RA Journal of Applied Research
||Volume||3||Issue||08||Pages-989-1000||August-2017|| ISSN(e): 2394-6709
Index Copernicus ICV: 74.25, DOI: 10.18535/rajar/v3i8.03
www.rajournals.in

Assessment of Awareness Level of Nutritional and Medicinal Benefits of *Moringa Oleifera* Plant among Farmers in South West Nigeria

Ajayi, Francis Oluwadamilare[1], Okunlola, J.O[2], Akinnagbe, O.M[3]

[1]Osun State College of Education, Ila-Orangun, Osun State
[2,3]Federal University of Technology Akure, Ondo State

ABSTRACT: The study assessed the awareness level of nutritional and medicinal benefits of moringa plant among farmers in south west Nigeria. Osun, Ondo and Ekiti states were purposively selected among the six states in South West Nigeria based on the predominance of tree crop farming. Multi-stage sampling technique was used to select three hundred and twelve (312) respondents while interview schedule was used to collect data from the respondents. The results of thestudyrevealed that respondents recorded high level of awareness (72.8%) of the various nutritional value of the plant and medicinal values of Moringa oleifera leaf (75.6%), seed (60.3%), and flower (61.5%). Also, they were highly aware of the use of moringa plant as growth enhancer (92.9%), forage plant for livestock (82.1%) and in agroforestry (89.7%) The study therefore recommends the need for agricultural extension service to develop an impact point on the use of Moringa oleifera to enhance dissemination of information, most especially on the technology of moringa oil extraction, disease prevention and curation.

Keywords: Assessment**, awareness, nutritional, medicinal, *Moringa oleifera***

INTRODUCTION

Moringa oleifera belongs to the monogeneric family *Moringaceae* (Verdcourt 1985; Olson 2002). The family Moringaceae includes species exhibiting a wide range of forms, from bottle trees to slender trees, sarcorhizal trees, or tuberous shrubs (Olson and Carlquist 2001). All these species are native to the Indian subcontinent, the Red Sea area, and parts of Africa, including Madagascar. Although Moringa is native to India and Pakistan (Morton 1991; Duke 2001), it is widely cultivated, especially in dry tropical areas of the Middle East and Africa (Fahey 2005; Palada *et.al*. 2007; Nouman *et.al*. 2013) and more recently in many countries located within the tropics, such as Nicaragua, because its pods, seeds, leaves, and roots are useful as fodder, vegetable, and plant growth enhancers (Sanchez *et.al*. 2006; Nouman *et.al*. 2013). Besides being consumed by humans, (Bennett *et.al*. 2003; Gidamis *et.al*. 2003), it is also used as animal fodder (Sanchez *et.al*. 2006; Nouman *et.al*. 2013), a natural coagulant of turbid water (Suarez *et.al*. 2003), and a source of phytomedical compounds (Anwar *et.al*. 2006).

Moringa is a drought tolerant plant that can be grown in diverse soils, except those that are waterlogged. Slightly alkaline clay and sandy loam soils are considered the best media for this species due to their good drainage (Ramchandran *et.al*. 1980; Abdul 2007). Thus, Moringa can be grown in versatile conditions including hot, humid, dry tropical and subtropical regions, except for waterlogged conditions. It can perform better under marginal conditions with ample nutritional quality. Almost every part of the tree is of value for food.

The leaf of moringa is a power house of nutritional value (Moringa News, 2008). The seed

RA Journal of Applied Research
||Volume||3||Issue||08||Pages-989-1000||August-2017|| ISSN(e): 2394-6709
Index Copernicus ICV: 74.25, DOI: 10.18535/rajar/v3i8.03
www.rajournals.in

is said to be eaten such as a peanut in Malaya. The Foliage is eaten as greens, in salads, while in India's ancient tradition of Ayurveda believes that the leaves of *Moringa oleifera* prevent about 300 diseases; and Hartwell (1971) had reported that the flowers, leaves and roots are used in remedies for tumors and dropsy in Nicaragua. *Moringa oleifera*, because of its socio-economic and cultural importance, is raising a growing international interest among Non-Governmental Organisations (NGO), scientists, public and private sectors which is leading to its adoption through diffusion of innovation theory.

Moringa oleifera is a type of tree that has recently attracted the particular interest of dieticians, healthcare professional, health seekers and green organization for its potential to be of tremendous health and ecological benefit to the entirety of mankind. Concerning its medicinal value, it acts as cardiac and circulatory stimulants, possess anti- tumor, antipyretic, antiepileptic, anti-inflammatory, antiulcer, antispasmodic, diuretic, antihypertensive, cholesterol lowering, antioxidant, antidiabetic, hepato protective, anti-bacterial and antifungal activities and are being employed for the treatment of different ailments in the indigenous system of medicine particularly in South Asia (The Wealth of India, 1962; Morimitsu *et.al*., 2000; Siddhuraju and Becker, 2003; Anwar *et.al*., 2007; Moyo *et.al*., 2011; Mishra *et.al*., 2011; Jacob and Shenbagaraman, 2011). Besides medicinal values of this plant, there has been earlier reports by, Fuglie (2000) that the leaf extract of *M. oleifera* accelerated growth of young plants, strengthened plants, improved resistance to pests and diseases, increased leaf duration, increased number of roots, produced more and larger fruits and generally increased yield by 20 and 35%. The value chain for Moringa product, if properly developed, offers considerable investment opportunities, and potential job creation, foreign exchange earnings and export diversification for Nigeria. It provides several interesting products, of which leaves and oil seem to be economically most attractive.

