PASTEURIA SPECIES FOR NEMATODE CONTROL: CURRENT DEVELOPMENTS AND FUTURE PROSPECTS

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Bacteria of the genus *Pasteuria* are promising biological control agents for plant parasitic nematodes, recognized for their ability to interrupt the nematode life cycle[1]. *Pasteuria spp.* are the only known biological control agents for nematodes with demonstrated control potential. Studies have shown the ability of these bacteria to reduce root-knot nematode populations below the economic threshold in several different crops and environments[3,7,8]. *Pasteuria* forms endospores as its final growth phase, and these spores are the infective stage used for nematode control. The ability to form spores is a significant advantage in formulating these bacteria for agricultural use, since mature spores are highly resistant to drying and mechanical shearing. Therefore, they can be supplied in a number of standard formulation types including powder and liquid suspension. The major limitation on the use of *Pasteuria* spp. for agricultural use has been the inability to grow them in the absence of a nematode host[2,3]. The cost of using these bacteria is expected to approach that of chemical nematicides if a suitable in-vitro growth system can be developed.

We have developed *in vitro* culture methods for *Pasteuria penetrans,* isolated from *Meloidogyne arenaria,* the peanut root-knot nematode. Our initial success relied on co-culture with *Enterobacter cloacae*, which grows in close association with the nematode gall, and on growth in sterile filtrates made from *E. cloacae* growth media[5]. We are now developing complex media modeled after the *E. cloacae* culture filtrates in order to produce a system amenable to industrial scale production of *Pasteuria* spp. We compared structures from *in vitro* cultures in complex medium or filtrate to those observed *in vivo*. The *P. penetrans* structures from *in vitro* cultures were very similar to those produced by us and published in the literature for *in vivo* cultures[4,6]. Endospores produced *in vitro* attached to nematodes at rates comparable to endospores produced *in vivo*. Infectivity of these endospores was verified with nematodes inoculated onto tomato plants. Daughter endospores developed within the nematode bodies after 500-degree days, which was comparable to *in vivo* endospores.

The findings presented here suggest that large-scale cultivation of *Pasteuria* species *in vitro* can be developed at costs competitive with chemical nematicides. We have demonstrated *in vitro* growth of *Pasteuria* in the absence of nematode tissue and we are proceeding to develop processes suitable for scale-up to industrial production levels.

References

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