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Preliminary Study on Influence of Different Media and Rooting Hormone
of Shoot Cutting of Eucalyptus



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အညွန့်ကိုင်းထိုးနည်းစနစ်ဖြင့် ယူကလစ်စပမ်မျိုးပင်အားကနဦးစမ်းသပ်လေ့လာခြင်း

သီရိတိုးခိုင်၊ တောအုပ်ကြီး
ယဉ်ယဉ်သိမ့်၊ ဦးစီးအရာရှိ
တင်တင်မူ၊ လက်ထောက်သုတေသနအရာရှိ
သစ်တောသုတေသနဌာန

စာတမ်းအကျဉ်း

ယူကလစ်စပမ်မျိုး ကိုခန္ဓာပိုင်းမျိုးပွားနည်းတစ်မျိုး ဖြစ်သည့် အညွန့်ကိုင်းထိုးနည်းစနစ်ကို အသုံးပြုပြီး ရေငွေထိန်းခန်းအတွင်း၌ (၁) မတူညီသော အဟာရမျိုးပွားစာသုံးမျိုးဖြင့် စမ်းသပ်ခြင်းနှင့် အမြစ်အားတိုးဆေးနှစ်မျိုးဖြင့် စမ်းသပ်ခြင်း၊ (၂) ကွဲပြားခြားနားသောရာသီဥတုမှ အမြစ်ထွက်ရှိမှုနှင့် ရှင်သန်နိုင်မှုကို စမ်းသပ်သောစာတမ်းဖြစ်ပါသည်။ စမ်းသပ်မှု (၁) ၏ စာရင်းအင်းပညာတွက်ချက်မှုအရ IBA အမြစ်အားတိုးဆေးသည် အမြစ်ထွက်နှုန်း အကောင်းဆုံးဖြစ်ကြောင်း တွေ့ရှိရပါသည်။ စမ်းသပ်မှု(၂)၏ ရလဒ်များကို စာရင်းအင်းပညာ တွက်ချက်မှုအရနေ့ဥတုသည် အမြစ်ထွက်ရှိမှု အများဆုံးဖြစ်ကြောင်းတွေ့ရှိရပါသည်။

**Preliminary Study on Influence of Different Media and Rooting Hormone of
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Abstract

The paper studied the vegetative propagation method especially shoot cutting of Eucalyptus species at three different hormones and different rooting hormone. Two experiments were conducted to find out the effect of different hormones and different rooting hormone on shoot cutting and the effect of seasonal variation on shoot cutting. According the statistical analysis, IBA showed the best rooting hormone. Hot season was maximum survival rate of shoot cutting.

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Preliminary Study on Influence of Different Media and Rooting Hormone of Shoot Cutting of Eucalyptus

1. Introduction

Trees are usually propagated by seeds, root, rhizome or leaves. Propagates raised by vegetative means, retain the genetic constitution of parent plants without segregation. It has been practiced for a long time in forestry and horticulture to produce planting stock of desired genetic constitution in tree/crop improvement programs. Another advantage is that large scale multiplication of selected individuals can be easily achieved for the commercial exploitation of improved varieties. Besides, vegetative propagation can be used for regeneration of tree species having problems of irregular seeding habits, long flowering and fruiting intervals, poor seed setting, low percentage of germination and undesirable short or long period of seed dormancy.

Nowadays, developing countries are trying to replenish the degraded forest by planting with fast growing species. The Forest Department is establishing, various kind of plantations such as commercial, watershed management, industrial and local supply wood plantation. Eucalyptus is the important raw material for the pulp and paper industry and on the basis of plantation area, and is one of the most productive forest crops especially in tropical area. The demand for pulp and paper production from Eucalyptus is increasing at alarming rate daily. Data is still lacking on the use of vegetative propagation for Eucalyptus, although there are a number of research regarding with other species. Reproduction of this paper emphasize on the influence of medium and hormone and seasonal variation on rooting and shooting of Eucalyptus.

2. Objective

2.1. General Objective

To examine the vegetative propagation of Eucalyptus by Shoot Cutting.

