Pathogenic nematodes as biocontrol agents against the mediterrenean fruit-fly,ceratitis capitiata(wied)

Gehan Mohamed Nouh

Bioassay studies were carried out to find out the efficacy of four entomopathogenic nematode species namely; Steinernema abbasi (from Sultanate of Oman), S. riobravis (from England), Heterorhabditis bacteriophora (from U.S.A.) and H. tayserae (from Nubariah, Egypt), against the full-grown larvae and one and three day old pupae of the Mediterranean fruitfly, Ceratitis capitata. Experiments were designed as laboratory and semi-field studies. The obtained results may be summarized as follows :I- Laboratory studies :In these studies, each of the tested 4 nematode species was applied in each of six concentrations (125, 250, 500, 1000, 2000 and 4000 infective juveniles/cm2 of soil surface) on the sand surface containing the desired stage which was placed either every 10 individuals in sand in a 100 cc half filled plastic cup (first method), or each individual in sand in a 5 cm diameter Petri dish (second method).I.1- Infectivity of entomopathogenic nematode species to C. capitata full-grown larvae and pupae :A- First method :The efficacy of all of the 4 entomopathogenic nematode species, on the full-grown larvae and the one and three day old pupae, was a concentration dependent; i.e., the mortality percentage, due to treatment, increased by the increase in the applied concentration.One week after exposure of C. capitata full-grown larvae to either of the six concentrations of the 4 nematode species, the means of mortality percentages were 70.5 (44-96), 62.7 (35-89), 70.5 (42-97) and10063 (39-88) % for application of S. abbasi, S. riobravis, H. bacteriophora and H. tayserae, respectively. On one day old pupae, the respective mortality percentages were 65 (36-93), 51.3 (23-80), 66 (36-95) and 55 (34- 78) %. While, in case of the three day old pupae of C. capitata, treatment by the mentioned species by the same concentrations caused 62.5 (33-90), 4i.5 (18-65), 59.2 (30-88) and 48 (23-72) % mortalities,respectively.As for the LC50 values of S. abbasi, S. riobravis, H. bacteriophora and H. tayserae, for the full-grown larvae of C. capitata, those were found to be 204, 308, 315 and 289 IJs/cm2 of sand surface, respectively. On one day old pupae, the respective values of LC50 were; 282, 645, 281 and 462 IJs/cm2. While, treatments of the three day old pupae revealed that the LC50 for the 4 nematode species were 321, 1350, 402 and 880 IJs/cm2 of soil surface, respectively.B- Second method :The individual treatments of C. capitata full- grown larvae caused mean mortality percentages of 88 (60-100), 70.7 (40-96), 86.7 (60-100) and 66.7 (40-92) % due to application of S. abbasi, S. riobravis, H. bacteriophora and H. tayserae, respectively. In case of one day old pupal treatments, these values were 84 (52- 100), 63.4 (32-92), 81.4 (48-100) and 59 (36-88) % mortality, respectively. By application of the 4 nematode species on the surface of sand containing 3 day old pupae of C. capitata, the mortality percentages among treated pupae were 68 (40-96), 50 (28-76), 66 (36-92) and 56.7 (32-84 %), respectively.Concerning the LC50 values for S. abbasi, S. riobravis, H. bacteriophora and H. tayserae on C. capitata full-grown larvae, after one101week of treatment; those were 47, 198, 82 and 240 infective juveniles/cm2 of sand surface, respectively. While, on the one day old pupae of the same pest, these values were 103, 323, 140 and 365 Us/cm2, respectively. After one week of treatment of the 3 day old pupae of C. capitata, the LC50 values for the same entomopathogenic nematode species were found to be 241, 698, 267 and 446 lls/cm2, respectively.from the obtained results, the following could be deduced :a-The effect of either of the 4

tested nematode species, against the Mediterranean fruitfly, increased by increasing the applied concentration.b-Among the tested stages, C. capitata full-grown larvae were the most susceptible (highest mortality rate and lowest LC50) compared to the one and three day old pupae of the same pest species. While, on the contrary, the three day old pupae showed highest resistance.c-Individual treatments of either of the used stages (second method) led to more efficacy of the applied nematode species (higher mortality rate and lower LC50's) that application of the same nematode species and concentration of every 10 individual placed in one cup (first method).d-Generally, S. abbasi gave the highest efficacy against C. capitata tested stages, followed by H. bacteriophora, then H. tayserae (the Egyptian isolated species). While, S. riobravis was the least effective on full-grown larvae, one day and 3 day old pupae of S. capitata.