Universiti Teknologi MARA

A Spatial Site Yield Potential Model of Oil Palm

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TABLE OF CONTENTS

		Page
ACKNOWLEDGEMENTS		iii
LIST OF TABLES		iv
LIST OF FIGURES		v
LIST OF APPENDICES		viii
ABSTRACT		ix
CHAPTER		
1	**INTRODUCTION**	1
1.1	Introduction	1
1.2	Plantation Management	1
1.3	Geographic Information System	2
1.4	Objectives	3
2	**LITERATURE REVIEW**	4
2.1	Brief Overview of Oil Palm	4
2.1.1	Soil Requirements	4
2.1.2	Suitable Zones for Oil Palm	6
2.1.3	Uses of Palm Oil	7
2.2	Site Yield Potential Model of Oil Palm	7
2.2.1	Definitions of Yield	9
	2.2.1.1 Genetic Yield	9
	2.2.1.2 Site Yield	10
	2.2.1.3 Actual Yield	10
2.2.2	Concept of Site Yield Potential (SYP) Model	11
2.2.3	Validation of SYP Model	12
2.3	A Short Description of Geographic Information System (GIS)	13
2.3.1	A Brief History of GIS	13
2.3.2	How GIS Works	14
2.3.3	Geographic Information System (GIS) in Relation to Modeling	14
3	**MATERIALS AND METHODOLOGY**	18
3.1	Study Area	18
3.1.1	Soil	18
3.1.2	Relief and Drainage	18
3.1.3	Rainfall	21

3.2 Data Conversion 22
3.2.1 Planting Material Data 23
3.2.2 Planting Density Data 23
3.2.3 Plant Rooting Activity Data 24
3.2.4 Soil Moisture Deficits Data 25
3.2.5 Slope Data 26
3.2.6 Planting Pattern Data 27

3.3 GIS and GPS Processing 29
3.3.1 Data Captured and Processes 29
3.3.2 Database Development 30
3.3.3 Generation of Spatial Data 36
3.3.4 Data Integration 53

4 RESULTS AND DISCUSSIONS 60

4.1 Validation of Model 60
4.1.1 Scatter Graph 60
4.1.2 Model Accuracy 70

4.2 Validation of Slope Generation 72

5 CONCLUSIONS AND RECOMMENDATIONS 78

6.1 Conclusions 78
6.2 Recommendations 80

REFERENCES 82

APPENDICES

I The value of root mean square error (RMSE), absolute difference, modeling efficiency (EF) and relative root mean square error (RRMSE) 89
II The value of slope measured by two different methods. Method 1 is determined by using a clinometer at the approximate site while Method 2 is determined by Digital Elevation Model generated from the Triangulated Irregular Network (TIN) model 90

A SPATIAL SITE YIELD POTENTIAL MODEL OF OIL PALM

ABSTRACT

By

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The site yield potential (SYP) has been used as a realistic target for the plantation management to achieve and maximize the oil palm production. This yield potential is currently computed using an empirical and numerical model, which is non-spatial. However, the oil palm yields are known to vary spatially across the plantation. To represent this, Geographical Information System (GIS) and Global Positioning System (GPS) technologies have been incorporated into the model. This has resulted in a spatial SYP model of oil palm that allows the management to quickly compare the target and actual yields over the whole plantation. The SYP model gave poor relative root mean square error of 18.12% and efficiency of –1.60, indicated that the model tended to over-estimate the site yield potential. These poor results were mainly caused by replanting area, the attacks of Rhinoceros beetles and wrong identification of Rengam soil series. When the above fields were removed from the analysis, the model gave low relative root mean square error of 10.9%. However, it still over-estimated the site yield potential by about 5% on average. Apart from this bias, the model performed satisfactorily based on the standard model parameters for precision. Results also show that the mean difference between slopes measured using clinometer and the readily available topographical map of Malaysia with a 20 m contour intervals using triangulated irregular network (TIN) model, were only 0.43 degree, which was below the accuracy of the clinometer of 1 degree, although they were statistically different. Therefore, an empirical model using GIS can be used as a tool to help the management and agronomists to focus on the main problems especially fields with large yield gap. This site yield potential model will require extensive validation before it can be adopted by the oil palm industry.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Malaysia has led technological and managerial developments in oil palm cultivation and marked improvements in yield and reduction in costs of production, which were achieved from advances in agronomic practices, breeding and management (Davidson, 1991). The palm oil industry has important economic implications for our country, Malaysia. Each year, the industry brings in valuable foreign exchange earning to the country, contributing to about 7% of the country's Gross Domestic Product. It provides employment for many in the country, especially to the rural population where it is more crucial.

However, the national oil palm yields have shown little or no improvement over the last two decades (Tinker, 2000). On the other hand, the real palm oil price has declined since 1950 while the production costs have increased almost linearly from 1993 onwards (Goh *et al.*, 1999). The dire consequence is declining profits, which can lead to the non-sustainability of the oil palm industry. It is therefore vital that we elevate the oil palm productivity in order to increase revenue and reduce production costs. The causes for the lack of impact in producing a high standard in management for better production must be figured out to make the oil palm industry more competitive in the future.

1.2 Plantation Management

Plantation management is traditionally based on large-scale extensive practices. Hence, there is a need to review and improve all factors that will contribute to yield reduction and make changes where necessary. The first step is probably to set a