



**International Journal of Applied Research and Technology**  
**ISSN 2277-0585**

Publication details, including instructions for authors and subscription information:  
<http://www.esxpublishers.com>

**Effects of Different Sizes of Fruit Stones and Seeds on  
the Germination of *Tectona grandis* (Linn.)**

Onilude, Q. A.<sup>1</sup>, Oyeleye, B. O.<sup>1</sup>, Aina – Oduntan, O. A.<sup>1</sup>, Adefila, B. K.<sup>1</sup>, Shasanya, O. S.<sup>1</sup>,  
Adekola, P. J.<sup>2</sup> and Olukiran, S.<sup>3</sup>

<sup>1</sup>Forestry Research Institute of Nigeria, Ibadan, Nigeria

<sup>2</sup>Federal College of Forestry, Ibadan, Nigeria

<sup>3</sup>Agricultural Research Council of Nigeria, Wuse, Abuja, Nigeria

Available online: February 28, 2014

To cite this article:

Onilude, Q. A., Oyeleye, B. O., Aina – Oduntan, O. A., Adefila, B. K., Shasanya, O. S., Adekola, P. J. and Olukiran, S. (2014). Effects of Different Sizes of Fruit Stones and Seeds on the Germination of *Tectona grandis* (Linn.). *International Journal of Applied Research and Technology*. 3(2): 129 – 133.

**PLEASE SCROLL DOWN FOR ARTICLE**

*This article may be used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan, sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.*

*The publisher does not give any warranty express or implied or make any representation that the contexts will be complete or accurate or up to date. The accuracy of any instruction, formulae and analysis should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.*

## Effects of Different Sizes of Fruit Stones and Seeds on the Germination of *Tectona grandis* (Linn.)

Onilude, Q. A.<sup>1</sup>, Oyeleye, B. O.<sup>1</sup>, Aina – Oduntan, O. A.<sup>1</sup>, Adefila, B. K.<sup>1</sup>, Shasanya, O. S.<sup>1</sup>, Adekola, P. J.<sup>2</sup> and Olukiran, S.<sup>3</sup>

<sup>1</sup>Forestry Research Institute of Nigeria, Ibadan, Nigeria

<sup>2</sup>Federal College of Forestry, Ibadan, Nigeria

<sup>3</sup>Agricultural Research Council of Nigeria, Wuse, Abuja, Nigeria

(Received: 14 August 2012 / Accepted: 03 September 2012 / Published: 28 February 2014)

### Abstract

Germination of *Tectona grandis* using both the fruit stones and the seeds of different size classes were investigated. Data on germination percentage (G%), mean daily germination (MDG), germination value (GV) and peak value (PV) for the fruit stones and the seeds were obtained. The fruit stones and the seeds were classified into small, medium and large sizes. The results showed that the different size classes of the fruit stones had mean daily germination (MDG); small (0.66); medium (0.77); and large (0.66) while the seeds had small (0.77); medium (0.77); and large (0.83). However, the germination capacities of the fruit stones for the small, medium and large sizes of *Tectona grandis* were 77%, 90% and 77% respectively, while germination capacities for the seeds were 90%, 90% and 97% for the small medium and large seed sizes respectively. The results showed that large seed size had the highest number of germination (29), followed by the small and medium sizes with 27 number of seedling germination each while for the fruit stones, medium sizes had the greatest number of germination. It can be therefore concluded for this study that seeds from large size class had been found to have a better germination percentage compare to the medium and small size classes. Furthermore, the fruit stones and seeds of the different size classes do have influence on the germination of *Tectona grandis*.

**Keywords:** Germination Value, Mean Daily Germination, Peak Value, *Tectona grandis*

For corresponding author:

E-mail: [info@esxnpublishers.com](mailto:info@esxnpublishers.com)

Subject: 0812-0227

© 2014 Exxon Publishers. All rights reserved

## Introduction

All plants species face a fundamental reproductive trade off and they can produce either small seeds or a few large seeds (Aderounmu, *et al.*, 2011). Considerations for superior seed morphological traits is of paramount importance in domestication programme. *Tectona grandis* is an exotic species belonging to the family of Verbenaceae. It is commonly known as teak. It is a tall evergreen tree. It has yellowish blonde to reddish brown wood. It attains the height of about 30m. Other related species of teak apart from *Tectona grandis* are *Tectona hamiltoniana* and *Tectona philippinensis* (Eco India, 2008). Its natural distribution is in Southeast Asia, from the Indian subcontinent through Myanmar and Thailand to Laos. It will grow and survive under a wide range of climatic and edaphic conditions (Anon, 1986). Researches have shown that seed morphological parameters have significant effects on the seedling vigour and subsequent development of plants (Oni and Bada 1991; Jimoh and Okali 1999; Oni 2000). There have been reports of larger seedling growth, higher probability of survival in low light and dry conditions and increased probability of recovery from herbivory in seedlings from large seeds than seedlings from small seeds (Leishman and Westoby, 1994; Harms and Dalling, 1997).

