

Challenges and Prospects of Tree Seedlings Production in Katsina State of Nigeria

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Abstract: *The aim of the study is to determine the constraint to tree seedlings production of Dutsin-ma Local Government Area of Katsina State. A total of 13 tree seedling producers (index producers according to years of seedling activities) were purposively sampled after inventory of seedling production centres in June 2013. A purposive criterion of selecting one index producer with highest number of years in seedling production activity from each centre was used to sample 13 producers. These seedling producers were later interviewed using semi structured checklist of 12 questions. Result of the study found out that all respondents contended that limited access to planting materials such as plastic bags, fencing wire, watering can and young tree shoot constraints the number of seedlings produced in 2012 and 2013 despite tree seedlings program of the state ministry of environment under its green initiative project. The study recommended that since government targeted interventions cannot provide planting materials to all producers, informal seed producers should be integrated into the system by providing enabling environment.*

Key words: *constraints, Tree Seedlings, local producers, Katsina State*

I. Introduction

The Sahel zone of West Africa on which parts of Northern Nigeria lies on was long ago before the advent of recurrent droughts (Mortimore, 2001b) and rapid increase in population (Tiffen, 1996) a repository of thousands of flora (Keay, 1948). This part of Africa is rich in biotic diversity of plant as indicated in Dalziel (1937) and Keay (1948) studies on plants of Nigeria. His inventory of trees of Northern Nigeria in 1937 listed hundreds of species in the area whereas that of Keay (1990) found out that there are nearly thousand species in Nigeria including many of the introduced species. Upon all environmental and social mishaps, this diversity was rich and species composition adequate to sustain the environment. However, as time passes by, these rich plant repositories gradually disappear both in density and diversity of stands. Many reasons were cited by researchers as the causes of this sudden mayhem in the area but common phenomenon of mis - management of resources was pointed at. Nigeria (the most populous country in Africa) faces extremely mounting pressures on biodiversity and tropical forests. Wildlife, trees, and many other plants are over-harvested and poached, and the natural environment faces increased degradation from expanding unsustainable agriculture, water pollution, air pollution, and a variety of other anthropogenic factors (David, 2008). Nearly 1,000 forest reserves are included in the IUCN World Database on Protected Areas (unep-wcmc.org), but many of these have no forests left, and most are highly degraded due to unsustainable extraction of timber, fuel wood, economically important plants, bush meat, and other resources. Nigeria's tropical forests are particularly hard hit. According to the United Nations Food and Agriculture Organisation, the country has the highest deforestation rate in the World (FAO, 2005). Between 2000 and 2005, Nigeria lost 55.7 per cent of its primary forests due to logging, agricultural expansion, and fuel wood collection (FAO, 2005).

The dependence of people on trees and forests is unlimited. Trees have crucial values to human beings not only for the resources they provide and ecosystem services (Mohammed, 1994) but for support they render to the environment (Daura, 2011) as well as medicinal properties (Etkin, 2002). Almost 1.6 billion people in the World rely on forest resources for their livelihood (World Bank, 2000). Trees and forests in dry Sub-Saharan Africa constitute the source of income, life support and means of survival for the poor people and women (Mogaka et al., 2001) particularly in periods of hardship, disasters and famine (Falconer, 1990). However, losing access to these products and markets can have negative impacts on rural households and can even threaten their survival (Kaimowitz, 2003).

Trees seedlings production is the solution to forest depletion in Africa especially where farmers form the primary system actors. This is true because farmers form a significant, if not the most significant player in the seed industry. They obtain seed through both formal and informal channels; with the latter source

constituting the largest source for smallholder farmers (Barnett, Chisvo and Pinto, 2011). FAO (2010) holds that over 90 per cent of the planters in developing countries are still planted with farmers' varieties and farm-saved seeds. These revelations further poses serious challenge because planting of trees which are seen as a fulcrum to healthy environment and better livelihood for the rural poor is jeopardized by low quality seedlings sourced on farms by farmers. However for better trees planting regime, access to seedlings and other planting material has to be a regular activity of most forest programmes. It is established fact that farmers and other vegetation users access seedlings from the repository they manage to store but the quality of which is doubtful (Danjuma, 2010).

