



Pesticidal Effect of Plant *Peganum Harmala* Against Stored Grain Pest *Tribolium Castaneum* (Coleoptera : Tenebrionidae)

KEYWORDS

efficacy, extracts, peganum harmala, *Tribolium castaneum*.

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ABSTRACT The study deals with evaluating insecticidal efficacy of a desert plant, *Peganum harmala* (family: Zygophyllaceae), different parts of which were formulated using different extracts and at various concentrations against *Tribolium castaneum*. The results showed that the ether extracts at highest dose concentration of 10% were the most effective in increasing adult mortality, retarding rate of development, reducing egg laying, adult emergence and weight loss in host grains of *Triticum vulgare*. Among the plant parts the leaf was found to be most effective followed by fruit, root and stem.

Tribolium castaneum is an important pest of stored agriculture products. This is omnivorous beetle having chewing mouth parts. This beetle is responsible for 10-40% loss in stored grains annually (Matthews 1993). *T. castaneum* is secondary pest of stored grains i.e. attack demished grains, dust and milled products.

The use of synthetic organic pesticides proved to be very successful weapon against these stored grain pests. But their excessive exploitation and in discriminate use however causes serious blacklashes including health and environmental hazards. Moreover resistance to pesticides in these species is another major problem. *Tribolium* is resistant to certain chemicals like malathion and phosphine.

It was therefore planned to screen local desert plant *Peganum harmala* (var Harmem, Gandhiyo) belonging to family Zygophyllaceae for its insecticidal efficacy against the insect pest *T. castaneum*. This plant has been reported to contain alkaloids-harmine, harmaline, harmalol and peganin and has been listed under poisonous plants of India (Chopra et al, 1965)

Material and Methods.

The test insect *Tribolium castaneum* was cultured on host grains of *Triticum vulgare* at a temperature of 26+2C and 70% relative humidity. Different plant parts viz. leaf, stem, root and fruits of *Peganum harmala* collected from Bikaner were used for the study. The formulations were prepared using petroleum ether (Assay 74.12) and glass distilled water. Ether extracts were prepared by Soxhlet extraction, aqueous extracts be boiling the material in water and aqueous suspension by suspending dried powder in water. 5 pairs of adult insects were released in 10g of grains of *Triticum vulgare* treated with 1ml of different doses which included 1, 2.5, 5 and 10% kept along with control and normal experimental sets all in three replicates. The various aspects studied to screen the efficacy included adult mortality, egg laying (no.) rate of development (no. of days), adult emergence (%) and weight loss in grains %. The results were statistically analysed using ANOVA and t-test.

Adult mortality.

Peganum at 10% concentration caused highest mortality of 60-80% in insects.

Although no work earlier seems to have been done to screen this Zygophyllous plant. But other plants and plant products against different insects have been used by various workers which include the work of Paul et al (1965) on the study of toxic effect of sweet flag (*Acorus calamus*) against *T. castaneum*.

Rai (1970) also proved the toxicity of *Melia azedarch* and *Acorus calamus* against *T. castaneum*. Malik and Naqvi (1984) tested seven plants for their repellent activity against *T. castaneum*.

Egg laying.

Different investigations revealed that the various extracts of plant *Peganum* were effective in bringing down the number of eggs laid by insect. The results further indicated that the concentration had an inverse relationship with this aspect, i.e. with an increase in extract concentration there was reduction in the number of eggs laid.

Reduced fecundity in *T. castaneum* while feeding on flour treated with 50ppm caffeine and 1000ppm castor oil was also absorbed by Akhtar and Mondel. (1994).

Saxena and Yadav (1986) also reported decrease in average number of eggs laid by *T. castaneum* treated with 1, 2 and 4% concentration extract of flower of *Delonix regia*.

Rate of Development.

During present work the time taken by the insect to develop from egg to adult was considered as the rate of development. It was observed that the various plant extracts formulation treatments influenced the rate of development in insect by increasing the time taken to complete development. Moreover the increase was particularly pronounced against 10% formulation of ether.

The increase in developmental period have been attributed by Pandey et al (1985) to the presence of neem products in food which acted as an antifeedant causing the larvae to feed slowly and consequently resulting in prolonged larval period.

The present results corroborate the findings of existence of antifeedant principles in plants of Zygophyllaceae and therefore retarding the development and resulting in an increase in the time taken to emerge as adults.

Adult emergence.

The number of insects emerging as adult can be taken as a parameter to judge the fact of various plant extract formulations on the pest. During present study the results observed revealed that in *T. castaneum* the plant treatments were effective in reducing the adult emergence to 50%.

Saxena and Yadava (1986) also reported egg hatching to be reduced by 59.18% and 82.35% respectively in *T. castaneum* when treated with 2% and 4% concentrations extract of flowers of *Delonix regia*. Chander et al also observed that the doses of 2% turmeric powder and 8ml/kg mustard oil were

reported to suppress the progeny of *T.castaneum* by 60% and 84% respectively.

Weight loss in grains.

Tremendous losses to stored grain due to insect infestation has been of serious concern. During present study the weight loss in grains infected by *T.castaneum* pest was assessed and was observed to be influenced by the treatment of plant extracts.

The weight loss in grains infested with *T.castaneum*, the loss was reduced to considerably lower levels by all the plant formulations which seems directly related to the drop in egg laying in the treated pest. All leaf formulations of *Peganum* were very effective to check the weight loss.

Jilani and Su et al (1983) used four essential oils against stored product pests *Sitophilus*, *zeamais*, *Tribolium castaneum*, *Oryzaephilus surinamensis* and *Rhizopertha dominica* and reported that 0.2% cassia oil when applied as a seed dressing kept stored wheat free from insect damage up to eight months.

The Zygophyllous plant *Peganum harmala* has been screened for the first time for its insecticidal efficacy and by the perusal of the results it may be concluded that:

1. Ether and aqueous extracts of root increases the adult mortality.
2. Aqueous extracts of root and fruit decreases egg laying.
3. Stem extracts influences the rate of development.
4. Leaf, root and fruit formulations reduced adult emergence to some extent.
5. All formulations of leaf reduced weight loss in grains.
6. 10% ether extracts was most effective against the pest.

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