

## TABLE OF CONTENTS

	<b>Page</b>
TABLE OF CONTENTS .....	i
LIST OF TABLES .....	ii
LIST OF FIGURES .....	v
INTRODUCTION .....	1
LITERATURE REVIEW .....	3
MATERIALS AND METHODS .....	10
Biological Studies of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto .....	15
Biological Life Table of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto .....	17
Eficiency of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto for Biological Control of <i>Thrips palmi</i> Karny .....	21
RESULTS .....	23
Biological Studies of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto .....	23
Biological Life Table of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto .....	36
Efficiency of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto for Biological Control of <i>Thrips palmi</i> Karny .....	56
DISCUSSION .....	63
CONCLUSION .....	65
LITERATURE CITED .....	67

## LIST OF TABLES

Table		Page
1	Body size of various stages of development of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Thrips palmi</i> Karny larvae under laboratory condition ( $28 \pm 2^{\circ}\text{C}$ and $75 \pm 2\%$ RH).....	29
2	Body size of various stages of development of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Corcyra cephalonica</i> (Stainton) eggs under laboratory condition ( $28 \pm 2^{\circ}\text{C}$ and $75 \pm 2\%$ RH).....	30
3	Body size of various stages of development of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Tetranychus</i> sp. adults under laboratory condition ( $28 \pm 2^{\circ}\text{C}$ and $75 \pm 2\%$ RH).....	31
4	Analysis body measuring of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto in each stages when fed with <i>Thrips palmi</i> Karny larvae, of <i>Corcyra cephalonica</i> (Stainton) eggs and <i>Tetranychus</i> sp. adults under laboratory condition ( $28 \pm 2^{\circ}\text{C}$ and $75 \pm 2\%$ RH).....	33
5	Duration of various developmental stages of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Thrips palmi</i> Karny larvae under laboratory condition ( $28 \pm 2^{\circ}\text{C}$ and $75 \pm 2\%$ RH).....	34
6	Duration of various developmental stages of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Corcyra cephalonica</i> (Stainton) eggs under laboratory condition ( $28 \pm 2^{\circ}\text{C}$ and $75 \pm 2\%$ RH).....	35
7	Duration of various developmental stages of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Tetranychus</i> sp. adults under laboratory condition ( $28 \pm 2^{\circ}\text{C}$ and $75 \pm 2\%$ RH).....	37

## LIST OF TABLES (Continued)

Table	Page
8 Comparative of duration period of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto in each stages when fed with <i>Thrips palmi</i> Karny larvae, <i>Corcyra cephalonica</i> (Stainton) eggs and of <i>Tetranychus</i> sp adults. under laboratory condition ( $28 \pm 2$ °C and $75 \pm 2\%$ RH).....	38
9 Biological life table, age-specific fecundity rate and net reproductive rate of increase ( $R_o$ ) of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Thrips palmi</i> Karny larvae under laboratory condition ( $28 \pm 2$ °C and $75 \pm 2\%$ RH).....	39
10 Biological attributes of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Thrips palmi</i> Karny larvae under laboratory condition ( $28 \pm 2$ °C and $75 \pm 2\%$ RH).....	40
11 Biological life table, age-specific fecundity rate and net reproductive rate of increase ( $R_o$ ) of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Maconellicoccus hirsutus</i> (Green) crawlers under laboratory condition ( $28 \pm 2$ °C and $75 \pm 2\%$ RH).....	43
12 Biological life table, age-specific fecundity rate and net reproductive rate of increase ( $R_o$ ) of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Corcyra cephalonica</i> (Stainton) eggs under laboratory condition ( $28 \pm 2$ °C and $75 \pm 2\%$ RH).....	44
13 Biological attributes of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Corcyra cephalonica</i> (Stainton) eggs under laboratory condition ( $28 \pm 2$ °C and $75 \pm 2\%$ RH).....	45
14 Biological life table, age-specific fecundity rate and net reproductive rate of increase ( $R_o$ ) of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Tetranychus</i> sp. adults under laboratory condition ( $28 \pm 2$ °C and $75 \pm 2\%$ RH).....	47

