

## Occurrence of *Pyemotes* sp. on *Tuta absoluta* (Meyrick)

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### ABSTRACT

The aim of this work was to study the population reduction of the tomato leafminer moth, *Tuta absoluta* (Meyrick), by *Pyemotes* sp. in the laboratory. The mite became greenish when fed on caterpillars, pupae, and adults of *T. absoluta*. The caterpillars and adults of *T. absoluta* were quickly paralyzed by the mite venom. A single *T. absoluta* could host many *Pyemotes* sp. physogastric females, which were allowed to grow on the moth. *Pyemotes* sp. can be a new alternative for the biological control of *T. absoluta*. However, this possibility must be better understood before it could be recommended, because *Pyemotes* sp. could also cause dermatitis in the humans.

**Key words:** Mite, parasitism, tomato leafminer, biological control

### INTRODUCTION

The mite *Pyemotes tritici* (Lagréze-Fossat and Montagné) (Acari: Pyemotidae) has many relevant characteristics for the biological control, such as short life cycle, a wide range of hosts, and rapid population growth (Moser et al., 1971; Bruce and Lecato 1979; Bruce and Wrensch 1990). Two other aspects of the *Pyemotes* spp. are important: their physogastric process and the suppression of their immature stages. During the feeding period, enlargement of the female body occurs and the same time, multiple embryos are produced and incubated (Gerson and Smiley 1990). The latter contributes to shorten the mite life cycle, by the suppression of the nymphal stages (Evans 1992). New adults are born from the female body. Females begin foraging their quarry soon after the

fecundation. They can tightly attach to the host body and paralyze it, by injecting venom (toxins). *Pyemotes* spp. is also known as “straw-itch mite” and its venom can also injure the humans, causing dermatitis (Moser 1975). In addition, the venom of the female can paralyze an insect host (Tomalski et al., 1988) even when it is immature for reproduction (Bruce and Wrensch 1990). Mite generalist behavior and efficient killing are strong points to be considered for a promising biological control strategy.

Many studies have been carried out on *Pyemotes* spp. biology (Moser 1975; Bruce and Lecato 1980; Bruce 1983; Bruce and Wrensch 1990). Due to its short life cycle, the population of *Pyemotes* sp. can easily increase. According to Tomalski et al. (1988) and Hoschele and Tanigoshi (1993), 200 to 350 sexually mature mites are produced per

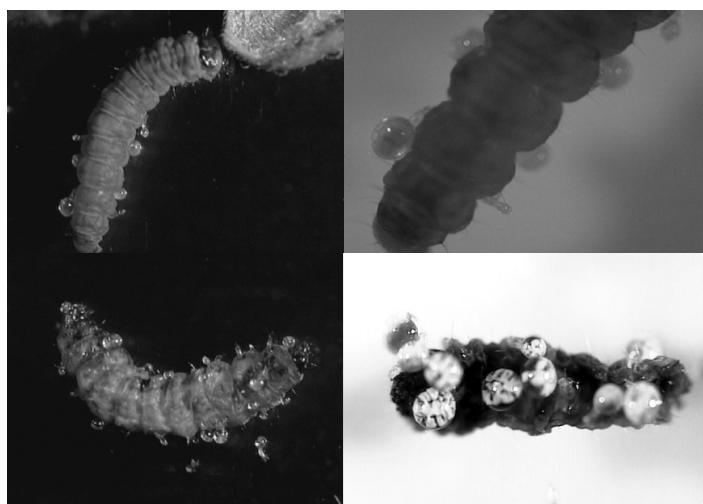
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female. More than 100 insect species among the Coleoptera, Hymenoptera, Lepidoptera, Homoptera, Strepsiptera, and Diptera have been described as *P. tritici* hosts (Cross et al., 1975; Bruce and Lecato 1980; Bruce and Wrensch 1990). In most cases, the mite was found on mass rearing in the laboratories and stored grains, attacking larvae of *Plodia interpunctella* (Hübner) (Lepidoptera: Pyralidae), *Ephestia cautella* (Walker) (Lepidoptera: Pyralidae), *Oryzaephilus mercator* (Fauvel) (Coleoptera: Silvanidae), *Lasioderma serricorne* (Fabricius) (Coleoptera: Anobiidae), and adults of *Tribolium castaneum* (Herbst) (Coleoptera: Tenebrionidae) and *Sitotroga cerealella* (Oliver) (Lepidoptera: Gelechiidae) (Bruce and Lecato 1979; Bruce and Lecato 1980; Hoschele and Tanigoshi 1993).

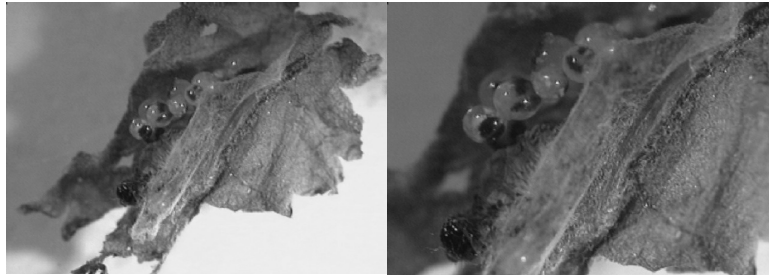
In October 2001, high mortality among larvae of *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) at different stages was observed in a mass rearing kept at the Integrated Pest Management Laboratory (Animal Biology Department/ Entomology – Federal University of Viçosa, Brazil). After the careful analysis, it was concluded that the high mortality rate was due to the increase in the population and parasitism of *Pyemotes* sp. on the insect. All the collected mite specimens were identified as *Pyemotes* sp., *ventricosus* group (Cross and Moser, 1975; Cross et al., 1981).

