

ASSESSMENT OF *Dennentia tripetala* Baker. F. SEEDLING GROWTH PERFORMANCE TO DIFFERENT WATERING FREQUENCIES

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Abstract

Water is an important factor in plant development. As important as water is, its excess can be dangerous and injurious to seedling; therefore the water requirement of seedlings at nursery level must be determined for effective performance of the plants. This study assessed the water requirement of *Dennentia tripetala* at nursery level. Sixty seedlings of relatively uniform size were selected and subjected to varying watering frequencies (once daily, twice daily and three times daily) to field capacity. The experimental design adopted for the study is complete randomized design with 20 single plant replicate per treatment. The growth parameters assessed were seedling girth, height and number of leaves for 16 weeks. Data generated was subjected to ANOVA and descriptive statistics. Watering frequency has no significant influence on growth parameters assessed at $p \leq 0.05$. Seedlings watered once daily and three times daily had mean values 0.25 ± 0.06 mm and 0.25 ± 0.05 mm respectively. Highest mean height were observed in once daily watering (10.5 ± 0.33 cm) while highest mean number of leaves was recorded in seedlings watered twice daily (6.7 ± 0.17). The findings obtained from this study showed that growth of pepper fruit seedlings was not significantly influenced by different water frequencies used. More so, the seedlings needs moderate watering.

Key Words: *Dennentia tripetala*, Watering frequency, Once daily, Seedling height

Introduction

Water is a significant factor in forest seedling nursery and it is critical to tree growth and development in the tropics (Awodola and Nwoboshi, 1993). Water is required by plants for the manufacture of carbohydrates and as a means for transportation of foods and mineral elements. Various vital processes in plants such as cell division, cell elongation, stem as well as leaf enlargement and chlorophyll formation depends on plant water availability (Price *et al.*, 1986). As

noted by Levy and Krikum (1983), insufficient water in plants below a critical level is usually demonstrated by changes in all structures leading to the death of the plants.

Root to shoot ratio may be higher in water stressed plants which showed that the root is being elongated in search for water while they exhibit small number and size of leaves (Emmanuel, 2014). Similarly, too much water in excess of plant need may retard physiological processes in plants. Recently, there has

been change in rainfall pattern due to climatic change which has led to drought and flood in different part of the country, there is therefore need to assess the water efficiency of tree species for proper documentation.

Dennentia tripetala Baker. F., is widely domesticated forest tree species in southern parts of Nigeria (Timothy and Okere, 2008). It is well known for its spicy fruit and it belongs to family Annonaceae. It is commonly called pepper fruit. It can grow to a height of 12-15m and have a girth of 0.6m. The fruits are mainly made up of the seed and a bit of hard spicy flesh the spicy taste of its leaves and fruit makes it popular in the southern part of Nigeria (Adebayo *et al.*, 2010). This species has being in use in folk medicine for fever, cough, toothache, as stimulant, food spice and seasoning as reported by Iseghohi (2015) in the review of the species.

Medicinal and nutritional compositions of this species have been investigated and reported by various scientists (Okwu and Morah, 2004; Ejechi and Akpomede, 2005; Oyemitan *et al.*, 2008). Nwachukwu *et al.* (2010) worked on influence of stages of seed maturity on germination of pepper fruit while Onefeli and Akinyele (2014) investigated its macropropagation but information about water requirement of this species was not available as at the time this study was carried out. Therefore, this study focused on watering frequency required to support seedling growth of the species for proper documentation so as to serve as base line information for seedling raising and plantation establishment.

Materials and Method

This study was carried out in Moist Forest Station, Benin City, Nigeria. The site is located on latitude 6°32'N and

longitude 5°58'E. The mean annual rainfall is 2025 mm and mean annual temperature is 26.1°C. Seedlings of *Dennentia tripetala* were raised through seeds and sixty seedlings of relative uniform growth and vigour were selected for this experiment. The seedlings were subjected to varying watering frequencies (once daily, twice daily and three times daily). The experiment was arranged in complete randomized design with 20 replicates per treatment. The growth parameters assessed were seedling girth, height and number of leaves. Data generated was subjected to ANOVA and descriptive statistics.