In Africa as in most developing countries, various programmes have been developed by both public and private sectors to source, propagate and distribute trees seedlings. Many examples cut across the continent but more prosperous are the programmes in Tanzania, Kenya and Malawi which yielded very good scores. In Tanzania, seedlings were raised in polyethylene bags, which were provided free of charge to farmers by a government re-forestation project (Bohringer et al., 2002) while in Nepal, a Danish non-profit organization (DANIDA) supports farmers by providing access seedlings through partnership program (Lillesø et al., 2001). In Nigeria various programmes such as Arid Zone Afforestation (1970s) as well as the Katsina Afforestation Programme, KTAPU (1990s) of Nigeria (Mortimore, 2004) started tree seedlings production but could not progress owing to their numerous objectives. Together with all constraints, one of the main strengths of national tree seed programmes such as the NTSP in Tanzania is their ability to produce large amounts of tree seed of a sufficient quality and of known origin. However lacks of planting materials inform of availability and affordability is argued by many as the main constraint to tree seedling production in Africa. At present lack of seedlings and other planting material constitutes a serious constraint for smallholders to fully utilise the benefit of trees (Simons, 1997; Johansson and Westman, 1992). Rural people's lack of access to sufficient amounts of a varied tree planting material of high quality therefore leads to concern about their livelihoods (sustainable and increased agricultural productivity and returns from tree plantings) in the short as well as the long term, thus, there is a need to reach smallholders with quality tree seed and other planting material (Danida Forest Seed Centre, DFSC, 2000). Some of the farmers in southern highlands of Tanzania pointed out that access to planting material is not the only constraint. However, lack of access to polythene bags (small plastic tubes in which seeds are sown) was considered a constraint to tree planting by farmers in all regions of Tanzania (Aalbæk, 2001) while farmers in the dry region of Dodoma, Tanzania considered lack of water a major problem (Nathan 2000).

Many seeming limitations by Danjuma (2010) were found out in Northern Katsina in Nigeria, (precisely Kabobi village and surroundings) where people waited for seedlings from the local forestry office that they hardly see let alone collect for planting. Koskela et al., (2010) reported that the lack of adequate smallholder germplasm delivery systems exhibits a major limitation for tree planting efforts.

The quality of the planting material depends on whether the farmer has access to good material, but also depends on whether the farmer has an incentive to invest in better planting material (Lillesø et al., 2009). Constraints due to lack of resources are widely acclaimed as responsible for poor quality of seedlings production as Nathan (2000) cited that in many instances, small holders faces lack of resources namely planting materials, water and finance and therefore the failure of producing viable seedlings begins here. Because of lack of resources, wide degeneration of farmers' interest of producing seedlings was seen in Africa especially that the indigenous species are long rewarding. Out of the many constraints, Aalbæk (1997) showed that access to planting materials such as polyethene bags and water were the hardest hitting constraints to viable seed production in Tanzania. In Katsina State Chukwujekwu (2010) reported that part of constraints to seedlings production is farmers' lack of incentives and inadequate extension agents who will disseminate new ideas. Most of the forest trees seedlings and arable crops are also attacked by termite immediately after germination (Chukwujekwu, 2010). Constraints of lack of planting materials have forced the closure of the only tree seedling production centre in Dan Matyawa in Maradi in 2009 (Danjuma, 2010) and the producers migrated temporarily to Nigeria to engage into more rewarding option.

Consequences of neglect to seedling production are numerous. At present rural people's lack of access to sufficient amounts of a varied tree planting material of high quality therefore leads to concern about their livelihoods (sustainable and increased agricultural productivity and returns from tree plantings) in the short as well as the long term, thus, there is a need to reach smallholders with quality tree seed and other planting material (DFSC, 2000).

The work has therefore answered the following question:

1. What types of tree seedling of the area do you produce in your centre?
2. How do you access the planting materials used in production?
3. Where do you access your seedlings from?
4. What type of challenges do you encounter during production?
5. What are most impeding constraints to tree seedlings production in your area?