2.2. Specific Objectives

- To investigate the rooting ability of shoot cutting
- To determine the effect of different hormone on rooting
- To find out the effect of seasonal variation in rooting by shoot cutting

3. Material and Methodology

There were two experiments in this study.

Experiment I The influence of different rooting hormone on shoot cutting at the different rooting media

Experiment II The effect of seasonal variation of shoot cutting

3.1 Experiment I: The influence of different rooting hormone on shoot cutting.

3.1.1 Experimental Site

An experiment on vegetative propagation of Eucalyptus was carried out in the Mist Chamber located at the Forest Research Institute. The experiments were conducted in Mist Chamber, which were under controlled condition of temperature (25°-35°) C, light and relative humidity (60-90).

3.1.2 Experiment Design and treatment Detail

The experiment was laid out in a Randomized Complete Design (RCD) with 4 replicates. The treatments consisted of medium (sand or soil mixture or mineral) and Root hormone ((Indole Butyric Acid)IBA or Ferti-start).

3.1.3 Preparation of Cutting Materials

A Secateurs was used for shoot cuttings. The shoot cuttings were collected from the nursery early in the morning (between 08:30 Am to 09:30 Am). And then, two third of the top leaves were clipped off, leaving only two third of the top leaves to reduce transportation rate of shooting. The bases of the cutting were dipped in the different root hormone.

Each treatment consisted of 15 cuttings. These cuttings were planted in the three different medium.

3.1.4 Rooting Medium

Three different propagation media namely; only river sand, 1:1 ratio of river sand and soil mixture and 1:1:1 ratio of river sand, soil mixture and

mineral. When the shoot cutting were planted in the media and placed in the Mist Chambers.

3.1.5 Preparation of the Rooting Hormones

IBA(Indole Butyric Acid) and Ferti-start were used in this experiment.

3.1.6 Misting System

A fine spray of water droplets on the leaves of cuttings few minutes prevents them from wilting, but the evaporation of water from the leaves varies with the prevailing weather conditions.

mist was as

Month	Max C	Min C
Jan	28	16
Feb	30	17
Mar	32	18
Apr	38	22
May	40	23
June	40	23
July	39	23
Aug	38	19
Sep	34	20
Oct	31	18
Nov	29	16
Dec	28	16

Temperature recorded in the chamber throughout the year follows.

Average maximum and minimum temperature throughout study months in the Mist Chamber.

3.2 The Effect of Seasonal Variation on Shoot Cutting

In the seasonal variation experiments the seasons were divided into three periods. Hot season (March to May), rainy season (June to September) and cold season (November to January). There was seasonal variation in the development of shoot cuttings. With the temperature of 40° C Max and 23° C Min, there was a vigorous growth of shoots.

3.3 Measurement and Statistical Analysis

The observations for the condition of shoot cutting were made by daily to record both the temperature and relative humidity from morning, noon to the evening. Weekly assessment was made on shoot cuttings two weeks after

treatment. The dried and dead shoot cuttings and the shed leaves were removed from the media immediately to prevent spread for fungus and diseases.

A Complete Randomized Design (CRD) was laid out at this experiment. Data collected has been processed and accumulated by using Microsoft Office Excel 2003. Collected data has been statistically analyzed by using statistical software: Analysis of Variance (ANOVA) was done by using Statistics version 8.0. Mean values were separated by using Least Significant Differences (LSD) test as 0.05 levels.

4. Result and Discussion

4.1 Experiment I: The influence of different media and rooting hormone on shoot cutting

LSD All- Pairwise Comparisons Tests of survival rate (Appendix. 1, 2 and 3, Fig) Indicated that the effect of different media and rooting hormone on shooting cutting in three seasons.

According to the statistical analysis, the sand media was better than the last two in three seasons. The best second media was 1:1 ratio of sand and soil mixture. The last one was the least at the survival percentage. Therefore, pure sand media could be survived and rooted in shoot cutting of Eucalyptus. The statistical analysis showed that IBA is the best rooting hormone.