Successful plantation establishment of *Tectona grandis* requires a detailed knowledge of its silvicultural requirements which is very vital in forest practice. Intraspecific variations are common in seed dimensions owing to the influence of the environment and genetic differences. Seed- size grading can be a very useful practice in the nursery. Through this, seedlings of uniform growth are produced (Aderonke, *et al.*, 2008). There is evidence that seed sizes influence seed production and even vegetative growth (Shado 1980). The demand for pulp and paper products has continued to rise owing to the increase in population in Nigeria and the number of students admitted to primary, secondary and tertiary institutions causing the continued over reliance on this imported exotic species to meet the increasing demand for pulp and paper. The wood from *Tectona grandis* is used for furniture making, boat decks and for indoor flooring. It is widely used to make the doors and house windows. It is resistant to the attack of termites. Teak is probably the best protected commercial species in the world. Therefore, there is need to increase the large expanse of this species already available in the country. However, this paper investigated the effects of different sizes of seed fruit stones and seed sizes on the germination of *Tectona grandis*.

## Materials and Methods

The fruit stones of *Tectona grandis* were collected from the seed store of Forestry Research Institute of Nigeria, (FRIN) Ibadan. The fruit stones collected were categorized into large, medium and small sizes using a digimatic calliper. The teak fruits collected were soaked and dried alternatively for 8days in a bucket filled with water. Simultaneously, another fraction of the fruit stones selected from each size class without soaking in water was cracked with hammer to extract the seeds from the fruit. For each of the different size classes, 30 fruit stones and 30 seeds were sown in a germination box filled with a mixture of a sieved top soil and a higher proportion of river sand and placed under a nursery shed. Watering was done twice daily. Germinations were observed and recorded every 5days, up to 30 days.

Mean Daily Germination (MDG), Peak Value (PV) and Germination Value (GV) were calculated using the following formulae (Czabator, 1962).

$$MDG = \frac{\text{Cumulative percentage of seed/fruit germination}}{\text{No. of days from sowing to end of test}} \dots\dots\dots (i)$$

$$PV = \frac{\text{Daily germination speed}}{\text{No. of days since sowing}} \dots\dots\dots (ii)$$

$$GV = (\text{final}) MDG \times PV \dots\dots\dots (iii)$$

## Results and Discussion

The Mean Daily Germination (MDG) values of fruit stones for the different size classes are large (0.66), medium (0.77), small (0.66) while that of the seeds were large (0.83), medium (0.77), and small (0.77) (Table 1). The fruit stones had a Peak Value range; large (0.6) and medium (0.4) after 15 days and the small (0.9) after 20 days. The seeds however had a Peak Value large (0.5) after 15 days, and the medium (0.6) after 20 days and small (0.3) after 10 days (Table 1).

The result showed that the medium fruit sizes had the greatest number of germination with 27, followed by small and large fruit sizes with 23 each (Fig 1). However, from figure 2 below, large seed size had the highest number of germination, followed by the small and medium sizes with 27 number of seedling germination each. Generally, medium fruit sizes and large seed sizes should be expected to germinate higher in the nursery. However, there have been conflicting reports on the effect of seed source and size on growth and yield in various crops (Burnett, *et al*, 1997, Perin *et al*, 2002). Aderonke, *et al.*, (2008) concluded that seed sizes do not affect the germination and early seedling growth of *Ceiba pentandra*, however, result here showed that seed sizes do affect the germination and seedling growth of *Tectona grandis*. Grading of teak fruits into classes would improve the quality of seed production and seedling yield. The germination capacity of fruit from each of the fruit size was high. The germination value was low for large fruits when compared with those of medium and small fruits. This could be attributed to the PV of germination, which took along period with respect to the total number of germination than those for medium and small fruit sizes. Turk and Tahaawa (2002) and Perin, *et al.*, (2002) indicated a similar finding, that seed size had no grain yield for Faba bean and the common bean. This is, however, in contrast to the findings on *Tectona grandis* for which medium size of the fruit stones and seeds have the best germination values.

## Conclusion and Recommendations

Effects of seed fruit stones and various seed sizes on the germination of *Tectona grandis* have been established. Phenotypic observations and measurement taken showed that there were distinct variations between the seed fruit stones and the large seed size, medium seed size and the small seed size of *Tectona grandis*. The medium size for both the seed fruit stone and the seed gave the best germination. However, there is still need to further the experiment to know the effect the sizes will have on the dry matter accumulation of the seedlings. *Tectona grandis* is an exotic and fast growing economic species known for its durability and its resistance to termites attack. The judicious selection of its planting materials could be meaningful for its improvement, thereby making it easier the multiplication of *Tectona grandis* plantation in the country.

