The Effects of Coconut Milk on the Rooting Of Two Types of Cutting of Terminalia Catappa

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Abstract— Objectives: The trial investigated the effects of coconut milk on stem and root cuttings of *Terminalia catappa*.

Methodology and results: Each cutting type treated with three coconut milk concentrations (0%, 50% and 100%).The experiment was a 2x3 factorial set, six treatment combinations replicated four times and laid out in a completely randomized design. The results showed that root cuttings produced significantly more cuttings with roots, number of roots on rooted cuttings and rooted cuttings with the longest roots ($P<0.05$) at 14 weeks after planting. Although cuttings treated with 100% coconut milk produced more cuttings with roots, number of roots on rooted cuttings and rooted cuttings with the longest roots, their results were not significantly better ($P>0.05$) than those treated with 50% and 0% coconut milk. There was a significant interaction ($P<0.05$) between cutting type and coconut milk concentration on the number of cuttings with roots, number of roots on rooted cuttings and rooted cuttings with the longest roots. Stem cuttings produced significantly more leaves ($P<0.05$) at 14 weeks after planting.

Conclusion and recommendation: There was a significant interaction ($P<0.05$) between cutting type and coconut milk concentration on the number of leaves produced. It was recommend that root cuttings treated with 100% coconut milk should be used for vegetative propagation programs of the species

Key words: Coconut milk, cuttings, rooting, propagation

I. Introduction

The United Nations Food and Agricultural Organization (FAO) estimated that 94 million hectares of global forest were lost during the last decade of the 20th Century (FAO, 2005). Seedlings are the most widely used reforestation stock material. However, it may not be possible to get a desirable character from a plant produced from seed (Hartman et al, 2002).Vegetative propagation is a means by which genetically identical plants are produced year after year so that successful varieties are maintained (Fennessy et al, 2000). Plants spread quickly by this means of vegetative propagation (Fennessy et al, 2000). Allan and Greenwood, (2001) said that a large number of flowering plants are able to reproduce asexually by vegetative propagation consequently, it provides a more effective means of achieving genetic improvement (Husen and Pal, 2006). Vegetative propagation through cuttings involves the use of any detached plant part, which, under favorable conditions will lead to the regeneration of new plants identical to the parent plant. Cuttings are an important means of starting new plants (David and James, 1998). In spite of the advantages cuttings and other vegetative propagates have, the suitability of a particular stock/ cutting type for propagation depends on its potential for growth and survival in the environment where it is out-planted; this is a measure of propagation success (Ritchie G.A, 1984, Reilly, 2002). They comparison of the regeneration potential of cuttings and seedlings has been made possible by traits common to both materials. According to (Morin and Gagnon, 1992) most studies that compare the potential for growth and survival of seedlings and cuttings have drawn conclusions based on either morphological or physiological measurements.

Terminalia catappa L is an averagely large tree that belongs to the family combretaceae (Walter et al, 1999).It been introduced and naturalized in the tropics. This tree species propagated from seed. Propagation by seed however, gives rise to variation with intermediate form in various characters such as fruit size, color and shape. Its kernels (nuts) are easily damage during extraction. The fruit and nut start to mould within a period of 1-2 days at ambient temperatures (Evans, 1999).The demand for forest products such as fruits, timber, tannins, medicinal plants etc. has increased considerably in the last couple of decades. There is therefore a need to improve the early growth of *Terminalia catappa* at the nursery stage to facilitate mass production of the species and increase its availability for the production of fruits, nuts, timber, ornamental and recreation purposes. The trial was undertaken to (i) To determine the effect of coconut milk on the vegetative propagation of cuttings of *Terminalia catappa* and (ii) To determine the most suitable cutting type in the vegetative propagation of the tree species.

II. Materials and Methods

The trial was carried out in the nursery of the Federal College of Forestry, Jos (Latitude 09°51'N, Longitude 08°53'E at an altitude of 1158m above sea level) between February and June 2007.Stem and root cuttings were collected from a 12-year old tree of *Terminalia catappa.* Each of the stem and root cuttings were treated with three concentrations of coconut milk 0%, 50% (50cl coconut milk + 50cl water) and 100%. The treated cuttings were then immersed in a fungicide (Ridomil), set in polythene bags containing sterilized river sand, and watered twice daily. Sprouting cuttings treated with insecticide (Rambo) to control insect attack.

The experiment was a 2x3 factorial set (two cutting types x three coconut milk concentrations) i.e. six treatment combinations replicated four times and laid out in a completely randomized design. Each treatment combination had four cuttings, replicated 4 times. After 14 weeks, the following parameters assessed; presence of leaves, number of rooted cuttings, and number of roots on rooted cuttings

and the length of the longest root on rooted cuttings. The treatments compared using analysis of variance (ANOVA).

