

## **HYMENOPTERAN PARASITIDS ASSOCIATED WITH SOME IMPORTANT STORED PRODUCT PESTS IN KERALA, INDIA**

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**Abstract:** Fourteen species of parasitoids belonging to 2 Superfamilies, Chalcidoidea and Ichneumonoidea were recorded. The super family Chalcidoidea included 3 families (Pteromalidae, Chalcididae and Trichogrammatidae) and 11 species while Ichneumonoidea has a single family Braconidae and 3 species. The most favourable season for the proliferation of the parasitoids was from April - June and September-October. A reduction in the emergence of parasitoids and their hosts was observed during the rainy season. Among the parasitoids recorded, *Anisopteromalus calandrae* was found to parasitise 11 stored product pests followed by *Theocolax elegans* (7 pests), *Lariophagus distinguendus* (6 pests), *Dinarmus basalis* (4 pests) and *Bracon hebetor* (3 pests).

**Keywords:** Hymenoptera, Parasitoids, stored pests, biological control, Kerala, India.

### **Introduction**

Insects have infested stored food products since the beginning of human civilization. Control of storage pests using conventional pest control techniques such as chemical control is not applicable because of the deleterious effect of these toxins on human health. Therefore, there is great potential for the use of natural enemies to control pests in stored products. The main obstacle in initiating a biological control program is the lack of knowledge about the pests and their natural control agents.

Parasitic Hymenoptera are the most important group of entomophagous insects which are utilized in various Biological Control Programmes against insect pests (Narendran, 2001). Due to the huge economic impact caused by storage pests, several studies on their predators have been carried out in various countries (Boucek, 1988; Ahmed and Kabir, 1995; Sanon et al, 1998; Flinn and Hagstrum, 2002; Noyes, 2002; Konishi et al., 2004). India being an agrarian economy pays utmost importance to the protection of its food resources. Biological control of stored grain pests by hymenopteran parasitoids were discussed by Devi (1996), Gupta et al. (1997) and Dongre et al. (2002). Parasitic wasps belonging to Chalcididae was described by Narendran (1989) and Pteromalidae by Sureshan and Narendran (2003). Studies

on the Hymenoptera of Kerala region were also conducted by Binoy et al., (2001) and Suresh et al (1999) that contained references to some species of Parasitic Hymenoptera. However, knowledge about the various available Hymenopteran parasitoids against a particular pest and its ecological requirements are still lacking. The present work is a contribution towards this objective and hopefully would provide a basis for further such studies in the future.

### Materials and Methods

Extensive field visits were conducted for obtaining the stored product pests from the food godowns and Central ware houses. Infected stored grains obtained from the store houses were reared in the laboratory with the help of rearing cages and bottles and the emerging parasitoids were collected. The parasitoids were card mounted and preserved in insect boxes specially made for the purpose for further studies (Narendran, 2001). The unmounted specimens were stored in 70% alcohol in small vials and kept in refrigerator. The preservative was periodically changed and replenished to prevent drying. The card mounted specimens were held on entomological pins, labeled and kept in insect boxes for detailed systematic studies. Observations on card mounted specimens were mostly done using Olympus (Magnus MSZ- TR) stereo zoom microscope. Preliminary identification was done by referring to literature and the identity was confirmed by referring the specimens to experts.

### Results and Discussion

A total of 14 species of parasitoids belonging to four families parasitizing different stored product pests were recorded during this study (Table 1).

**Table 1:** List of parasitoids, their known host insects and the infested stored products

NAME OF PARASITOID Family/ Species	NAME OF HOST INSECT SPECIES	NAME OF STORED PRODUCT
<b>Pteromalidae</b> <i>Anisopteromalus calandrae</i> (Howard)	<i>Callosobruchus chinensis</i> *, <i>C. maculatus</i> *, <i>Lasioderma serricorne</i> , <i>Rhyzopertha dominica</i> , <i>Sitophilus oryzae</i> , <i>S. granarius</i> , <i>S. zeamais</i> , <i>Stegobium paniceum</i> , <i>Tribolium castaneum</i> *, <i>Ephestia elutella</i> , <i>Oryzaephilus surinamensis</i>	Pulses, cowpea, stored seeds, tobacco, ginger, turmeric, chilies, flour, wheat, rice, cereals, cholam, oats, coriander, nuts, candy
<i>Dinarmus acutus</i> Thompson	<i>Callosobruchus maculatus</i> *	Cowpea, stored seeds
<i>Dinarmus basalis</i> (Rondani)	<i>C. chinensis</i> *, <i>C. maculatus</i> *, <i>Acatoscelides obtectus</i> , <i>Trogoderma granarium</i>	Cowpea, grams, stored seeds, wheat, rice, barley, sorghum, pulses, maize
<i>Dinarmus vagabundus</i>	<i>C. maculatus</i> *, <i>C. chinensis</i> *	Stored seeds, cowpeas,

