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ENTERPRISES IN AGROFORESTRY SYSTEM AS A MEANS OF ECONOMIC EMPOWERMENT: AWARENESS ON ITS SOCIO-ECONOMIC IMPORTANCE

PRZEDSIĘBIORSTWA W SYSTEMIE AGROLEŚNICTWA JAKO ŚRODKI ZATRUDNIENIA GOSPODARCZEGO: ŚWIADOMOŚĆ ZNACZENIA SPOŁECZNO-EKONOMICZNEGO

Abstract

Agroforestry practice has a long history but recently has received more attention owing to the problems long-faced on forest reserves depletion and shortage of food supply. Agroforestry is becoming accepted as a land-use system that is capable of producing both food and wood while at the same time reduce forest resource user dependency as a means of livelihood thereby conserving and rehabilitating ecosystems. Enterprise in agroforestry is seen as a practice that serves as an alternative to the use and overuse of forest reserve resources. This paper reviews the studies of agroforestry businesses that are capable of sustaining a household in forest communities and rural areas, especially those

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that depend on forest resources. It enumerated on the processes of production of Shea-butter (Vitellaria paradoxa), Mushroom, locus beans (Parkia biglobosa) and setting up of nursery for seedling raising as a means of livelihood. It also talks about the cost implication and accruing profits. This paper believes that education/training programs on agroforestry enterprises are eminent, with the conclusion that there is a dire need for an aggressive awareness on Agroforestry enterprises to persuade forest user as a better option of means of livelihood in order to save forest reserves from depletion as well rescue forest endangered species.

Keywords: *Agroforestry, Enterprise, land-use, multi-cropping, communication, awareness*

Streszczenie

Praktyka agroleśna ma długą historię, ale ostatnio poświęcono jej więcej uwagi ze względu na problemy związane z wyczerpywaniem rezerw leśnych i brakiem zapasów żywności. System agroleśny staje się akceptowany jako system zagospodarowania przestrzennego, który jest w stanie wytwarzać zarówno żywność, jak i drewno, jednocześnie zmniejszając zależność od zasobów leśnych jako środka utrzymania, a tym samym ochrony i rehabilitacji ekosystemów. Przedsiębiorstwa agroleśne są postrzegane jako praktyka, która służy jako alternatywa dla wykorzystywania i nadmiernego wykorzystywania zasobów rezerwatów leśnych. W artykule dokonano przeglądu badań przedsiębiorstw agroleśnych, które są w stanie utrzymać gospodarstwo domowe w społecznościach leśnych i na obszarach wiejskich, zwłaszcza tych zależnych od zasobów leśnych. Wymieniono w nim procesy produkcji masła shea (Vitellaria paradoxa), grzybów, locus fasoli (Parkia biglobosa) i założenia szkółki dla hodowli sadzonek jako środka do życia. Artykuł mówi także o wpływie na koszty i naliczaniu zysków. W niniejszym dokumencie stwierdzono, że programy edukacyjne / szkoleniowe dotyczące przedsiębiorstw agroleśnych są bardzo ważne, a także, że istnieje pilna potrzeba świadomości przedsiębiorstw agroleśnych, aby przekonać użytkowników lasów, że stanowią one lepszą opcję oszczędzania rezerwatów leśnych przed wyczerpaniem oraz ratowaniem zagrożonych gatunków leśnych.

Słowa kluczowe*: agroleśnictwo, przedsiębiorczość, zagospodarowanie terenu, uprawa wielu roślin, komunikacja, świadomość*

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Statement of the problem in general outlook and its connection with important scientific and practical tasks.