Moringa products are demanded at the international markets (USA, China, and India) mainly in the form of leaf powder tablets and drinks and are regarded as a healthy nutritious food supplement. The seedcake, a cheap by product of oil extraction can serve as an inexpensive, protein-rich feedstuff for livestock. In several African countries the local market for dried leaves and leaf powder is expanding as awareness of its nutritional benefits increases. Equally, demand is set to rise as the seed oil is used in the cosmetics industries and it is considered an alternative and cheaper source of biodiesel. Despite the enormous potentials of Moringa, evidence on large scale production of the plant in Nigeria is relatively scanty. This may be due to inconsistent and unrealistic empirical findings on the economic feasibility and profitability of the plant under commercial plantation (Fodl et al, (2001); Gamatie and Saint Sauveur, (2006); Sogbo et al, (2006), Van der Heijden, (2011).

In spite of the nutritional and medicinal benefits derivable from this important plant, Moringa oleifera still remains unpopular and has not been fully utilized, especially in developing countries like Nigeria. This may not be unconnected with low level of awareness of people about the various benefits of Moring. It is against this background that this study is therefore set out to assess the level of awareness of nutritional and medicinal benefit of Moringa oleifera among farmers in south west Nigeria with the aim of ascertaining the socio economic characteristics of the respondents and determining their level of awareness of the benefits derived from the plant.

RA Journal of Applied Research
||Volume||3||Issue||08||Pages-989-1000||August-2017|| ISSN(e): 2394-6709
Index Copernicus ICV: 74.25, DOI: 10.18535/rajar/v3i8.03
www.rajournals.in

METHODOLOGY

The study was carried out in Southwest Nigeria which comprises six states which are: Oyo, Ogun, Lagos, Osun, Ekiti and Ondo States. Osun, Ondo and Ekiti states were purposively selected for the study based on the predominance of tree crop farming.

Ondo state lies between latitudes 5 45' and 7 52'N and longitudes 4 20' and 6 03'E. It is bounded on the east by Edo and Delta states, on the west by Ogun and Osun states, on the north by Ekiti and Kogi states, and to the south by the Atlantic Ocean. The state occupies a land area of about 15,000 Square kilometers with a population of 3,441,924 (National Population Commission 2006), Federal Office of Statistics (FOS), (2007). The state has eighteen (18) Local Government Areas, with Akure as the capital city

Osun State lies between latitude 7° 30′ 0″ N and longitude 4° 30′ 0″ E. It is bounded in the north by Kwara State, in the east partly by Ekiti State and partly by Ondo State, in the south by Ogun State, and in the west by Oyo State. The state has a population of 3,423,535 according to year 2006 population census figure given by National Population Commission (FOS, 2007) covering an estimated area of 8,602 square kilometers with thirty (30) Local Government Areas.

Ekiti State is located between longitudes 40°51′ and 50°451′ East of the Greenwich meridian and latitudes 70°151′ and 80°51′ north of the Equator. It lies south of Kwara and Kogi State, East of Osun State and bounded by Ondo State in the East and in the south, with a total land Area of 5887.890square kilometers. Ekiti State has sixteen (16) Local Government Councils with population of 2,384,212 (FOS, 2007).

The state's economy is basically agrarian, with large scale production of cocoa, palm produce and rubber. Other crops such as maize, cassava, cocoyam, fruits and vegetables are also produced in large quantities. The dry season is short, lasting generally from December to February. The average annual rainfall is about 1,220mm; the monthly minimum temperature is about 22.49^0C while the monthly maximum temperature is about 26.6^0C. Furthermore, the yearly relative humidity is about 76.05%. The predominant ethnic group in the study areas is Yoruba with some others such as Ibo, Ebira, Hausa and Fulani. Agriculture has been the backbone of the three states providing income and employment opportunities to over 75 percent of the population of the states. It also provides over 70 percent of the states' Gross Domestic Product (GDP) (Ministry of Agriculture, Fisheries and Forest Resources, Annual Report, 2007)

Multi-stage sampling technique was used in selecting samples. In the first stage, Ondo, Osun and Ekiti states were randomly selected owing to their contribution to tree crops production in Southwest, Nigeria. At the second stage, two Local Government Areas were purposively selected from each of the states based on intensity of Moringa cultivation, making a total of six local government areas in all the states. The third stage, four villages were randomly selected from each Local Government Areas from the list of the villages with high number of moringa plantation collected from the Agricultural Development Project officers in each state headquarters, thus a total of 24 villages were chosen from the three states.The fourth stage involved simple random selection of respondents using snow ball technique to select 13 moringa farmers in each of the villages chosen. In all, 312 farmers were interviewed for the study.