Results and Discussion

Watering frequency has no significant influence on all growth parameters assessed at $p \leq 0.05$ (Table 1). Girth of *D. tripetala* seedlings as influenced by different watering frequencies ranged from 0.24mm to 0.25mm. Seedlings watered once daily and three times daily had mean girth values 0.25 ± 0.06 mm and 0.25 ± 0.05 mm respectively while least girth value was observed in seedlings watered twice daily (0.24 ± 0.04) (Table 2). Over the period of assessment (16 weeks), increment was observed in seedling girth (Fig. 1). At 1st week of assessment, seedlings watered twice daily had the highest mean girth value of 0.29mm while seedling watered once daily had the least (0.19mm). At 11th week, seedlings watered three times daily recorded the highest mean girth value of 0.23mm while seedlings watered once daily and twice daily had same mean values of 0.22mm. At 16th week of assessment, seedlings watered once daily and seedlings watered three times daily recorded maximum mean girth value of 0.25mm while

minimum value was recorded in seedlings watered twice daily (0.24mm).

Highest mean height value was observed in once daily watering (10.5±0.33cm) followed by three times daily watering (9.9±0.47cm) while least value was recorded in seedlings subjected to twice daily watering (9.5±0.44cm) (Table 2). According to Fig. 2, seedling height increased generally over the period of assessment. At 1st and 9th week of assessment, seedlings watered once daily recorded the highest mean height values of 6.3cm and 8.6cm while seedlings watered three times daily recorded least mean height values of 3.7cm and 4.6cm respectively. Finally at 16th week, seedlings watered daily recorded the highest mean height value of 10.5cm while seedlings watered three times daily recorded the least (6.45cm).

According to Table 2, highest mean number of leaves was recorded in seedlings watered twice daily (6.7±0.17) while seedlings watered three times daily recorded the least mean value of 6.5±0.4. There was increase in number of leaves in all the treatments over the period of assessment (Fig. 3). Seedlings subjected to three times daily watering recorded the highest mean value of 3.7 at 1st week of assessment while those watered twice daily had least value of 3.4. But at 9th week, seedlings watered once daily recorded the highest mean value of 5.1 while those watered three times daily recorded the least value (4.65). Finally at 16th week, seedlings watered twice had the highest mean leaf number (6.65) while seedlings watered three times daily recorded the least mean number of leaves (6.45).

Table 1: Analysis of Variance on Effect of Watering Frequency on Growth *Dennettia tripetala* Seedlings

Growth parameters		Sum of Squares	df	Mean Square	F	Sig.
Girth	Between Groups	0.002	2	.001	2.397	.100
	Within Groups	0.03	57	.001		
	Total	0.032	59			
Height	Between Groups	10.176	2	5.088	1.967	.149
	Within Groups	147.431	57	2.587		
	Total	157.607	59			
Number of leaves	Between Groups	0.400	2	.200	.135	.874
	Within Groups	84.450	57	1.482		
	Total	84.850	59			

Table 2: Means of Growth Parameters Measured on *Dennentia tripetala* Seedlings subjected to Different Watering Regimes

Parameters	Treatments	Mean
Girth	Once Daily	0.25±0.06
	Twice Daily	0.24±0.04
	Three times Daily	0.25±0.05
Seedling Height	Once Daily	10.5±0.33
	Twice Daily	9.5±0.24
	Three times Daily	9.9±0.47
Number of Leaves	Once Daily	6.6±0.19
	Twice Daily	6.7±0.17
	Three times Daily	6.5±0.4