Man has power over nature and how useful nature is a function of human management activities. Land is one of the essential resources and it's inevitable. It is commonly exploited for agricultural, residential and industrial purposes. Focusing on agricultural use of land, soil and climate are the most exploited, while less consideration or attention is focused on land use management systems call Agroforestry (Sobola O.,

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Amadi D., Jamala, G. 2015, p. 20-2). Land use management system historically can be traced back to the aftermath of prehistory of hunting and gathering of forest habitats by hunters and gatherers, the domestication of plants for agricultural purposes and lately, the introduction of some exotic species and high rate of deforestation that appeals for modern-day land use structure (Alao, J. S. Shuaibu, R. B. p. 156-159). Agroforestry characteristics majorly include the social forestry approach which is to provide local communities avenue to benefit from the forest while keeping it in shape. Agroforestry in a way increases the production of food and related services in agriculture and forestry through the management of ecological diversification (Brian P. 2013, 10-53). It can also be described as an intended effort aimed at improving socio-economic expansion through food production of various combinations of agriculture and forest practices in the general field of intercropping activities. Modern farmers use it as a tool to meet the projected outcomes from time to time (Brian P. 2013, p. 10-53). And its products such as tree foods, fruits, leaves and trees are valuable to mankind over time. Agroforestry has helped mankind in many ways, it has help reduce required land if agricultural and forestry activities were to be done separately, as well as the cost of production (Adepoju A., Akinyemi O., Oyewole S. and David E. 2018, p. 781-787). Also in an experimental work of institutions like International Institute of Tropical and Agriculture on tree, shrubs and crop production, it has helped to correct primitive believe of Orthodox farmers that were used to the system of one crop per parcel of land with the belief that growth of one crop will affect the other in a multi-crop farming system. And has corrected the perception that, farming within or around the forest is tantamount to waste of time because of the belief that tree covers will prevent crops from receiving needed sunlight to grow (Amonum, J., Babalola, F. Agera S. 2009, p. 18-30). Agroforestry is ascribed to help savage and cover-up for the vacuum left by forest degradation caused by deforestation (Roger L. 1996, p. 5-7). Unlike the days when forests were in good shape and serves as source of food to human with its products and climate adjuster, nowadays, overcutting of firewood, fodders, timbers, hunting and grazing of livestock has caused depletion to the forests resulting in shortening the benefits accruing to human, environment and forest habitats, which made the call for agroforestry land-use system a way forward (Sobola O., Amadi D., Jamala, G. 2015, p. 20-2). The purpose of agroforestry introduction in forestry and agricultural business is to utilize the available resources in a more sustainable manner to enhance targeted outcomes to the benefit of all. Agroforestry comes in different forms, it practices include a variety of land use systems, it could be forest and crops or forest and livestock or combination of both on the same land. This is in line with various organization's initiatives on crop physiology and agronomy (Viswanath, S, Lubina, P. Subbanna, S and Sandhya, M 2018, p. 18-29). In International Development Research Center (IDRC) research, integration of plantation, crop like rubble and animal, and intercropping of legumes and coconut was sustainable. Similarly, there are many small enterprises that can be done within forest reserve through its products, resources and forest activities. These enterprises are self-sustaining or can serve as a source of additional revenue for the individual. They serve as a means of livelihood to forest dwellers and helped to reduce forest illegal usage, which many people don't know about due to lack of awareness and training. They are many and are referred to

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as agroforestry enterprises in practice, these include Seedling production, Mushroom production, Snailry, Fishery, Fruit tree, Spices and Medicinal Plants, Honey production, Shea butter production, Grasscutter, Briquette, African locust beans among others. Creating proper awareness of it has the capacity to reduce the unemployment rate and also serve as a source of raw material for industries (Smith J. 2010, p. 2-24.). But this paper's focus will be on those that are value-added based within the forest ecosystem. These will include Mushroom production, Shea butter production, African locust beans and Nursery for seedling production. It will look into the problems resulting in agroforestry, the importance of communication in agroforestry and descriptions of some initiatives in Agroforestry enterprises.

Analysis of latest research where the solution of the problem was initiated.

