

## TABLE OF CONTENTS

Cover page.....	i
Confirmation Page.....	ii
Statement Page.....	iii
Acknowledgement.....	iv
Table of Contents.....	vi
List of Tables .....	vii
List of Diagrams.....	viii
List of Appendix.....	x
List of Summaries.....	xi
Abstract.....	xiii
<i>Intisari</i> .....	xiv

### CHAPTER 1 INTRODUCTION

1.1	Introduction.....	1
1.2	Research Problem.....	4
1.3	Research Objective.....	5
1.4	Research Significance.....	5

### CHAPTER 2 LITERATURE REVIEW

2.1	Classification of Actinomycetes.....	6
2.2	Secondary metabolites produced .....	7
2.3	Polyketide synthases and Non-Ribosomal Peptides .....	8
2.4	The characteristics of <i>Streptomyces</i> sp. GMR-22.....	9
2.5	<i>Candida albicans</i> and Infections caused by <i>Candida albicans</i> .....	12
2.6	Morphologies of <i>Candida albicans</i> .....	14
2.7	Mode of action of antifungal agents.....	15
2.7.1	<i>ERGII</i> gene found in <i>Candida albicans</i> .....	19
2.8	Genome mining using bioinformatics tools.....	21
2.9	Hypothesis.....	24

### CHAPTER 3 RESEARCH MATERIALS AND METHODS

3.1	Research Plan.....	25
3.2	Time and Place of Research.....	25
3.3	Total number of samples .....	26
3.4	Research Variables.....	26
3.5	Research Materials.....	26
3.5.1	Materials for fermentation.....	26

3.5.2	Materials used for the extraction of secondary metabolites.....	27
3.5.3	Materials needed for the Analytical Thin layer chromatography.....	27
3.5.4	Materials needed for MIC fluconazole tests.....	27
3.5.5	Tools.....	27
3.5.5.	Tools for the fermentation and extraction of <i>Streptomyces</i> sp. GMR-22.....	27
3.6	Research Methodology.....	28
3.7	Research Procedure.....	29
3.7.1	Fermentation.....	29
3.7.2	Production of secondary metabolites.....	29
3.7.3	Extraction of secondary metabolites from GMR-22.....	30
3.7.4	Preparation of extracts.....	31
3.7.5	Thin Layer Chromatography.....	32
3.7.6	Growth of <i>Candida albicans</i> .....	33
3.7.7	Antifungal susceptibility testing of <i>Candida</i> isolates.....	33
3.7.8	Determination of MIC values.....	34
3.7.9	Genome mining.....	35

## **CHAPTER 4 RESULTS AND DISCUSSION**

4.1	Results.....	36
4.1.1	Morphology and results after culturing <i>Streptomyces</i> sp. GMR-22.....	36
4.1.2	Fermentation cycle of <i>Streptomyces</i> sp. GMR-22.....	37
4.1.3	Results of TLC Tests.....	38
4.1.3.1	TLC plate for n-hexane.....	39
4.1.4	Test tubes containing laboratory strains of <i>C. albicans</i> .....	41
4.1.5	MIC test results.....	42
4.1.6	Genome Mining of <i>Streptomyces</i> sp. GMR-22.....	44
4.1.7	Secondary metabolite biosynthesis gene clusters involved in antifungal production.....	50
4.2	Discussion.....	51

## **CHAPTER 5 CONCLUSION AND RECOMMENDATIONS**

5.1	Conclusion.....	55
5.2	Recommendations.....	56

<b>REFERENCES</b> .....	57
-------------------------	----

<b>APPENDIX</b> .....	64
-----------------------	----