POTENTIAL OF NEOTROPICAL AND TEMPERATE HETERORHABDITID NEMATODES AS BIOLOGICAL CONTROL AGENTS FOR THE SWEETPOTATO WEEVIL, CYLAS FORMICARIUS (FABRICIUS) (COLEOPTERA: APIONIDAE).

By

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A THESIS PRESENTED TO THE GRADUATE SCHOOL
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MASTER OF SCIENCE

UNIVERSITY OF FLORIDA

1994

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APRIL, 1994

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Six heterorhabditid entomopathogenic nematode isolates from the Caribbean *Heterorhabditis* sp. D1 strain (Group I; [local variant of D1 strain] JAM34 and Luquillo), *Heterorhabditis* sp. D1 strain (Group II; JAM23, SJo02, and SC12), and a previously unrecorded species, *Heterorhabditis* sp. (Group III; El Yunque) and two heterorhabditids from North America, *Heterorhabditis bacteriophora* Poinar HP88 and NJ70, were compared for their potential as biological control agents for the sweetpotato weevil, *Cylas formicarius* (Fabricius) (Coleoptera: Apionidae). Various assays were used to compare nematodes, including infectivity tests, virulence assays, and progeny production. Nematodes differed in their ability to invade and kill late

instars of the weevil, but did not differ in the number of progeny produced within weevil cadavers. Virulence of heterorhabditid nematodes to the weevil was not related to climatic origin, but differed among species groups. Caribbean nematodes within Heterorhabditis sp. groups I and II were more virulent than the Caribbean nematode within group III and the H. bacteriophora strain NJ70.

The three nematode species, Heterorhabditis sp. D1 (JAM34), Heterorhabditis sp. (El Yunque), and H. bacteriophora HP88, were compared for their ability to survive, infect, and reproduce in various soil temperature regimes. The tolerance of the three nematode species to soil temperature appeared to be related to their climatic origin. One species from the Caribbean, Heterorhabditis sp. D1 strain (JAM34), was more tolerant of warmer temperatures than the temperate nematode H. bacteriophora HP88 strain. HP88 was also better adapted to cooler temperatures than JAM34. Heterorhabditis sp. El Yunque, a novel species, was isolated from higher elevations (600 m) in Puerto Rico and was least tolerant to test temperatures. These data indicate that interspecific differences may occur among heterorhabditid species in their survivorship, infectivity, and tolerance to soil temperatures. The importance of these data in nematode-based biological control programs against the sweetpotato weevil are discussed.