RA Journal of Applied Research
||Volume||3||Issue||08||Pages-989-1000||August-2017|| ISSN(e): 2394-6709
Index Copernicus ICV: 74.25, DOI: 10.18535/rajar/v3i8.03
www.rajournals.in

Respondents were asked to indicate their awareness status of *Moringa oleifera* products on a yes/no basis. Those they indicated that they were aware were scored 1 while those they never aware were scored 0. The awareness score was obtained for each of the components of the tree. The maximum obtainable score was 6,13,6,6,5,4,6,3,5 and 8 for nutrient content, moringa leaf, root, oil, seed, flower, growth enhancer, forage, agro forestry and industry respectively, while the minimum score was zero for those that never aware of any of the practices identified. The average stands at (3) for nutritional content, (6.5) for leaf, (3) for root, (3) for oil, (2.5) for seed, (2) for flower, (3) for growth enhancer, (1.5) for forage, (2.5) for agro forestry and (8) for industry, therefore all responses above the average were rated high while responses below the average were rated low for rate of awareness of moringa practices. Mean of the awareness score for nutrient content (3), leaf (6.5), root (3), oil (3), seed (2.5), flower (2), growth enhancer (3), forage (1.5), agro forestry (2.5) and industry (8) were used to rate the level of awareness of the different parts of the plants into either high or low.

RESULTS AND DISCUSSION

Awareness of the nutritional values of moringa plant

Table 1showed that higher percentage (77.2%) of the farmers were aware that moringa plant had three times the iron in spinach. Seventy-five percent of the respondents were aware that moringa hasseven times the vitamin C in citrus (Oranges), 54.5% and 52.9%respectively were aware that it has four times the calcium in milk and vitamin A in carriots, 58.7% and 50.3% of the respondentswere aware that it has two times the protein in milk and three times the potassium in banana respectively. The findings indicated that more than half of the farmers were aware of the above listed nutritional values of moringa plants. Although, majority (75.0%) were aware that the plant has seven times the Vitamin C in orange and three times the iron in spinach. This implied that most of the farmers would be able to utilise moringa plant as vitamin and iron supplements in the study area.

Further analysis to determine the level of awareness of the nutrional values of moringa, as indicated in Figure 1 revealed that 72.8% of the farmers had high level of awareness of nutritional value of moringa. This implies that the respondents could be easily motivated to cultivate and utilize moringa plants because of their understanding of moringa as food supplements.

Table 1: Distribution of respondents based on their awareness of nutritional values of Moringa plant

Nutritional values	Frequency*	Percentage
Moringa has 7 times the vitamin C in oranges	234	75.0
It has 4 times the calcium in milk	165	52.9
It has 4 times the vitamin A in carriot	170	54.5
It has 2 times the protein in milk	183	58.7
It has 3 times the potassium in banana	157	50.3
It has 3 times the iron in spinanch	241	77.2

Source: Field survey, 2014.
*Multiple responses

RA Journal of Applied Research
||Volume||3||Issue||08||Pages-989-1000||August-2017|| ISSN(e): 2394-6709
Index Copernicus ICV: 74.25, DOI: 10.18535/rajar/v3i8.03
www.rajournals.in

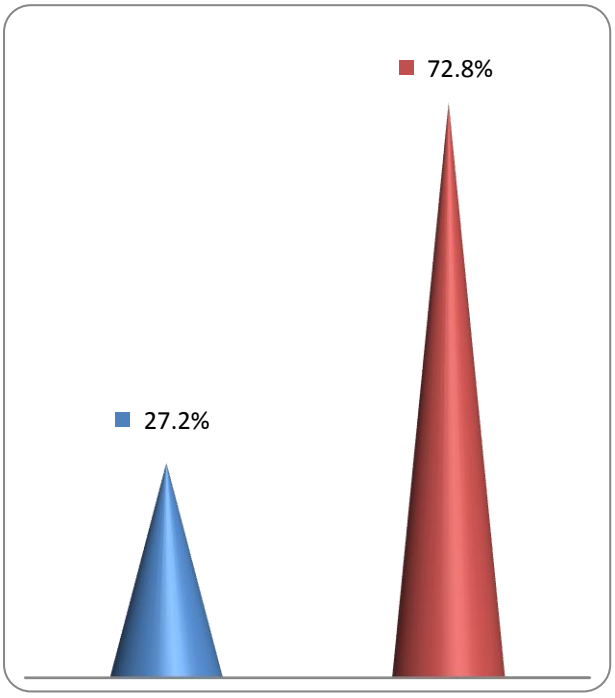

Figure 1: Respondents' level of awareness of nutritional values of Moringa plant

Awareness of the medicinal value of moringa leaf

Table 2 revealed that about 82.4% of the respondents were aware that moringa leaf can be used to cure fever and reduce high blood pressure in human being. Out of the 13 identified uses of moringa leaf, only one (its use in curing minor respiratory difficulties) was perceived by the respondents as not having a medicinal value. Others were aware of its uses in curing gastrointestinal upset (ulcer and diarrhea) (68.0%), headache (79.5%), inflamation (64.7%), anemia (64.4%), and eyes infection (59.0%). Respondents were also aware of moringa plant in poor nutrition (75.6%), bronchitis (66.3%), inner ear infection (55.4%), skin infection (67.9%), and increase milk production (74.7%). Further analysis revealed that majority (75.6%) were aware of the medicinal value of moringa leaf while 24.4% of the respondents were not aware of the medicinal value of moringa as shown in Figure 2. The findings revealed that most of the farmers were aware of the medicinal uses of Moringa leaf.