## References

- Aderonke, Adio; Oyeleye B; and Oduwaiye E. A (2008): Effects of Seed Source and Size on Germination and Early Seedling Growth of *Ceiba pentandra* (Linn.) Gaertn. *Journal of Forestry Research and Management*, Forestry Research Institute of Nigeria Vol. 5, 2008.
- Aderounmu, A.F and Adegeye, A.O (2011): effect of seed size on germination and early seedling development of *Vitellaria paradoxa* (C.F.Gaertn) Hepper. *Journal of Sustainable Environmental Management*. Association of Women in Forestry and Environment by Forestry Research Institute of Nigeria Vol 3. 2011.
- Anon (1986): The useful plants of India. Publications and Information Directorate, CSIR, New Delhi, India.
- Burnett, V. F; Coventry, D. R; and Newton, P.J (1997): Effect of Seed Source and Seed Phosphorus Content on the Growth and Yield of Wheat in North-Eastern Victoria. *Australian Journal of Experimental Agric*. 37:191-198.
- Czabator, F. J (1992): Germination value: an index combining speed and completeness of pine seed germination. *Forest Science*, Vol. 8, 386-396.
- Eco India (2008): The description of *Tectona grandis* by Eco India Company, India.
- Harms, K.E and Dalling J.W (1997): Damage and herbivory tolerance through resprouting as an advantage of large seed size in tropical trees and lianas. *Journal of tropical Ecology* 13: 617-621 (ISI).
- Jimoh, S.O and Okali D.U.U (1999): Variations in fruits and seed characteristics and germination of *Tetrapleura tetraptera* (Schum & Thonn). Taub from different sources in South Western Nigeria. *Nigerian Journal of Forest Resources* 15:1pp 10-21.
- Leishman, M.R. and Westoby, M. (1994): The role of large seed size in shaded conditions: Experimental evidence. *Functional Ecology*. 8: 205-214.
- Oni, O. (2000): Training lecture notes on Plant Genetic Resources Management. Vegetative propagation conservation. Paper presented at a National training Course. Plant Genetic Resources Management, NACGRAB. 12pp.
- Oni, O and Bada, S. (1991): Effect of seed size on seedling vigour in Idigbo (*Terminalia ivorensis*) A. Chev). *Journal of Tropical Forest Science* 4(3): 215-254.
- Perin, A; Araujo, A.P. and Texeira, M.G (2002): Effect of seed size on biomass and nutrient accumulation and on grain yield of common bean. *Pesquisa Agropecuaria Brasileira* 37:1711-1718.
- Shado, M.B. (1980): Procurement of Seeds Towards self-sufficiency. Paper presented at 10<sup>th</sup> Annual Conference of FAN, Sokoto. November, 1980.
- Turk, M.A and Tawaha, A.R.M (2002): Effect of dates of sowing and seed size on yield and yield components of local Faba bean under semi-arid conditions. *Legumes Research* 25:301-302.

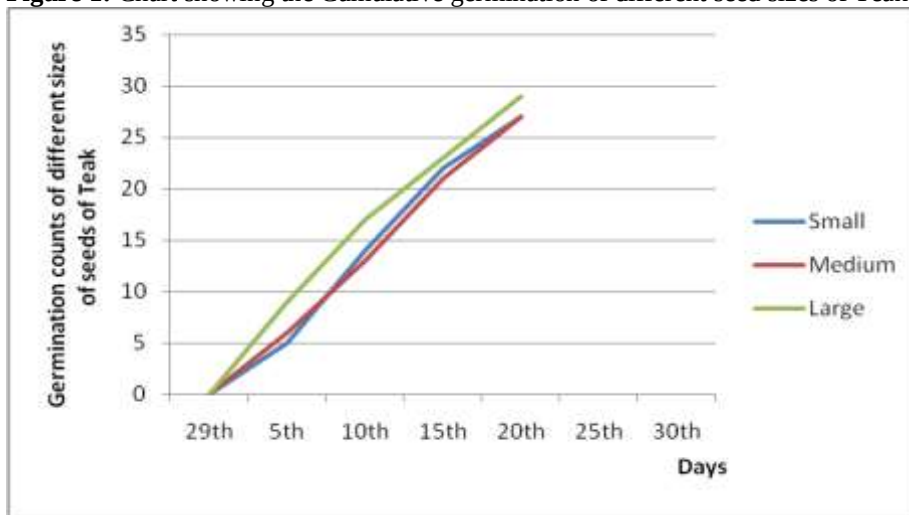
## Tables

**Table 1:** Showing the Mean Germination Values for fruit stones and seeds of *Tectona grandis*

| Fruit/seeds  | Different sizes | Germination % | MDG  | PV  | GV   |
|--------------|-----------------|---------------|------|-----|------|
| Fruit stones | Large           | 77            | 0.66 | 0.6 | 0.40 |
|              | Medium          | 90            | 0.77 | 0.4 | 0.31 |
|              | Small           | 77            | 0.66 | 0.9 | 0.59 |
| Seeds        | Large           | 97            | 0.83 | 0.5 | 0.42 |
|              | Medium          | 90            | 0.77 | 0.6 | 0.46 |
|              | Small           | 90            | 0.77 | 0.3 | 0.23 |

## Figures

**Figure 1:** Chart showing the Cumulative germination of different seed sizes of Teak



**Figure 2:** Chart showing the Cumulative germination of different seed sizes of Teak