Study Area

Dutsin-ma Local Government Area covered a landmass of about 527 km² (Wikipedia, 2013), is an ancient area in northern Nigeria and an administrative headquarter since 1976. Dutsin-ma town is found between latitude 12°27'10" N and 12°27'16" N and longitude 07°29'56" E and 07°30'04" E. The Census results of 2006 in Nigeria put the population of Dutsin-ma to 169,671 people and an average growth rate of 2.8% (NPC, 2006).

The climate of the study area is the 'Aw' type as determined by Koppen in which distinctive wet and dry seasons are caused by the fluctuations of the ITCZ (Inter Tropical Convergence Zone) or the ITD south to north (rainy season), vice versa (dry season) and meeting at a front. The ITCZ separates humid maritime air mass originating from the Atlantic Ocean and dry desert air mass. The ITCZ follows the apparent movement of the sun, (northwards in April – July and southwards in September – October). Temperature is generally cool in the morning, hot in the afternoon, and very cool in the evening. Maximum temperature range in Katsina is between 29°C and 38°C but harmattan season (November to February) lowers temperature to about 18°C and 27°C in the noon.

With the exception of some exotic species planted as ex-situ conservation trees, the vegetation in Dutsin-ma area is composed of indigenous species which grow spontaneously. The trees found include *Parkia biglobosa*, *Adansonia digitata*, *Khaya senegalensis*, *Fadherbia albida*, *Tamarindus indica*, and *Borassus aethiopum*, and exotic species such as *Azadirachta indica*, *Eucalyptus camaldulensis*. Few fruit trees are grown on farms such as *Magnifera indica* and *Anacardium occidentale*.

II. Methodology

A total of 13 tree seedlings production centres were inventoried and indexed based on the location found in the area. Seedling producers of each centre (in 7 villages of the area) were later enumerated and sorted out based on years in seedling activities in their centre using purposive sampling technique. A purposive criterion of selecting one index producer with highest number of years in seedling production activity from each centre was used to sample 13 producers. These seedling producers were later interviewed using semi structured checklist of 12 questions. Results of the study were presented in tables and discussed appropriately. Bar graph is used to depict number of years of index producers in seedling production activity and modes of accessing seedlings of the area. The number of producers according to location found as well as years in tree seedling production is presented in table 1.

Table 1: Number of Index Tree Seedlings Producers of the Study Area

Location of seedlings centres	Number of producers
Darawa	02
Dutsin-ma	03
Gago	02
Garhi	02
Kagara	02
Makera	01
Turare	01
Total	13

Source: Author (2013)

III. Result And Discussions

3.1 Producers' Years in Seedling Production Activities

A total of 13 producers were distributed based on number of years they have spent in seedling production in the seven (7) villages of the area. Each bar represents number of years of a producer thus while some villages may have one bar (producer) others have two (2) and three (3) accordingly.

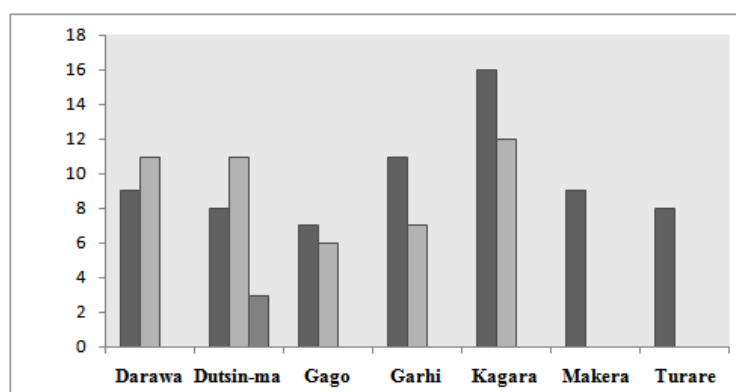


Figure 1: No. of Years in Seedling Production according to villages in the Study Area

3.2 Types of Seedlings Produced In the Area

Table 2: Tree seedlings produced in seedling production centres of the area

Local names (Hausa)	Botanical names
Bedi	<i>Azadirachta indica</i>
DorawarBature	<i>Dolomix regia</i>
Kashu	<i>Anarcadium occidentale</i>
Kuka	<i>Adansonia digitata</i>
Magwaro	<i>Magnifera indica</i>
Tsamiya	<i>Tamarindus indica</i>
Turare	<i>Eucalyptus camaldulensis</i>
	<i>Gmelina borea</i>