Problem Leading to the Need for Agroforestry Enterprise

Prolonged issues on forest degradation have generated lots of concerns among policymakers and private investors on forestry and forest-related businesses. With focused attention paid to the problems leading to forest depletion (deforestation) and environmental degradation in the total forest ecosystem (Amonum, J., Babalola, F. Agera S. 2009, p. 18-30). All efforts seem insufficient given the facts that no many changes are seen, and all these are because forest users have not changed their module up Randi. These forest stakeholders include the researchers, the timber contractors, herbal plant sellers and the forest host communities among others (Viswanath, S, Lubina, P. Subbanna, S and Sandhya, M 2018, p. 18-29). On the part of forest scientists, many types of research have been done but were not implemented or the implementation didn't yield the expected result. Many research findings established that afforestation, forest protection and finding alternative resources to forest products will reduce forest use and depletion, but the late implementation of afforestation programs and time lag of tree growth has created a vacuum and also resulted to further loss of forest products and habitats that makes up forest ecosystem. Meanwhile, the contractors, herbal sellers and people leaving in forest areas see forests as a natural God's gift for sustenance thereby made it the means for livelihood (Oke A. Adebisi M. 2019, p. 15 – 22). They are the main cause of forest problems through illegitimate use of forest reserves in the tree falling without replacement or plan to replace, use of forest endangered spices in fauna and flora which in turn lead to the extinction of some of them and the use of woods for heating and as firewood immeasurably. These problems over time have deepened the search for the opposite approach to correcting these problems both by individuals and organizations. The common goal is to find a practice that is socio-economically suitable, ensures sustainability and serves as an alternative to the use of forest resources (Oke A. Adebisi M. 2019, p. 15 – 22). Agroforestry enterprises started as a program for local forest community dwellers to pave way for benefiting from the forest without depleting its resources. It teaches in theory and practices, how many businesses can be done within forest cover and environ, with mutual benefit of preserving the forest and improve on socioeconomic livelihood (Viswanath, S, Lubina, P. Subbanna, S and Sandhya, M 2018, p. 18-29).

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Importance of Communication to Agroforestry

Knowledge is power and is regarded as the key to success in any field. It entails Information acquired that helps a person function in any activity. Information dissemination is a prominent activity in all aspects of life, which is achieved through the communication process. Communication is the transfer of ideas, thoughts or feelings from a sender to the receiver through verbal or nonverbal means. Although there are many definitions of communication, most share some common points, as "transferring", "interaction" and "sharing with others". Communication was defined as "the process that occurs when ideas, information and feelings are conveyed between individuals or groups of individuals for deliberate purposes" this shows that it is not only about the Information but also feelings, thoughts, needs and observations are involved in the process (Baguley, P. 1994). This transfer gains special significance in agroforestry especially, as a service sector working with humans. In short, in order to plan and develop agroforestry, there is a need for improved communication internally and externally using appropriate mode. Messages are passed through different means; linguistic (content, meaning, speech qualities) and non-linguistic (body language, body contact, distance, appearance) All these factors in the process of communication enables materialization and achievement of public relation goal such as to inform, convince, motivate and provide mutual understanding on pressing issues especially (Smithson, S. 1984).

The aim to communicate is numerous, however, the purpose of most of the communications is to affect the feelings, thoughts or even behavior of people being communicated to about a particular thing. The importance of agroforestry systems at a global scale was highlighted in Agenda 21 of the Rio Convention, where agroforestry systems, and therefore agroforestry practices were mentioned as sustainable land management options (Nair P. 1993, p. 21-53). For this impact which encompasses several aspects like Environment, economy, agricultural production and rural living, by rural areas and farms, communication is necessary as it aids information sharing and interactions between farmers and the source of the information. When the sustainability role of Agroforestry is well communicated through the exchange of information and open discussions on recent developments through the communication process, productivity will be enhanced. With this, the farmers express their struggles and get feedbacks to overcome these struggles. Also, institutional memory where knowledge and information are for life is developed (Nair P. 1993, p. 21-53).

Aims of paper. Methods

This paper rests on the strength of other literature and information from field and programs, as well as reports and publications of Forestry Research Institute of Nigerian. Both descriptive and photography methods of analysis are employed with a focus on some brief descriptions of some chosen areas of enterprise in Agroforestry. An insight into what the business entails alongside production processes will be given.

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Exposition of main material of research with complete substantiation of obtained scientific results. Discussion.