Table 2: Distribution of respondents based on their awareness of medicinal values of Moringa leaf

Medicinal value leaf**	Frequency (n=312)	Percentage
Moringa leaf is used for gastrointestinal upset	248	79.5
For treating headache	212	68.0
Inflammation	202	64.7
Anemia	201	64.4
Fever	257	82.4
Minor respiratory difficulties	155	49.7
Eyes infections	184	59.0
Poor nutrition	236	75.6
Bronchitis	207	66.3
Inner ear infection	173	55.4
Skin infection	212	67.9
Increase in milk production	233	74.7
High blood pressure	257	82.4

Source: Field survey, 2014.
**Multiple responses

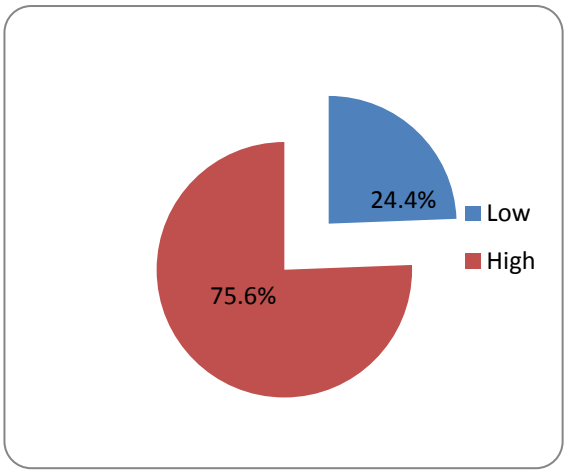

Figure 2: Distribution of respondents based on their level of awareness of medicinal value of moringa leaf.

RA Journal of Applied Research
||Volume||3||Issue||08||Pages-989-1000||August-2017|| ISSN(e): 2394-6709
Index Copernicus ICV: 74.25, DOI: 10.18535/rajar/v3i8.03
www.rajournals.in

Awareness of the medicinal uses of moringa seeds

Table 3 showed that higher percent (81.1%) of the respondents were aware that moringa seed can be used as water purifier. Out of the 5 identified uses of moringa seeds only 1 (its use for sexual dysfunction) were perceived by the respondents as not having a medicinal value. Others were aware of its uses to cure Arthritis (73.1%), Rheumatoid disorders (63.1%) and improve sex drive (52.6%) respectively. Further analysis revealed that above half (60.3%) were aware of the medicinal value of moringa seeds while only (39.7%) of the respondents were not aware of the medicinal value of moringa seeds as shown in Figure 5. The findings conformed to Odeyinka (2013) that moringa seeds have been of many uses by farmers in South West Nigeria.

Table 3. Distribution of respondents based on their awareness of the medicinal uses of Moringa seed

Variable	Frequency*	Percentage
Moringa seeds for arthritis	228	73.1
For rheumatoid disorder	197	63.1
Sexual dysfunction	143	45.8
Improved sex drive	164	52.6
Water purifier	253	81.1

Source: Field survey, 2014.
*Multiple surveys

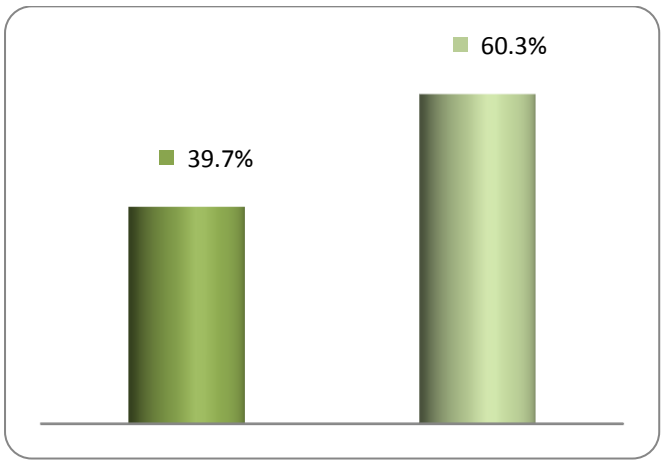

Figure 3: Level of awareness of the use of Moringa seeds

The awareness of the uses of moringa flower

Results in Table 4 showed that 74.7% of the respondents were aware that Moringa flower can be used to cure rheumatism. Also, about 74.0% indicated that Moringa flower can be used as tonic while 65.7% said it can be used to cure throat infection and only 58.0% revealed that it can be used in the treatment of cold. Further analysis using the awareness score revealed that higher proportion (61.5%) of the respondents were aware of the medicinal value of Moringa flower while only (38.5%) of the respondents were not aware of the medicinal value of Moringa flower as shown in Figure 4. The result is in consonance with the findings of Odeyinka et.al (2007) that most farmers in South West Nigeria have knowledge of either planting or utilizing *Moringa oleifera* for its various values.

