

Full Length Research Paper

Significant differences in natural regeneration of endemic forest tree in Edo State, Nigeria

Onakpoma C. Shedrack

Department of Biological Sciences, Igbinedion University, Okada, Nigeria. E-mail: dronakpoma.cs@yahoo.com.

Accepted 19 August, 2017

Taungya as an agroforestry system in regenerating endemic forest tree species is not successful in Edo State. This was revealed in the current study. Significant differences in natural regeneration exist in the zones studied. The failure of the Taungya system arose from abandonment of the sites after devegetation, non availability of planting stock which is due to poor funding. The area that was kept under continuous cultivation had 15.60 of regenerated endemic species. The area that fallow for 3 years had 34.33 species regenerated. The control had 22.33 of regenerated species. The most occurred species is *Terminlia Superba* - 31. Evidence from the study is indicative of the fact that adequate endemic taxa regeneration can not rely on Taungya system as it is practiced now. To ensure safe environment, endemic forest species saved from extinction, proper regeneration and forest plantation establishment of endemic taxa are recommended.

Key words: Taungya, endemic taxa, forest plantation, regeneration.

INTRODUCTION

The various forest departments and government control led agencies have been unable to prevent wanton destruction of the tropical rain forests as effectively as anticipated. The result is that it impacts undesirable loss of bioresources. This is an obvious situation where the proper values of trees and forest have not been fully appreciated. Forests embody a number of estimable values including environmental, economic and social values. These are always lost when the forest is destroyed. Although evidence abounds to show that many people are concerned about the rapid destruction of tropical forests little is, however, being done to counter the effects on the environment. However, due to hard work and enthusiasm, the Cape Verde Islanders (Leaky and Longman, 1988) planted trees to cover their deforested lands but in the other parts of the tropics logging companies continue to fell the rain forest trees.

Schemes to replace the destroyed forests cannot keep pace with the destruction and new forest plantations usually rely on exotic species like *Tectona grandis*, *Gmelina aborea* and Eucalyptus species introduced because they grow faster than the native hardwoods like *Terminalia ivorensis*, *Terminalia superba*, *Chrysophyllum albidum*, *chrysophyllum delevoiyi* and *Nauclea diderrichii*. However, genetic diversity in forest trees is best

conserved in native population. In the past Edo State Government Nigeria insisted that the logging contractors should rehabilitate or take part in the regeneration of the forests they have plundered. However, the loggers faced practical problems like raising nursery stock and the authority face the problem of implementation. There is lack of seedling production by the relevant government agencies to facilitate the programme.

Biological and economics reasons are limiting factors towards the fast restoration of tropical rain forest. Many tropical hardwoods produce seeds very erratically and seeds often fail to germinate. They are also susceptible to pests and diseases. It had been observed (Last and Leaky, 1985) that if it is laid bare and severely eroded the number of native tree species which will be capable of recolonising it is extremely limited. Very often there simply will not be a native pioneer species that will survive as a result the conservation of ecotype therefore will not be possible. The domestication of endemic species has been neglected. If some of the native hardwoods that provide the every day requirements of the local people are domesticated and brought into commercial production as high-yielding varieties it would help. These requirements include timber.

The ever increasing demand, nationally and internation-

ally, for tropical hard woods again focus great attention of policy makers after realizing imminent disappearance arising from man's reckless exploitation. It is therefore necessary to urgently rehabilitate the surviving old forests and seek better, faster and dependable methods of restoring impacted high forest areas through domestication strategies. Attention should be focused on the endangered endemic species like *Nauclea diderrichii*, *Terminalia superba* and *chrysophyllum delevoiyi*. There is urgent need to domesticate the threatened indigenous species in order to avert serious ecological problems in Nigeria. Asiodu (1997) reported that "forests in Nigeria should be restored to 25% by the year 2010 and meanwhile maintain a ban on export logs, encourage rapid afforestation and create adequate incentive for this, identify and rehabilitate all threatened and endangered species of fauna and flora".

This current research work is in response to national call. The result of this research work is therefore expected to provide the much needed information on quicker, affordable, practicable and dependable methods of forest regeneration, bioresources conservation and environmental protection. Coreman and David (1999) described forest regeneration as enhancing the growth of existing timber stands, ensuring adequate regeneration following harvest and important forest management activities, which can increase total timber supply and profits. Thomas (1999) confirmed that reforestation methods used to maximize the probability of success are relatively simple in concept but often difficult to execute. Success requires selection of appropriate species, acquisition of good seed or other propagation materials, selection of competent growers, understanding production cycles land providing the grower with sufficient lead time, proper stock handling prior to planting, selecting competent and experienced planters and planting at the optimum time. According to Geldemhuys (1995) loss and fragmentation of forests due to excessive burning and clearing for subsistence and economic agriculture contribute to loss of unique habitats, biodiversity and atmospheric deterioration. Forest restoration is required to reverse this environmental degradation and this can only be successful if they are economically viable or if they provide in the daily needs of rural communities.

