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Beauveria bassiana attacking the Colorado potato beetle  
Leptinotarsa decemlineata: A tritrophic association.**

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## Scientific Note

### ***Syspastospora parasitica*, a mycoparasite of the fungus *Beauveria bassiana* attacking the Colorado potato beetle *Leptinotarsa decemlineata*: A tritrophic association.**

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#### Abstract

A tritrophic association is reported, involving a Colorado potato beetle (*Leptinotarsa decemlineata*) infected with *Beauveria bassiana*, which in turn was infected with *Syspastospora parasitica*.

**Keywords:** biocontrol, mycoparasites, entomopathogens, insect pathology, *Leptinotarsa*, *Hypothenemus*

#### Results

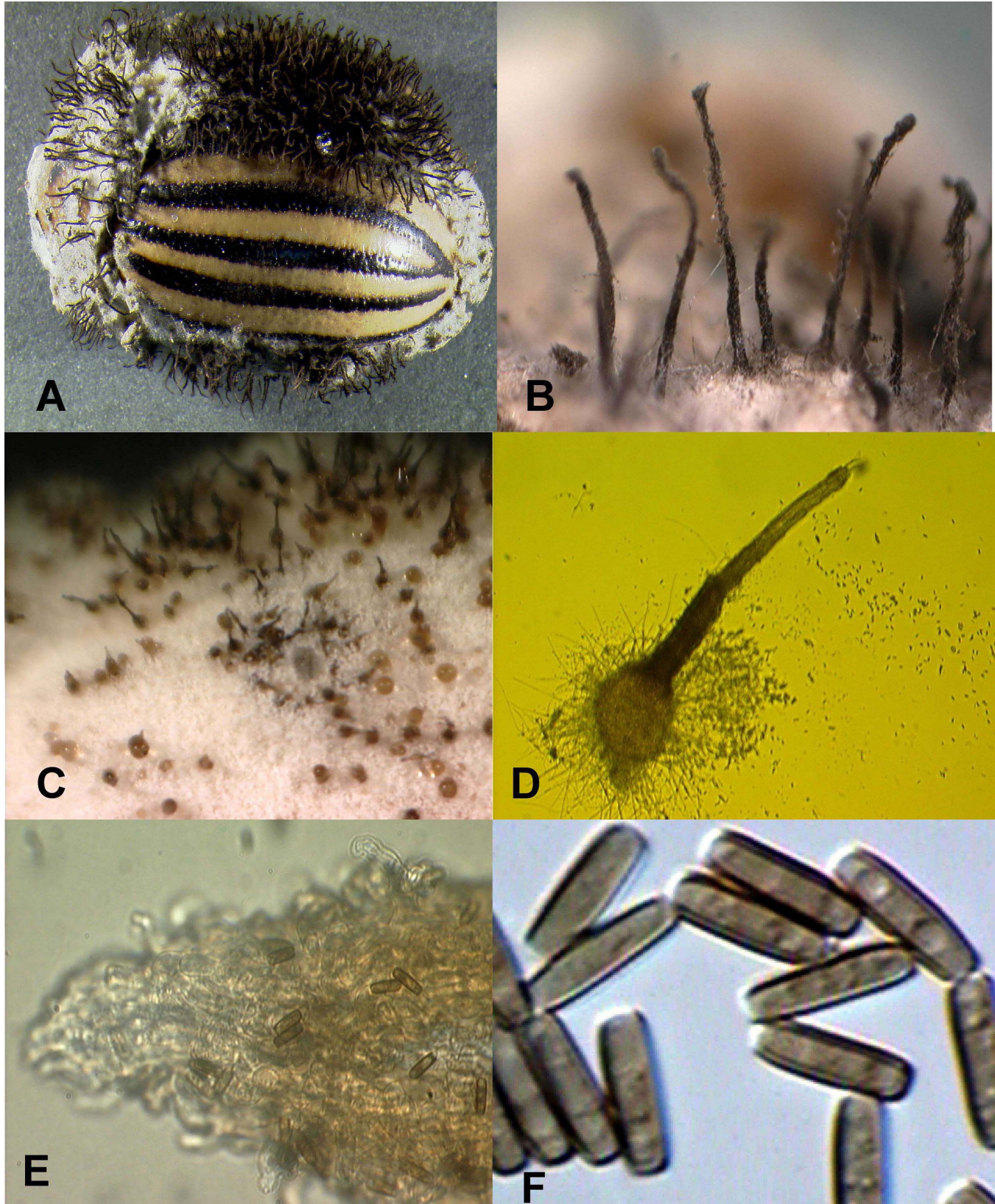
As part of a program for sampling *Beauveria bassiana* infections in the Colorado potato beetle (*Leptinotarsa decemlineata* (Say); Coleoptera: Chrysomelidae) collected from a potato field at the Beltsville Agricultural Research Center in Beltsville, Maryland, USA, we observed that 1 out of ca. 300 infected beetles collected on July 25, 2003, at a site known as Sleepy Hollow (N 39° 01.978', W 76° 55.857'; 39 m above sea level), exhibited mycoparasitic growth on *B. bassiana* (Figure 1a-c). The mycoparasite was identified as *Syspastospora parasitica* (Tulasne) Cannon & Hawksworth.

