RESEARCH ARTICLE

Biopesticidal effect of aqueous exctract of leaves of *Argemone maxicana* on *Callosobruchus chinensis* (l) for the protection of *Phaseolusa conitifolius* grains

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ABSTRACT

Extract of leaves of the *Argemone maxicana* was tested against the infestation of *Callosobruchus chinensis* for the protection of the grains *Phaseolusa conitipholeus*. Aqueous extract was found to be very effective in protecting the damage caused by *Callosobruchus chinensis* to the grains of *Phaseolusa conitipholeus*. Loss of weight 3.7%and the loss of protein contents in the total grains of *Phaseolusa conitipholeus*2.6% were effectively reduced in grains treated with at 1.2 ml/kg. Dose concentration at the rate of 25 gms *Phaseolusa conitifolius grains*. Aqueous extract of leaves *of Argemone maxicana* was effective so it can be used for the protection of the *Phaseolusa conitifolius* and other pulses grains during storage.

Keywords: *Argemone maxicana, Callosobruchus chinensis, Phaseolusa conitifolius.*

INTRODUCTION

Phaseolusa conitifolius has high nutritional value in pulses and is cultivated all over the world. The numbers of pulses seeds suffer a great damage and loss during storage due to *Callosobruchus chinensis* attack. Among the insect pests attacking store products, pulse beetle *Callosobruchus chinensis,* (Coleoptera, Bruchidae,) is a serious pest.

Use of chemical pesticides has given rise to many serious problems caused by their residues the need for effective, biodegradable pesticides with greater selectivity search for new types of insecticides, Botanical preparations have long been used for protection of stored grains produces by small scale farmers in India, Various plant by-products have been tried recently with a good degree of success as protectants against a number of stored grain insect pests (Gill and Lewis, 1971), e.g. the parts of Neem, Tulsi, clustered apple leaves Nirgudi tree have been used extensively. Application of the plant originated pesticides causes multiple growth and reproductive abnormalities in insect's pest (Jaiswal and Srivastava, 1992). The biopestiside of plant origin also have the potential to reduce the population of insect in succeeding generation (Raju *et. al.,* 1990) thus they form an ideal component of ecological pest management program.

MATERIALS AND METHODS

Rearing of *Callosobruchus chinensis:*

Non infected grains of the *Phaseolusa conitifolius* were purchased from the local market shop and were screened for the damaged and infected grains if any. The non-infected grains were washed in clean water and were dried at 45 ^{0}C in the oven to kill if any infective stage of the pest exists in the grains. The dry grains were placed in the clean glass bottle. The cap of the bottle was perforated for the ventilation. Wet muslin cloth was tied at the mouth of the bottle before capping to maintain the humidity for the survival of the pest.

Callosobruchus chinensis were separated from the infected grains. Ten males and ten females were released in the plastic jar containing 500 grams of the grains and were allowed to grow. The adult females laid the eggs on the grains. Beetles when died were removed and the culture was maintained for experimental work. The young adults began to emerged out from the grains, the adults hatched, were used for the experimentation and some were released in the fresh pulses again to maintain the stock culture.

Collection and Preparation of extract:

Fresh leaves of *Argemone maxicana* were collected from different parts of natural habitats at Dr. Babasaheb Ambedkar Marathwada University campus Aurangabad and washed with tap water and were dried in the shade at laboratory. The dried leaves were pulverized in the grinder and the powder was screened with cotton cloth than stored in the airtight polyethylene bag. Ten grams of the dried powder was soaked in100 ml. distilled water for 24 hours. Then the mixture was filtered by Whatman filter paper and the filtrate was collected and was directly used with different concentration.

Grains used:

25 grams of the disinfected pulse grains were taken in each of the plastic jar. One jar was maintained as control and others were labeled and used for experimentation.0.4 ml. 0.8 ml 1.2 ml 1.6 ml 2.0 ml. extract were added in each plastic jar containing 25 gms grains. The dead adults were removed and the data as given in the tables was collected and mentioned in the table, it shows the protective role of the aqueous extract of the leaves of *Argemone maxicana* on grains of *Phaseolusa conitifolius* against the *Callosobruchus chinensis*.

RESULTS

Phaseolusa conitifolius is the common pulse used as sprouted grains for several preparations of breakfast and meals in the country. It is highly susceptible to the infestation of the bruchids, *Callosobruchus chinensis* and *Callosobruchus maculates*. General observations show that *Phaseolusaconitifolius* seeds if remains for few months in the house are heavily attacked by these pests and makes them unfit for eating. *Callosobruchus chinensis* occurs commonly in most of the pulses.

