

CONTENTS

	Page
Contents	viii
List of Tables	ix
List of Figures	xi
List of Abbreviations and Symbols	xiii
Chapter	
1 Introduction	1
Introduction	1
Objectives	2
Review of Literatures	3
2 Materials and Methods	16
Materials	16
Equipments	17
Experimental Methods	18
3 Results	33
4 Discussions	58
5 Conclusion	65
Bibliography	68
Appendix	77
A	78
B	88
Vitae	89

LIST OF TABLES

Table	Page
1. Compositions of ingredients in different granule formulations for spray application	20
2. Compositions of ingredients in different tablet formulations for spray application	21
3. Compositions of ingredients in different granule formulations for broadcast application	21
4. Compositions of ingredients in different tablet formulations for broadcast application	22
5. Different types of treatment used under greenhouse condition	29
6. Number of viable bacteria in granules containing <i>B. megaterium</i> for spray application	35
7. Number of viable bacteria in formulations containing <i>B. megaterium</i>	36
8. Particle size of bacterial granules for spray application (GS)	37
9. Disintegration time to prepare 1% w/w solution of bacterial granules for spray application (GS)	37
10. The pH value of 1% w/w and 5% w/w solution of bacterial granules for spray application (GS)	38
11. The viscosity value at 250 rpm of 1% w/w and 5% w/w solution of bacterial granules for spray application (GS)	39
12. Average weight, thickness, hardness and friability of bacterial tablets for spray application (TS)	40
13. Disintegration time to prepare 1% w/w solution prepared from bacterial tablets for spray application (TS)	40
14. The pH value of 1% w/w solution prepared from bacterial tablets for spray application (TS)	41

LIST OF TABLES (CONTINUED)

Table	Page
15. The viscosity value at 250 rpm of 1% w/w solution prepared from bacterial tablets for spray application (TS)	42
16. Particle size of bacterial granules for broadcast application (GB)	43
17. Bulk density and true density of bacterial granules for broadcast application (GB)	43
18. Average weight, thickness, hardness and friability of bacterial tablets for broadcast application (TB)	44
19. Efficacy of selected formulation containing <i>B. megaterium</i> in suppressing the development of sheath blight disease in the greenhouse conditions	51
20. Number of viable bacteria on surface of leaf sheath after spraying the selected bacterial formulation for 4, 7 and 14 days	53
21. Number of viable bacteria on surface of leaf blade after spraying the selected bacterial formulation for 4, 7 and 14 days	54
22. Inhibition of <i>R. solani</i> mycelial growth tested on PDA incorporated with 1% w/w solution of the selected bacterial formulations	56
23. Number of viable bacteria in the selected formulations after storage at room temperature (26 - 30°C) for 6 months	57

LIST OF FIGURES

Figure	Page
1. Rice sheath blight disease	4
2. The cycle of rice sheath blight disease	5
3. <i>B. megaterium</i> , a rod-shaped bacterium in chains	8
4. Stages of sporulation in <i>B. megaterium</i>	10
5. Numbers of viable bacterial endospores at different time of incubation	33
6. <i>B. megaterium</i> formulations	34
7. The percentage of floating ability of tablet formulations containing <i>B. megaterium</i> for broadcast application (TB)	45
8. The percentage of bacterial release from tablet formulations containing <i>B. megaterium</i> for broadcast application (TB)	46
9. Micrographs of bacterial endospores on the surface of selected formulations	48
10. Micrographs of bacterial endospores on the plant surface after placing into the formulations	49
11. The lesion on each rice tiller which had sheath blight symptoms	50
12. Inhibition of <i>R. solani</i> mycelial growth tested on PDA incorporated with 1% w/w solution of the sterile water (as a control treatment) or the selected bacterial formulation	55
13. Structural formula of hydrogenated vegetable oil, type I	78
14. Structural formula of hydroxyethyl cellulose	79
15. Structural formula of hydroxypropyl methylcellulose	80
16. Structural formula of α -lactose monohydrate	81
17. Structural formula of magnesium stearate	82
18. Structural formula of methylcellulose	83
19. Structural formula of sodium alginate	84

LIST OF FIGURES (CONTINUED)

Figure	Page
20. Structural formula of sodium carboxymethylcellulose	85
21. Structural formula of sodium starch glycolate	86
22. Structural formula of talcum	87

LIST OF ABBREVIATIONS AND SYMBOLS

Alg	= Sodium alginate
CFU	= colony forming units
cps	= centipoises
HVO	= Hydrogenated vegetable oil
HEC 4000	= Hydroxyethyl cellulose 4000
HPMC 4000	= Hydroxypropyl methylcellulose 4000
MC 4000	= Methylcellulose 4000
PCA	= Plate Count Agar
PDA	= Potato Dextrose Agar
PDB	= Potato Dextrose Broth
rpm	= revolution per min
SCMC 1500	= Sodium Carboxymethylcellulose 1500