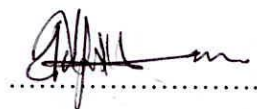


The work described in this thesis was carried out by me under the supervision of Dr. (Mrs.) N. Salim and Dr.(Mrs.) H.M.R.K. Ekanayake and a report on this has not been submitted in whole or in part to any University for another Degree/Diploma.

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**Studies on biology and histopathology of *Meloidogyne* spp.
affecting *Centella asiatica* L. and environmentally
acceptable control measures**

BY

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**Thesis submitted to the University of Sri Jayawardhenepura for the
award of the Degree of Master of Philosophy in Botany in**

2005

DEDICATION

**To my loving parents and dear teachers
whose enthusiastic encouragement
made me to success in
higher education**

TABLE OF CONTENTS

	Page no.
LIST OF TABLES.....	vii
LIST OF FIGURES.....	ix
LIST OF PLATES.....	xi
ACKNOWLEDGEMENT.....	xiii
ABSTRACT.....	xv
CHAPTER 1 – INTRODUCTION.....	1
CHAPTER 2 - LITERATURE REVIEW	
2.1 <i>Centella asiatica</i>	4
2.1.1 Origin.....	4
2.1.2 Classification.....	4
2.1.3 Morphological characters.....	5
2.1.4 Germplasms.....	5
2.1.5 Distribution.....	5
2.1.6 Propagation.....	6
2.1.7 Nutritional composition of leaves.....	6
2.1.8 Chemical constituents of <i>C. asiatica</i> plant.....	7
2.1.9 Uses of <i>C. asiatica</i>	7
2.1.9.1 As a food.....	7
2.1.9.2 Health aspects.....	7
2.1.9.3 Cosmetic uses.....	8
2.2 Root knot nematodes, <i>Meloidogyne</i> spp.....	8
2.2.1 Introduction.....	8

2.2.2 Zoological classification of the genus.....	9
2.2.3 Symptoms and damage.....	10
2.2.3.1 Histopathological changes.....	10
2.2.3.2 External symptoms.....	12
2.2.4 Identification of <i>Meloidogyne</i> spp.....	14
2.2.5 Life cycle of <i>Meloidogyne</i> spp.....	15
2.2.6 Root knot nematodes and their distribution in Sri Lanka.....	17
2.2.7 Control of root knot nematodes.....	17
2.2.7.1 Physical agents.....	17
2.2.7.2 Cultural practices.....	18
2.2.7.3 Chemicals.....	21
2.2.7.4 Use of resistant varieties/ cultivars.....	22
2.2.7.5 Biological control.....	22
2.2.7.6 Integrated nematode management (INM).....	24
2.3 Infection of <i>Meloidogyne</i> spp. in <i>C. asiatica</i>	25

CHAPTER 3 – METHODOLOGY

3.1 Collection of <i>C. asiatica</i> plants.....	26
3.1.1 Collection of diseased plants.....	26
3.1.2 Collection of healthy plants.....	26
3.2 Preparation of potting mixture.....	26
3.3 Growing of <i>C. asiatica</i> plants.....	27
3.4 Isolation of female <i>Meloidogyne</i> spp. from root knots.....	27
3.5 Identification of nematodes.....	27

3.6 Isolation of male <i>M. incognita</i> from soil.....	28
3.7 Isolation of eggs and larvae of <i>M. incognita</i>	28
3.8 Pure culture of <i>M. incognita</i>	29
3.9 Inoculation of <i>M. incognita</i>	29
3.10 Assessment of the disease.....	30
3.10.1 Gallling Index.....	30
3.10.2 Fresh and dry weights of shoots and roots.....	30
3.11 Differentiation of germplasms of <i>C. asiatica</i>	31
3.12 Screening of identified germplasms of <i>C. asiatica</i> for their reaction to the <i>M. incognita</i>	32
3.13 The effects of the infestation by <i>M. incognita</i> on growth, absorption and translocation of nutrients and water in <i>C.</i> <i>asiatica</i> plants.....	33
3.13.1 The effects of the nematode infestation on Nitrogen, Phosphorous and Potassium contents of <i>C. asiatica</i>	33
3.13.2 The effects of different inoculum levels of <i>M. incognita</i> on growth, absorption and translocation of nutrients and water in <i>C. asiatica</i> plants.....	34
3.13.2.1 Determination of Moisture content	35
3.13.2.2 Determination of Sodium, Calcium, Magnesium and Iron contents.....	35
3.14 Effects of different soil amendments in controlling the population of <i>M. incognita</i> affecting <i>C. asiatica</i>	36

