

TABLE OF CONTENT

COVER	i
LEGALIZATION PAGE	ii
LETTER OF AUTHENTICITY	iii
PREFACE	iv
TABLE OF CONTENT	vi
CONTENT OF TABLE	viii
CONTENT OF FIGURE	ix
ABSTRACT.....	xi
INTISARI.....	xii
I. Introduction	1
1.1 Background	1
1.2 Purpose	3
1.3 Problems	3
II. Literature Review	4
2.1 Rice Sheath Blight.....	4
2.2 <i>Rhizoctonia solani</i>	4
2.2.1 Introduction.....	4
2.2.2 Symptoms on rice plant.....	5
2.2.3 Disease cycle and epidemiology	5
2.2.4 Symptoms on rice plantTaxonomy and characteristic of <i>Rhizoctonia solani</i>	6
2.2.5 Hyphal characteristics	7
2.2.6 Sclerotia.....	8
2.2.7 Anastomosis and variety of <i>Rhizoctonia solani</i>	8
2.3Biological Control Agents against <i>Rhizoctonia solani</i>	11
2.3Soil Bacterial Diversity of Rice Field	15
III. Hypothesis	18
IV. Materials and Methods	19
4.1 Time and Place.....	19
4.2 Materials.....	19
4.3 Field Trial.....	19
4.3.1 Design of Experiment.....	19



4.3.2 Plant maintenance	21
4.3.3 Sheath blight disease observation.....	21
4.3.4 Data analysis	23
4.4 Identification of Pathogen	24
4.4.1 Collection and Isolation of Isolates	24
4.4.2 Molecular Identification	24
4.4.3 Morphological Characterization.....	26
4.4.4 Molecular Identification Using Universal Primer	24
4.5 Community Structure of Rhizobacteria.....	27
4.5.1 Soil sampling	27
4.5.2 DNA extraction from soil	27
4.5.3 DNA amplification and visualization	27
4.5.4 Data analysis	27
V. Results and Discussions.....	28
5.1 Field Experiment.....	28
5.1.1 Agronomical Parameters.....	28
5.1.2 Disease Incidence and Intensity.....	32
5.2 Identification of Rice Sheath Blight Pathogen	38
5.2.1 Molecular identification using specific primers.....	38
5.2.2 Molecular identification using universal primers	41
5.2.3 Morphological characterization.....	44
5.3 Community Structure of Rhizobacteria.....	47
5.3.1 Dependent culture.....	47
5.3.2 Independent culture	51
VI. Conclusions and Suggestions.....	56
6.1 Conclusions.....	58
6.2 Suggestions.....	58
Literature Cited	59

CONTENT OF TABLE

Table 2.1	List of <i>Rhizoctoniasolanianastomosis</i> groups (AGs) and AG subgroups and main hosts.....	10
Table 4.1	Composition of treatment using biological control agent.....	20
Table 4.2	List of <i>Rhizoctoniasolanii</i> isolates with the origins.....	24
Table 4.3	List of <i>Rhizoctoniasolanii</i> isolates for comparison.....	24
Table 4.4	List of specific primers for identification of <i>Rhizoctoniasolanii</i> isolates.....	25
Table 5.1	Statistical analysis of the effect from biological control agent with different formulations on agronomical parameters of riceplant.....	34
Table 5.2	Statistical analysis of the effect from biological control agent with different formulations on disease incidence and disease intensity.....	35
Table 5.3	Morphological characteristic of <i>Rhizoctoniasolanii</i> isolates.....	40

CONTENT OF FIGURE

Figure 2.1	Sheath blight disease symptoms on rice	5
Figure 2.2	<i>Rhizoctoniasolanii</i> hyphae with 90 degrees branches.....	7
Figure 4.1.	Land Mapping for Treatments	21
Figure 4.2	Map for samples of block observation	22
Figure 4.3	Map for production plot	22
Figure 4.4	Scoring for sheath blight disease based on plant height.....	23
Figure 5.1	Plant height of rice plant IR64 variety using 5 different formulations of biological control agents and 2 control.....	28
Figure 5.2	Leaf color chart of rice plant IR64 variety using 5 different formulations of biological control agents and 2 controls	29
Figure 5.3	Number of tillers vs productive tillers of rice plant IR64 variety using 5 different formulations of biological control agents and 2 controls.....	30
Figure 5.4	Rice production IR64 variety using 5 different formulations of biological control agents and 2 controls	31
Figure 5.5	Disease incidence of rice sheath blight from IR64 variety using 5 different formulations of biological control agents and 2 controls	32
Figure 5.6	Disease intensity of rice sheath blight from IR64 variety using 5 different formulations of biological control agents and 2 controls	33
Figure 5.7	Area Under Disease Plant Curve (AUDPC) of rice sheath blight from IR64 variety using 5 different formulations of biological control agents and 2 controls	34
Figure 5.8	DNA amplification of <i>Rhizoctoniasolanii</i> isolates with primer Rhsp1/5,8KhotR.....	39
Figure 5.9	DNA amplification of <i>Rhizoctoniasolanii</i> isolates with primer (A) Rs1F/Rs2R (B) AG2sp/5,8KhotR and AG22sp2/5,8KhotR.....	40
Figure 5.10	DNA amplification of <i>Rhizoctoniasolanii</i> isolates with primer ITS1/ITS4.....	41
Figure 5.11	Maximum Likelihood tree of ITS sequences analysis to show relationship of SL1 and SL2 among another sub-group of <i>Rhizoctoniasolanii</i>	42
Figure 5.12	Morphological variation of <i>Rhizoctoniasolanii</i> isolates on PDA.....	45
Figure 5.13	Un-weighted pair group method with arithmetic mean dendogram of <i>Rhizoctonia solanii</i> isolates constructed with NTSYSpc 2.0 using cluster analysis based on morphological characters	46
Figure 5.14	Soil bacterial community structure revealed by PCR-RISA analysis in soil samples before and after application of biological control agents using dependent culture method of DNA extraction	47



Figure 5.15	Un-weighted pair group method with arithmetic mean dendogram of paddy soil before and after treatment of biological control agents using dependent culture method of DNA Extraction.....	49
Figure 5.16	Soil bacterial community structure revealed by PCR-RISA analysis in soil samples before and after application of biological control agents using independent culture method of DNA extraction	51
Figure 5.17	Un-weighted pair group method with arithmetic mean dendogram of paddy soil before and after treatment of biological control agents using independent culture method of DNA Extraction.....	52