Benefits from Agroforestry

The main forest product is a tree and there is tree presence in agricultural activities. Tree presence helps to collect moisture with the leaves, and drips onto the ground, without trees, moisture in the air blows away while tree roots also prevent soil from being washed away. Tree leaves provide organic substances for soil organisms that are good for crops and increases soil fertility while trees, in turn, protect soil (Montagnini F., Nair P. 2004, p. 281–295). This formed a working soil life cycle protection and natural fertility structure. Trees protect the soil from the harmful effects of strong sun, wind and heavy rain, conserve moisture in the soil and control climate activities. Therefore, agroforestry helps to make farming self-reliant, it increases yields of fodder, firewood, timber, fruit, herbs, etcetera if well-practiced (Moore S. 2008. P. 209-245.). Meanwhile, if daily needs of fodder, fuel, leaf litter and food etcetera, are met through alternative means, the forest will be less used, preventing deforestation and leads to forest conservation. The farm economy becomes stronger and livestock needs are easily achieved (Franzel S, Cooper P, and Denning G. 2002, p. 156-170). Agroforestry makes available timber, fruit, herbal medicines, firewood, fodder etc., to landowners and, livestock are also easily raised for income, and the overall standard is strengthened. By producing daily needs of fodder, fuel, timber, etc. On the farm, less time is spent going to the forest to destruct forest products and its habitat (Boffa, J. 2015).

Some Agroforestry Enterprises of Interest

Forest products both Non-Timber and Timber Forest Products has a variety of derivable products/resources that are useful to mankind. While common practice has ever been on the raw usage of many of these products especially by forest users and people living in forest communities around developing countries, attention is shifting to value addition to these resources in order to improve its acceptance, ease the pressure on forest reserves as well as to improve on income of those that engages in its practices(Montagnini F., Nair P. 2004, p. 281–295). The practice of adding value to the forest and related products is what is incorporated into what's called Agroforestry enterprises and this has many products in it as mentioned above. This study will focus on a few with a brief explanation of its establishment structure (Franzel S, Cooper P, and Denning G. 2002, p. 156-170).

Vitellaria Paradoxa

Vitellaria paradoxa (Shea butter) is a fat extracted from the nut of the African Shea tree. It is ivory in color when raw, with more processed versions being white in color, and yellow when a root is added to it (Alfred T., 2002). Shea butter, cultivated in most parts of the Sudan-Sahelian regions of Africa is an economically and culturally important tree species, especially wherever oil palm does not grow. The dried kernel of the fruit is used to produce oil or fat (Shea butter) for local consumption and is commercially sold as an ingredient in cosmetic, pharmaceutical and edible products (Boffa, J. 2015).

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Figure 1. Vitellaria paradoxa (African Shea tree).

Source: Tropical.theferns

The fruit pulp is an important local nutritional product, consumed by adults and children, and provides a wide range of nutrients (Hall, 1996). The vitamin and mineral-rich vegetable butter extracted from the nut provides cooking oil for households in several regions. It is also used locally as a skin and hair moisturizer, in soap making. Its medicinal properties are known to relieve rheumatic and joint pains and to quicken healing times and prevent infection of open wounds. It is also widely used to treat skin problems such as dryness, sunburn, burns, ulcers and dermatitis (Marchand D. 1988. p.17; Moore S. 2008, p. 209-245.). Also, the wood is of importance as it is used occasionally for charcoal, construction, for furniture and as pounding mortars (Dalziel J. 1937, p. 350–354; Abbiw D. 1990, p. 66–67). The bark is used for traditional medicines and the latex is used for making glue. Shea butter (including fractions and derivatives) is marketed internationally as an ingredient for manufacturing cosmetics (moisturizing creams, paper wipes, sun lotions and soaps). In the pharmaceutical sector, Shea has been used as a base for medicinal ointments, as an anti-inflammatory treatment for arthritis and a topical treatment for eczema and other skin conditions including herpes lesions, as well as in nutraceuticals for lowering cholesterol (Boffa, J. 2015). Shea trees start bearing its first fruit at 10 – 15 years old. Full production is attained when the tree is between 20 – 30 years and produces nut for up to 200 years. Shea nuts are collected first after the fruits ripen and fall from the tree at the beginning of the rainy season. The Shea fruit consists of a

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thin, sweet and nutritious pulp that surrounds the relatively large oil-rich seed from which the butter is extracted. The kernels are then separated from the fruit and ready to begin the Shea butter production process (Yussif, A. 2015). The Shea nuts are processed in a very arduous procedure, such as separation, Crushing, Roasting, Milling, Kneading, Stirring, Purification, and so on, until the resulting butter is creamy and usually thick. It can range in color from beige to light or dark green or even grey. The color it produces depends largely on factors such as season the nuts were harvested and maturity of nut.