The genus *Syspastospora* (Ascomycota: Sordariales) was erected by Cannon and Hawksworth (1982) to accommodate *Melanospora parasitica*, one of several species distinguished from species of *Melanospora* by characters that include a long perithecial neck composed of parallel hyphae and distinctive ascospores. In addition to *S. parasitica* two other species have been described: *S. boninensis* (Horie *et al.* 1986) and *S. tropicalis* (García *et al.* 2002), both isolated from soil. *S. parasitica* is known only as a mycoparasitic hyperparasite infecting various entomopathogenic clavicipitaceous fungi, e.g., *Beauveria*, *Hirsutella*, *Paecilomyces*, and some verticilliid species (Cannon and Hawksworth 1982). *S. parasitica* produces black perithecia with a small globose base and exaggeratedly long necks out of which copious quantities of

cylindrical ascospores with markedly truncate ends are released (Fig. 1).

*S. parasitica* has been reported on various entomopathogenic fungi infecting insects, e.g., *B. bassiana* attacking the ash weevil *Stereonychus fraxini* (Coleoptera: Curculionidae) (Markova 1991); *Cephalosporium* spp. (= *Verticillium*) attacking the Kenya mealybug *Planococcus kenya* Le Pelley (Hemiptera: Pseudococcidae) (Masaba 1988); *Paecilomyces farinosus* attacking an unknown insect (ARSEF 5375; USDA-ARS Collection of Entomopathogenic Fungal Cultures, Ithaca, NY); *Paecilomyces tenuipes* attacking *Bombyx mori* (Lee and Nam 2000); *B. bassiana* infecting *Cydia pomonella* (L.) (Lepidoptera: Tortricidae); *Beauveria tenella* infecting *Melolontha* spp. (Coleoptera: Scarabaeidae); *Spicaria farinosa* (= *Paecilomyces farinosus*) infecting *Boarmia bistortata* Goeze (Lepidoptera: Geometridae); and *Spicaria fumosorosea* (= *P. fumosoroseus*) infecting *Thaumetopoea pityocampa* (Schiff.) (Lepidoptera: Thaumetopoeidae) (Müller-Kögler 1961). Ours is the first report of *S. parasitica* (ARSEF 7285) on a Colorado potato beetle infected with *B. bassiana*.

In our experience *S. parasitica* may go unobserved on the host. On two occasions when *B. bassiana* was transferred to potato dextrose agar from the Colorado potato beetle corpse, the presence of *S. parasitica* infection was not observed, although *S. parasitica* perithecia developed on the *B. bassiana* mycelial mat in approximately 60 days. Similar examples from inoculation of the



**Figure 1.** (A) A tritrophic association with a Colorado potato beetle infected with *Beauveria bassiana*, which in turn is infected with *Sypastospora parasitica*; (B) close-up of *S. parasitica* perithecia; (C) perithecia growing on *B. bassiana* culture; (D) dissected perithecium with released ascospores; (E) ascospores moving to the tip of the perithecium; (F) close up of ascospores.

coffee berry borer, *Hypothenemus hampei* (Ferrari) (Coleoptera: Curculionidae: Scolytinae), simultaneously with *B. bassiana* and *Syspastospora* ascospores resulted in *B. bassiana*-induced coffee berry borer mortality in around five days; it was not until three months later that *S. parasitica* perithecia appeared and produced ascospores. The slow development of *S. parasitica* perithecia also occurred when cultures of *Syspastospora* were started with ascospores that were contaminated with *B. bassiana*. In this case, *B. bassiana* grew within days but *S. parasitica* perithecia did not appear until almost one month later. In contrast, perithecia plated directly over *B. bassiana* cultures developed new ones in about 4 days at 25°C.

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