Table 4: Distribution of respondents based on their awareness of the uses of Moringa flower

Variable	Frequency*	Percentage
Moringa flower uses for throat infection	205	65.7
Common cold	181	58.0
Rheumatism	233	74.7
Tonic	231	74.0

Source: Field survey, 2014.
*Multiple responses

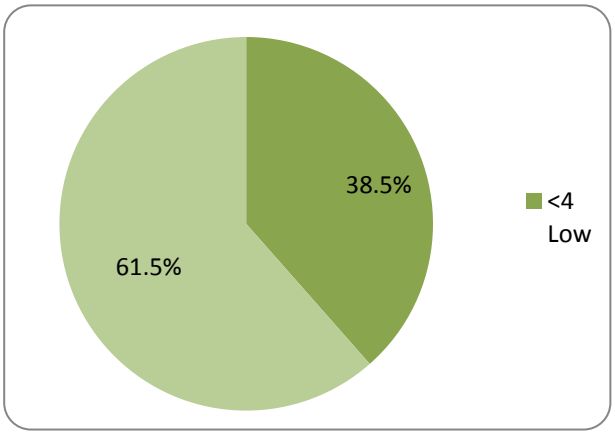

Figure 4: Level of awareness of the uses of Moringa flower

RA Journal of Applied Research
||Volume||3||Issue||08||Pages-989-1000||August-2017|| ISSN(e): 2394-6709
Index Copernicus ICV: 74.25, DOI: 10.18535/rajar/v3i8.03
www.rajournals.in

Awareness of medicinal value of moringa root

Results in Table 5showed that 65.1% of the respondents were aware that moringa root stimulate appetite and out of the six medicinal uses of moringa root only two (use for treating impotence and sexual dyfunction and cure for menstruation problem) were perceived by the respondents as not having a medicinal value. Others farmers were aware of its treatment of disorder of circulatory system (53.5%), stimulate appetite (65.1%) improve function of digestive tract (58.7%) and cramps and arthritis pains treatment (54.2%). Further analysis revealed that majority (62.5%) of the respondents were aware of the medicinal values of moringa root while only 37.5% of the respondents were not aware of the medicinal value of moringa root as shown in Figure 5. This implied that majority of the farmers were aware of the medicinal values of moringa root in the study area. The implication of this finding is that their involvement in the cultivation of the plant would be enhanced.

Table 5: Distribution of respondents based on their awareness of medicinal values of Moringa root (n=312)

Medicinal values of moringa root**	Frequency	Percentage
Treatment of disorder of circulatory system	167	53.5
Stimulate appetite	203	65.1
Improve function of digestive tract	183	58.7
Impotence and sexual dysfunction	153	49.0
Menstruation problem	116	37.2
Cramps and anthritis	169	54.2

Source: Field survey, 2014.
**Multiple responses

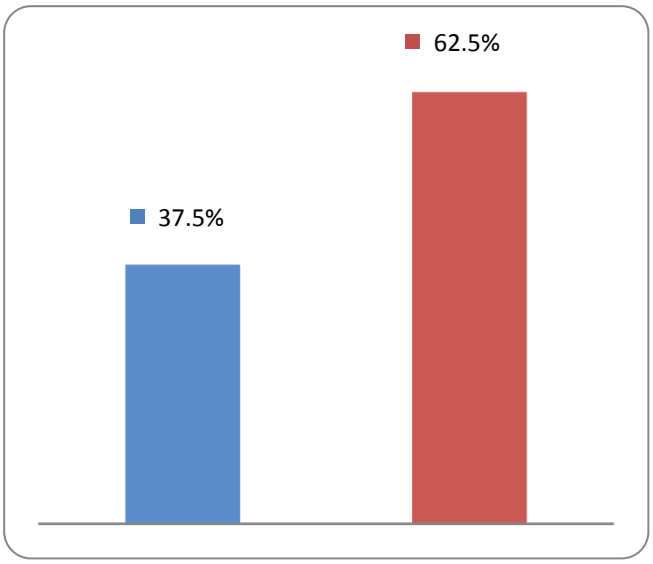

Figure 5: Level of awareness of medicinal value of Moringa root.

Awareness of the uses of moringa oil

Results in Table 6showedthat majority (81.7%) of the respondents were aware that moringa oil can be used for skin treatment. Out of the 6 identified uses of moringa oil, only 3{uses as cooking oil (49.7%), fuel for lamp (48.1%) and as bio diesel (47.4%)} were perceived by the respondents as not having a prominent awareness. Others were aware of its uses as industrial oil (66.7%) and uses as machine lubricant (53.8%). Further analysis, revealed that majority (74.7%) were not aware of the uses of moringa oil while only (25.3%) of the respondents were aware of the uses of moringa oil as shown in Figure 6 . This low level of awareness of moringa oil could be due to non availability of the oil due to complexity of the technology of its extraction and therefore requires some level of expertise which could be difficult for farmers to perform without the guidance of extension personnel.

RA Journal of Applied Research
||Volume||3||Issue||08||Pages-989-1000||August-2017|| ISSN(e): 2394-6709
Index Copernicus ICV: 74.25, DOI: 10.18535/rajar/v3i8.03
www.rajournals.in

Table 6: Distribution of respondents based on their awareness of the uses of Moringa oil

Uses of moringa oil	Frequency (n=312)*	Percentage
Skin treatment	255	81.7
Cooking oil	155	49.7
Industrial oil	208	66.7
Machine lubricant	168	53.8
Fuel for lamps	150	48.1
Bio diesel	148	47.4

Source: Field survey, 2014.