(Timberlake)		grams
<i>Theocolax elegans</i> (Westwood)	<i>C. maculatus*</i> , <i>C. chinensis*</i> , <i>Lasioderma serricorne</i> , <i>Rhyzopertha dominica*</i> , <i>S. granarius</i> , <i>S. oryzae*</i> , <i>S. zeamais</i>	Tobacco, ginger, turmeric, chillies, flour, oats, wheat, rice, corn, cholam
<i>Lariophagus distinguendus</i> (Forster)	<i>Lasioderma serricorne</i> , <i>Rhyzopertha dominica*</i> , <i>S. granarius</i> , <i>S. oryzae*</i> , <i>S. zeamais</i> , <i>Stegobium paniceum</i>	Tobacco, ginger, turmeric, chillies, flour, grains, wheat, rice, corn, coriander
<b>Chalcididae</b> <i>Antrocephalus mitys</i> (Walker)	<i>Corcyra cephalonica*</i>	Rice, cocoa, biscuits, seeds
<i>Epitranus erythrogaster</i> Cameron	<i>Corcyra cephalonica*</i>	Rice, cocoa, biscuits, seeds
<i>Proconura caryobori</i> (Hanna)	<i>Corcyra cephalonica*</i>	Rice, cocoa, biscuits, seeds
<b>Trichogrammatidae</b> <i>Trichogramma japonicum</i> Ashmead	<i>Corcyra cephalonica*</i>	Rice, cocoa, biscuits, seeds
<i>Trichogrammatoidea nana</i> (Zehntner)	<i>Stegobium paniceum*</i>	Turmeric, coriander, ginger
<b>Braconidae</b> <i>Bracon brevicornis</i> (Wesmael)	<i>Ephestia cautella*</i>	Cereal grains
<i>Bracon hebetor</i> Say	<i>Corcyra cephalonica*</i> , <i>Ephestia elutella</i> , <i>Sitotroga cerealella</i>	Rice, cocoa, biscuits, seeds, nuts, candy, cereals, flour
<i>Stenobracon deesae</i> (Cameron)	<i>Corcyra cephalonica*</i>	Rice, cocoa, seeds, cereal grains

\*- Present study

The parasitoid species reported in this study belonged to 2 Superfamilies, Chalcidoidea and Ichneumonoidea. The super family Chalcidoidea includes 21 families, of which 3 families (Pteromalidae, Chalcididae & Trichogrammatidae) and 11 species were obtained. In the Ichneumonoidea super family, 3 parasitoid species belonging to a single family Braconidae were obtained. Parasitic Hymenoptera are well adapted and well synchronized with their hosts and their regulating action gives an advantage of permanency in maintaining the population of their hosts (Narendran, 2001).

Among the parasitoids recorded, *Anisopteromalus calandrae* was found to parasitise 11 stored product pests followed by *Theocolax elegans* (7 pests), *Lariophagus distinguendus* (6

pests), *Dinarmus basalis* (4 pests), *Bracon hebetor* (3 pests) and *Dinarmus vagabundus* (2 pests). *Antrocephalus mitys*, *Bracon brevicornis*, *Dinarmus acutus*, *Epitranus erythrogaster*, *Proconura carybori*, *Stenobracon deesae*, *Trichogramma japonicum* and *Trichogrammatoidea nana* was found to parasitise only a single pest. The most favourable season for the proliferation of the parasitoids was from April- June and September and October. A reduction in the emergence of parasitoids and their hosts was observed during the rainy season probably due to high humidity, low temperature and damage to stored products due to fungal growth.

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