

UNIVERSITI TEKNOLOGI MARA

**INFLUENCE OF SEED SOAKING
TREATMENT ON SEED
GERMINATION AND VIGOUR;
OPTIMAL TRANSPLANTING
SEEDLING AGE AND PRUNING ON
AGRO-MORPHOLOGICAL
PERFORMANCE OF *Jatropha curcas*
L.**

MUHAMAD SYUKRIE BIN ABU TALIP

Thesis submitted in fulfillment
of the requirement for the degree of
Master of Science

Faculty of Applied Science

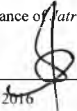
July 2016

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicates or acknowledges as referenced work. This thesis has not been submitted to any other academic institution or non- academic institution for any other degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulation for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of candidate : Muhamad Syukrie Bin Haji Abu Talip
Student I.D No. : 2008548217
Programme : Master of Science /AS780
Faculty : Applied Sciences
Thesis title : Influence of Seed Soaking Treatment on Seed Germination and Vigour; Optimal Transplanting Seedling Age and Pruning on Agro-Morphological Performance of *Jatropha curcas* L.

Signature of candidate : 
Date : 26 July, 2016

ABSTRACT

Jatropha is a large shrub species which is resistant to drought and low soil fertility thus it has a potential alternative keybiofuel source over declining fossil fuel sources. Due to the several agronomic practices information from other countries it should be tested in environment conditions of Sarawak to achieve optimal yield production. The study explored the nursery techniques and early field establishment with three objectives of *Jatropha curcas* Linn. The objective of nursery technique was to investigate the germination percentage of pre-sowing soaking treatment of seeds on liquid fertilizer. The objectives of the study on early field establishment were to determine the optimal transplanting age of *Jatropha* in the field and to examine the effect of pruning management on the growth parameters and yield of *Jatropha*. An experiment using a factorial 3×2 Split Plot Design which were consisting of three seedling ages and two pruning management replicated four times was conducted to study early field establishment. The parameters determined were germination percentage, seedling vigour and mortality percentage. The plant performances observed at field planting were plant height, plant collar diameter, branching pattern, flower and fruit production. The treated seeds with liquid fertilizer showed higher germination percentage on Day Four at 72%. However at Day Nine, there were no significant differences with all treatment recorded germination rate of 97 – 98%. In field condition, one month old seedling showed highest mortality percentage at fifty percent while the two months old seedling showed at 12.5% and four month old seedling was lowest at 6.25%. Generally, there were no significant differences on the plant performance on the seedlings transplanting age as reflected by the number and weight of nuts recorded at the end of the period of study. However, the pruned plants showed significant different in the plants height, primary and secondary branching pattern and bunches production. Furthermore, a strong relationship was shown between the production of branches and fruit nuts total weight. The study provided evidence that seedling age at two months old was the recommended age for transplanting to the field thus reducing seedling period in the nursery as compared to four months old conventional recommended seedling. Pruning management should be conducted at eight months as there was increased yield. The outcomes of this study are very significant contribution to *Jatropha* cultivation in order to have good quality of seedlings and high in production due to good agricultural practice

TABLE OF CONTENTS

	Page
CONFIRMATION BY PANEL OF EXAMINERS	ii
AUTHOR'S DECLARATION	iii
ABSTRACT	iv
ACKNOWLEDGEMENT	v
TABLE OF CONTENTS	vi
LIST OF TABLES	ix
LIST OF FIGURES	xii
LIST OF PLATES	xv
LIST OF ABBREVIATIONS	xvi
 CHAPTER ONE: INTRODUCTION	
1.1 Background of The Study	1
1.2 Problem Statement	3
1.3 Research Questions	4
1.4 Objectives of Study	4
1.5 Scope and Limitation of the study	4
1.6 Significance of study	5
 CHAPTER TWO: LITERATURE REVIEW	
2.1 Description of <i>Jatropha curcas</i> Linn.	6
2.2 Economic Importance of Jatropha	9
2.3 Plant Propagation	10
2.3.1 Seed Propagation	11
2.3.1.1 Seed Dormancy Treatment	14
2.3.2 Vegetative Propagation	17
2.4 Plants Branching and Pruning	19

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Jatropha is a multipurpose large shrub species which is drought resistant and suitable to be planted on low soil fertility in the tropical and subtropical regions. Believed to be a native from Central America and Mexico, *Jatropha* is now cultivated in Africa and Asia. There is misconception that the *Jatropha* plant requires little water and almost no inputs in terms of fertilizers and pesticides (Arvidsson et al., 2011). The fact is that the *Jatropha* plant does require all these inputs and maintenance in amounts significantly lower than for many other energy crops (Banerji, 1985). Thus it has become a potential alternative key biofuel source over declining fossil fuel resources (Becker and Francis, 2003). In addition, the uses of biofuel extracted from *Jatropha* have advantage due to lesser greenhouse gases emission to the atmosphere (George et al., 2005).

Its scientific name is *Jatropha curcas* Linn. belonging to the genus Euphorbaceae. The plant can reach a height of three to eight meters, but it can grow up to a height of eight to ten meters under favourable conditions. It is an early maturing tree and producing seeds within 12 months under favourable conditions and good agronomic management practices (Heller, 1996). Samba et al. (2007) reported that *Jatropha* is fast growing and produce seeds after approximately two years, depending on many factors such as rainfall conditions and propagation methods either from cuttings or seeds. When optimal planting methods are followed, the yields have been better than average (Basha et al. 2009). Deans and Svoboda (1993) stated that yield improvement can be done by having proper planting systems in term of planting date and planting density. The tree produces seeds containing about 30 – 35% of non-edible oil (Heller, 1996; Grimm, 1996; RF, 1998). Kalam et al. (2012) reported that the waste of *Jatropha* from seed extracted can be used to produce organic fertilizer due to high content of nitrogen compound, protein, and some anti-pesticide compounds. Thus, the application of waste on marginal soil after four to five years treatment will become suitable for planting food crops or reforestations. According to FACT