According to the statistical analysis, , the relation of media and rooting in the hot season and cold season showed that Pure sand and IBA pointed out the best performance and the second performance was sand and soil mixture (1:1) and IBA. However in the cold season, the best performance was Pure sand and IBA, the second performance was sand and soil mixture and manure (1:1:1).

4.2. Experiment II: The Effect of Seasonal variation on shoot cutting.

In this experiment, the survival rate of shooting at hot season was high. March and April was found to be the best for the percentage of survival (Fig) It was known from experience that the optimum time is often before growth initiation in the plant cycle.(Appendix 1,2,3)

5. Conclusion and Recommendation.

5.1 Conclusion

The result of experiments indicated that all 3 means of different media were no significantly different among the means. But all 3 means of different hormone were significantly different from one another. In the correlation between media and different hormone, there were 4 groups (A, B, etc.) in which the means are not significantly different from one another.

5.2 Recommendation

We should use IBA for the best survival rate of shoot cutting and carry out shoot cutting at the hot season due to the best survival rate of shoot cutting. We should use only pure sand media for root development. Since, the collection between only pure sand media and IBA rooting hormone was the best, we should use it for best survival rate of shoot cutting.

Since IBA is a very expensive chemical rooting hormones, we may use Ferti-start at the hot season in the sand media for the best survival rate as the alternate way.

Appendix 1

Rainy Season**LSD All – Pairwise Comparisons Tests of SV for Media**

Media	Mean	Homogeneous Group
Sand	7.9167	A
Sand & Soil Mixture (1:1)	6.6667	B
Sand& Soil Mixture & Manure (1:1:1)	5.4167	C

Alpha 0.05 Standard Error for Comparison 0.2414
 Critical T Value 2.064 Critical Value for Comparison 0.4981
 Error term used : Rep * Media*chem, 24 DF
 All 3 means are significantly different from one another

LSD All –Pairwise Comparison Test of SV for Chemical

Chemical	Mean	Homogeneous Group
IBA	8.2500	A
Ferti- Start	6.3333	B
Untreated (Control)	5.4167	C

Alpha 0.05 Standard Error for Comparison 0.2414
 Critical T Value 2.064 Critical Value for Comparison 0.4981
 Error term used: Rep*Media*Chem, 24 D
 All 3 means are significantly different from one another

LSD All- Pairwise Comparisons Test of SV for Media * Chem

Media* Chem	Mean	Homogeneous Groups
1 2	9.5000	A
2 2	8.5000	B
1 1	7.5000	C
1 3	6.7500	C
2 1	6.7500	C
3 2	6.7500	C
2 3	4.7500	D
3 1	4.7500	D
3 3	4.7500	D

Alpha 0.05 Standard Error for Comparison 0.4181
 Critical T Value 2.064 Critical Value for Comparison 0.8628
 Error term used: Rep * Media*Chem, 24 D
 There are 4 groups (A,B, etc.) in which the means are not significantly different from one another

Appendix 2

Hot season**LSD All – Pairwise Comparisons Tests of SV for Media**

Media	Mean	Homogeneous Group
Sand	10.167	A
Sand & Soil Mixture (1:1)	8.667	B
Sand& Soil Mixture & Manure (1:1:1)	7.000	C

Alpha 0.05 Standard Error for Comparison 0.3257
 Critical T Value 2.064 Critical Value for Comparison 0.6723
 Error term used : Rep * Media*chem, 24 DF
 All 3 means are significantly different from one another

LSD All –Pairwise Comparison Test of SV for Chemical

Chemical	Mean	Homogeneous Group
IBA	10.250	A
Ferti- Start	8.417	B
Untreated (Control)	7.167	C

Alpha 0.05 Standard Error for Comparison 0.3257
 Critical T Value 2.064 Critical Value for Comparison 0.6723
 Error term used: Rep*Media*Chem, 24 D
 All 3 means are significantly different from one another

LSD All- Pairwise Comparisons Test of SV for Media * Chem

Media* Chem	Mean	Homogeneous Groups
1 2	11.750	A
2 2	10.750	AB
1 1	10.000	B
1 3	8.750	C
2 1	8.250	C
3 2	8.250	C
2 3	7.000	D
3 1	7.000	D
3 3	5.750	E