## LIST OF TABLES (Continued)

<b>Table</b>	<b>Page</b>
15 Biological attributes of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Tetranychus</i> sp. adults under laboratory condition ( $28 \pm 2$ °C and $75 \pm 2\%$ RH).....	48
16 Population parameters calculated from biological attributes of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Thrips palmi</i> Karny larvae, <i>Maconellicoccus hirsutus</i> (Green) crawlers, <i>Corecyra cephalonica</i> (Stainton) eggs and <i>Tetranychus</i> sp. adults.....	51
17 Partial ecological life table of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Thrips palmi</i> Karny larvae under laboratory condition ( $28 \pm 2$ °C and $75 \pm 2\%$ RH).....	52
18 Partial ecological life table of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Maconellicoccus hirsutus</i> (Green) under laboratory crawlers condition ( $28 \pm 2$ °C and $75 \pm 2\%$ RH).....	54
19 Partial ecological life table of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Corecyra cephalonica</i> (Stainton) eggs under laboratory condition ( $28 \pm 2$ °C and $75 \pm 2\%$ RH).....	57
20 Partial ecological life table of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Tetranychus</i> sp. adults under laboratory condition ( $28 \pm 2$ °C and $75 \pm 2\%$ RH).....	59
21 Efficiency of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when released on different rates for controlling <i>Thrips palmi</i> Karny in the cage (the 5 <sup>th</sup> day).....	62

## LIST OF FIGURES

Figure		Page
1	Stock culture of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto on eggplants in the insectary. (A) <i>W. rotunda</i> feeding on <i>Tetranychus</i> sp.....	11
2	Stock culture of <i>Thrips palmi</i> Karny on eggplants in the insectary. (A) Larvae of <i>T. palmi</i> .....	12
3	Stock culture of <i>Tetranychus</i> sp. on eggplants in the insectary. (A) Nymphs and adults of <i>Tetranychus</i> sp.....	13
4	Stock culture of <i>Corecyra cephalonica</i> (Stainton). (A) Eggs of <i>C. cephalonica</i> .....	14
5	Rearing of <i>Maconellicoccus hirsutus</i> (Green) on pumpkin and (A) adults and crawlers of <i>M. hirsutus</i> .....	16
6	Methology for rearing <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto on leaf of eggplant. (A) Egg of <i>W. rotunda</i> .....	18
7	Adults of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto were reared on eggplant leaves which confine with fine net.....	19
8	The cages for studies efficiency of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto	22
9	Eggs of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto.....	24
10	First nymphal (A), second nymphal (B), third nymphal (C), fourth nymphal (D) and fifth nymphal (E) instars of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto....	25
11	Male and female adults of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto.....	28
12	Egg curve of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Thrips palmi</i> Karny larvae under laboratory condition ( $28 \pm 2^\circ\text{C}$ and $75 \pm 2\%$ RH)..	42
13	Egg curve of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Corecyra cephalonica</i> (Stainton) eggs under laboratory condition ( $28 \pm 2^\circ\text{C}$ and $75 \pm 2\%$ RH).....	46
14	Egg curve of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Tetranychus</i> sp. adults under laboratory condition ( $28 \pm 2^\circ\text{C}$ and $75 \pm 2\%$ RH).....	50

## LIST OF FIGURES (Continued)

Figure		Page
15	Survivorship curve of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Thrips palmi</i> Karny larvae under laboratory condition ( $28 \pm 2^\circ\text{C}$ and $75 \pm 2\%$ RH).....	53
16	Survivorship curve of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Maconellicoccus hirsutus</i> (Green) crawlers under laboratory condition ( $28 \pm 2^\circ\text{C}$ and $75 \pm 2\%$ RH).....	55
17	Survivorship curve of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Corcyra cephalonica</i> (Stainton) eggs under laboratory condition ( $28 \pm 2^\circ\text{C}$ and $75 \pm 2\%$ RH).....	58
18	Survivorship curve of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when fed with <i>Tetranychus</i> sp. adults under laboratory condition ( $28 \pm 2^\circ\text{C}$ and $75 \pm 2\%$ RH).....	60
19	Efficiency of <i>Wollastoniella rotunda</i> Yasunaga and Miyamoto when released on different rates for controlling <i>Thrips palmi</i> Karny in the cage.....	61