

Atirach Noosidum 2011: Characterization of New Entomopathogenic Nematodes from Thailand: Foraging Behaviors and Their Virulence to Selected Agricultural Pests. Doctor of Philosophy (Entomology), Major Field: Entomology, Department of Entomology. Thesis Advisor: Professor Angsumarn Chandrapatya, Ph.D. 162 pages.

One hundred and sixty eight soil samples were collected from 5 provinces, all located in southern Thailand. Eight isolates of entomopathogenic nematodes (EPNs) were isolated and identified to species using restriction profiles and sequence analysis. Five of the isolates were identified as *Heterorhabditis indica*, and one as *Heterorhabditis baujardi*. Two undescribed *Steinernema* isolates were also discovered which matched no published sequences and grouped separately from the other DNA restriction profiles. Behavioral tests showed that all *Heterorhabditis* spp. were cruise foragers, based on their attraction to volatile cues and lack of body-wave behavior, while the *Steinernema* isolates were more intermediate in foraging behavior.

The LC₅₀ values against *Galleria mellonella* larva ranged from 1.99-6.95 IJs/insect. Moreover, nematode virulence of new isolates were also performed against other insect pests; *Plutella xylostella* larva were killed by *H. indica* isolate K4 and showed significantly higher LC₅₀ value (16.75 IJs/larva). The second and third-instar larvae of *Spodoptera litura* had the significantly highest invasion rate by *H. indica* isolate K4 (LC₅₀ value = 10.27 and 16.12 IJs/larva, respectively). The LC₅₀ values of 4 EPNs to second and third-instar larvae ranged from 10-34 IJs/larva. However, all nematode isolates did not infect *P. xylostella* and *S. litura* pupae whereas *Steinernema* sp. isolate K8 could invade *S. litura* pre-pupal stage for 60% at 10 d after application. In addition, *H. indica* isolate K4 had the highest virulence to *Tenebrio molitor* larvae (LT₅₀ = 33.76 h), followed by *Steinernema* sp. isolate K8 (LT₅₀ = 48.15 h) and *Steinernema* sp. isolate K8 was able to infect first-instar larva of *Oryctes rhinoceros* (100% mortality rate at 72 h) whereas *H. indica* isolate K4 could not kill *O. rhinoceros* larva.

Steinernema sp. isolate K8 showed potential as a biological control agent in high clay soils in nine centimeter columns of either sandy loam or sandy clay loam and the *Steinernema* sp. isolate K8 had the greatest infection rate in both soil types compared to the other Thai isolates and 3 commercial EPNs.

Student's signature

Thesis Advisor's signature

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