III. Results and Discussion

Cutting type				
COCONUTMILK CONCENTRATION (%)	STEM CUTTING	ROOT CUTTING	MEAN	$LSD_{0.05}$
O	0.2	2.3	1.3	
50	0.9	3.4	2.1	0.9
100	0.6	5.2	2.9	
$LSD_{0.05}$ interaction= 0.7				
Mean	0.6	3.6		
LSD0.05 = 1.1				

Table 1: Effects of coconut milk concentration and cutting type on the number of rooted cuttings of Terminalia catappa after 14 weeks

Cutting type				
COCONUTMILK CONCENTRATION (%)	STEM CUTTING	ROOT CUTTING	MEAN	$LSD_{0.05}$
O	0.5	6.4	3.6	
50	1.6	9.3	5.5	4.2
100	0.7	11.6	6.1	
$LSD_{0.05}$ interaction= 2.9				
Mean	0.9	9.1		
LSD0.05 = 5.1				

Table 2: Effects of coconut milk concentration and cutting type on the number of roots on rooted cuttings of Terminalia catappa after 14 weeks

Cutting type				
COCONUTMILK CONCENTRATION (%)	STEM CUTTING	ROOT CUTTING	MEAN	$LSD_{0.05}$
O	0.7	6.2	3.7	
50	1.6	8.3	5.0	3.1
100	1.2	10.4	5.6	
$LSD_{0.05}$ interaction= 2.9				
Mean	1.7	8.3		
LSD0.05 = 3.7				

Table 3: Effects of coconut milk concentration and cutting type on the length of the longest root on rooted cuttings of Terminalia catappa after 14 weeks

Cutting type				
COCONUTMILK CONCENTRATION (%)	STEM CUTTING	ROOT CUTTING	MEAN	$LSD_{0.05}$
O	1.4	0.0	0.7	
50	3.6	0.0	1.8	1.6
100	2.3	0.0	1.2	
$LSD_{0.05}$ interaction= 1.1				
Mean	2.4	0.0		
LSD0.05 = 2.0				

Table 4: Effects of coconut milk concentration and cutting type on the number of leaves on sprouted cuttings of Terminalia catappa after 14 weeks

The results in Tables 1, 2 and 3 show that root cuttings produced significantly more cuttings with roots, number of roots on rooted cuttings and rooted cuttings with the longest roots ($P<0.05$) than stem cuttings, at 14 weeks after planting. According to Ifenkwe and Akalusi 2004 the presence of terminal buds, resulting in higher concentrations of phyto-hormones (auxin-like substances) in the apical meristem of stem cuttings; that are not present in root cuttings caused the stem cuttings to utilize most of their reserves in shoot development (Table 4) which is detrimental to root formation. The effectiveness of the cutting type is necessary for optimal production of roots. High levels of amino acids are produce at the root base of plants for root cuttings (Hartman *et al*, 2002). The results revealed that the number of rooted cuttings and number of roots on rooted cuttings. The length of the longest roots on rooted cuttings increased as coconut milk concentration increased. The reasons might be due to plant higher hormone concentrations that had favored root initiation, formation and elongation. (Davis and Joiner, 1980; Ladipo, 1989; Ifenkwe and Akalusi, 2004).Although cuttings treated with 100% coconut milk produced the most rooted cuttings, number of roots on rooted cuttings and rooted cuttings with the longest roots (Tables 1, 2 and 3) the results were not significantly better ($P >0.05$) than those treated with 50% and 0% coconut milk. There was however a significant interaction ($P<0.05$) between cutting type and coconut milk concentration in the number of rooted cuttings, number of roots on rooted cuttings and rooted cuttings with the longest roots.

IV. Conclusion

Based on the results obtained from this study, it`s concluded that Terminalia catappa can be propagated from root cuttings using phyto-hormones. We also recommend that vegetative propagation programs should use root cuttings treated with 100% coconut milk for an optimum results.

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ANNEXES

PLATE I: ROOTED ROOT CUTTING OF Terminalia Catappa TREATED WITH 0% COCONUT MILK 14 WEEKS AFTE PLANTING

PLATE II: ROOTED ROOT CUTTING OF Terminalia Catappa TREATED WITH 50% COCONUT MILK 14 WEEKS AFTER PLANTING

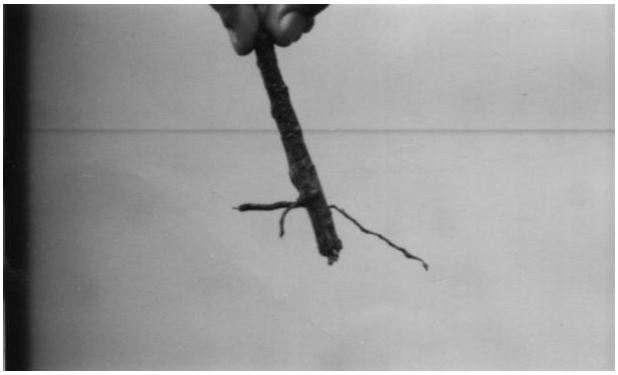

PLATE III: ROOTED ROOT CUTTING OF Terminalia Catappa TREATED WITH 100% COCONUT MILK 14 WEEKS AFTER PLANTING

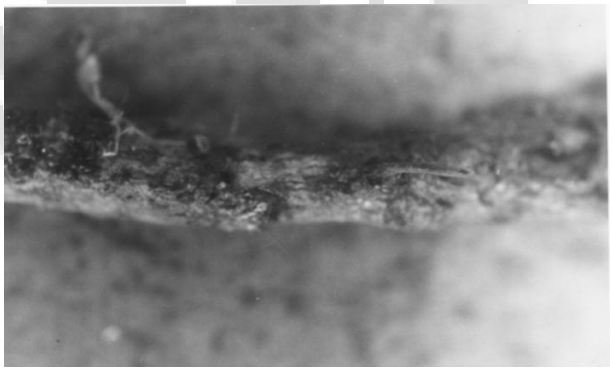

PLATE IV: ROOTED STEM CUTTING OF Terminalia Catappa TREATED WITH 50% COCONUT MILK 14 WEEKS AFTER PLANTING