Alpha 0.05 Standard Error for Comparison 0.5642
 Critical T Value 2.064 Critical Value for Comparison 1.1644
 Error term used: Rep * Media*Chem, 24 D
 There are 4 groups (A,B, etc.) in which the means are not significantly different from one another

Appendix 3

Cold season**LSD All – Pairwise Comparisons Tests of SV for Media**

Media	Mean	Homogeneous Group
Sand	5.5833	A
Sand & Soil Mixture (1:1)	5.3333	A
Sand& Soil Mixture & Manure (1:1:1)	5.0833	A

Alpha 0.05 Standard Error for Comparison 0.2414
 Critical T Value 2.064 Critical Value for Comparison 0.4981

Error term used : Rep * Media*chem, 24 DF

All 3 means are no significantly different among the means.

LSD All –Pairwise Comparison Test of SV for Chemical

Chemical	Mean	Homogeneous Group
IBA	6.5833	A
Ferti- Start	5.5000	B
Untreated (Control)	93.9167	C

Alpha 0.05 Standard Error for Comparison 0.2414
 Critical T Value 2.064 Critical Value for Comparison 0.4981

Error term used: Rep*Media*Chem, 24 D

All 3 means are significantly different from one another

LSD All- Pairwise Comparisons Test of SV for Media * Chem

Media* Chem	Mean	Homogeneous Groups
1 2	7.0000	A
3 2	6.5000	AB
2 2	6.2500	ABC
1 1	5.7500	BCD
3 1	5.5000	CD
2 1	5.2500	D
1 3	4.0000	E
3 3	4.0000	E
2 3	3.7500	E

Alpha 0.05 Standard Error for Comparison 0.4640
 Critical T Value 2.064 Critical Value for Comparison 0.9576

Error term used: Rep * Media*Chem, 24 D

There are 4 groups (A,B, etc.) in which the means are not significantly different from one another

Figure 1.- Experiment II : The Effectiveness of Different Rooting Media at Different Season.

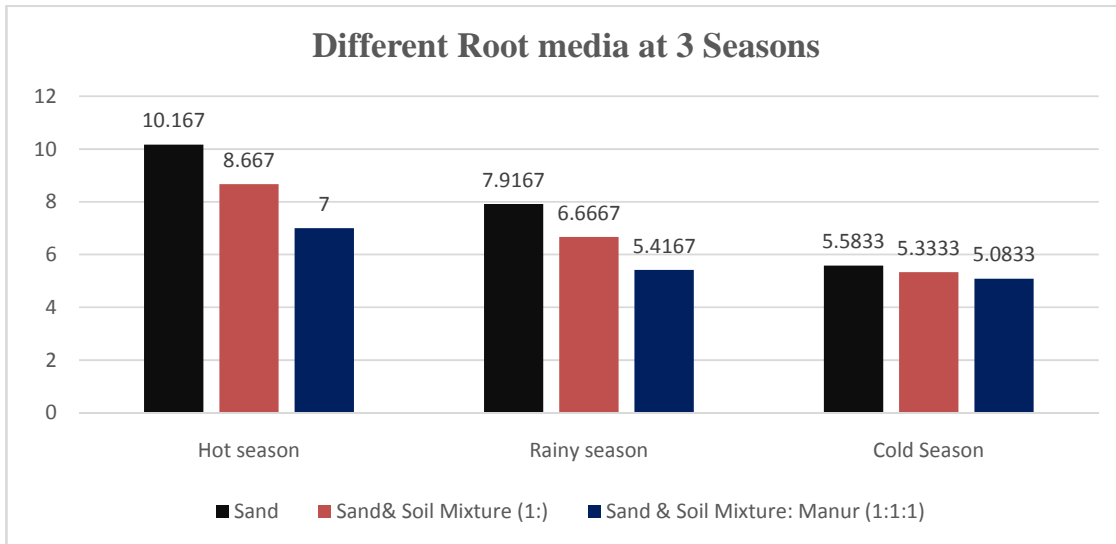


Figure 2.- Experiment II : The Effectiveness of Different Rooting Hormones at Different Season.

