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ESTIMATION OF LOSSES CAUSED BY PULSE BEETLE, *CALLOSOBRUCHUS CHINENSIS* (L.) IN STORED MUNG BEAN SEED

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ABSTRACT : The experiment was performed in the storage laboratory during the year 2019 and 2020 to investigate the seed damage, weight loss and germination loss caused by the pulse beetle, *Callosobruchus chinensis* on stored mung bean seeds under normal room circumstances. The observations were started from 30 days of insect release to 180 days onto the mung bean seeds. During 2019, the percentages of seed damage (9.14 to 97.18), weight loss (6.91 to 69.30) and germination loss (18.33 to 96.33) were observed, while in 2020, the percentages of seed damage (9.99 to 98.06 percent), weight loss (6.2 to 69.38 percent) and germination loss (19.66 to 97.66 percent) were observed.

Key words : Mung bean, pulse beetle, storage laboratory, seed damage, germination loss, insect release, weight loss.

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INTRODUCTION

India's dietary habits are still predominantly vegetarian, and it relies mainly on vegetal sources to achieve its daily protein requirements. Pulses play a vital role in the diet of common people of Asian countries. Because they are abundant in protein (20-30%), these meals have been termed "poor man's meat" (Rahman *et al*, 2010).

Mung bean (*Vigna radiata* L. Wilczek) is one of the most cost-effective pulse crops. It's a great source of easily digestible protein that's low in flatulence and goes well with Asia's staple rice/wheat diet. Cereals provide a perfect blend of essential amino acids with significant biological value when supplemented with them.

The growth of agriculture-based economies of world depends on the sustained supply of quality seed. Thus, it becomes essential to protect the seed from insect pests during storage. The seeds, if properly stored, remain edible for several years and are rich in protein. In storage, pulses suffer enormous losses due to pest attack.

Callosobruchus chinensis L., the most dangerous insect pest in pulses, is known to be prolific and rapid in breeding, and can swiftly cause a significant quantitative drop as well as diminish the nutritional value of stored grains. The adult pulse beetles do not eat the seeds but they mate and oviposit on them. The newly hatched larva bores into the seed and starts feeding on its contents till the whole endosperm are eaten up. The damage due to this pest affects the germinating ability and nutritive value of the seed (Sharma, 1984). Under normal conditions of storage C. *chinensis* causes heavy losses to chickpea which increases with storage duration (Jat *et al*, 2013). During storage, the beetles can cause up to 100% loss in bean seeds. (Gbaye *et al*, 2011). Pulse beetle feed on endosperm of seed leaving behind only seed coat causes reduction in germination of seeds, weight loss and lower market value (Tesfu and Emana, 2013). An effort was undertaken to evaluate the seed damage, weight loss, and germination loss in a local mung bean variety during storage in light of the economic significance of pulses as well as losses brought on by the pulse beetle.

MATERIALS AND METHODS

The experiment was conducted in storage laboratory, department of Entomology and Agricultural Zoology, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi during 2019 and 2020.

The initial adult culture of the test insect, *Callosobruchus chinensis* was maintained in the storage laboratory, department of Entomology and Agricultural Zoology, Institute of Agricultural Sciences, Banaras Hindu

The current findings are in partial agreement with Chakraborty *et al* (2014), who concluded that in the first generation, cowpea (5.21 percent) showed the maximum weight loss followed by kidney bean, green gram, and pea (4.21, 3.86, and 3.36 percent, respectively), while in the second generation again the maximum weight loss was observed in cowpea (6.22 percent) followed by green gram (5.00 percent), and black gram (3.26 percent).

These findings are consistent with prior research, which found that mung bean seeds were the medium-sized seeds with 8.9 percent weight loss, while lentil seeds were the smallest with a 13.4 percent weight loss owing to the pulse beetle (Chakraborty *et al* 2004).

Germination loss

During 2019, the mean percent germination loss was 18.33 after 30 days of releasing adult bruchids. 60 days after bruchid released, the mean germination loss was 48.33 percent. It was 62.66, 77, 89.66 and 96.33 mean percent losses in germination after 90, 120, 150 and 180 days of released adult bruchids, respectively (Table 1).

During 2020, after 30, 60 and 90 days of releasing adult bruchids, the mean losses in germination were 19.66, 49.33 and 63.33 percent. The losses in germination were 78.33, 90.33 and 97.66 after 120, 150 and 180 days of bruchid released (Table 2).

The aforementioned findings corroborate earlier research by Singh (2020), who observed germination loss of 42 & 33.6 percent, respectively in smaller and larger size pulse grains, respectively.

The current findings are consistent with those of Singh *et al* (2017), who released 1, 2, 4, 8 and 16 pairs of adults to determine the losses caused by the pulse beetle in jars containing 100 g chickpea grains. One pair of adult pulse beetles caused the least amount of germination loss, measuring 4.00 percent. The 16 pairings released after 30 days of storage suffered the greatest loss of germination *i.e.*, 43.5 percent. The loss in germination followed the same pattern after 90 days of storage and reached their peak, *i.e.*, 28.5 percent in the event of releasing one pair of adult pulse beetles, and 99 percent in the case of releasing sixteen pairs of adult pulse beetles.

The current findings are consistent with those of Parmar and Patel (2016), who discovered mung bean susceptibility to *Callosobruchus chinensis* L. during storage. After six months of storage, C. *chinensis* exhibited a 29.97-65 percent reduction in germination.

The current findings are similarly consistent with those of Jat *et al* (2013), who stated that the lowest mean germination loss was reported in the instance of one adult pulse beetle pair, namely 4.55 percent. The largest losses 44.57 percent, were seen when 16 pairs were released after 30 days of storage. Following the same pattern after 90 days of storage, the losses peaked at 29.27 percent for the release of one adult pair and at 100% for the release of 16 adult pulse beetle pairs.

The current findings are similarly consistent with those of Singh and Sharma (1982), who estimated a 47.53-79.60 percent loss of germination due to pulse beetle damage to grains.

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