



Infestation of *Pyemotes* sp. (Acari, Pyemotidae) on *Tetragonula iridipennis* (Hymenoptera: Meliponinae) colonies

K. Vijayakumar and R. Jayaraj

Department of Zoology, Kongu Nadu Arts and Science College, Coimbatore, Tamil Nadu, India.

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Abstract

The infestation of *Pyemotes* sp. on *T. iridipennis* colonies was investigated under experimental conditions. These parasitic mites were found in intersegments of the queen bee and also found on pupal brood cells. The infested colony becomes queen less and leads to death of the colony within a month. The food store from the infested colonies attracted the bees from nearby colonies and their enemies. The forager bees from nearby colonies were found to collect the food and construction materials from infected colonies and it leads to dispersion of the *Pyemotes* sp. on nearby colonies. The isolation of infested colonies and skillful management practices are the only way to restricting the infestation and dispersion of *Pyemotes* sp.

Key words: *T. iridipennis*, parasitic mites, pupal brood cells and *Pyemotes* sp.

Introduction

The mites belonging to the subclass Acari and the class Arachnida are most serious Acarine pests for nests of honey bees and these mites were directly feeding on the brood and adult bees. The infestation of parasitic mites on *Apis cerana* and *A. mellifera* are reported by various authors (Makkar *et al.*, 2010). The parasitic mites were attacked both the adults and the brood, with a distinct preference for drone brood in honey bee colonies. They suck the blood from both the adults and the developing brood, weakening and shortening the life span of the ones on which they feed. Makkar and Chhuneja (2011) again reported the parasitic mites (*V. destructor* and *T. clareae*) are major problem of *A. mellifera* colonies in Punjab, India.

In India, Only few studies are reported on the infestation of mites on stingless bee colonies. Radhakrishnan and Ramaraju (2011) reported the association between mites (*Fuscuropoda* and

Blattisocius) and stingless bees colonies. Vijayakumar *et al.* (2013) reported the infestation of dry fruit mite *Carphoglyphus lactis* on *T. iridipennis* colonies in India. The infestation of *C. lactis* initiate the pollen store and subsequently spread over the brood cells and declining worker strength attracted the more predators and carry away all food store and young ones. The present study reports that the infestation of parasitic mites (*Pyemotes* sp.) on stingless bee colonies, particularly on laying queen and pupal cells of *T. iridipennis*.

Materials and methods

The present investigation was carried out during October 2012 to January 2013 at the meliponary unit, Nellithurai, Tamil Nadu, India (11° 01' N/ 76° 56' E). The infested colonies were carefully inspected and all life stages of mites were removed from the infested brood cells and on the gaster of queen with a moist fine hair brush and dead mites were preserved in 70 % ethanol for identification. The various stages of worker

brood cells, laying queen and food stores from infested colonies were carefully collected and photographed under the Leica M165C stereomicroscope. The mites were identified as *Pyemotes* sp. (Pyemotidae).

A total of four *T. iridipennis* colonies had sufficient population strength and a normal laying physogastric queen were selected and isolated from meliponary and carefully monitored. The pupal brood cells from the infested colonies were introduced the four strong colonies and all observations were documented periodically.

Results and Discussion

The early indication for the mite infestation is declining queen egg laying and more number of collar stage worker brood cells found on top of the brood comb without provision. The construction of worker brood cells was stopped and the soft cerumen from advancing fronts becomes brittle and shown black in colour (Fig. 1a). Small pores were found on the top of pupal brood cells. The queen and pupal cells from these infested colonies was carefully removed and observed under microscope. One to three predatory mites were found on the intersegments of gaster (Fig. 1b) and more number of mites were found inside the matured pupal cells. After two week time, the nurse bees from these infested colonies were stopped to construct the worker brood cells and the pollen foraging activity was rapidly decreased.

The population strength of the infested colonies was declining and the mite infestation was found to spread on entire brood cluster (Fig. 1c). The four infested colonies were succumbed to death within a month and floor board of the infested colonies had various body parts of bees such as thorax, hind legs and wings. The food stored in the infested colonies was attracted the various predators like ants, bees from other hives. These may be a primary factor for spreading the parasitic mite *Pyemotes* sp. to other colonies. The inspection of brood cells and waste dumps from

these dead colonies, the occurrence of the various life stages of parasitic mites (*Pyemotes* sp.) were documented.