3.15 Effects of different ratios of compost as potential soil amendment in controlling the population of <i>M. incognita</i> in <i>C. asiatica</i>	37
3.16 Effects of the amount of poultry manure and poonac as potential soil amendments in controlling the population of <i>M. incognita</i>	38
3.16.1 Effect of poultry manure.....	38
3.16.2 Effect of poonac.....	38
3.17 Effects of the different 'enemy plants'/'trap crops' in controlling the population of <i>M. incognita</i> that infects <i>C. asiatica</i>	39
3.18 Susceptibility of some weed species to <i>M. incognita</i> affecting <i>C. asiatica</i>	40
3.19 Evaluation of some ornamental plants as host plants to <i>M. incognita</i>	41
3.20 Histopathology of the roots of <i>C. asiatica</i> infested with <i>M. incognita</i>	42
3.20.1 Slide preparation procedure.....	43
3.20.2 Staining procedure with Safranin and Fast green.....	44
3.21 Statistical analysis.....	45
 CHAPTER 4 -RESULTS	
4.1 root knot nematode incidence in <i>C. asiatica</i>	46
4.2 Symptoms of naturally infested <i>C. asiatica</i> plant with <i>Meloidogyne</i> spp.....	47
4.3 Isolation of <i>Meloidogyne</i> spp.....	49

4.3.1 Isolation of female <i>Meloidogyne</i> spp. from root knots.....	49
4.3.2 Isolation of male nematodes from nematode infested soil.....	49
4.3.3 Isolation of eggs and larvae of <i>Meloidogyne</i> spp.....	49
4.4 Identification of species of <i>Meloidogyne</i>	49
4.5 Identification and differentiation of germplasms of <i>C. asiatica</i>	54
4.6 Screening of identified gemplasms of <i>C. asiatica</i> against <i>M. incognita</i>	72
4.7 The effects of <i>M. incognita</i> on growth, absorption and translocation of nutrients and water in <i>C. asiatica</i> plants.....	76
4.7.1 The effects of the nematode infestation on Nitrogen, Phosphorous and Potassium contents of <i>C. asiatica</i>	76
4.7.2 The effects of different initial inoculum levels of <i>M. incognita</i> on growth, absorption and translocation of nutrients and water in <i>C. asiatica</i> plants.....	76
4.8 The effects of different soil amendments in controlling the population of <i>M. incognita</i> in <i>C. asiatica</i>	84
4.9 The effects of compost content in controlling the population of <i>M. incognita</i> in <i>C. asiatica</i>	87
4.10 Effects of poultry manure and poonac as potential soil amendments in controlling the population of <i>M. incognita</i> in <i>C. asiatica</i>	93
4.10.1 Effect of poultry manure.....	93
4.10.2 Effect of poonac.....	93

4.11 The effects of different ‘enemy crops’/’trap crops’ in controlling the population of <i>M. incognita</i>	96
4.12 Susceptibility of some weeds to <i>M. incognita</i> isolated from <i>C. asiatica</i>	100
4.13 Response of some ornamental plants to <i>M. incognita</i> isolated From <i>C. asiatica</i>	100
4.14 Histopathology of roots of <i>C. asiatica</i> infested with <i>M. incognita</i>	103
CHAPTER 5 – DISCUSSION.....	117
CONCLUSIONS.....	128
REFERENCES.....	131
APPENDICES.....	146

LIST OF TABLES

	Page No.
1. Nutritional composition of gotukola.....	6
2. The occurrence of root knot nematode infestation of <i>C. asiatica</i> in surveyed locations.....	46
3. Germplasms of <i>C. asiatica</i> and their locations.....	55
4. Some morphological characters of germplasms of <i>C. asiatica</i> grown for ten weeks under homogeneous conditions in a greenhouse.....	56
5. The response of different germplasms of <i>C. asiatica</i> to <i>M. incognita</i>	72
6. Effects of the infestation by <i>M. incognita</i> on Nitrogen, Phosphorous and Potassium contents of <i>C. asiatica</i>	76
7. Effects of initial inoculum levels of <i>M. incognita</i> on the infestation and moisture content of shoots and roots of <i>C. asiatica</i> plants, ten weeks after inoculation.....	80
8. Effects of different population levels of <i>M. incognita</i> on mean Na, Mg, Ca and Fe contents of shoots of <i>C. asiatica</i> , ten weeks after inoculation.....	82
9. Effects of different population levels of <i>M. incognita</i> on mean Na, Mg, Ca and Fe contents of roots of <i>C. asiatica</i> , ten weeks after inoculation.....	83

