

**EFFECT OF MOISTURE ABSORBENT HYDRO POLYMER
(ZEBU) ON GROWTH OF COCONUT (*Cocos nucifera* L.)
SEEDLINGS IN THE COCONUT NURSERY**



BY

P. GAYASHINI KELUM PERERA



FAG474



Project Report
Library - EUSL

FACULTY OF AGRICULTURE

EASTERN UNIVERSITY

SRI LANKA

2017

PROCESSED
Main Library, EUSL

ABSTRACT

Coconut palm is one of the most important plantation crop worldwide. Success of coconut plantation establishment starts with the production of good quality planting materials. Selecting the best planting materials before field planting assures higher productivity. Cost of production of coconut seedling is very high in coconut nurseries, because coir dust is becoming a scarce resource even within the Coconut Triangle. Therefore, the use of coir dust in the potting mixture might not be a feasible proposition in the near future. Therefore it was considered imperative to test the suitability of other options available locally. Moisture absorbent hydro polymer (Zeba) is one the best alternative to the coir dust used in potting media of coconut seedlings. Therefore an experiment was conducted to investigate the effect of moisture absorbent hydro polymer on growth of coconut seedlings and water retention characteristics of the soil.

The experiment was carried out under a plant house and laboratory of the Agronomy Division, Coconut Research Institute of Sri Lanka (CRI), Lunuwila. The experiment was laid out in the Complete Randomized Design (CRD) with twelve replicates.

Different potting mixtures were used as treatments such as T₁ – top soil: organic manure: coir dust, 1:1:1, T₂ – top soil: organic manure: moisture absorbent compound, 1:1:1, T₃ – top soil: moisture absorbent compound, 1:1, T₄ – top soil: coir dust, 1:1. Measurements were taken and data were statistically analyzed.

There was no significant difference ($P>0.05$) among tested treatments in seedling girth and root volume. The results revealed that there were significant ($P<0.05$) differences among the treatments on seedling height, number of fully opened leaves, leaf area, dry

leaf area, dry shoot weight, dry root weight, soil moisture content and soil water retention capacity. Plant growth rate was increased in T₁.

According to the chi square values, there was significant ($P < 0.05$) differences among the treatments on number of fully opened leaves at 10th and 12th weeks after planting. T₁ exhibited the highest seedling height, number of fully opened leaves, leaf area, dry shoot weight, dry root weight. Same as the T₁ (top soil, coir dust and organic manure) potting mixture, the T₃ (top soil and moisture absorbent) potting mixture also caused to the considerable increase in plant height, number of fully opened leaves, leaf area, dry shoot weight, dry root weight of coconut seedlings while T₃ exhibited highest soil moisture content and water retention capacity also. Therefore application of moisture absorbent hydro polymer could be used to get maximum growth and soil moisture characteristics of coconut seedlings. Then cost of production of coconut seedlings may be reduced.

Keywords: Coconut, plantation, planting material, coir dust, moisture absorbent hydro polymer

TABLE OF CONTENT

ABSTRACT	i
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	v
LIST OF TABLES	viii
LIST OF FIGURES	x
LIST OF PLATES	xi
ABBREVIATIONS	xii
CHAPTER 1	1
INTRODUCTION.....	1
Objectives.....	5
CHAPTER 2	6
2.0 Review of Literature.....	6
2.1 Coconut	6
2.1.1 Coconut palm.....	6
2.1.2 Taxonomy	7
2.1.3 Proximate composition	8
2.1.4 Origin and distribution of Coconut.....	8
2.1.5 The place of coconut in the world and its position in Sri Lanka	9
2.1.6 Sri Lanka coconut production.....	11
2.1.7 Production of quality planting materials and its importance.....	12
2.1.8 Types of coconut nursery	13
2.1.8.1 Conventional nursery.....	14
2.1.8.2 Polybag nursery	15
2.1.8.3 Pre nursery preparation.....	15
2.1.8.4 Raising coconut seedlings in poly bags.....	17
2.1.8.5 Advantages of polybag seedlings	18
2.1.9 Coconut nursery management	19
2.1.9.1 Selection of the Nursery site.....	19
2.1.9.2 Nursery Beds	19
2.1.9.3 Moisture conservation in Soil bed	20
2.1.9.4 Irrigation	20
2.1.9.5 Weed control.....	21
2.1.9.6 Termite attack	21

2.1.9.7 Removal of non-germinated seedling.....	21
2.1.9.8 Removal of low quality seedlings	22
2.1.10 Water requirement for coconut nursery.....	22
2.1.10.1 Moisture conservation in coconut nursery.....	23
2.1.10.2 Importance of moisture conservation	23
2.1.10.3 Method of moisture conservation.....	25
2.1.10.4 Problems in conventional moisture conservation methods in coconut nurseries in Sri Lanka	26
2.1.10.5 Materials used to conserve moisture in potting media.....	27
2.2 Starch-based moisture absorbent (Zeba).....	27
2.2.1 Different sizes of particles of moisture absorbent (Zeba)	30
2.2.1.1 ZEBA XL (Large Granule Formulation).....	30
2.2.1.2 ZEBA SP (Small Granule size)	30
2.2.1.3 ZEBA RD (Powdered Formulation).....	31
2.2.2 Key benefits of moisture absorbent.....	31
CHAPTER 3	32
3.0 MATERIALS AND METHODS	32
3.1 Description of the Experimental Site	32
3.2 Poly bag preparation.....	33
3.3 Collection of different ingredients for potting media	33
3.4 Experiment	34
3.4.1 Experimental Procedure	34
3.4.1.2 Preliminary study.....	34
3.4.2 Pot Culture Experiment	37
3.4.3 Treatments	37
3.4.4 Laying in poly bags	38
3.4.5 Experimental Design	39
3.4.6 Agronomic Practices.....	40
3.4.7 Irrigation	40
3.4.8 Fertilizer application.....	40
3.4.9 Pest and disease control.....	41
3.4.10 Weeding.....	41
3.5 Measurements.....	41
3.5.1 Seedling height	42
3.5.2 Seedling girth.....	42

3.5.3. Number of fully opened leaves.....	42
3.5.4 Leaf area	42
3.5.5 Potting media moisture content	42
3.5.6 Moisture requirement of the potting media	43
3.5.7 Volume of the roots	43
3.5.8 Dry shoot biomass	43
3.5.9 Dry root biomass	44
3.6 Cost analysis.....	44
3.7 Statistical analysis	44
CHAPTER 4	45
4.0 RESULT AND DISCUSSION	45
4.1 Seedling height.....	45
4.2 Number of fully opened leaves	50
4.3 Leaf area.....	51
4.4 Dry weight of shoot.....	53
4.5 Dry weight of roots	54
4.6 Seedling girth	56
4.7 Root volume	58
4.8 Moisture content.....	59
4.9 Water retention Capacity.....	61
4.10 Cost analysis.....	62
CHAPTER 5	63
5.0 CONCLUSION	63
SUGGESTIONS FOR FURTHER STUDIES	65
REFERENCES	66
APPENDIX	79