after 48 hours of exposure. 20 adult insects were subjected to the smoke of various plant parts in chambers specially fabricated for this purpose. It was observed that the smoke treatment of leaf of *Aerva tomentosa* causes 40 – 50% mortality in *Rhizopertha* after 48 hours of treatment.

INTRODUCTION

In India, cereal grains such as wheat, pulses and rice form the principle source of dietary fibre. These grains are highly susceptible to infestation by stored grain pest such as *Tribolium castaneum*, *Rhizopertha dominica* and *Callasobruchus chinensis*. Pests reduce grain weight, nutritional value and germination of stored grains. Infestation also causes contamination and odour that reduces the quality of grains and make it unfit for human consumption. Moreover high relative humidity and warm temperature of India make it a suitable environment for insect multiplication. About 500 species of insects are associated with stored grain products.

In India, estimated losses due to stored grain pests are about 10% of total production. The lesser grain borer (*Rhizopertha dominica*) is a cosmopolitan beetle of the family *Bostrichidae*. It is reported to have originated from India but now has a world wide distribution. It is very destructive primary pest of stored grains.

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 *Aerva tomentosa* 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.

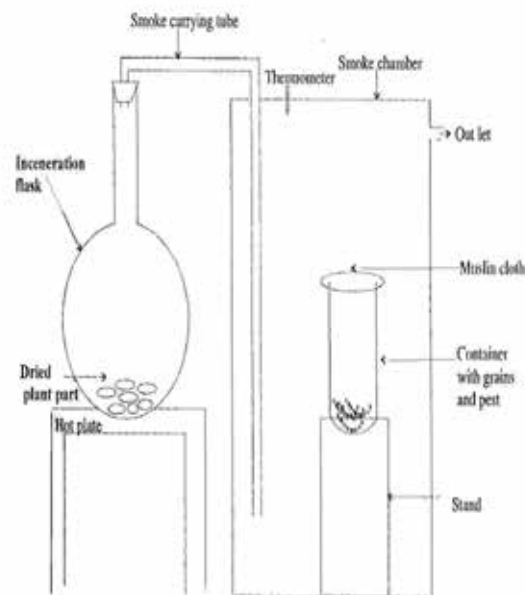


Fig 1. Schematic diagram of smoke treatment

MATERIALS AND METHODS

The pest insect *Rhizopertha dominica*, was cultured on host grains of *Sorghum bicolor* (jawa) at a temperature of 28 ± 2 °C and 70% relative humidity. Different plant parts viz. leaf, stem, root and fruit of *Aerva tomentosa* 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.

$$\% \text{ Adult Mortality} = \frac{D}{T} \times 100$$

Where ,

D = The difference between the initial number of adults released and the surviving adults after treatment,

T = Total number of insects initially released.

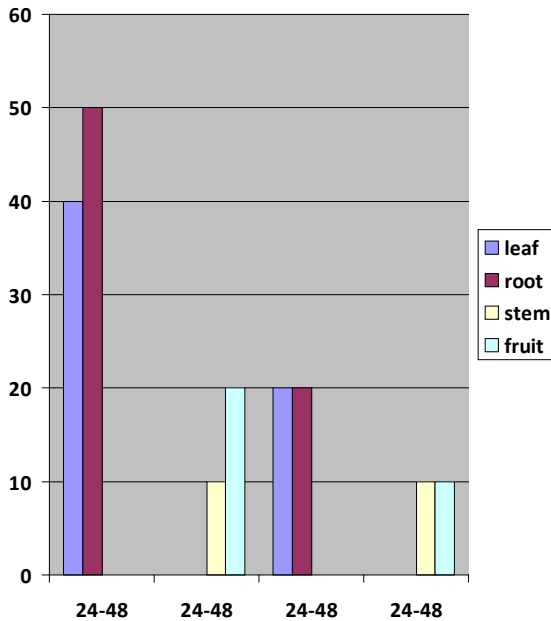


fig.2

Effect of smoke treatment of various parts of plant *Aerva tomentosa*.on the adult mortality (%age) of pest *Rhizopertha dominica*.

RESULTS AND DISCUSSION

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

The results of smoke treatment of different plant parts of *Aerva tomentosa* on the pest have been presented graphically in figure 2. The results showed that the maximum mortality of 40 – 50% was observed in the pest. The leaf of *Aerva tomentosa* was found to be most effective causing highest adult 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 *Pharmala* 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.