

The Uses Of *Azadirachta Indica A. Juss* (Neem Tree) In Taura Local Government Area, Jigawa State, Nigeria

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Abstract

The purpose of this study was to determine the uses of Azadirachta indica A. juss (neem tree) in Taura Local Government Area, Jigawa State, Nigeria. This plant is an invasive species; it was introduced long ago but has a great importance in terms of control of desertification, land degradation and abundant human/animal uses. The whole neem tree have different uses depending on the portions, it could be the leaves, bark, stems and roots. The study categorizes uses to local farmers into three thus; direct uses, consisting of five different questions, the ecological uses consisting of six questions and the medicinal uses consisting of four questions. The sample size of 398 local farmers were used and shared within the ten wards of the Local Government Area. The result obtained had shown that the response from the Local farmers were positive.

Key words: *Azadirachta indica A. juss* (neem tree), direct uses, ecological uses and medicinal uses.

Introduction

Plants are the integral part of land resources that need careful management and sustainability for utilization by future generations. Vegetation as a resource provides some basic needs for life such as food, fuel wood, conservation of soil fertility, roofing of Houses and medicines (Tukur, *et al.* 2013). Living within the environmental limits is one of the central principles of sustainable development. There are so many implications of the current human population explosion that put pressure on the natural resources. These include among others, land degradation, deforestation and construction activities (Tukur, *et al.* 2013). Biological diversity and sustainable resource use are crucial for ecosystem stability and human survival. However, biodiversity is under assault world over, due to rapid and accelerating anthropogenic activities causing persistent decline in species diversity. Consequently, biodiversity conservation has become one of the dilemmas currently facing mankind in both developed and the developing world, UNEP/CBD (2011). The conservation of habitats and landscapes constitutes of the major targets of the convention on biological diversity through its global strategy for plant conservation. Meeting this biodiversity conservation target requires every country, State or Local Government to engage in systematic conservation planning and related conservation action (CBD, 2002). People of Taura local government Area are mostly local farmers and the farming system is subsistence farming. During the dry season most of the cattle keepers rely on cutting of most native plants to feed their cattle. This has resulted in the reduction or elimination of most of the native trees leading to habitat loss.

Azadirachta indica A. juss is a newly introduced species, but it has strong morphological and physiological adaptations that suit it to survive and regenerate even

with considerable cuttings and adverse conditions. The agents of its distribution and dispersal are many and they include the following:-

- i. Birds that suck the liquid portion of the mature seed and throw away the seed.
- ii. The local farmers who take the local manure to their farms containing the seeds.
- iii. Farmers who plant the seeds.
- iv. The seed itself can be transported by wind from one place to another.
- v. Some animals' feaces contain the seeds and are dispersed from one place to another, (Tukur *et al.* 2013).

The seed itself is capable of withstanding adverse conditions before and after germination. The young neem plant is not eaten by every animal or it is hardly eaten by animals. Considering the frequencies and plants distribution across the farms, settlements and the few remaining grazing yards, the *Azadirachta indica* A. juss is considered the most abundant. During the dry season the plant sheds its leaves in order to minimize water loss.

Literature review

***Azadirachta indica* A. juss: taxonomy and nomenclature**

Neem belongs to the family *Meliaceae* and botanically known as *Azadirachta indica*, A. juss is a woody family of plants comprising 50 genera and about 640 species widely distributed throughout the tropics and subtropics with only slight penetration into temperate zones (Muellner, *et al.*, 2005). Its native place is Indian sub-continent. It is a hardy, quick growing evergreen tree with a height of 15 to 20 meters, semi-straight trunk of 30 to 80 cm in diameter. It spreads its branches as much as 20 meters. Leaves are up to 30cm long, pinnate, leaflets are 7cm long, lance acuminate, oblique, more or less serrated 12 to 17 in numbers. Neem tree is recognized as "Kalpavriksha" because of its versatile usages. As far agriculture is concerned, the neem and its products are used in various ways to protect the environment and promote sustainable agriculture. All parts of neem and products derived from them are useful. The important parts of neem like leaves are useful as a good fodder of animals. It is the most commonly used plant as animal feed by the farming community during the dry periods when no other fodder is available.

