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### Original article

## Pretreatment techniques affect seedling growth characteristic *Moringaoleifera*

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#### ABSTRACT

*Moringa oleifera*, commonly called the horseradish tree, drumstick tree, ben oil tree, miracle tree, and Mother's Best Friend, known for its multi-purpose attributes, wide adaptability, and ease of establishment. Its leaves, pods and flowers packed with nutrients important to both humans and animals. Where diets lack in these essential nutrients the *Moringa* tree makes a major contribution to human health. The overall aim of this study was to gain further knowledge on how to cultivate, *Moringa oleifera* in nurseries in order to obtain more high quality seedling and higher yields, mainly during the dry season under dry tropical conditions in Sudan. Three pre-treatment techniques soaking in water for (0.0hrs, 12hrs, 18hrs) used in determination of growth parameters such as height, width, crown and root /shoot ratios, The results indicate that variation in growth and productivity within the species under investigation is significant at the initial three months. Growth of control (0.0 water soaking) was faster and better than other two treatments. Therefore seed of *moringa* do not need treatment.

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## 1. Introduction

In recent years, interest has grown in the utilization of what have come known as 'multipurpose' plants. One such plant is *Moringa oleifera* Lam (syn. *Moringa pterygosperma*), the most widely cultivated species of a monogeneric family Moringaceae. *Moringaoleifera* is one of the 14 species of family Moringaceae, native to India, Africa, Arabia, Southeast Asia, South America, and the Pacific and Caribbean Islands (Iqbal *et al.*, 2006). Because *M. oleifera* naturalized in many tropic and subtropics regions worldwide, a number of names such as horseradish tree, drumstick tree, ben oil tree, miracle tree, and Mother's Best Friend refer to the plant. (Jahn, 1981). It called 'Shagara al Rauwaq' in Nilevalley (von Maydell, 1986). According to Muluvi *et.al* (1999), the Moringa tree introduced to Africa from India at the turn of the twentieth century where used as a health supplement and it was originally an ornamental tree in the Sudan, planted during British rule in the alleys along the Nile, public parks, and the gardens of foreigners. It seems likely that the Arab women of Sudan discovered this remarkable clarifier tree (Jahn1986). The Moringa consumed by humans throughout the century in diverse culinary ways (Iqbal *et al.*, 2006). Almost all parts of the plant used for taste, flavor or as vegetable and seed activities (Chumark *et al*, 2008) culturally for its nutritional value, purported medicinal properties (DanMalam *et al*, 2001; Dahiru *et al*, 2006). The investigation of the different parts of the plant is multidisciplinary, including but not limited to nutrition, ethnobotany, medicine, analytical chemistry, phytochemistry and anthropology (McBurney *et al*, 2004). The aim of this study to investigating the effects of seed pre-treatment techniques on uniform germination and successful establishment and determine feasible and practical seed dormancy – breaking method as reflected uniform germination. Research objective was to analyze the effects of different re-establishment techniques through three pre-treatment techniques soaking in water for (0.0hrs.12hrs, 18hrs) on seedling growth and survivorship during the nursery stage, to investigate the growth characteristic of the plant species at the nursery stage for successful establishment and development. Specific objectives include Determination of growth parameters such as height, width, crown and root /shoot ratios, with different seed treatment

## 2. Materials and methods

Seeds used in the experiment collected from Kenana field Northeast kenana factory White Nile state Sudan. The experiment conducted in the nursery of the Forests National Corporation Center at AD Duwem city White Nile state during the period 26/3/2011-26/6/2011 following the ordinary nursery practice for raising forest tree seedlings. The seedling was grown in polythene bags of 25 cm width by 30 cm length when flat. The soil used river silt .No fertilizers used and three seeds grown in each bag. The seedling were watered every three days through flood irrigation which is the common practice with sunken nursery bed The seedling were placed in beds under the shade in complete randomized design with 3 replicates . For each pretreatment180 seedling were raised i.e. 60 seedling per plot. The seedling growth parameters were measure Resultmonthly then the seedling dried at 80<sup>°</sup>C until a constant weight obtained and the following assessments made. Total dry weight (g) shoot dry weight (g) and root dry weight (g). All results statistically analyzed with the statistical package MSTATC program. Analysis of variance (ANOVA) and difference among treatments means were determined by Duncan, Multiple Range test at (P = 0.05) level.