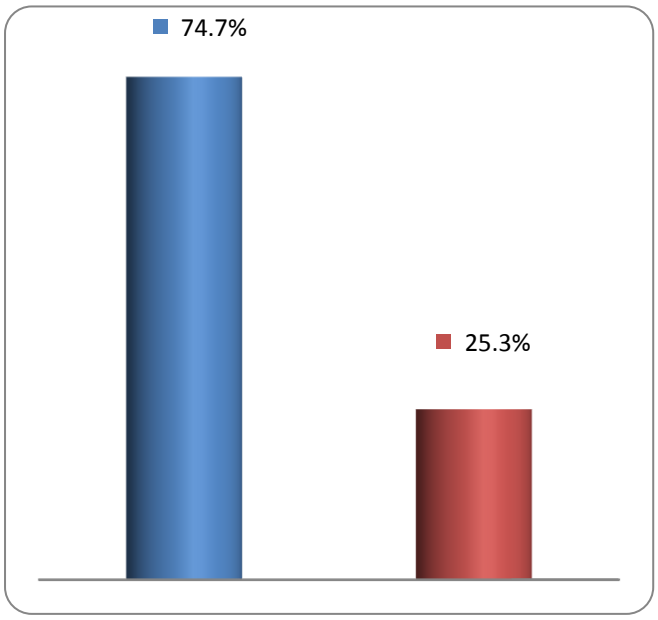

Figure 6:Respondents level of awareness of the uses of Moringa oil

Awareness of moringa plant as growth enhancer

From the study 84.3% of the respondents were aware that moringa plant serves as growth enhancer when intercropped and also in animal forage as stated in Table 7. The entire six identified uses of moringa plant as growth enhancer showed that the respondents were aware of the growth enhancing effect of moringa plant through shade for vegetables (79.8%), support for climbers (62.2%), foliar spray 64.4%, and green manure (74.4%). Further analysis revealed that majority of the respondents (92.9%) were aware of moringa plant as growth enhancer while only (7.1%) of the respondents were not aware of moringa plant as growth enhancer as shown in Figure 7. The findings revealed that the use of moringa as growth enhancer was widely known by the respondents. The implication of this is that respondents would be deeply involved in adopting the plants as growth enhancer especially in the area of enriching soil nutrients aiming at promoting sustainable soil management practices.

Table 7: Distribution of respondents based on their awareness of Moringa plant as growth enhancer

Variable	Frequency*	Percentage
Intercropping	263	84.3
Shade for vegetables	249	79.8
Support for climbers	194	62.2
Foliar spray	201	64.4
Green manure	232	74.4
Animal forage	263	84.3

Source: Field survey, 2014.

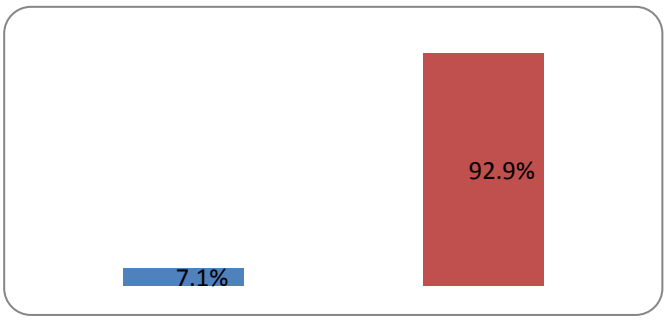

Figure 7: Level of awareness of Moringa plant as growth enhancer

Awareness of moringa as forage plant for livestock

Table 8 revealed that 82.1% of the respondents were highly aware that moringa plant can be used as forage plant by livestock to increase its milk production. In addition, 73.1% of

RA Journal of Applied Research
||Volume||3||Issue||08||Pages-989-1000||August-2017|| ISSN(e): 2394-6709
Index Copernicus ICV: 74.25, DOI: 10.18535/rajar/v3i8.03
www.rajournals.in

the respondents indicated that they were aware of the uses of Moringa to improve the health status of livestock while only 39.7% were aware that it can be used to improve yield size. Further analysis revealed that majority (82.1%) were aware of moringa as forage plant for livestock while 17.9% of the respondents were not aware of moringa as forage plant for livestock as shown in Figure 8. The findings implied that respondents would be ready to adopt and use moringa as forage plant in livestock production if the plant is available. The readiness of farmers to adopt moringa as forage plant for animal feeds was adjuged by Odeyinka *et.al*. (2007) assertion that about 92.8% of farmers in South West Nigeria indicated their willingness to use moringa as forage crops if introduced to them

Table 8: Distribution of respondents based on their awareness of Moringa as forage plant for livestock

Variable	Frequency*	Percentage
Increases-milk production	256	82.1
Increases yield size	124	39.7
Improves health status	254	81.4

Source: Field survey, 2014.

