

## An Overview of Pulse Beetle, *Callosobruchus* spp.

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### Editorial

The genus *Callosobruchus* belongs to the order Coleoptera and subfamily Bruchidae. There are quite a number of species available under this genus such as *C. analis*, *C. chinensis*, *C. dolichosi*, *C. imitator*, *C. latealbus*, *C. maculatus*, *C. nigripennis*, *C. phaseoli*, *C. utidai*, *C. theobromae*, *C. subinnotatus*, *C. semigriseus*, *C. rhodesianus* and *C. pulcher* etc. Among them, *C. maculatus* is one of the major and primary pest, that could attack a wide variety of pulses rarely in the field and common storage condition. Pulses is the main source of protein for vegetarian people. It is an important stored product pests of Africa, Asia and spread throughout the tropical and subtropical countries.

A female can lay 70 to 150 eggs on the seeds and the incubation period lasts for 4-5 days. The larval and pupal period ranging from 11-20 and 6-8 days respectively. Average period between egg to adult takes around 23-28 days. The larvae of this species feed and develop exclusively inside the seed of legumes, hence the name bean beetle. Male adult can live for 7-10 days and female can live for 6-10 days. After emergence of adult from seeds, they mainly involved in reproduction. *C. maculatus* is well adapted to living in dry beans and seeds as it does not require food or water to reproduce. In its life time adult never feed any pulses. *C. maculatus* infestation was dependent on the water content of the food, which is needed for fecundity and longevity.

In tropics, it breeds freely from March to November and hibernates in the larval stage during winter. The pest causes maximum damage during February to August. It is used as a model organism in many biological laboratories due to its fast multiplication time and ease of maintenance.

Worldwide, is estimated to be 10-40% of stored food products were lost due to insects, fungus, bacteria and virus [1]. India produces around 12.65 million tons of pulses per year and nearly 8.5% of this is lost during post harvested handling and storage [2]. ICAR and CIPHET reported that the cumulative percentage of post-harvest losses of pulses was between 6.36-8.41% at March 2015.

Some of the external factors such as, temperature, humidity, moisture content, carbon-dioxide/oxygen, insects and microbial activities are either directly or indirectly influenced infestation on stored pulses. Changes in the physico-chemical parameters pave the way destruction of seeds. Increase in the moisture content (5-14%) of the pulses resulted in increasing insect infestation and also the fungal infection in pulses, due to excess of moisture content in pulses as well as the pest excretory waste. Insect and fungal infestation leads to the loss of physical, chemical and nutritive value and also reduced the market value. Physical loss mainly in weight, appearance and colour is

entailed. The grains increase in acidity, reducing sugars, uric acid due to insect attack. Insects often devour the germ portion or embryo which is more nutritive.

Excretory wastes of this pests cause many diseases for human beings (neurological, urological and allergic) and animals. Synthetic chemicals are used for controlling the pests as it gives prominent results, especially phosphine and methyl bromide are widely used as fumigant. Using these synthetic chemical leads to the development of resistance in insects and cause several environmental issues. Many investigators are searching alternatives for these chemical fumigants. Physical and biological methods are practiced in small scale level.

Sands and soil components are used as traditional insecticides in warehouse. Sands provide protective layer on top of stored seed. Temperature treatment of stored grains is a best physical method which successfully kills all life stages of insects at a stipulated period. Most of the stored product insects cannot tolerate extreme temperature, more heating and cooling and show heavy mortality. Superheating of food grains provide extra protection without treating with any insecticide. Pheromones are used as behavioural control of insects either by applying male specific or female specific pheromonal substances.

In recent years, research is focussed on the use of plant oils and their bioactive chemical constituents as possible alternatives the synthetic fumigants. There has been growing interest in the use of plant oils for protection of agricultural products due to their low mammalian toxicity and low persistence in the environment. Using essential oils in small scale gives good protection to the stored grains. If any formulations developed from the essential oils with synergistic effects, then it may be used as a component in large storage structures.

Many tools and techniques are available to identify the pest infestation in earlier stages. Which could give satisfactory results in controlling the pest infestation. One of the best suggestion is the consumer should buy pulses directly from the farmers and use some ancient traditional methods like mixing of oil, applying red sand, covering on the upper layer of seeds with neem leaves before it stored for future use.

### Conclusion

The management of the stored pest by traditional methods is a suitable and cost effective method, which could not cause any ill effect to the environment as well as to the non target organism.

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