Habitat, Environment, Ecology and uses of *Azadirachta indica* A. juss (Neem Tree)

Neem's natural habitats are seasonally dry, deciduous, mixed forest, occurring in association with *Acacia* species and *Dalbergia sissoo*. It grows on a wide variety of neutral to alkaline soils but performs better than most species on shallow, stony, sandy soils, or in places where there is a hard calcareous or clay pan not far below the surface. It grows best in soils with a pH of 6.2-7.0. However, it is perhaps best adapted to deep, permeable, sandy soils. Neem compared to other species is well adapted to stress conditions, (Ahmed, 2014). It is also known to increase soil fertility and water holding capacity. Thus, large scale plantations of neem trees helps to combat desertification, deforestation, soil erosion and to reduce excessive global temperature. Neem has high rate of photosynthesis and liberate more oxygen (O₂) than any other tree species, thus purifying the atmosphere. In the northern part of India the temperature under the neem vegetation has been found to be 10°C less than the surrounding temperature during hot summer months. In areas of low rainfall and high wind speeds, neem is useful as a wind break. A fully grown neem tree yield about 10-100 tons of dried biomass/ ha, comprised of leaves (50%), fruits and wood (25%) each, (Anonymous, 1993). Its extensive, deep root system is presumably an adaptation to seasonally dry sites. In Nigeria, the Neem

tree is widely grown in the North-eastern sub-region, perhaps, due to the region's climate which is strategically located within the Sahel Savanna belt of West Africa. It was first introduced in the 19th century (Ahmed, 2014). Presently, the Neem tree is commonly used for firewood while its leaves are used as traditional medicament. It is also generally used as household and family shades, especially during the dry season. Most importantly, the Neem tree has been effective in the control of erosion and desert encroachment. The Neem tree is a multi-purpose tree of socio-economic and ecological significance; one of which is combating desertification Medugu, 2008 in (Abdurashid *et al.*, 2014). The tree comes in handy in the erection of shelter belts, as wind breakers, shade and woodlots in arid regions like Adamawa, Bauchi, Borno, Gombe, Jigawa, Kano, Katsina, Kebbi, Sokoto, Yobe and Zamfara State (Ahmed, 2014). Despite the well-informed initiative aimed at harnessing and exploiting the maximum potential and benefits of the Neem tree, very little is done to harness its huge potential. Ignorance, disregard for the environment and conservation of its (environment) resources are the major reasons. Researched results have indicated that there are multiple benefits to be derived from the versatile and eco-friendly wonder tree, which possesses over 137 bio-active constituents, with preventive, curative and health-enhancing properties. The concern of the tree was brought to the lime-light during the administration of Chief Olusegun Obasanjo, who, after receiving briefs on the notable achievements recorded by the National Research Institute for Chemical Technology (NRICT) Zaria, on neem tree research and development, during a meeting with key government officials and other international agencies who were interested in investing in Neem tree in Nigeria in 2004. The presidential committee was given some strong terms of reference, among which were;

- The development and growth of high quality neem species generally in Nigeria, but specifically in Borno, Katsina, Kebbi and Zamfara states.
- To develop medium and small-scale processing facilities for production of fertilizers, pesticides, soap-making and any other by-products of neem which could be produced for both the local and international markets.

