
ABSTRACT

Entomopathogenic nematodes of genera *Steinernema* and *Heterorhabditis* were successfully used as biological control in agriculture. Therefore, enhancing their efficacy was the aim of the present research, using three simple methods. In the first one, continuous culturing of nematode juveniles, under optimum condition of temperature and nematode density, was performed and new progenies of *Steinernema riobrave* and *Heterorhabditis bacteriophora* (ISK-2 strains), with high quality, were obtained and, thus, maximizing nematode efficacy with high conservation of energy reserves:

- High content of total lipid, total protein, total carbohydrate and glycogen percentage
- High penetration rate and virulence than in the original nematodes.
- A decline in the lipase, protease, amylase and invertase activities in the new progenies of the two species.

In the second, *S. riobrave* nematodes penetrating the insect host at different intervals after infection were selected. In the third method, *S. riobrave* early penetrating the host (at the first hour of infection) were selected. Also, new progenies recording high penetration rate and high mortality to *G.mellonella* were obtained.

Key words

Entomopathogenic nematode - *Steinernema riobrave* - *Heterorhabditis bacteriophora* - *Galleria mellonella* - Energy reserves - Penetration rate - Mortality - Enhancing - Efficacy

CONTENTS

List of Tables	I
List of Figures	III
Introduction	1
Aim of the work	3
Review of literature	4
1. Taxonomy of entomopathogenic nematodes	4
1.1. <i>Steinernema</i> and <i>Heterorhabditis</i>	4
1.2. Mutualistic bacteria	5
2. Strain discovery	6
3. Nematode biology	6
4. Host range	7
5. Storage	8
6. Factor affecting nematodes survival and infectivity	9
7. Biochemistry	14
Material and methods	20
Material	
A. Nematodes	20
B. Chemicals	20
C. Kits	20
D. Equipments	20
Methods	
A. Experiment I: Continuous culturing of nematode juveniles (under optimum condition of temperature and nematode density)	21
1. Determination of main energy reserves in nematode juveniles	21
1.1. Total lipids	22
1.2. Total proteins	25
1.3. Glycogen content	28
1.4. Total carbohydrates	30
1.5. Hydrolyzing enzymes in nematode juveniles	30
a. Determination of carbohydrate hydrolyzing enzyme activity	33
b. Determination of proteolytic activity (protests assay)	34
c. Determination of lipase activity	34
2. Nematode biological and ecological activities	40
2.1 Penetration rate	40
2.2 Virulence (one:one)	40

B. Experiment II: Selection of nematodes penetrating the host at different intervals after infection.	40
C. Experiment III: Selection of nematodes penetrating the host at the first hour of infection	41
Result	43
A. Experiment I:	43
1. Energy reserves in nematode juveniles	43
1.1 Total lipids	43
1.2 Total protein	46
1.3 Glycogen content	46
1.4 Total carbohydrates	51
1.5 Hydrolyzing enzymes in nematode juveniles	54
a) Carbohydrate hydrolyzing enzymes	54
• Amylase activity	54
• Invertase activity	54
• Trehalse activity	59
b) Protease activity	59
c) Lipase activity	59
2. Nematode biological and ecological activities	66
2.1 Penetration rate	66
2.2 Virulence	66
B. Experiment II: Selection of nematodes penetrating the host at different intervals after infection	71
C. Experiment III: Selection of nematode penetrating the host at the first hour of infection.	76
Discussion	81
Summary	91
Conclusion	97
References	99
Arabic summary	8-1