Figure 2. Shea Butter in liquid form

Source: FRIN Training Module, 2018

Figure 3. Shea Butter in solid form

Source: FRIN Training Module, 2018

Figure 4. Shea Butter cake

Source: FIN Training Module, 2018

Apart from other users of African Shea trees in medicine and pharmaceutical, Shea butter is its most pronounced product and it does not require special skill to undertake it production business processes. Also, the needed fund to start up is small and affordable and it can yield so much for its producer. Especially now that many European

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and American countries have found a use for it (Marchand D. 1988, p. 17).

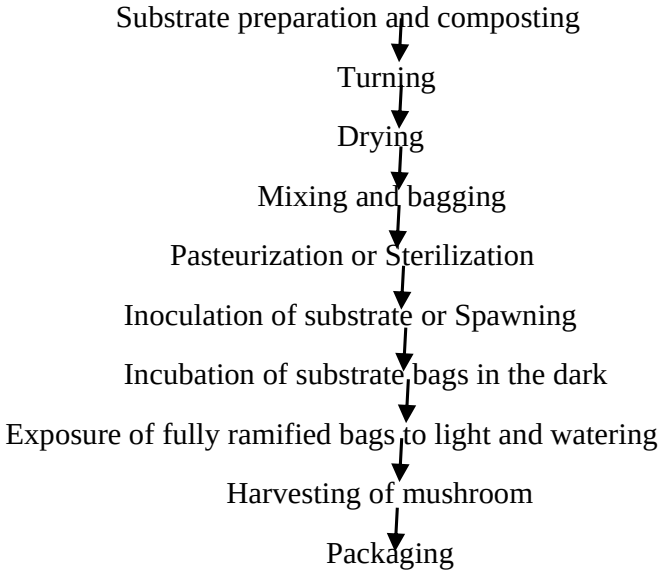
Mushrooms

A mushroom is a fleshy, spore-bearing fruiting body of a fungus, typically produced above ground on soil or on its food source. Mushrooms are used extensively in cooking, though it's neither meat nor vegetable, mushrooms are known as the "meat" of the vegetable world.

The carbohydrate content of mushrooms represents the bulk of fruiting bodies accounting for 50 to 65% on a dry weight basis (Wani B, Bodha R. and Wani A. 2010, pp. 2598-2604). On a dry weight basis, mushrooms normally contain 19 to 35% protein whereas fat is very low as compared to carbohydrates and protein (Wani B, Bodha R. and Wani A. 2010, pp. 2598-2604). Mushrooms have the advantage over other crop plants in their ability to grow on waste agricultural products like sawdust, straws, sugarcane bagasse, and coconut waste products etcetera.

Some Nigerian edible mushrooms include; Pleurotus tuber-region, Pleurotus squarrosulus, Termitomyces spp, Volvariella auricular judae, Volvriella volvaceae, Auricularia auricular judae, Chlorophyllum molybdites, Schizophyllum commune, Psathyrella atroumbonate, Psathyrella condolleana, Tricholoma lobayenae (T. lobayensis).

Figure 5. Mushroom Cultivation Procedures



Source: Field Survey, 2019

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Figure 6. Different Agricultural waste.

Source: Field survey, 2019

Figure 7. Packaged Mushroom.