10. Effects of different soil amendments on the nematode multiplication and yield of <i>C. asiatica</i> inoculated with <i>M. incognita</i>	85
11. Effects of different compost contents on the infestation of <i>M. incognita</i> in <i>C. asiatica</i>	89
12. Effects of the contents of poultry manure on reducing the population of <i>M. incognita</i> in soil.....	94
13. Effects of different poonac contents on the infestation of <i>M. incognita</i> and the yield of <i>C. asiatica</i>	95
14. Effects of different poonac contents on the fresh and dry weights of roots of <i>C. asiatica</i> infested by <i>M. incognita</i>	96
15. Effects of different 'enemy crops'/ 'trap crops' on the infestation and yield of <i>C. asiatica</i> infested by <i>M. incognita</i>	97
16. Effects of different 'enemy crops'/ 'trap crops' on the fresh and dry weights of roots of <i>C. asiatica</i> infested by <i>M. incognita</i>	99
17. Response of some common weeds to <i>M. incognita</i>	101
18. Response of some common ornamental plants to <i>M. incognita</i>	102

LIST OF FIGURES

	Page No.
1. Disease cycle of root knot caused by nematodes of the genus <i>Meloidogyne</i>	16
2. <i>Centella asiatica</i> , Germplasm G ₁ (x ½).....	60
3. <i>Centella asiatica</i> , Germplasm G ₂ (x ½).....	61
4. <i>Centella asiatica</i> , Germplasm G ₃ (x ½).....	62
5. <i>Centella asiatica</i> , Germplasm G ₄ (x ½).....	63
6. <i>Centella asiatica</i> , Germplasm G ₅ (x ½).....	64
7. <i>Centella asiatica</i> , Germplasm G ₆ (x ½).....	65
8. <i>Centella asiatica</i> , Germplasm G ₇ (x ½).....	66
9. <i>Centella asiatica</i> , Germplasm G ₈ (x ½).....	67
10. <i>Centella asiatica</i> , Germplasm G ₉ (x ½).....	68
11. <i>Centella asiatica</i> , Germplasm G ₁₀ (x ½).....	69
12. <i>Centella asiatica</i> , Germplasm G ₁₁ (x ½).....	70
13. <i>Centella asiatica</i> , Germplasm G ₁₂ (x ½).....	71
14. Fresh and dry weights of shoots of healthy and <i>M. incognita</i> infested plants of different germplasm of <i>C. asiatica</i>	74
15. Fresh and dry weights of roots of healthy and <i>M. incognita</i> infested plants of different germplasm of <i>C. asiatica</i>	75
16. Effect of different inoculum levels of <i>M. incognita</i> on mean fresh and dry weights of shoots (yield) of <i>C. asiatica</i> (G ₅) plants.....	77
17. Effect of different inoculum levels of <i>M. incognita</i> on mean fresh and dry weights of roots of <i>C. asiatica</i> (G ₅) plants.....	79

18. Effect of different soil amendments on mean fresh and dry weights of shoots (yield) of <i>C. asiatica</i> (G ₅) plants infested with <i>M. incognita</i>	86
19. Effect of different soil amendments on mean fresh and dry weights of roots of <i>C. asiatica</i> (G ₅) plants infested with <i>M. incognita</i>	88
20. Effect of different compost treatments on mean fresh and dry weights of shoots (yield) of healthy and <i>M. incognita</i> infested plants of <i>C. asiatica</i> (G ₅).....	90
21. Effect of different compost treatments on mean fresh and dry weights roots of healthy and <i>M. incognita</i> infested plants of <i>C. asiatica</i> (G ₅).....	92