The female lays eggs and glues on the grains. The number of eggs glued on single grain varies from one to five. The female lays eggs for about 8 to 10 days. The tiny larva that hatches out penetrates in the grains and grows within the grains. They eat the grains from inside and make them hollow and then pupate. The pupa can be removed from the grain. After about 28 days, the adult emerges out from the grains. Table shows the effect of aqueous extracts of *leaves of Argemone maxicana* on the mortality of adult *Callosobruchus chinensis* and their life cycle stages. The mortality rate was high and the number of eggs laid,

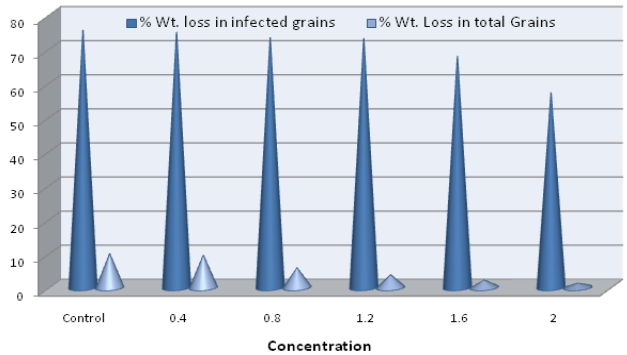

Fig. 1: Effect of aqueous extract of *Argemone maxicana* leaves on the wight loss in grains of *Phaseolus aconitifolius* by the stored grain pest, *C. chinensis*

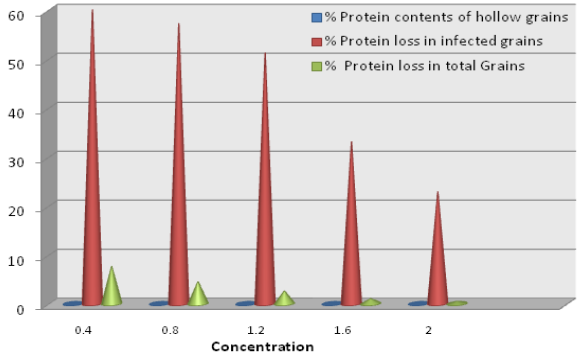

Fig. 2: Effect of aqueous extract of *Argemone maxicana* leaves on the protein loss in grains of *Phaseolus aconitifolius* by the stored grain pest, *C. chinensis.*

grains infested and adults emerged were highly reduced with the increase in the concentration of the extract as shown in the tables. There was no infestation and emergence of adults in the concentrations of 1.2 ml per Kg grains and above 2.0 ml per Kg grains. The mortality rate, egg laying and hatching of the adults was minimized in the aqueous extracts of *Argemone maxicana*.

Caswell (1981) reported that over 130 plants and plant products have been shown to have insecticidal activity against stored product pests. Many of the plants which farmers use as protectants have a strong smell which, it is supposed, repels or kills insects. Other workers have previously reported that plant powders reduce oviposition by bruchids under laboratory conditions. The plants include neem kernel powder (Sowunmi and Akinnusi, 1983) and Kurunegaladasia *Tridax procumbens* (L.) with C. *maculatus* (Bhaduri *et al.,*1985), and custard apple *Annona squamosa*L. seed powder with C. *chinensis* (Ali *et al.*1983). Among bruchids, *Callosobruchus chinensis*is a major cosmopolitan pest that causes serious damage to pulses in storage condition. Gugar and Yadav (1978) reported that 55-69% weight loss and 45.6 - 66.3%protein loss by infestation of pulse beetle on chickpea.

Our study show that the effect of aqueous extracts of leaves of *Argemone maxicana* on the weight loss of infected and total grains, and protein loss in infected and total grains of *Phaseolusa conitifolius*. Percent weight loss in infected and total grains was highly reduced inlow concentrations of the extracts of leaves of *Argemone maxicana*. The whole grains of *Phaseolusa conitifolius* were found to have 24.87 percent proteins while the infected hollow grains had reduced proteins contents on exposure to extracts of leaves of *Argemone maxicana* while percent protein loss in total grains at the said concentrations was highly reduced indicating the saving of the proteins against the damage by *Callosobruchus chinensis*. Protein loss was also minimized in different concentrations of aqueous extracts as given in the tables.

CONCLUSION

The results of the study have confirmed that the beetle, C. *chinensis,* can be effectively controlled by admixing *Argemone maxicana* leaf extract with 25 gm of *Phaseolusa conitifolius* seeds for at most 6 months. The use of plants extract should be encouraged in small farm storage, as the expenditure of these plants originated bio-pestiside are low and easily available when compared with synthetic insecticides. Additionally, further seeds would be available for use as food and for sale by the farmer because grain infestation would be reduced. Consumers would also get additional value for their currency.Thus, the present investigations indicate that plants derivatives might be useful as insect pest control agents for marketable use. To diminish the severe damage caused by insect pests, the traditional use of plant products, proved to be highly effective against stored product insects. Application of plant products to grain seeds for storage is an economical and valuable technique, and its easy adaptability will give additional advantages leading to acceptances of this knowledge by farmers. A study to improve the effectiveness of plants derivatives as insecticides will profitable to agricultural sectors of developing countries, as these material are not only of low cost, but also have less environmental impact. Therefore, from the above study it may be concluded that the *Argemone maxicana* leaf extract can be effectively used as grain protectants and thereby reduce the residual of toxic chemicals in our food stuff as well as in the environment.

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