Source: FRIN Module, 2019

Harvested mushrooms can be packed in polythene bags after appropriate weighing for proper costing. Bags of fresh mushrooms should be a puncture in a few places to allow aeration of the mushrooms. Harvested mushrooms that are not immediately needed can be thoroughly dried and packed for sales in the dried form. Its demand is on the increase and hotels, restaurants and vegetarians are the common customers. To produce mushrooms, one will need a space in the form of a cage, shelves, pasteurizer, and space for mixing of the substrate, and sawdust, lime, wheat-offer, and mushroom seed. Meanwhile, the cost of production is low when compared to the receivable on its sales. Production cost yield up to 200 percent in profit.

Locust Bean

Parkia biglobosa (Locust bean) is found in a wide range of environments in Africa and is primarily grown for its pods that contain a sweet pulp and valuable seeds. Where the tree is grown, the crushing and fermenting of its seeds constitute an important economic activity. The tree also has medicinal values, as various parts of the tree are useful. Also, the locust bean tree can have a positive effect on the yield of other nearby crops in Agroforestry systems. This is because the tree is a useful windbreak and also can be used as a shade tree. Soils under the tree are improved by leaf fall, so its common practice to grow seasonal crops such as maize, cassava, yams, millet, etc (Orwa C., Mutua A., Kindt R., Jamnadass R., Anthony S. 2009). The yellow pulp which contains the seed which can be processed into a valuable carbohydrate food known as Dawadawa among Hausa, Iru among Yoruba (Olaniyan, A., 2013).

The seed is first cooked to remove the seed coat and then fermented to produce the desired result. Gmelinaarborea, as well as banana leaves, can accelerate the fermentation of seeds, and bring an increase in protein, crude fat and moisture contents with a corresponding decrease in carbohydrate (1. Gernah, D., Inyang, C., and Ezeora, N. 2007, p. 227-239). The fruit pulp, the leaves and the seeds are also used to feed livestock and poultry (Heuzé V., Thiollet H., Tran G., Edouard N., Lebas F.

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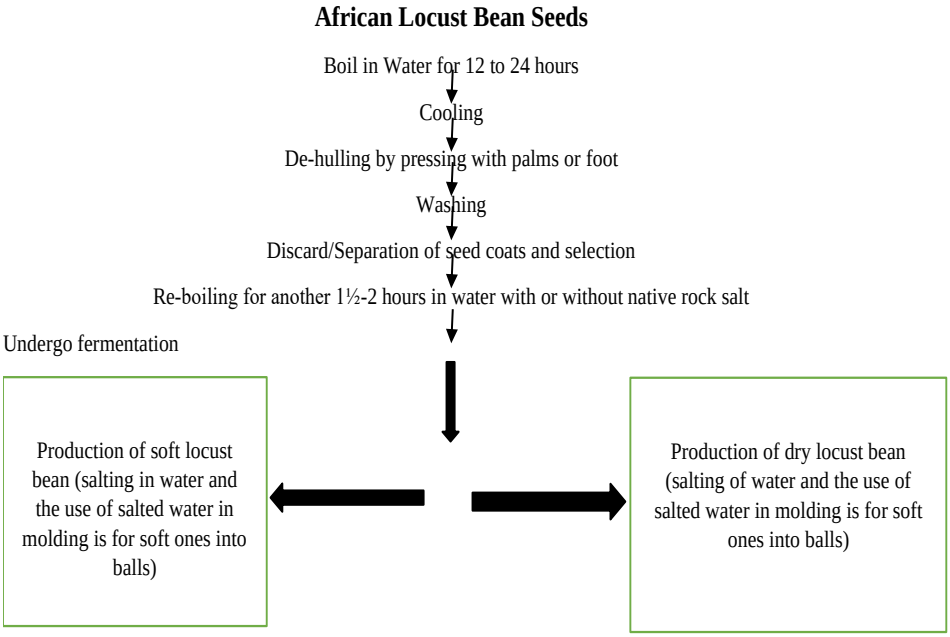
2018. African Locust Bean (Parkiabiglobosa and Parkiafilicoidea). Feedipedia, a program by INRA, CIRAD, AFZ and FAO. https://www.feedipedia.org/node/268). The sales of some of these products especially locus bean have proved profitable over time and can serve as means of income generation for forest users.