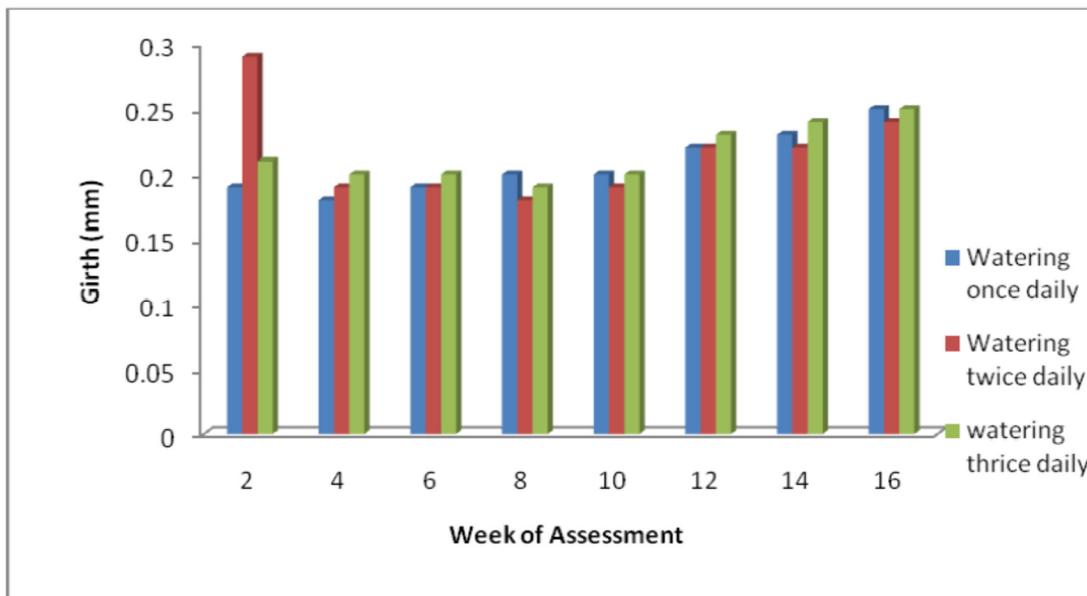


Fig. 1: Effect of Watering Frequency on Girth of *Dennentia tripetala* Seedlings over a Period of 16Weeks

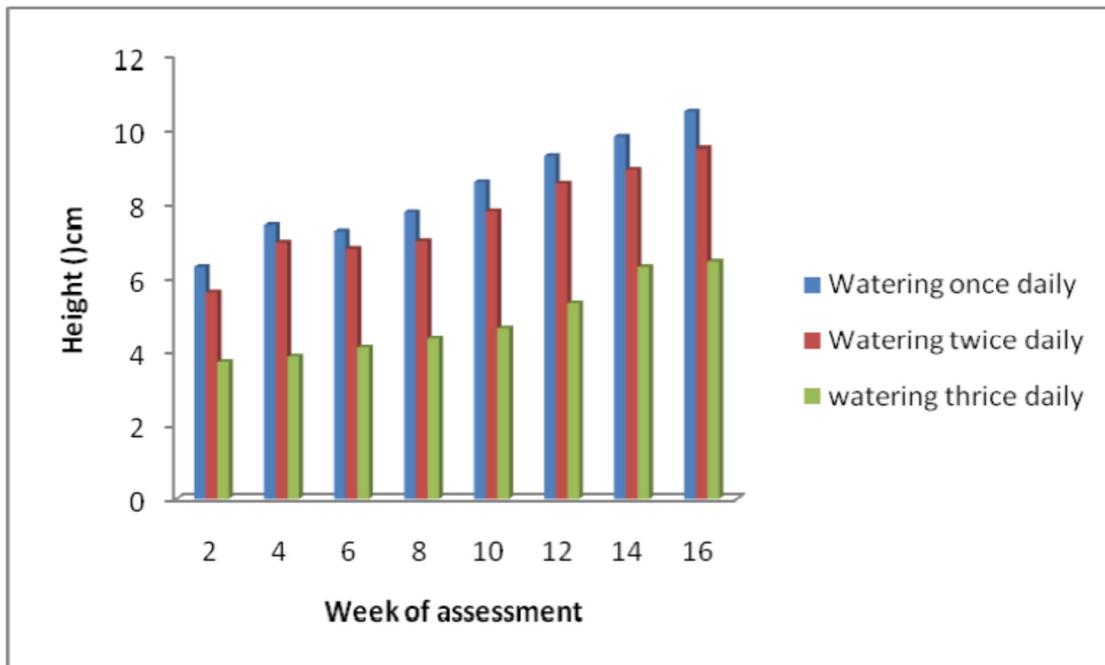


Fig. 2: Effect of Watering Frequency on Height of *Dennentia tripetala* Seedlings over a Period of 16Weeks