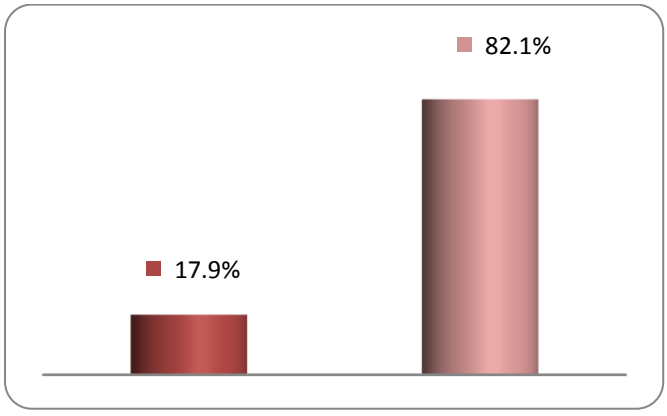

Figure 8: Level of awareness of Moringa as forage plant for livestock

Awareness of the uses of moringa in agro forestry

From Table 9 about 90.7% of the respondents were aware that moringa plant is used in agro forestry as shade tree. About 88.1%, 80.4%, 53.8% respectively were aware of the use of moringa plant in agro forestry as windbreak, living fences and alley cropping respectively. From the study 46.5% of the respondents were not aware of the ornamental value of moringa plant. The study further revealed that 89.7% were aware of utilisation of moringa in agro forestry practices while 10.3% of the respondents were not aware of moringa as agro forestry as shown in Figure 9.

Table 9: Distribution of respondents based on their awareness of the use of Moringa inagroforestry

Variable**	Frequency*	Percentage
Windbreak	275	88.1
Living fences	251	80.4
Shade tree	283	90.7
Alley cropping	168	53.8
Ornamentals	145	46.5

Source: Field survey, 2014.

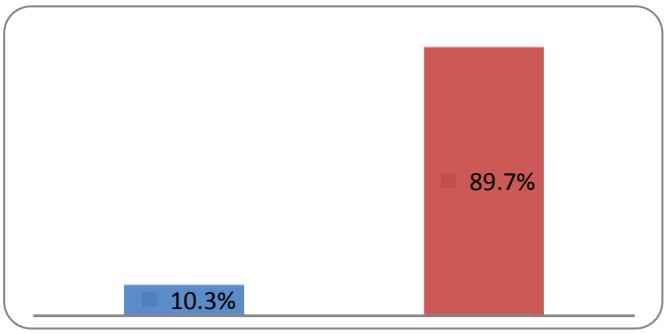

Figure 9: Level of awareness of Moringa in agro forestry

Awareness of the industrial uses of moring

The results in table 10 showed that 78.8% respondents asserted that they use moringa as fertilizer. Out of the 16 identified industrial uses of moringa plants only 2 (honey/sugarcane juice

RA Journal of Applied Research
||Volume||3||Issue||08||Pages-989-1000||August-2017|| ISSN(e): 2394-6709
Index Copernicus ICV: 74.25, DOI: 10.18535/rajar/v3i8.03
www.rajournals.in

purifier (67.9%)and water purification material (76.3%) were perceived by the respondents as highly effective. The level of awareness of use of moringa as fertiliser material and water purification among others was due to the fact that they were of great importance to the farmers. The use of Moringa for water purification and source of fertilizer in most rural areas may not be unconnected to the general neglect of the rural areas in terms of basic amenities such as pipe borne water. This might result to the inhabitants of these areas using locally available resources to meet their immediate needs as most of them depend on water from the streams and rivers. Personal experience showed that most government constructed boreholes in these areas were no longer in good conditions as at the time of this survey. Also, farmers are also aware of the dangers involved in the use of fertilizers. Thus, many of them now adopt farming practices that are sustainable such as the use of leaves and other farm waste as way of replenishing soil nutrients. Further analysis in figure 10 revealed that majority (54.2%) were aware of industrial uses of moringa plant while only (45.8%) of the respondents were not aware of industrial uses of moringa.The implication of this findings is that farmers in the study area will not be able to cultivate large hectare of moringa plant since their knowledge of the industrial uses of the plant may be due to their low level of awareness recorded among them.

Table 10: Distribution of respondents based on their awareness of industrial uses of Moringa plant

Variable	Frequency*	Percentage
Paper production	131	42.0
Textile materials	94	30.1
Cellophane	77	24.7
Blue dye ink	89	28.5
Calico printing	65	20.8
material		
Rope making	122	39.1
Mat making	128	41.0
Tanning hides and skin	91	29.2
Soap making	141	45.2
Domestic-cleaning agent	137	43.9
Fertilizer material	246	78.8
Honey and sugarcane juice purifier	212	67.9
Biopesticides material	146	46.8
Pulp making	68	21.8
Water purification material	238	76.3
Gum material	92	29.5

Source: Field survey, 2014.

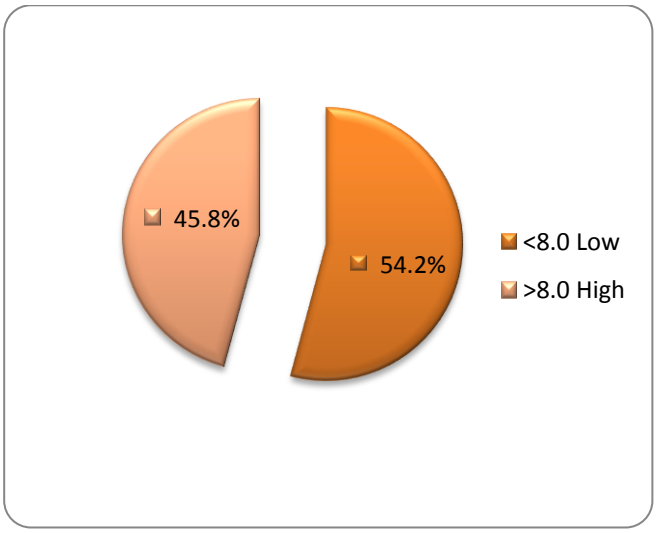

Figure 10: Level of awareness of the industrial uses of Moringa plant by the respondents