Source: Author (2013)

Discussion:

Table 2 indicated that a total of eight (8) species are propagated by the producers of the area. It is clear that because the seedling centres are owned privately, most of the species except *Adansonia digitata* and *Tamarindus indica* are exotic ones that regenerate income products and provide food to the people within short period of time. The main purpose of seedling producers of this area is to propagate 'exotic trees' such as *Magnifera indica* and *Anarcadium occidentale* which are mostly quick rewarding through products like fruits. The limited diversity of seedling produced (in terms of richness) is however as a result of constraints of capital and inability of old techniques of seedling propagation to integrate the production of seedlings not common to the area.

3.3 Sources of Planting Materials of Producers of the Area

The result of the study found out that four (4) public nurseries in Katsina as the main sources of tree seedlings of producers of the area. These are Dustin-ma Zonal Forest nursery, European Economic Community (EEC) nursery Katsina, Katsina Arid Zone Program (KAZP) nursery and Katsina Afforestation Project Unit (KTAPU).

Table 3: Types and Sources of planting materials of the producers

Types of Planting materials	Sources
Young shoot	KTAPU, KAZP nursery, EEC nursery, market
Plastic bags	KTAPU, EEC nursery, market
Fencing wire	EEC nursery, market
Watering can and hose	EEC nursery, market
Shovel, wheel barrow	market

Source: Author (2013)

Discussion:

It is depicted in table 3 that seedling producers of the area collect seedlings and plastic bags from public nurseries while other materials are obtained from the markets. It was mentioned that although planting materials from government agencies are free or subsidised, only those producers with 'connections' have access to them. A survey of most agencies depicted that only young seedlings and plastic bags may be readily available. In fact this was a reason why only few centres manage to continue operating because coupling with uncertainties from government schemes the market prices of the planting materials are exploitatively volatile.

3.4 Techniques of Tree Seedlings Production

Knowledge of seedling production of the area is categorised into two source which are generated from the respondents of the area. Generally knowledge in this part of Nigeria falls into intuitive (indigenous) and acquired (formal).

Table 4: Knowledge of Seedlings Production

Sources of production Knowledge	Number of Producers	Percentage %
Intuitive	09	66.66
Acquired	02	13.34
Both	02	20.00
Total	13	100

Source: Author (2013)

Discussion:

Virtually most producers showed that they have the knowledge of seedlings production through intuition. Like most rural trees' stakeholders, they mentioned that the knowledge was passed on to them from parents when they were children. Although their knowledge is by far most important, the producers however lack modern techniques of seedling propagation as well as sowing. It was observed that the idea they have is still indigenous with the exception of only improvement in grafting same species of genetically different varieties. At present the knowledge of the producerstilted on nursing seedlings on beds usually through fencing, watering, weeding and application of manure. They also sow seedlings of threatened indigenous species which they source locally in a move to avert extinction of valuable stands in the area.

3.5 Major Constraints to Tree Seedlings Production in the Area

A total of four (4) constraints are depicted in table 5 with nominal frequencies of respondents (producers). The frequencies of the producers are shownbased on responses of the producers as depicted in the table below.

Table 5: Constraints to Tree Seedling Production in the Area

Constraints	Frequencies
Lack of capital	03
Lack of planting materials	07
Pests	01
Shortage of water	02

Source: Author (2013)

Discussion:

An inventory of constraints to tree seedlings production in the area showed thatabout four (4) variables limit seedling propagation in the area. The constraints are however spatially different in terms of magnitude from village to village though within same geographical location. Lack of planting material is the major constraint of the producers because it is mentioned by seven (7) respondents in five (5) of the seven (7) villages of the study thus making it most hard-hitting while pest is said to have less impact.

3.6 Most impeding constraints to Seedling Production

Constraints to tree seedling production vary significantly from one geographical are to another. Thus while it is found in Tanzania by Albaek (1997) that lack of planting materialsis a threat to seedlings production, in certain area constraints might differ.