Intrigued by the vast potentialities of this wonder tree whose properties have been utilized to manufacture an array of Neem-based products, such as toothpaste, medicated soap, shampoo, varnish, bio-pesticides, fertilizers and drugs, a presidential committee on the transformation of neem seeds to wealth was inaugurated. The committee was also charged with developing a national bio-enterprise on neem tree for wealth creation, poverty alleviation and health enhancement, (Ahmed, 2014). The Neem tree has been (and still is) an indispensable part of home remedies for ages and will be a future crucial component of home remedies. Even the shade of the tree is believed to be of quite healthy and, thus, it has been a recommended tree to be planted around house-holds and communities, (Ahmed, 2014). It is reported that India derives annual revenue of more than four billion Naira from Neem tree seeds, as well as its enormous uses and application pharmaceutical, pesticides, cosmetics and fertilizer, amongst others. This economic impact of the Neern tree will, no doubt, increase household income and wealth sustainability for the majority of the populace and more. Similarly, the opportunity to grow neem trees in Nigeria is huge. It should be a national pursuit worthy of consideration, because of its by-products which are financially viable to produce. Environmentally, the wood of the neem is highly durable and termite-resistant and, of course, can be a means of improving ground-water balance. Attempts should be made to select

quality seedlings, so as to improve yield. Neem oil is extracted from the seeds of the neem tree and has insecticidal and medicinal properties due to which it has been used for thousands of years in pest control, cosmetics and medicine. Neem seed cake (residue of neem seeds after oil extraction) when used for soil amendment or added to soil, not only enriches the soil with organic matter but also lowers nitrogen losses by inhibiting nitrification. It also works as a nematicide (Adegbehin *et al.*, 1990). Neem leaves are used to treat chickenpox and warts by directly applying to the skin in a paste form or by bathing in water with neem leaves. In order to increase immunity of the body, neem leaves are also taken internally in the form of neem capsules or made into a tea. The tea is traditionally taken internally to reduce fever caused by malaria. This tea is extremely bitter. It is also used to soak feet for treating various foot fungi. It has also been reported to work against termites. Neem leaves are used in curing neuromuscular pains. They are also used in storage of grains. Neem twigs are also used in India and Africa as toothbrushes. These days toothpastes with Neem extracts are also available commercially. Neem (leaf and seed) extracts have been found to be spermicidal and thus research is being conducted to use neem extracts for making contraceptives. Neem produces pain relieving, anti-inflammatory and fever reducing compounds that can aid in the healing of cuts, burns, earaches, sprains and headaches, as well as fevers. Neem bark and roots also have medicinal properties. Bark & roots in powdered form are also used to control fleas & ticks on pets. Neem has anti-bacterial properties that help in fighting against skin infections such as acne, psoriasis, scabies, eczema, etc. Neem extracts also help in treating diabetes, AIDS, cancer, heart disease, herpes, allergies, ulcers, hepatitis and several other diseases. There are many active constituents of Neem. Neem oil leaves and neem extracts are used to manufacture health and beauty care products. Some of such products are soaps, bath powders, shampoos, lotions and creams, toothpastes, neem leaf capsules to increase immunity and as a skin purifier, insect repellents, pet care products, and others, (Ahmed 2014). Neem extracts have been approved for use on food crops. It has been proven in various research studies that Neem is non-toxic to birds, beneficial insects or humans and protects crops from pests.

Methodology

Population of the study

Target population for the study was the entire population of Taura Local Government Area, Jigawa State, Nigeria. According to National census 2006 Taura L.G.A has a total population of 131,757. However, 80% of the Population is comprised of farmers, this give rise to 105,405.6.

$n = \frac{N}{1 + N(\alpha)^2}$ an's formula below,

The target population was 105,405.6. The sample size used was obtained using the formula of sloven's as follows

Where

- n = sample size
- N = population size
- I = constant
- α = the level of precision
- N = 105405

$$\alpha = 0.05$$

$$n = \frac{105405}{1 + 105405 (0.05)^2}$$

$$n = \frac{105405}{1 + 105405 \times (0.0025)}$$

$$n = \frac{105405}{1 + 263.5125}$$

$$n = \frac{105405}{264.5125}$$

$$n = 398$$

A 95% confidence level (P=0.05) was assumed for the equation. This generated a sample size of 398 people.

Sampling Technique

Taura Local Government Area has ten distinct areas known as wards (constituencies), therefore, based on the constituencies quota sample was used to divide the respondents into ten (10) wards. Forty (40) respondents' were selected randomly using simple random sampling from each ward. Semi structured interview questionnaires were used for the collection of data, thus questionnaire for local farmers.