In Nigeria and the other tropical world, several forest regeneration methods have been attempted. Natural regeneration, which has been used, is a process whereby the forest is allowed to grow back to its original state unaided. This process failed and an attempt was made to enrich the forest by planting desired seedlings. This method included line planting and group planting. There was also the tropical shelter wood system (T.S.S.). All these methods were abandoned as they could not meet the desired goal at the time (Lowe 1966). Igugu and Bamgbala (1973) ascertained that these methods were mostly practiced in Iguobazuwa, Omo, and Idanre forest

reserves in Nigeria, but the above methods failed and gave way to plantation forestry.

Taungya or agroforestry is a system where forestry practices are combined with agricultural and agriculture-related activities. The main objectives of an agroforestry system are to optimize production and economic return per unit area in a given period of time. Agroforestry is a deliberate incorporation of trees into farming systems. Allison et al. (1986) reported that taungya as an agroforestry system could be an effective and cost saving method of establishing forest plantation. The farmers are issued with an allocation of 0.4. to 1.0 hectares of land by the Forestry Department. Land preparation and after planting maintenance practices are the responsibilities of the farmer, the underlying principle is low cost of plantation establishment. However, experience has shown that the system is very wasteful as the old growth forests are cleared without being planted back as such these areas are exposed to degradation and loss of ecotype.

The purpose of this study is to ascertain the number of endemic species that can regenerate under natural conditions after the original climatic climax has been cleared for farming. The reason of choosing the zones is that they are the areas where Taungya is most practiced. The result from the study is expected to provide insight into methods for further plans that can be utilized for natural regeneration or other alternatives leading to environmental conservation. The method(s) will therefore proffer basis for sustainable forest management in the tropics.

MATERIALS AND METHODS

For the purpose of assessing the effect of Taungya on natural regeneration of endemic tree species, Edo State Nigeria was divided into 3 zones; A – Iguobazuwa, B – Okada, and C – Ekpoma. Three plots 10 m x 10 m of 3 years old were randomly selected from each zone and labeled 1, 2, 3. An uncleared area of the same ecotype measuring 30 m x 30 m was marked out for the control with three randomly selected plots also of 10 m x 10 m. Information on total regeneration per zone and mean number of regeneration per zone was recorded. The frequency occurrence of the most noticed species was recorded. Information on economic contribution from forest exploitation and distribution was obtained from the State Ministry of Agriculture, Forestry Division.

RESULTS AND DISCUSSION

The results obtained from this study are presented in Tables 1, 2 and Figure 1. From the field trip to the zones evaluated in the study, it was observed that zones A and B were maintained and recultivated annually up to the third year. Each year cassava, *Manihot esculenta*, was planted. Zone C was opened up and abandoned for the three years. It was also observed that these deforested areas, zones A – C, were not planted with *Tectona grandis* species intended for the planting. Evidence from A and B (Tables 1 and 2) showed that de-

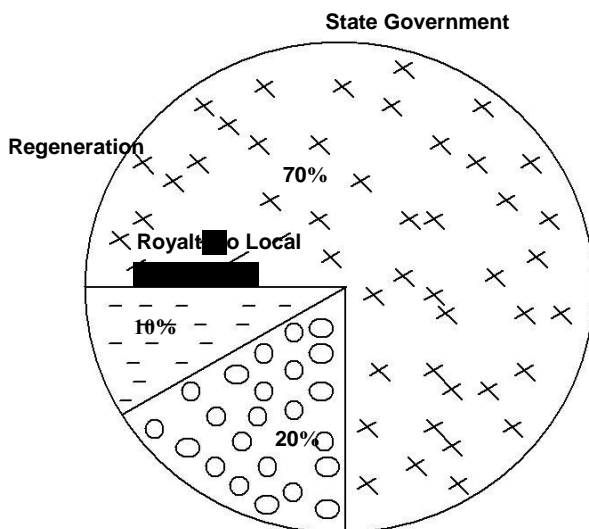
Table 1. Natural regeneration of endemic forest tree species 3 years after de-vegetation.

Zones	Plots			Total	Mean number Of regeneration
	1	2	3		
A	20	15	12	47	15.66
B	10	20	15	45	15.00
C	30	40	28	103	34.33
Control uncleared	30	20	22	67	22.33

Table 2. Frequency occurrence of most noticed species.

