

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

Authors: Posada, Francisco, Vega, Fernando E., Rehner, Stephen A., Blackwell, Meredith, Weber, Donald, et al.

Source: Journal of Insect Science, 4(24) : 1-3

Published By: Entomological Society of America

URL: <https://doi.org/10.1673/031.004.2401>

The BioOne Digital Library (<https://bioone.org/>) provides worldwide distribution for more than 580 journals and eBooks from BioOne's community of over 150 nonprofit societies, research institutions, and university presses in the biological, ecological, and environmental sciences. The BioOne Digital Library encompasses the flagship aggregation BioOne Complete (<https://bioone.org/subscribe>), the BioOne Complete Archive (<https://bioone.org/archive>), and the BioOne eBooks program offerings ESA eBook Collection (<https://bioone.org/esa-ebooks>) and CSIRO Publishing BioSelect Collection (<https://bioone.org/csiro-ebooks>).

Your use of this PDF, the BioOne Digital Library, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Digital Library content is strictly limited to personal, educational, and non-commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne is an innovative nonprofit that sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.



Scientific Note

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

Francisco Posada¹, Fernando E. Vega¹, Stephen A. Rehner¹, Meredith Blackwell², Donald Weber¹, Sung-Oui Suh², and Richard A. Humber³

¹*Insect Biocontrol Laboratory, U. S. Department of Agriculture, Agricultural Research Service, Bldg. 011A, Beltsville, Maryland 20705 USA*

²*Department of Plant Biology, Louisiana State University, Baton Rouge, Louisiana 70803 USA*

³*Plant Protection Research Unit, U. S. Plant, Soil & Nutrition Laboratory, U. S. Department of Agriculture, Agricultural Research Service, Tower Road, Ithaca, NY 14853 USA*
vegaf@ba.ars.usda.gov

Received 9 March 2004, Accepted 12 May 2004, Published 15 July 2004

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

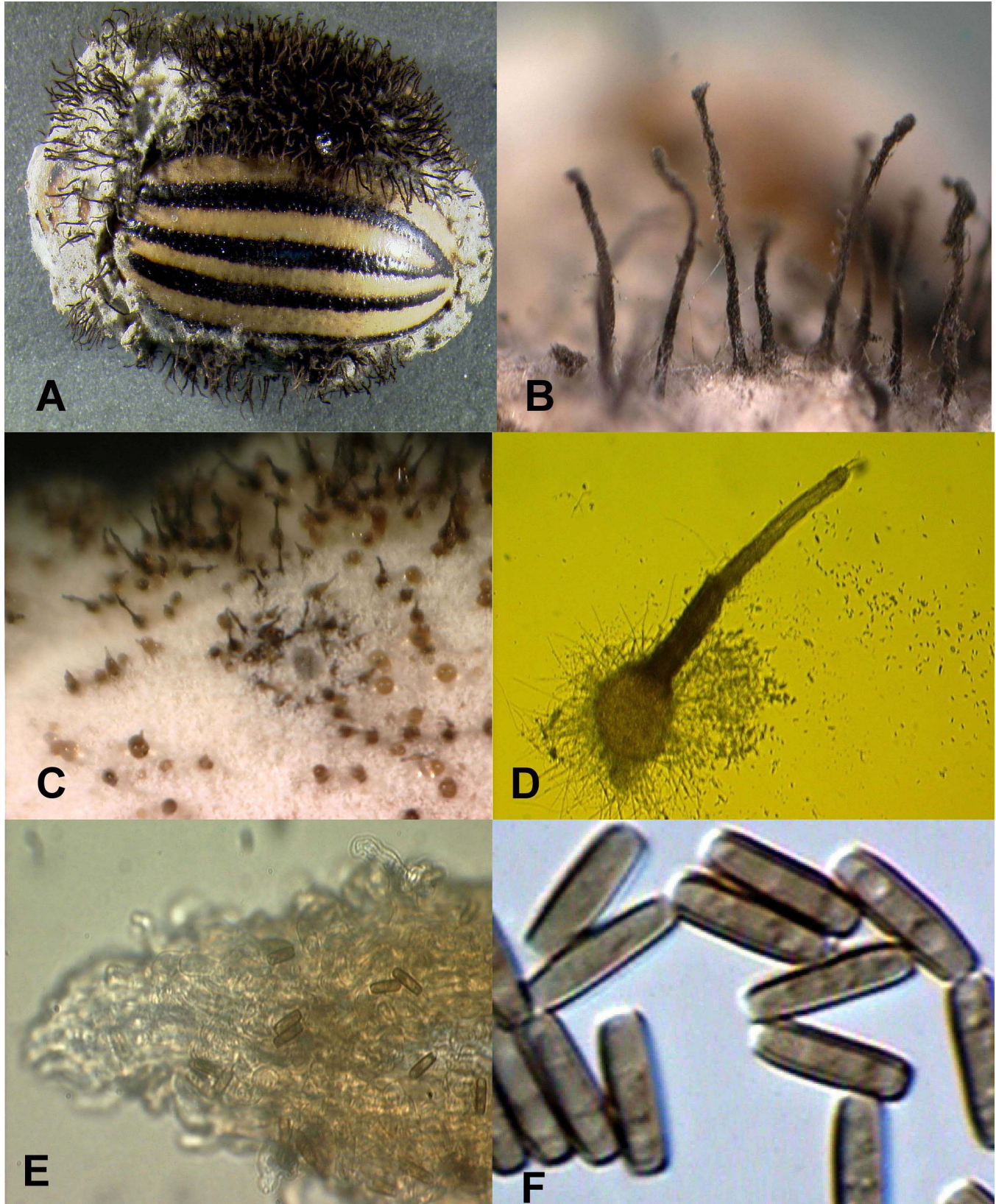


Figure 1. (A) A tritrophic association with a Colorado potato beetle infected with *Beauveria bassiana*, which in turn is infected with *Syspastospora parasitica*; (B) close-up of *S. parasitica* perithecia; (C) perithecia growing on *B. bassiana* culture; (D) dissected perithecium with released ascospores;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

Acknowledgments

We thank Ann Sidor for collecting the insects. Part of this study was supported by the National Science Foundation (DEB-0072741 to MB).

References

- Cannon PF, Hawksworth DL. 1982. A re-evaluation of *Melanospora* Corda and similar Pyrenomycetes, with a revision of the British species. *Botanical Journal of the Linnean Society* 84: 115-160.
- García D, Stchigel AM, Guarro J. 2002. A new species of *Syspastospora* from tropical soils. *Mycologia* 94: 862-865.
- Horie Y, Udagawa SI, Cannon PF. 1986. Four new species of the Ceratostomataceae (Ascomycetes). *Mycotaxon* 25: 229-245.
- Lee S, Nam S.-H. 2000. A mycoparasite Ascomycete *Syspastospora parasitica* on the entomopathogenic fungus *Paecilomyces tenuipes* growing in *Bombyx mori*. *Mycobiology* 28: 130-132.
- Markova G. 1991. *Melanospora parasitica* attacking *Beauveria bassiana* on ash weevil *Stereonychus fraxini* in Bulgaria. *Journal of Invertebrate Pathology* 58: 450-452.
- Masaba DM. 1998. Coffee Physiology and Breeding. *Review of Kenyan Agricultural Research*, Vol. 25, 53 pp.
- Müller-Kögler E. 1961. *Melanospora parasitica* Tul. als Parasit der insektenpathogenen *Beauveria tenella* (Delacr.) Siem. *Zeitschrift für Pflanzenkrankheiten und Pflanzenschutz* 68: 600-605.