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Short Note

Occurrence of Insects in Stored Cocoa Beans in Tamil Nadu

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Investigations were carried out on insects associated with stored cocoa beans in private godowns at Sennakallpalyam, Dharapuram in Tamil Nadu, India during 2010-2011. The tools used were normal sieve sample, UV light trap, pheromone trap and stack probe trap. The survey indicates the presence of 10 insect species namely ; *Lasioderma serricorne* (F.), *Tribolium castaneum* (Herbst.), *Araecerus fasciculatus* (De Geer), *Prostephanus truncates* (Horn), *Carpophilus* sp. (Erichson) *Ephestia* sp. (Walker), *Hypothenemus* sp. (Ferrari), *Cryptolestes ferrugineus* (Stephens) *Liposcelis* sp. and *Plodia interpunctella* (Hubner). These physical method helps for early detection and management of stored grain pest effectively.

Key words: Normal sieve sampler, TNAU probe trap and UV light trap, Stored Pests of Cocoa

Stored product insects are serious pests of dried, stored, durable agricultural commodities and of many value- added food products and non -food derivatives of agricultural products worldwide. They can cause serious postharvest losses, upto 9% in developed countries and 20% or more in developing countries besides contaminating food products through the presence of live insects, chemical excretions or silk, dead insects and insect body fragments (Phillips and Throne, 2010). Cocoa (*Theobroma cacao* L.) is called as “food of gods’’ and it is the third important beverage crop next to coffee and tea and is the third highest produced commodity in the world after coffee and sugar. Commercial cultivation of cocoa started in India in 1970s.

Insect infestation during storage results in the breakdown of the butter and increases free fatty acid (FFA) levels in the beans (Anonymous, 1970). The level of FFA in the beans must be less than 1.0% to meet the acceptable level of 1.75% in cocoa butter extracted from the beans (Anonymous, 1996). Very few studies have been carried out on the insects of cocoa beans in storage in India. Narasimhan (1987) reported that the almond moth, *Cadra cautella* (Walker) and cigarette beetle *Lasioderma serricorne* (F.) infest stored cocoa beans in Kerala and Karnataka states of India.

Materials and Methods

Survey

This investigations were made at ware houses located at Sennakallpalyam, Dharapuram in Tamil Nadu, India on the incidence of insects on stored cocoa beans through normal sieve sampler, TNAU probe trap and UV light trap from December 2010 to April 2011.

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Normal sieve sampling

About 1kg of sample was collected randomly from Ghana, Indonesia and Indian stacks using a sampling spear and sieved using a 2 mm sieve. Ten such samples from each stack were taken every week. The sampling was done for one month. Observation on the number and type of insect species sieved out was recorded.

TNAU Probe trap

Ten stored cocoa bean bags were randomly selected each from Ghana, Indonesia and Indian beans. TNAU probe traps (6 inches) (Mohan, 2004) of ten numbers were placed in the bags at the rate of one per bag and observation on the number and type of insects trapped was recorded for one month.

UV- Light trap

UV light traps (Mohan, 1993) were placed in five godowns at one per godown at a height of 1.5m above ground level, in warehouse corners, as the insects tend to move towards these places during evening hours. The trap was operated during night hours. The observation on insect species and number of insects collected was noted weekly basis for eight weeks.

Results and Discussion

Survey for major insect species present in stored cocoa beans

The insect species recorded during the study in stored cocoa bean storage godown are presented below (Table 1).

Common insects found in stored cocoa beans throughout the study period were, cigarette beetle (*L. serricorne*), red flour beetle (*T. castaneum*) and rusty grain beetle (*C. ferrugineus*). Detection ratio between probe traps and sieve sample showed that

Table1. Insect species observed in cocoa bean godown

Common name	Scientific name	Family	Order
Cigarette beetle	*Lasioderma serricorne* (F.)	Anobiidae	Coleoptera
Red flour beetle	*Tribolium castaneum* (Herbst.)	Tenebrionidae	Coleoptera
Cocoa bean weevil	*Araecerus fasciculatus* (De Geer)	Anthribiidae	Coleoptera
Larger grain borer	*Prostephanus truncatus*(Horn)	Bostrichidae	Coleoptera
Dried fruit beetle	*Carpophilus* sp.(Erichson)	Nitidulidae	Coleoptera
Indian meal moth	*Plodia interpunctella* (Hubner)	Phycitidae	Lepidoptera
Cocoa moth	*Ephestia* ellutella Hb.	Phycitidae	Lepidoptera
Cocoa borer	*Hypothenemus* sp. (Ferrari)	Scolytidae	Coleoptera
Psocids	*Liposcelis* sp.	Liposcelidae	Psocoptera
Red rusty beetle	*Cryptolestes ferrugineus* (Stephens)	Laemophloeidae	Coleoptera
Parasitoid Wasp	*Bracon* sp.	Braconidae	Hymenoptera
Predatory bug	*Xylocoris* sp.	Anthocoridae	Hemiptera

trap detected twice the number of insects than sieve sample (Table 2).

Earlier studies by Dharamputra (1999) gave the similar picture on insects present in stored cocoa beans. Though *P. truncatus* and *Hypothenemus* sp. were present in the cocoa bean storage, at a low level, this finding is very important as these two insects are of phytosanitary/ quarantine importance. They were known to cause damage to stored maize grain and dried cassava roots (Hodges, 2002) in Africa, from where the cocoa beans were imported. Though, sieve sampling is common in pest management, detection by TNAU probe trap was more effective for the major insects attacking cocoa beans. However, the bags are to be randomly selected from each stack and traps should be used. Similar studies by Mohan (1993) showed that the probe trap detected more number of *R. dominica*, *T. castaneum* and *S. oryzae* compared to normal sieve sampling in rice storage.

Table 2. Detection ratio for three insect species in probe trap and normal sampling methods

Insect species	Detection ratio		
	Probe trap	Normal sample	Trap : Normal
Tribolium castaneum	40	16	2.5:1
Cryptolestes ferrugineus	97	13	7.46 : 1
Lasioderma serricorne	38	15	2.53 : 1

UV light trap

UV light trap was very effective for trapping many insects. The insects trapped were *C. ferrugineus P. interpunctella*, *E. ellutella*, *L*. *serricorne*, *T. castaneum, P*. *truncatus*, *Carpophilus* sp, *A*. *fasciculatus*, *Hypothenemus* sp, *Bracon* sp and *Xylocoris* sp. The total number of insects caught during the experimental period were in the order of *C. ferrugineus* > *T. castaneum* > *Xylocoris* sp. > *E. ellutella* > *A. facsiculatus* > *Bracon* sp. > *P. truncatus* > *P. interpunctella* > *L. serricorne* > *Carpophilus* sp. > *Hypothenemus* sp. As UV light trap was found effective for both Coleopterans and Lepidopteran insects attacking stored cocoa beans, UV light trap can be recommended in cocoa bean warehouses and godowns for monitoring and detecting stored grain pests of both the orders.

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