Zones	Plots			Total
A	1	T.s.	= 2	7
	2	Tvi	= 4	
	3	Cd	= 1	
B	1	T.s.	= 8	11
	2	Tvi	= 2	
	3	Cdv	= 1	
C	1	T.s.	= 20	31
	2	Tvi	= 10	
	3	Cd	= 1	
Control	1	= T.s.	= 10	25
	2	= Tvi	= 12	
	3	= Cd	= 3	

T.s. = *Terminalia Superba.*
 Nd = *Nauclea dideroichii*
 Cdv = *Chrysophyllum delevoyi*
 Cd = *Chrysophyllum albidum.*
 Tvi = *Terminalia ivorensis*

**Figure 1.** Edo State forest revenue allocation. Source: Edo State Forestry Department, Benin City (1998).

forestation of the original climatic climax has effect on natural regeneration of endemic species. Zones A and B were particularly poor in regeneration probably due to continuous cultivation. During farm weeding coppices and germinated seeds could also have been destroyed. These areas are subject to degradation and successional changes leading to the endemic species being out-competed.

Significant regeneration was recorded in zone C. The result obtained in C is suggestive of the possibility of good natural forest regeneration if enough fallow period is allowed. However, enough quality timber species cannot rely on natural regeneration as the outcome is poor. Furthermore, opening up or deforesting forested areas without reforestation exposes the area to environmental degradation. The forestry subsector contributes significantly to the over all Edo State's economy. In spite of the contribution only a very small percentage of the revenue is allocated to forest regeneration fund (Figure 1). From the survey conducted and the study, it was inferred that the non existents of adequate tree nursery for seedling production and non planting of deforested areas could be due to poor revenue allocation to the regeneration fund.

The study showed that, the Taungya system of forest regeneration does not support the regeneration of endemic taxa. A number of factors were seen to be responsible for this in this current study. The relevant government control agency does not pay enough attention to forest regeneration. There are no functional tree nurseries where planting materials could be raised. Even the areas deforested for the Taungya system are not reforested. Where efforts were made, the endemic forest species were not planted. This current study is in consonance with previous work (Ehiagbonare, 2004) highlighting the reported poor natural regeneration of endemic forest species under various land use practices. The revenue allocated to forest regeneration fund (Figure 1) is too low, only 10%. Furthermore, the tropical forest species, though of great biodiversity have seed production and poor viability problems. Richards (1952) and Hopkins (1974) observed that tropical forest tree seeds lose viability easily and the species have irregular phenology. This could have accounted for the poor natural regeneration of the endemic forest species.

The evidence from this study leads to the conclusion that Taungya system and as a means of regeneration of endemic forest tree species cannot be relied on. To save the endemic forest tree species Allison et al. (1986) advocated forest plantation establishment of the species. This agrees with the idea of this current study. In addition the state and Federal government as a matter of deliberate policy should increase allocation of funds to forest regeneration in the states. More tree nurseries should be established to raise seedlings of endemic forest species for forest plantation establishment.

REFERENCES

- Allison SE, Umeh IL, Fawusi AK (1986). Handbook of Forest Plantation Techniques for Nigeria. Forestry Projects Monitoring and
- Asiodu J (1997). Ecology. The Presidency Abuja Nigeria Pp 1 – 70.
- Coreman WJR, David M (1999). Economic incentive for Natural Regeneration cut – over planted and Oldfield Afforestation of Pine Citation C.I.F.O.R 61 P.
- Ehiagbonare JE (2004). A study of the impact of Land Use on Natural Regeneration of *Terminalia*
- Geldemhuys CJ (1995). Restoration of Degraded sites, Division of Forest Science and Technology, GSIR Pretoria South Africa Pp 2
- Hopkins B (1974). Forest and Savanna Heinemann Education Books pp. 155
- Igugu GO, Bangbala EO (1973). Enrichment Planting in Tropical High Last FT Leaky RRB (1985). Better trees to fight desertification. Spectrum: 191: 2 – 4.
- Leaky RRB, Longman KA (1988). Low – Tech Cloning of Tropical Trees. Appropriate Technology. 15(1):b
- Lowe RU (1966). Tropical Shelter Wood System No. 1 F.R.I.N. Ibadan Pp 193 – 212
- Richards PW (1952). The Tropical Forests: Cambridge University Press Pp. 450.
- Superba (Engl and Diels) and *Nauclea diderrichii* (De Wild) Seedlings. Nig. J. Appl. Sci. Vol. 22:232–234.
- Thomas MJ (1999). Revegetating Decomposed Granitic Soils. A Nursery's Man View. Owner – Manager, California Forestry Nursery ETNA 55 P.