Figure 8. Processing Stages Flow Chart



Source: Field Survey, 2007

Nursery

A nursery is developed and managed site, designed to produce seedlings, to be grown unto favorable conditions until they are ready to be planted. A nursery is primarily created to produce a sufficient quantity of high-quality seedlings to meet the needs of its users. These actions make the seedlings readily available at the required planting season, saving time, money and efforts of farmers to raise seedlings.

The nursery site should be located in the nutrient-rich/medium soil, near to water source, free from soil pathogens and insects, availability of cheap and skilled labors and has good access to the main road for easy transportation. The site should be on a gently sloping area and away from other tall crops: this is important for good drainage as well as to encourage air circulation.

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Figure 9 Nursery Management

Source: FRIN Module, 2017

An appropriate site must be selected for the most effective, efficient, and economical design of a nursery. The purpose and target of plants to be produced will decide the site selection and its improvement. Careful observation of site conditions and an assessment of past and present climatic records are important. If desired, make a list of potential nursery sites and compare them using a decision matrix.

On the contrary, each nursery will have a unique design based on distinct needs, resources, and requirements.

Figure 10. Nursery Shed

Source: Field Survey, 2018

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Generally, a good nursery should consist of water tank/pond, water pump/pump house, seed and fertilizer storeroom, implement shed, germination/mother bed area; potting/container filling area, seedling raising area, worker mess/hall, office room, propagation structures, compost area, etcetera. A nursery is usually arranged in a series of beds with a pathway between them. An open area is needed at one end, where work such as sieving of soil and filling of containers can be done. Usually, a room/shelter is required for staff and the watchman, and where equipment can be securely stored. The layout should be in a way that enables operations to flow logically through the nursery so as to save labor and time. Roads and paths within the nursery should be carefully planned. The nursery facilities should be kept clean. Every effort should be made to control weeds in and around the nursery as weeds may host insects and pathogens (Krishnan, 2014). A plot of land can accommodate three to five thousand seedlings, and depending on scarcity and quantity, its price varies and can earn one million nairas (thousands of USD). Seedlings raising is a lucrative business in sub-Sahara Africa because of the afforestation program ongoing in many countries like Nigeria.

Discussion

Agroforestry enterprise is a product of agroforestry practice. The system simply deals with value addition in an existing product that is either used as a raw material or those forest products that were not packaged/branded. There are many new ways or improved techniques of presenting most of these product courtesy of agroforestry enterprises schemes. For instant, the fishery is not new but fish baking is an improved way of presenting fish for more acceptance which also helps in its preservation and purification. There is long list of agroforestry product from forest point of view that include, timber derivable products like, Moringaoleifera (oil, bread, gel, tea, flour biofuel etc), Vitellariaparadoxa(Shea nut, oil, Shea butter), Irvingiagabonensis (gam, juice, black die, oil), Parkiabiglobosa (locust beans), and non-timber agroforestry practices like, fishery, honey production, sidling production, mushroom and so on. These products are becoming known and the acceptance kept on increasing as more techniques and improved way of their presentation has been adopted by more people than before.

Shea butter (Vitellariaparadoxa) for instance was usually wrapped in papers or nylons but now packaged in branded and colorful plastic/rubber containers in different scent and flavors. Africa locus beans (Parkiabiglobosa) were usually wrapped in leaves with some noticeable dirt but the new packaged locust beans in branded containers are cleaner. Mushrooms that grow naturally on decayed trees can be grown at home with forest/tree wastes, while the fear of some poisonous ones is no longer there. There are locations where one of two of these products is common and is already serving as the only means of livelihood, introducing modern techniques will improve the quality and acceptability of these products as well as increase the number of people dealing with them. It will reduce the other businesses done in the forest like tree cutting, hunting etcetera which in turn result in deforestation and extinction of some endangered species.

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Conclusions.

There is a need for government and its agencies to include in their policies education/training programs on agroforestry enterprises. Especially, forestry departments of government should carry out researches on the value chain of these products and follow up on the proper implementation of their findings. Also, there is a dire need for an aggressive awareness on Agroforestry enterprises to persuade forest user as a better option of means of livelihood, this which is believe will reduce deforestation and safe forest reserves from depletion.

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