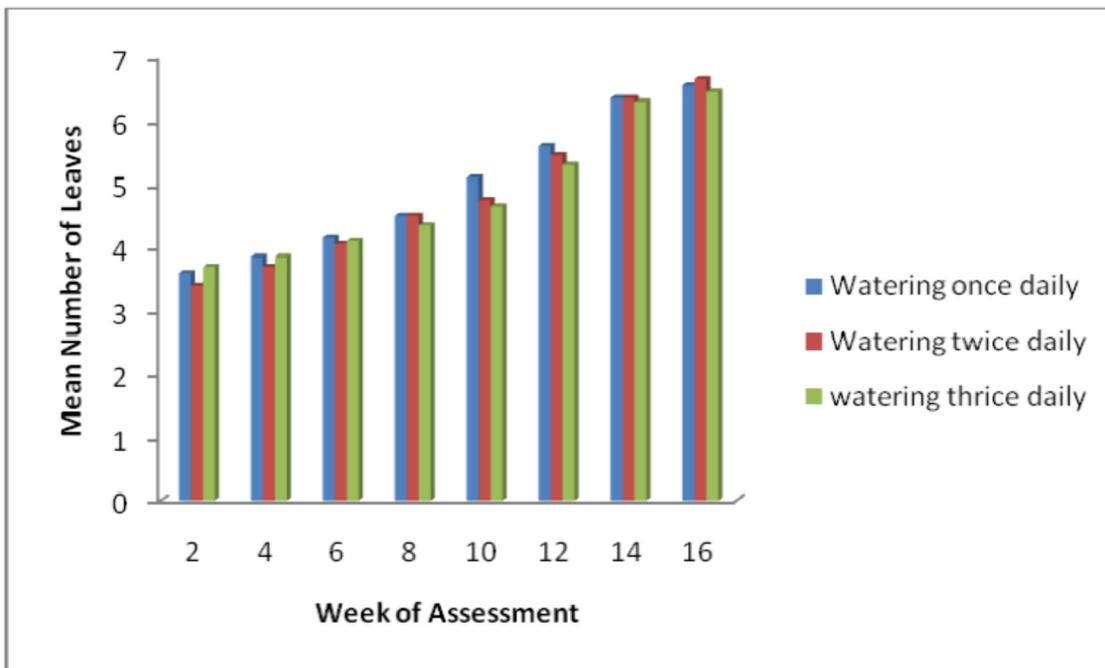


Fig. 3: Effect of Watering Frequency on Leaf Production of *Dennentia tripetala* Seedlings over a Period of 16 Weeks

Water being one of the most important factors for plant growth can dictate success or failure of plantation

establishment. It influences soil nutrient availability and control activities of soil borne microorganisms (Clark *et al.*, 2009).

Too much of water can leach nutrient from soil while too little can make nutrients unavailable to plant though present therefore leading to stunted growth or death of such plant. From this study, it was observed that *D. tripetala* does not require heavy watering as seedlings watered once daily performed optimally over the period of assessment. Considering plant girth, there was no significant difference in the mean values recorded. Seedling watered once daily recorded maximum mean height value of 10.5 ± 0.33 though there was no significant difference in the means of the three treatments while watering twice daily recorded least height value. Seedling watered three times daily had least mean leaf number 6.5 ± 0.4 . This implies that too much of water did not support the growth of this species. Ogunrotimi and Kayode (2018) studied the effect of watering regimes on early seedling growth of *Solanum macrocarpon* L. and found that seedling height was not significantly affected which was in line with the finding of this study. He also found out that watering regime influenced number of leaves but in contrary to the findings of this study. Elhadi *et al.* (2013) reported no significant difference in mean values obtained for collar diameters of five tropical trees observed among all irrigation frequencies used.

Conclusion

The results obtained from this study showed that growth of pepper fruit seedlings was not significantly influenced by different water frequencies used. It can be deduced that the seedlings require minimum water to perform optimally as watering once to field capacity will support the growth of the seedlings.

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