Findings

Table 1: Direct use questions (For local farmers)

<i>How often do you use neem as a source of fire wood?</i>		
Category	Frequency	Percent
Everyday	221	61.4
Twice a week	61	16.9
Once a week	78	21.7
Total	360	100.0
<i>Dead neem leaves are use as local manure</i>		
2 years ago	63	17.5
5 years ago	155	43.1
10 years ago	140	38.9
None	2	.6
Total	360	100.0
<i>Neem tree is used for timber because</i>		
It is easy to obtain	92	25.6
It is not affected or destroyed by termite and other pests	268	74.4
Total	360	100.00
<i>Neem tree is used for roofing of houses because</i>		
It is easy to obtain	94	26.1
It is not affected or destroyed by termite and other pests	276	73.9
Total	360	100
<i>Neem tree is used as animal fodder because</i>		
Unavailability of other indigenous plant species	174	45.6
Neem tree is more abundant in the area	196	54.4

Total	360	100
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Field Source 2017

The table above shows that majority of the local farmers use neem as a source of firewood 61%. The local farmers have been using dead neem leaves as local manure for a long time ranging from five to ten years and it reduces the amount of acid in the area. The local farmers use neem tree as timber and for roofing of houses because it is not affected or destroyed by termite and other pests 74% and 73% respectively. Most of our domestic animals feed on neem tree because it is the most abundant plant species and also because of the absence of other indigenous plant species in the environment.

Table 2: Ecological Uses (for local farmers)

<i>Neem tree is used for shelter and shade</i>		
Category	Frequency	Percent
It is the most frequent species in the area	222	61.7
It is the plant that withstand environmental stress and is capable of regeneration	130	36.1
Neem shade is very conducive for shelter and shade	8	2.2
Total	360	100.0
<i>The neem tree has various methods of dispersal and is the most fast growing species in the area</i>		
It is dispersed by bats as it suck the liquid portion and throw the seed away	257	71.4
It is dispersed through animal faeces	95	26.4
It is dispersed by human beings	8	2.2
Total	360	100.0
<i>Neem tree is used to control soil erosion</i>		
Neem tree is seen along degraded area	180	50.0
Neem tree is seen sprouting along gully areas	180	50.0
Total	360	100.00
<i>Neem tree help in the reduction of evaporation from the soil surfaces.</i>		
It can easily withstand environmental stress	122	33.9
It can easily survive on a marginal land (plant resources are very few).	238	66.1
Total	360	100
<i>Neem tree is sensitive to changes in temperature (seasonal variations).</i>		
When the season is windy, dry and cold the neem shades its leaves.	136	37.8
When the season is warm and dry the neem produces more leaves.	224	62.2
Total	360	100

<i>Neem helps in converting drought and halting the spread of desert.</i>		
It can be seen underneath other trees.	238	66.1
It can be seen sprouting all over the environment.	100	27.8
Neem acts as a substitute of other old or dead trees.	22	6.1
Total	360	100

Field Source 2017

The table above shows that the neem tree is the most frequent species in the area 61% and it is also capable of withstanding stress and can easily regenerate (fast growing species) in the area. It has many dispersal methods; the dispersal mechanism is mainly through bats and other birds which constitutes about 71%. Neem tree is used to control erosion because it can be seen along the degraded area (gully areas).

The neem tree is highly sensitive to temperature variability when the season is dry, cold and windy the plant shades its leaves to minimize the rate of transpiration. When the season is warm and dry the plant produces more leaves to enable it to continue with its phonological process. The neem plant can be seen in an area where the plant resources are very few.

