Pasteuria sp. for Biological Control of the Sting Nematode, *(Belonolaimus longicaudatus)*, in Turfgrass

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Goals:

- Examine bacteria ultrastructure with transmission electron microscopy and begin describing a new species of *Pasteuria* that we have discovered parasitizing the sting nematode, *Belonolaimus longicaudatus*.
- Perform host range studies on this new *Pasteuria* sp.
- Begin studies to elucidate the population dynamics of this new *Pasteuria* sp. on sting nematode grown on St. Augustinegrass in laboratory pot cultures under controlled conditions.

We are describing a new species of bacterium in the genus *Pasteuria* that we discovered parasitizing the sting nematode, *Belonolaimus longicaudatus* in Florida. We are hopeful that this obligate bacterial parasite of nematodes (*Pasteuria* n. sp. [S-1]) will have some potential for inoculative biological control in golf course greens against the sting nematode, a destructive ectoparasite that can reduce the root dry weight of turfgrasses and other crops in sandy soils by as much as 30-50 percent.

In 1994, we completed ultrastructural studies with transmission electron microscopy (TEM) that showed that *Pasteuria* n. sp. (S-1) is a new species and helped to elucidate its life cycle. The sporangium and endospore diameters of *Pasteuria* n. sp. (S-1), are on the average at least 1.0 and 0.5 μm wider than these respective measurement for the other described species of *Pasteuria*. The outer cortical wall thickness at its thickest point is ⅓ the endospore diameter for *Pasteuria* n. sp. (S-1), compared with 1/4-1/15 for the other described species of *Pasteuria*.

A brief description of the life cycle follows. After attachment of a mature endospore to the cuticle of the host, penetration ensues via a germ tube through the cuticle into the pseudocoelom of the nematode. A mycelial microcolony is formed, which eventually breaks up and is distributed throughout the pseudocoelom (fragmentation). Mycelial filaments are divided by septa and possess double-layered cell walls. Endospores are produced endogenously, and the formation sequence (sporogenesis) for *Pasteuria* n. sp. (S-1) is similar to the three other described species of *Pasteuria*. A septum is formed within the sporangium,

the sporangium cytoplast condenses to form a forespore, the endospore walls form, the endospore matures, and areas adjacent to the endospore give rise to perisporal "attachment" fibers.

Laboratory host attachment studies and field observations completed in 1994 on *Pasteuria* n. sp. (S-1) demonstrate that it is highly host specific and attacks only nematodes in the genus *Belonolaimus* or within the species *B. longicaudatus*. We have initiated population dynamic studies on *Pasteuria* n. sp. (S-1) in laboratory pot cultures of the sting nematode on the model turfgrass host (FX-313 St. Augustinegrass) under controlled conditions. After 84 days, sting nematode cultures which were inoculated with 10 or 25 sting nematodes with *Pasteuria* n. sp. (S-1) have not shown suppression or a disease epizootic. The experiment will run for at least 210 days and it may take at least this long for establishment of the bacteria under these conditions.

In 1995, we propose to do studies on the effects of temperature on development of *Pasteuria* n. sp. (S-1), and conduct monthly survey work in golf course areas where this bacterium occurs naturally, to assess its suppressive effects on sting nematodes. We also will begin sampling golf course areas where sting nematode is no longer a problem, to try and isolate different species or isolates of antagonists to nematodes of turfgrass.