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Influence of Storage Containers on *Callosobruchus Maculatus* (Fab.) Infesting Green Gram

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ABSTRACT

Influence of storage containers prepared from six different materials viz. gunny bag, polythene fertilizer bag, bamboo basket coated on both sides with mixture of soil and cowdung (1:1 w/w), earthen pots (mouth closed with mud), galvanised tin and plastic containers were evaluated against storage pulse beetle Callosobruchus maculatus (Fab.) (Coleoptera: Bruchidae) on green gram, Vigna radiata L. (Wilczek) seeds in the laboratory. The result indicates that the effectiveness towards seed damage by Callosobruchus maculatus, number of eggs per seed, holes per seed, loss in seed weight and total development period was in the descending trend of plastic container > galvanised fin> polythene fertilizer bag > earthen pot > gunny bag and bamboo basket. The storage containers did not influence the seed viability and cookability of the stored grains.

Key words: Storage containers, *Callosobruchus maculatus* (Fab.) and green gram

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INTRODUCTION

Pulses are important source of protein in vegetarian diet and also participate in maintaining soil fertility due to nitrogen fixing ability. The Pulse beetle, *Callosobruchus maculatus* (fab.) (Coleoptera: Bruchidae) is a major pest of economically important leguminous grains such as cowpea, green gram and black gram [1, 2, 3). The family, Bruchidae, order coleoptera, contains a large number of serious pest species of pulse crops. *Callosobruchus maculatus* is one of the most important insect species, infesting green gram both in the fields and in the stores. It was found that apxoximately 2.5 to 3.0 million tonnes of pulses are lost annually due to insects pest [4]. Generally, the damage starts in the field, female lays eggs on the green pods and the grubs feed through the pod cover and remain concealed in developing seed [5]. When such seeds are harvested and stored, the insect continues to feed as hidden infestation and emerges as an adult and may cause total destruction within a period of 3-4 months and the grains become unfit for human [6]. Whereas, the safe use of synthetic insecticides to protect stored grains and their products from insect pests are highly desirable [7]. Since, Pulses are the the main source of protein and their storage is more difficult. Therefore, effort has been made to minimize the loss in storage pulses caused by Callosobruchus maculates by using different container.

MATERIALS AND METHODS

Insect culture

The culture of *C. maculatus* was raised on the green gram in the laboratories and the removal and transfer of the culture are carried out by aspirator Beetles emerged from these cultures were used in the experiment with in 24 hours. Saxes were distinguished on the basis of antennae and abdomen [8].

Study on extent of seed damage by use of different storage containers

The experiment was set up at 30^{O}C in completely randomized block design with three replication. Two hundred seeds of green gram, local cultivar Khargone – 1 were taken for each storage containers in which 10 pair of freshly emerged beetles was released.The following container was taken as treatment.

(1) Gunny bag (2) Fertilizer plastic bag (3) Plastic containers (4) Galvanized tin containers (5) Bamboo basket containers coated with soil + cowdung (1:1) (6) Earthen pots (mouth closed with mud) each container capacity of 200 gram seeds. Observation were taken on the following aspects -

Extent of Oviposition in different treatment and total developmental period (egg to adult) survival percentage, seed damage and reduction in seed after 10, 60, 120, 180 days and 1 year of storage.

RESULTS AND DISCUSSION

Table-1: Influence of storage containers on bruchid *C. maculatus* oviposition on green gram seeds at different storage periods

Storage containers	Extent of Oviposition				
	10 Days	60 Days	120 Days	180 Days	1 year
Plastic containers	7.09	60.15	100	100	100
Galvanized tin containers	10.57	66.12	100	100	100
Earthen pots	12.27	71.23	100	100	100
Bamboobasket containers	13.80	75.57	100	100	100
Fertilizer plastic bag	11.02	69.36	100	100	100
Gunny bag	14.78	78.62	100	100	100

Table-2: Influence of storage containers on green gram seeds- Percent Seed damage and Percent Reduction in Seed Weight by bruchid *C. maculatus* at 60 days

Storage containers	% Seed damage	% Reduction in Seed Weight
	60 Days	60 Days
Plastic containers	6.11	34.09
Galvanized tin containers	8.97	37.67
Earthen pots	12.59	48.03
Bamboobasket containers	13.50	50.19
Fertilizer plastic bag	11.37	40.76
Gunny bag	22.44	53.84

In 200 grams seed of green gram (C.V. Khargone), 10 pairs of freshly emerged beetles were released. Seed were kept in six different types of storage containers, which were replicated three times. Studies on extent of oviposition were carried out by counting the total number of eggs laid on the seeds after 10 days, 60 days, 120 days 180 days and one year of release of the insects (Table-1). However, Percent Seed damage and Percent Reduction in Seed Weight by bruchid *C. maculatus* were carried out at 60 days (Table-2).

The result indicates that the effectiveness towards seed damage by *Callosobruchus maculatus*, number of eggs per seed, holes per seed, loss in seed weight and total development period was in the descending trend of plastic container > galvanised fin> polythene fertilizer bag > earthen pot > gunny bag and bamboo basket. The storage containers did not influence the seed viability and cookability of the stored grains.However, percent Seed damage and percent Reduction in Seed Weight by bruchid *C. maculatus* at 60 days were occurs maximum in gunny bag and mimimum in plastic container. Seed damage was 100% in all the container after 60 days.

The above finding indicate that green gram seed if stored in plastic container or tin container can be protected to some extent up to 60 days further, they can be stored for a longer period, free from bruchid infection if the seeds are treated with a seed protectant.

However, Mannan and Tarannum [9] conducted a survey in Jamalpur region to investigate the losses of pulses during storage at farmer's level and found that containers like plastic container (7.8% infestation), plastic boium (8.6% infestation), Jute bag with multiple (2-5), polythene lining inside (7.7% infestation), tin container with polythene lining inside by mixing sand with pulses (8.2% infestation) and RC bottle (8.4% infestation) showed better performance for storing different pulse crops. Jat *et al.* [10]) recorded that the losses caused by pulse beetle by releasing 1, 2, 4, 8 and 16 pairs of adults in jars, each containing 500g chickpea grains and found that the losses were increased with increase in storage period. However, exposure to the sun in different coloured polythene bag killed *C. chinensis* eggs and grubs were observed in infested green gram in 24 hours [11].Patil *et al.* [12] performed a test on the chickpea seeds cv. PG-12, stored in jars, each containing 0, 1, 2, 4 or 8 pairs of newly emerged adults of *C. maculatus* and they noticed that population count and seed infestation were directly proportional to the number of pairs of adult beetles released.Several bruchid species attack cereals and pulses in store and cause a loss of 10 – 15% with a germination loss ranging from 50 – 92% [13]. A study was performed on the population build up, grain damage, weight losses and evaluation of different storage containers against *C. chinensis* on chickpea during 30 to 180 days of storage [14]

The study will be helpful to the farmers in minimizing the storage losses of green gram from the pulse beetles, which is low cost approach and to make safe both to environment and human health.

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