Table 6: Most Impeding constraint according to respondents

	Constraints			
	Lack of capital	Lack of planting material	Shortage of water	Pests
Index Producers	04	06	02	01
Prospective producers	04	08	01	-

Source: Author (2013)

Discussion:

Chi-square was calculated to test whether constraints impede tree seedling production in the area based on responses. At 0.05 level of significance and degree of freedom (5), the calculated value (11.7) is greater than the critical value (11.07), therefore null hypothesis is rejected that constraints do not impede production in the area. The calculated chi-square value is obtained based on the condition that the observations are independent. The result showed that although the constraints are common in the study villages, they impede production even in small amount.

Moreover, it can be further deduced from table 6 that lack of planting materials is the most impacting constraint to tree seedling production in the area. Pest is however not a main constraint to production according to many producers may be because of access to cheap pesticides in local market. Lack of capital may affect production in all villages but is more pronounced as barrier in Gago and Garhi may be because these villages are more remote than the others and thus access to capital will be more challenging. Lack of water is also more felt in Makera and Garhi villages because of basement rocks underlying the area which makes the construction of shallow wells difficult.

3.7 Access to Tree Seedlings

Access to tree seedlings among producers of the area falls into two categories viz; free and purchase. This means that producers can only obtain seedling through purchase, local exchange or from distribution centres of the government in the area.

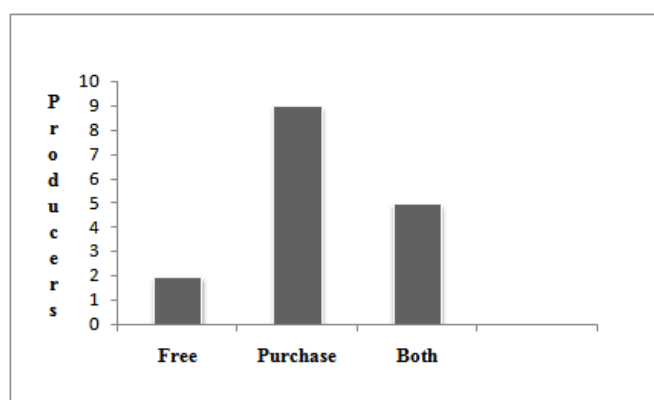


Figure 2: Modes of access to planting materials in the producers

Discussion:

It was depicted in figure 2 that majority of the producers mentioned the purchase of shoots in plastic bags from local seedling centres at a nominal price of ₦50 to ₦100 per bag which vary from village to village. These shoots are later planted in compounds, in enclaves and farms or send back to local seedling exchange centres for exchange among users. It was revealed that few have access to free seedlings from government owned nurseries in Katsina (EEC and KTAPU sites) and recently Runka Kukar Jangere nursery which is mostly of *Azadirachta indica*, *Eucalyptus camaldulensis*, *Magnifera indica*, and *Anarcadium acidantale*. The result indicated that seedlings producers that wait for free seedlings will do so for long because of shortage as well as tight procedures. They are also left with only option of restricted diversity of species because of the less richness of the distributed seedlings.

IV. Conclusion

Tree seedling production centres of the area remains the only pool where seedlings are produced in the area despite all constraints. While majority of them operate a private informal business, the few non-functional government sponsored nurseries (seedlings centres) are either relics or operate at minimum capacity due to neglect. Incentive in tree seedling sector has been the surest way of maintaining the system even though some researchers do not see free distribution as a panacea. Example, incentive for private sector participation in terms of distribution of tree seedlings, at no cost to the recipient, by the Federal and State governments have provided tremendous encouragement to the rural dwellers, especially farmers, who plant the seedlings on their farmlands. More than 197,000 contact farmers benefited from such scheme under the second forestry project (World Bank, 1997). This led to the establishment of about 4,882 ha of private woodlots in the northern part of the country.

The study found out that the producers use obsolete tools and old techniques to produce seedlings of especially exotic trees because they are more preferred by the local buyers. Lack of planting material and shortage of water are the highest ranking constraints to seedlings production in the area, thus very similar to the situation in most parts of Africa (Albaek, 2001; Nathan, 2000). The study is so paramount because it is observed that more than any other thing tree seedling producers value their seedling centres for livelihood and seedling multiplication.

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