LIST OF PLATES

	Page No.
1. <i>C. asiatica</i> plant infested with <i>Meloidogyne</i> spp.....	48
2. Female nematodes of <i>Meloidogyne</i> spp. isolated from <i>C. asiatica</i> root galls(x10x22).....	50
3. A male nematode of <i>Meloidogyne</i> spp. isolated from <i>C. asiatica</i> root galls (x10x15).....	51
4. Eggs and larval stages of <i>Meloidogyne</i> spp. isolated from <i>C. asiatica</i> root galls (x10x22).....	52
5. Photographs of perineal patterns of female <i>M. incognita</i> isolated From <i>C. asiatica</i> root galls.....	53
6. Transverse section (T.S.) of a healthy <i>C. asiatica</i> root showing undamaged vascular region(VR) and cortex (CO) (10x10).....	104
7. T.S. of an infested <i>C. asiatica</i> root showing giant cells (GC) and dark brown patches due to cell necrosis (10x4).....	105
8. Enlarged section of T.S. of infested <i>C. asiatica</i> root showing inserting the head of the female nematode (FN) in the intercellular space between giant cells (GC) (10x10).....	106
9. Enlarged section of T.S. of infested <i>C. asiatica</i> root showing thick-walled, multinucleated, dense cytoplasmic giant cells (MGC) and vacuolated giant cell (VGC) (10x10).....	108
10. T.S. of an infested <i>C. asiatica</i> root showing two clusters of giant cells (GC) located in the vascular region (10x4).....	109

11. T.S. of an infested <i>C. asiatica</i> root showing three clusters of giant cells (GC) and the nematode (N) located in the vascular region (10x4).....	110
12. Enlarged section of T.S. of infested <i>C. asiatica</i> root showing four clusters of giant cells (GC) with different sizes, blocking in the vascular region (10x10).....	111
13. A portion of a T.S. of infested <i>C. asiatica</i> root showing formation of giant cells (GC) in the cortex and the female nematode (FN) (10x4).....	112
14. T.S. of infested <i>C. asiatica</i> root showing many female nematodes (FN) embedded near the vascular bundles (VB) and in the cortex (CO) among or adjacent to the giant cells (GC) (10x4).....	113
15. Infested <i>C. asiatica</i> root showing globular root knot (RK) with egg mass (EM) which is laid outside the root tissue (10x4).....	114
16. A portion of a T.S. of infested <i>C. asiatica</i> root showing nematode eggs (EG) inside the root tissue (10x10).....	115
17. A portion of a T.S. of infested <i>C. asiatica</i> root showing secondary invasion of second stage larvae (SL) through the vascular bundle (VB) to new feeding sites (10x10).....	116

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ABSTRACT

Germplasms of gotukola were confirmed to be infested by a root knot nematode species, *Meloidogyne incognita*. Surveys and laboratory experiments were conducted to gather detailed information of this nematode incidence in *C. asiatica* and attempts were made to find out potential control measures that are environmentally safe.

The use of resistant plants is highly satisfactory method which does not cause environmental pollution. In this study, twelve different germplasms of *C. asiatica* designated as G₁-G₁₂ were tested for their reaction to *Meloidogyne incognita*. Among the tested germplasms, only G₁ was resistant to nematode infestation. The germplasms G₂, G₃, G₇, G₈ and G₁₀ were moderately susceptible whereas all the other germplasms were found to be highly susceptible to this infestation. The infestation has caused loss in yield of all the susceptible germplasms tested. The highly susceptible germplasms had significant ($P < 0.05$) yield loss ranging from 18.3 to 35.7%.

The infestation was effectively controlled by application of sterilized soil, sterilized sand and compost or cow dung or tea waste as soil amendments at the rate of 1:1:½ improving plant growth under the conditions tested. Use of compost at the rate of 1:1:1½ (sterilized soil, sterilized sand and compost) has given the maximum plant growth while suppressing the nematode population. Further, application of 10g of poonac and 10g of poultry manure to 430ml of potting mixture, has given a significant reduction of nematode population while giving maximum yield of gotukola under the conditions tested.

Population of *M. incognita* could also be controlled successfully by planting two plants of *Sesamum orientale* along with one plant of *C. asiatica* under the conditions tested.

Some common weeds that are susceptible to *M. incognita* were identified. Also some ornamental plants resistant to this nematode, which can be useful in crop rotation were identified.

The infestation and development of *M. incognita* in *C. asiatica* caused histopathological changes in the form of giant cells and root knots. In this study, formation of root knots and different stages of nematode development were examined preparing microtome sections of infested roots. Giant cell formation was observed in both vascular and cortical regions. Groups of two to six giant cells of thick walled multinucleated dense cytoplasm were noted while some giant cells were vacuolated.

The effect of five different inoculum levels of *M. incognita* on the plant growth, absorption and translocation of nutrients and water in the gotukola were determined. Significant reductions in fresh and dry weights of shoots were observed in higher population levels (≥ 2000 eggs and larvae) of the nematode. The absorption of Na, Mg, Ca and Fe from soil by the infested plants were significantly ($P < 0.05$) lower than that by the healthy roots. The effect increased with the increasing population levels of the nematode.