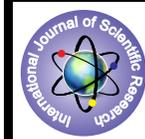


Efficacy of plant *Peganum harmala* on the percentage of damaged grains infested by pulse beetle *Callosobruchus chinensis* Linn



Zoology

KEYWORDS : Extracts, *Vigna radiata*, *Callosobruchus chinensis*, *Peganum harmala*

Amandeep Kaur Mann

Department of Zoology, Dungar College, Bikaner-334 001

Meera Srivastava

Department of Zoology, Dungar College, Bikaner-334 001

ABSTRACT

The present research was carried out to evaluate the grain protectant efficacy of plant *Peganum harmala*, different parts of which were formulated using different extracts and at various concentrations against *Callosobruchus chinensis*. The results showed that the damaged percentage of grains of *Vigna radiata* infested with *Callosobruchus chinensis* have direct relationship with concentration. The sets treated with dose concentration of 10% were most effective and recorded lowest damage to the grains.

1. INTRODUCTION.

Pulses play an important role in Indian diet and are a major source of protein. India is the largest producer of pulses in the world, with 24% share in the global production. The mung bean is important pulse crop. *Vigna radiata*, commonly known as green gram or mung bean is native to India and Central Asia. But 2.5 to 3.0 million tonnes of pulses are lost annually due to pest (Ali, 1998) [1]. Bruchids are major and increasing pests of pulses crops in India. The pulse beetle *Callosobruchus chinensis* L. (Coleoptera: Bruchidae) is the major pest causing severe damage and great economic loss. Damage is caused by this beetle during larval stage which is spent within the seed coat. It is usually detected only during adult emergence by which time damage has already been done.

As chemical insecticides pose several hazards, need arises to search for non-toxic grain protectant. Botanical insecticides seem to have a distinctive advantage being eco-friendly, biodegradable, non-toxic to non-target population, economic and easily available.

It was therefore planned to screen a desert plant *Peganum harmala* belonging to family *Zygophyllaceae* on the percentage of damaged grains infested by pulse beetle *Callosobruchus chinensis* Linn. 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) [3].

2. MATERIALS AND METHODS.

The test insects *C.chinensis* was cultured on host grains of *Vigna radiata* at a temperature of 28±2C and 70% relative humidity. Different plant parts viz. leaf, stem, root and fruit 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 by boiling the material in water and aqueous suspension by suspending dried powder in water. Five pairs of adult insects were released in 10 grams of grains on *Vigna radiata* treated with 1 ml. of different doses which included 1, 2.5, 5 and 10% along with control and normal experimental sets.

The weight loss of grains (%) was assessed in terms of biomass by finding the differences between initial weight of the grain i.e. when five pairs of pest insects were released and the final weight of the grains taken after the emergence of new progeny of pest insects and calculated as:

$$\% \text{ Weight loss} = \frac{Iw - Fw}{Iw} \times 100$$

Where, **Iw** = Initial weight (10 gram)

Fw = Final weight

The average values were calculated by using observations from the three replicates and compared with control and normal treatments. Here normal includes untreated grains while

control includes grains treated only with the particular solvent viz.; water, ether etc.

The results were statistically analysed using ANOVA and t-test.

3. RESULTS AND DISCUSSIONS.

The results are presented in figure 1, revealed following findings:

The weight loss indicates the quantitative loss in stored grains due to insect feeding showing a direct relationship between insect population and weight loss.

It was observed that in normal experimental sets in the grains infested with insect was 20.06%.

The weight loss was reduced by the treatment of the plant *Peganum* to as low as 0.5% as compared to 2% in control sets the leaf and fruit of *Peganum* significantly brought down the weight loss in grains.

When comparisons were made with respect to concentration, the maximum weight loss was observed in untreated grains i.e. normal experimental sets while minimum in grains treated with 10% concentration of extract.

The weight loss was 1.0% and 2.5% with ether extract of leaf and 1.0% with aqueous extract of leaf.

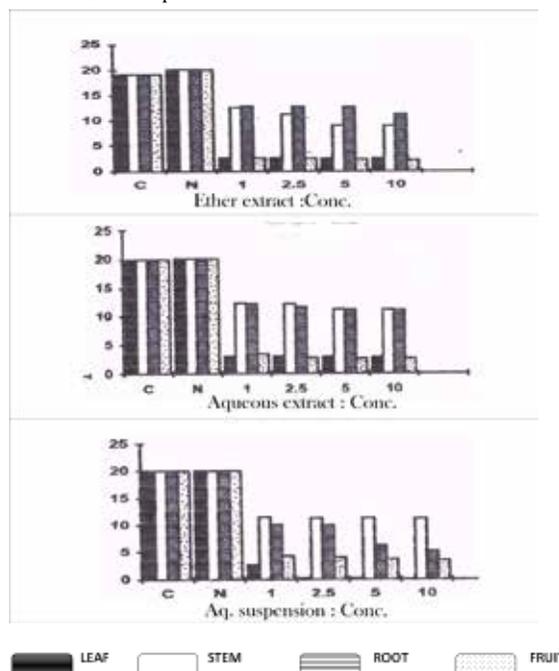


FIG. 1

EFFECT OF DIFFERENT FORMULATIONS OF SOME PARTS OF PLANT *PEGANUM HARMALA* ON THE WEIGHT LOSS ON THE GRAINS OF *VIGNA RADIATA* INFESTED WITH *CALLASOBRUCHUS CHINENSIS*.



fig. 2
photograph showing seeds of vigna radiata damaged by the insect pest *Callasobruchus Chinensis*.

The weight loss was 1.0% and 2.5% of all the three extracts of fruit of *Peganum*.

The present findings are in agreement with the observations of Kumari et al (1990) [5] who evaluated the efficacy of mustard, Linseed, Til, Groundnut, Neem and Mahua oil as grain protectant against *Callosobruchus chinensis*.

Similar effects were reported by Chiranjeevi (1991) [4] who tested the leaf powder of neem, apamaga kesarachettu, lantana, rhizome powder of sweet flag, seed powder of neem and ashes of cow dung, acacia wood, neem wood and casuarina for these efficacy on percentage of damaged grain, percentage of protection over control and viability of treated seeds.

The present findings are in agreement with the investigations made by Khaire et al (1992) [6] on the efficacy of sunflower, castor, mustard, sawflower, palm, groundnut, sesame, neem, karanj and maize oil as protectant of pigeonpea against the attack of *Callosobruchus chinensis* showed that adult emergence was prevented by karanj oil at 0.75 and 1.0% and neem oils at all concentrations.

Similar effects were also reported by Pandey and Verma (1977) [7] who tested the seed powder of *Annona* species against pulse beetle, *Callasobruchus maculatus* as protectant of moong seeds.

It was reported by Begum and Quinones (1991) [2] that coconut, soyabean, mustard or peanut oils applied to moong bean seeds infested with *Callasobruchus chinensis* reduced population number.

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

The leaf and fruit extracts are most effective to be used as seed protectant against pulse beetle *Callosobruchus chinensis*.

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