Table 3: Medicinal Use (For local farmers)

<i>Which part of the neem tree do you use?</i>		
Category	Frequency	Percent
Bark	9	2.5
Leaves	146	40.6
Root	89	24.7
Branches	91	25.3
None	25	6.9
Total	360	100.0
<i>How do you prepare it for use?</i>		
Cutting	92	25.6
Boiling	243	67.5
None	25	6.9
Total	360	100.0
<i>In what quantity do you use them?</i>		
Large quantity	71	19.7
Small quantity	264	73.3
None	25	6.9
Total	360	100.00
<i>Neem plant is use to cure?</i>		
Malaria	100	27.8
Yellow fever	168	46.7
Tooth paste	5	1.4
Stomach ache	62	17.2
None	25	6.9
Total	360	100

Field source 2017

The table above shows that all parts of neem are medicinally useful but the leaves, roots and branches are of much more important. It is prepared for use mostly through boiling 67% and it is used in small quantity because of its nature of chemical strength. It is used to cure so many illnesses like malaria, yellow fever and stomach ache. It has been in use locally since its introduction in to the area.

Discussion

The questions asked were categorized into three parts for the local farmers containing five, six and four questions respectively. They are the direct use, ecological use and medicinal use questions. Neem tree had a lot of importance; it is useful for shelter and shade, in most homesteads, neem can be found as one of the major shade plants and it can be found lining most of the streets. It is one of the most abundant and effective trees that can withstand harsh environment and is capable of regeneration (Ahmed 2014). Its main importance to Taura local community is the control of erosion and desert encroachment. It has contributed immensely against further deterioration of the environment in terms of fire wood, timber and acts as a major animal feed especially during the dry season.

It is the major medicinal plant in the area capable of curing several diseases known to the local community. Other uses of the Neem tree include preparation of farm implements, making of mortars for grinding, fencing or demarcation of boundaries, local manure, preservation of food, being used as pesticides and wind control (formation of shelterbelts), (Abdurashid *et al.*, 2014). From the result obtained, *Azadirachta indica A. Juss* had a positive impact on various uses for human being in terms of direct use, ecological uses and medicinal uses. The results were shown in tables and explanations were made. Neem trees grow in certain marginal land (an area where the plant resources are very few) and therefore do not have to displace food production because it can be raised where soil are too worn out for crops and also helps to reduce erosion (Abdulrashid, *et al.* 2014). The wood is hard and resistant to termites, borers and fungi. *Azadirachta indica A. Juss* is considered suitable for general purpose, plywood, timber, agricultural implements, fence posts, boat building (Abdulrashid, *et al.* 2014).

Conclusion

Generally, *Azadirachta indica A. Juss* was found to be the most abundant (frequent) plant species in Taura local government area. It has been shown to be of great importance to human in relation to its uses. It has strongly contributed in the control of desert encroachment, improved soil fertility by reducing its soil acidity and acted as wind breaker (the establishment of so many neem shelter belts), (Tukur *et al.*, 2013) Its abundance has a tremendous contribution on the climate control, improved agricultural activities and yields. It is very sensitive and adaptive to the temperature variability and photo period capable of regeneration and good seed yields. Despite the well informed initiatives aimed at harnessing and exploiting the maximum potential and benefits of the neem tree, very little is done to harness its huge potentials (Ahmed 2014). Any nation that disregards its environment and conservation of the natural resources would have itself to blame and it may encounter a greater problem of desertification, land degradation, climate change and habitat loss or habitat fragmentation. This economic impact of the neem tree will no doubt increase household income and wealth sustainability for the majority of the populace and more. Therefore, there is strong need to grow neem tree in northern Nigeria. It should be a national pursuit, worthy of consideration because of its by-products which are financially viable to produce. Environmentally the wood of the neem is highly durable and termite

resistant and of course can be a means of improving growing water balance under the ground.

Recommendation

1. Its mode of phenology was sensitive (adaptive) to the environment by producing more leaves, flowers and yield millions of viable seeds that has various ways of dispersal. With the view of improving a forestation, agricultural activities and climate change.
2. The neem tree in Taura Local Government Area had dominated the native trees as it can withstand the environmental stress.
3. The neem tree in Taura Local Government Area was useful in relation to desertification control, shelter and shades, roofing of houses, fodder and medicinal uses to the community.

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