## 3. Result and discussion

### 3.1. Seedling Characteristics

Table (1) shows mean seedling characteristic by treatment for moringa in third month of growth. Seedling growth evaluated in term of assessment of nine growth parameters .The results showed significant differences for all growth characteristics of the three treatments. From the result obtained it is apparent that shoot of( control) 0.0 water socking grow faster in length .The maximum root length attained( control) 0.0water socking and 18hrs H<sub>2</sub>O socking is lowest one in both shoot and root length. Table (2, 3) 0.0hrs H<sub>2</sub>O socking showed good growth for three-month. 18hrs H<sub>2</sub>O socking showed better growth in the first months on root growth and showed lowest growth as the third month. For the root growth among the three treatments, it was significant during initial first months when using root length as only criteria for evaluating growth performance and productivity. This may be explained in the light of the findings obtained by Ahmed (in Ibrahim 1988) for Acacia subspecies ,that root length is

of critical importance at early stage as deeper primary root system provides access to more reliable source of water in short time than available to shallow root system. However, under difficult conditions particularly low soil moisture, the ratio of root length to shoot length considered as an important factor. In survival of plants, the ratio believed to be large for species grow in dry region. Jacobs (1955), as quoted by Abbott (1984) Ahmed (1982) claimed that seedling of arid land tree species are characterized by that their roots grow taller than shoots even if they are watered, yet dry matter production from shoot of all treatment was much superior to the root dry matter production.

The treatment control 0.0 water soaking and 12hr H<sub>2</sub>O soaking produced relatively higher number of leaves per seedling this is an indication of adaptation of two treatments to condition compared to 18hrs H<sub>2</sub>O soaking. The shoot height important criteria mainly as early height growth determining the success of seedling establishment. Seedling that will grow rapidly could have practical to browsing. Fast growing seedling can compete better with other vegetation Demister (1972) argued that outstanding seedling can maintain superior growth, rates for considerable periods.

**Table 1**Growth characteristics of 3-month old seedlings of *Moringaoleifera* the three pretreatment

Growth characteristics	treatment		
	18 H <sub>2</sub> O soaking	12H <sub>2</sub> Osoaking	0.0H <sub>2</sub> Osoaking(control)
Shoot length (cm)	60.36 <sup>c*</sup>	75.34 <sup>b*</sup>	90.33 <sup>a*</sup>
Root length (cm)	12.25 <sup>b</sup>	14.50 <sup>a</sup>	14.61 <sup>a</sup>
Total length (cm)	72.16 <sup>c</sup>	89.84 <sup>b</sup>	104.94 <sup>a</sup>
Growth at root color (cm)	14.89 <sup>a</sup>	15.26 <sup>a</sup>	15.40 <sup>a</sup>
No. of leaves/seedling	9.6 <sup>b</sup>	13.4 <sup>a</sup>	14.2 <sup>a</sup>
Shoot dry weight (gm.)	181.08 <sup>c</sup>	226.02 <sup>b</sup>	270.99 <sup>a</sup>
Root dry weight (gm.)	36.75 <sup>b</sup>	43.50 <sup>a</sup>	43.83 <sup>a</sup>
Total dry weight (cm)	217.83 <sup>c</sup>	269.52 <sup>b</sup>	314.82 <sup>a</sup>
Root /shoot Ratio	0.2 <sup>a</sup>	0.19 <sup>b</sup>	0.16 <sup>c</sup>

\* Similar letters in the same row are not significantly different using Duncan, Multiple Range test at (P = 0.05) level.

**Table 2**

Shoot growth rate of the three provenances under investigation at the first three months in the nursery

Treatment	Month		
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
0.0hrs H <sub>2</sub> Osoaking	50.6 <sup>a*</sup>	74.5 <sup>a*</sup>	90.33 <sup>a*</sup>
12hr H <sub>2</sub> Osoaking	30.45 <sup>b</sup>	50.79 <sup>b</sup>	75.34 <sup>b</sup>
18hrs H <sub>2</sub> O soaking	30.3 <sup>b</sup>	50.3 <sup>b</sup>	60.36 <sup>c</sup>

\* Similar letters in the same column are not significantly different using Duncan, Multiple Range test at (P = 0.05) level.

**Table 3**

Root growth rate of the three treatments under investigation at the first three months in the nursery

treatment	Month		
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
0.0hrs H <sub>2</sub> Osoaking	10.23 <sup>b*</sup>	14.615 <sup>a*</sup>	14.61 <sup>a*</sup>
12hr H <sub>2</sub> Osoaking	10.815 <sup>b</sup>	14.82 <sup>a</sup>	14.50 <sup>a</sup>
18hrs H <sub>2</sub> O soaking	11.635 <sup>a</sup>	12.615 <sup>b</sup>	12.2 <sup>b</sup>

\* Similar letters in the same column are not significantly different using Duncan, Multiple Range test at (P = 0.05) level.

#### 4. Conclusion

The results indicate that variation in growth and productivity within the species under investigation is significant at the initial three months. Growth of control (0.0 water soaking) was faster and better than other two treatments. Therefore seed of moringa do not need treatment

Since there are significant differences in seedling characteristics at juvenile growth, performances between the three treatments the recommendation for relevant utilization and successful establishment of the species in nursery and later in the field is use seed without any treatment

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