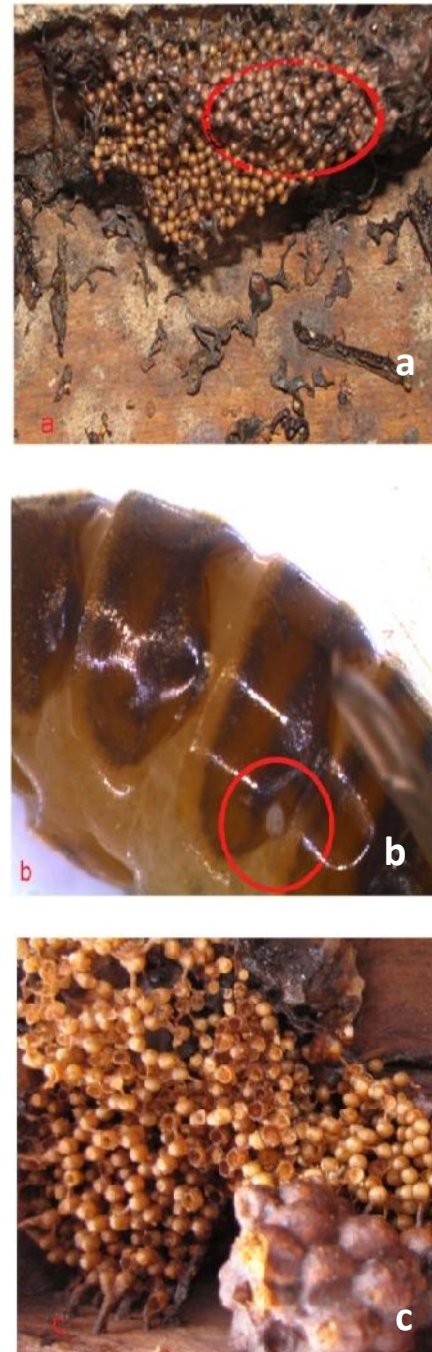


Fig. 1. Infestation of *Pyemotes* sp. on stingless bees

- 1a. Initial infestation on brood comb
- 1b. Mite found on inter segments of queen bee
- 1c. Severe infestation of *Pyemotes* sp on worker brood

Very few literatures are available for the relationship between *Pyemotes* and bees (O'Connor and Klimov, 2004). These mites have been reported to parasitize solitary bees of the Anthophoriidae and Megachilidae families. The infestation of *P. tritici* on nests of *Tetragonisca angustula* and *Frieseomelitta varia* causes death of entire colonies. The concentration of *P. tritici* was higher on the larvae and the pupae than on the adult bees and also found on inter-segmental areas of the adult bees, instead of being distributed over the entire body, as was the case on the larvae and pupae (Menezes *et al.*, 2009).

In addition to the other two reports on stingless bees (Macías-Macías and Otero -Colina, 2004), there are also reports of these mites parasitizing *Apis mellifera* and *A. cerana*. The most severe case happened in Queensland, Australia, where *Pyemotes* mites caused the death of 19 colonies of *A. mellifera* (Morse, 1978). The forager bees from nearby stingless bee colonies were found to be transmit the mites from infested colonies to other colonies. The isolation of the infested hive from meliponary will prohibit the dispersion of the mites. The dispersion of mites from the infested colonies was previously reported by various authors (Kerr *et al.*, 1996; Nogueira-Neto, 1997; Macías-Macías and Otero-Colina 2004). The timely isolation of infested colonies and management practices are the most effective measures for preventing mite infestation.

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References

Kerr, W.E., Carvalho, G.A. and Nascimento, V.A. 1996. Abelha Uruçu, Biologia, Manejo e Conservação. Coleção Manejo da Vida Silvestre. Fundação Acangaú, Belo Horizonte.

Macías-Macías, J.O. and Otero-Colina, G. 2004. Infestation of *Pyemotes tritici* (Acari: Pyemotidae) on *Melipona colimana* (Hymenoptera: Apidae: Meliponinae): a case study. *Agrociencia.*, 38: 525 - 528.

Makkar, G.S., Chhuneja, P.K. and Gill, M.S. 2010. *Bee World.* 91 (3) : 47 - 49.

Makkar, G.S. and Chhuneja, P.K. 2011. In: Dhawan, A.K., Sharma, D.R. and Kumar, R. (Eds.) Extended Abstracts of 3rd Congress on Insect Science on Pest Management for Food Security and Environment Health, PAU, India, 18-20 April, 2011. Indian Society for Advancement of Insect Science, Department of Entomology, PAU, Ludhiana, India, p. 272.

Menezes, C., Coletto-Silva, A, Gazeta, G.S, Kerr, W.E. (2009). Infestation by *Pyemotes tritici* (Acari, Pyemotidae) causes death of stingless bee colonies (Hymenoptera: Meliponina). *Genetics and Molecular Res.*, 8(2): 630-634.

Nogueira-Neto, P.N. (1997). Vida e Criação de Abelhas Indígenas sem Ferrão. Nogueirapis, São Paulo.

O'Connor, B. and Klimov, P. 2004. Family Pyemotidae Berlese, 1987. Available at [http://insects.ummz.lsa.umich.edu/beemites/Species_Accounts/Pyemotidae.htm]. Accessed June 15, 2007.

Radhakrishnan, V, Ramaraju, K (2011). Diversity of mites associated with honey bee species in Coimbatore region of Tamil Nadu, India. In: Honey Festival-cum- Experience Exchange Workshop and Prospects and Promotion of Apiculture for Augmenting Hive and Crop Productivity, PAU, Ludhiana. p.226.

Vijayakumar, K, Muthuraman, M. and Jayaraj, R. 2013. Infestation of *Carpoglyphus lactis* (Linnaeus) (Acari: Carpo-glyphidae) on *Trigona iridipennis* (Apidae: Meliponinae) from India. *Sch. J. of Agricultural Sci.*, 3(1) : pp. 25-28.