*T. absoluta*, known as tomato leafminer moth, is the main tomato pest in Brazil and other South American countries because it is hard to be controlled (Imenes et al., 1990; Castelo Branco 1992; Gonçalves-Gervásio et al., 1999). The leafminer can attack the whole plant at all the growing stages by opening galleries in leaves, branches, buds, and fruits (Fernandez and Montagne 1990; Souza et al., 1992; Uchôa-Fernandes et al., 1995). During *Pyemotes* sp. was feeding on caterpillars (Fig. 1), pupae (Fig. 2) and adults (Fig. 3) of *T. absoluta*, with one or more mites per host (Figs. 1, 2 and 3), was observed that soon after the parasitic mite attachment, toxins paralyzed the larvae and adults. At that point, mites became greenish (Fig. 4), turning yellowish and then brownish during the feeding. The opisthosoma of *Pyemotes* sp. also changed and the female body enlarged, becoming spherical and milky (physogastric process).

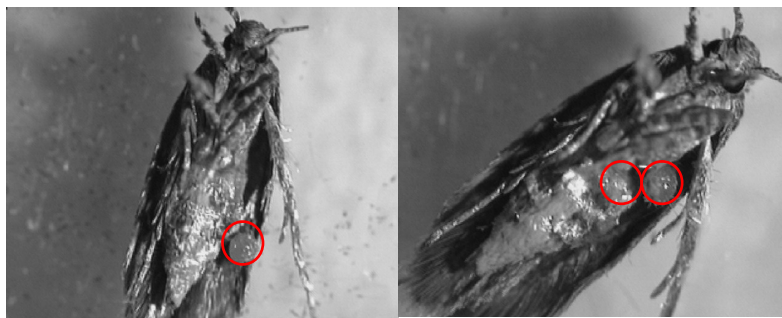
In agreement with Trivelli and Velásquez (1985), *P. tritici* is lethal for mass rearing of insects because the mite can kill a whole insect population, as found in study. Therefore, *Pyemotes* sp. can be considered a strong biological control agent for *T. absoluta*, showing fast reproduction and efficient parasitism over the insect. However, because *Pyemotes* sp. can cause dermatitis in humans, further studies must be conducted on the mite field behavior and performance, which remain unknown.



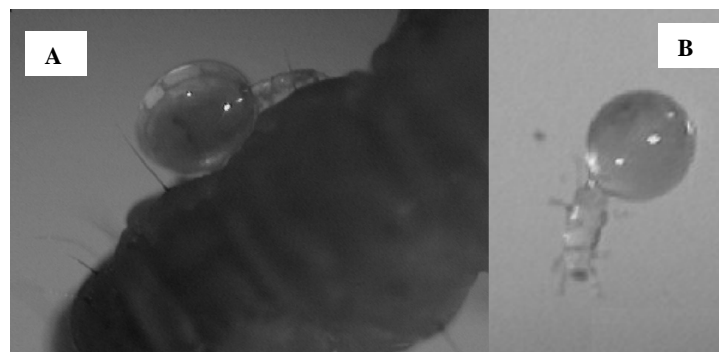
**Figure 1-** *T. absoluta* larvae attacked by physogastric females of *Pyemotes* sp



**Figure 2-** *Pyemotes* sp. physogastric females on *T. absoluta* pupae



**Figure 3-** *Pyemotes* sp. physogastric females on *T. absoluta* adults



**Figure 4** - A) A *Pyemotes* sp. physogastric female feeding on a *T. absoluta* caterpillar; B) Greenish colour of *Pyemotes* sp. physogastric female after eating.

## RESUMO

O ácaro *Pyemotes* sp. (Acari: Pyemotidae) é um parasita de várias espécies de insetos e exibe o processo de fisogastría na reprodução. É registrada

a ocorrência de *Pyemotes* sp. sobre a traça-do-tomateiro, *Tuta absoluta* (Meyrick), que sofreu redução considerável de suas populações em condições de laboratório. Este ácaro foi observado parasitando larvas, pupas e adultos de *T. absoluta*

e suas fêmeas fisogástricas apresentaram coloração esverdeada. As larvas e adultos de *T. absoluta* atacados por *Pyemotes* sp. exibiram paralisia em poucos minutos, devido à injeção de toxinas por parte do ácaro. Observou-se que um único indivíduo de *T. absoluta* pode suportar muitas fêmeas fisogástricas de *Pyemotes* sp., permitindo que outra geração do ácaro continuasse a se reproduzir. O ácaro *Pyemotes* sp. surge como uma possibilidade para o controle biológico de *T. absoluta*, mas sua utilização deve ser melhor avaliada já que é uma espécie causadora de dermatites em humanos.

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Received: December 26, 2005;

Revised: September 28, 2006;

Accepted: May 24, 2007.