

## Article

## The effect of different temperatures on the development of the predatory mite *Bdella tropica* Atyeo (Acari: Bdellidae) with the prey *Xenylla longauda* Folsom (Collembola: Hypogastruridae)

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### Abstract

The effect of temperature on the development of the predatory mite *Bdella tropica* Atyeo preying on *Xenylla longauda* Folsom (Collembola: Hypogastruridae) was examined in the laboratory. The duration of different developmental stages of *B. tropica* became shorter as the temperature increased from 20°C to 32°C. The optimum development temperature was between 24°C and 28°C. The mite could not complete development at 35°C or 18°C.

**Key words:** Bdellidae, *Bdella tropica*, *Xenylla longauda*, development, biological control

### Introduction

The edible fungi industry had been an important part of agricultural industry in China with the main products including *Agaricus bisporus* (Lange) Singer, *Lentinus edodes* (Berkeley) Singer, *Pleurotus ostreatus* (Jacquin ex Fries) Kummer (Ruan *et al.* 2008). Among the main pests were *Lycoriella solani* Winnertz, *Drosophila melanogaster* Meigen, *Tyrophagus putrescentiae* (Schrank) and the collembolan species *Hypogastrura communis* Folsom and *Xenylla longauda* Folsom, commonly known as springtails, (He *et al.* 2005). Damage by *H. communis* and *X. longauda* is usually ignored by producers. However, these springtails are able to transmit pathogens (Hui *et al.* 2003), so rapid control is essential, especially during the summer when pest multiplication rates are at their maximum. As most edible fungi are sensitive to pesticides, or pesticide residue (Gu 2002), chemicals are not an acceptable control method. In addition, springtails usually hide in the culture medium or in holes on the pilei, thus reducing the efficacy of the pesticide (He *et al.* 2005; Du 2003; Hui *et al.* 2003). Biological control may therefore offer an alternative control option.

Snout mites (Bdellidae) are known to be effective predators of springtails and we considered these as possible biological control candidates for the species of Hypogastruridae infesting mushrooms. In previous studies, we found the predatory mite *Bdellodes japonicus* (Ehara) could prey on all life stages of *H. communis*, except the egg (Ji *et al.* 2007a), but its efficacy as a biological control agents was limited because it could not lay eggs when associated with *H. communis* (Ji *et al.* 2009). We then investigated another bdellid predator, *Bdella tropica* Atyeo which was able to lay eggs with the prey *X. longauda* in the preliminary tests of this study. The functional responses of *B. tropica* to *X. longauda* at different constant temperatures was determined in our previous study (Ji *et al.* 2007b), which predicted that *B. tropica* could be an effective predator of *X. longauda* if released before the peak of *X. longauda* oviposition (Ji *et al.* 2007b). In this paper, we report on the the effect