CONCLUSION

The study concluded that farmers in SouthWest Nigeria had high level of awareness on*Moringa oleifera*nutritional values, medicinal values of Moringa leaf, seed, flower and root. Also, there was high level of awareness of Moringa plant as growth enhancer, forage plant for livestock, agro forestry, and industrial uses. This low level of awareness of moringa oil could

RA Journal of Applied Research
||Volume||3||Issue||08||Pages-989-1000||August-2017|| ISSN(e): 2394-6709
Index Copernicus ICV: 74.25, DOI: 10.18535/rajar/v3i8.03
www.rajournals.in

be due to non availability of the oil due to complexity of the technology of its extraction and therefore requires some level of expertise which could be difficult for farmers to perform without the guidance of extension personnel.There is need for extension to develop an impact point on the use of *Moringa oleifera*to enhance dissemination of information, most especially on the technology of moringa oil extraction, disease prevention and curation.

REFERENCES.

1. Abdul, D.A.S. (2007). Economic importance of Moringa oleifera in Tafa Local Government Area of Niger State. NDE Project. Federal College of Forestry Mechanization, Kaduna, Nigeria. pp 37
2. Anwar, F., Hussain, A.I., Ashraf, M., Jamil, A. and Iqbal, S. (2006). Effect of salinity on yield and quality of Moringa oleifera seed oil. Grasas y Aceites. Vol. 57 394–401.
3. Anwar, F., Latif, S., Ashraf, M. and Gilani, A.H. (2007). Moringa oleifera: A food plant with multiple medicinal uses. Phytother. Res., 21: 17-25.
4. Bennett, R.N., Mellon, F.A., Foidl, N., Pratt, J.H., DuPont, M.S. and Perkins, L. (2003). Profiling glucosinolates and phenolics in vegetative and reproductive tissues of the multi-purpose trees Moringa oleifera L. (Horseradish tree) and Moringa stenopetala. J Agric Food Chem. Vol. 51 3546–3553.
5. Duke, J.A. (2001). Moringa oleifera Lam. (Moringaceae). In: Handbook of Nuts (Ed. Duke JA). CRC Press, Boca Raton, FL, USA, 214–217.
6. Fahey, J.W. (2005). Moringa oleifera: A Review of the Medical Evidence for Its Nutritional, Therapeutic, and Prophylactic Properties. Part 1. Trees for Life J 1: 5 [online]. Available at http://www.tfljournal.org/article.php/20051201124931586.
7. Foidl, N., Makkar, H.P.S. and Becker, K. (2001). The potential of Moringa oleifera for agricultural and industrial uses, pp 45-76, In: The Miracle Tree: The Multiple Attributes of Moringa (Ed) Lowell J. Fuglie, CTA, Wageningen, The Netherlands. http://www.moringanews.org/actes/foidl_en.doc
8. Fuglie, L.J. (2000). New Uses of Moringa Studied in Nicaragua. ECHO Development Notes Vol 68.
9. Gidamis, A.B., Panga, J.T., Sarwatt, S.V., Chove, B.E. and Shayo, A.B. (2003). Nutrient and antinutrient contents in raw and cooked young leaves and immature pods of Moringa oleifera Lam. Ecol Food Nutr. Vol. 43 399–411.
10. Hartwell, J.L. (1971). Plants used against cancer: a survey. Lloydia 30-34. CAN 1967-1971
11. Jacob, S.J.P and Shenbagaraman S. (2011). Evaluation of Antioxidant and Antimicrobial Activities of the Selected green leafy vegetables. International Journal of PharmTech Research. Vol 3 (1) pp 148-152
12. Mishra, G., Singh, P., Verma, R., Kumar, S., Srivastava, S., Jha, K.K. and Khosa, R.L. (2011). Traditional uses, phytochemistry and pharmacological properties of Moringa oleifera plant: An overview. Der Pharmacia Lettre. Scholar Res. Lib. Vol.3(2) 141-164.
13. Morimitsu, Y., Hayashi, K., Nakagama, F., Horio, K.U. and Osawa, T. (2000).

RA Journal of Applied Research
||Volume||3||Issue||08||Pages-989-1000||August-2017|| ISSN(e): 2394-6709
Index Copernicus ICV: 74.25, DOI: 10.18535/rajar/v3i8.03
www.rajournals.in

Antiplatelet and anticancer isothiocyanates In Japanese horseradish, wasabi. Bio. Factors. Vol. 13 271-276.
14. Moringa News (2008). The MoringaNews network. [Accessed on April 14, 2014].
15. Moringanews/ Moringa Association of Ghana. Moringa (2010). Growing and processing moringa leaves. Gémenos: Imprimerie Horizon.
16. Morton, J.F. (1991). The horseradish tree, Moringa pterigosperma (Moringaceae).A boon to arid lands. Econ Bot. Vol.45 318-333.
17. Moyo, B., Masika, P.J., Hugo, A. and Muchenje, V. (2011). Nutritional characterization of Moringa (Moringa oleifera Lam) leaves. Afr. J. Biotechnol. Vol.10(60) 12925-12933.
18. Nouman, W., Siddiqui, M.T., Basra, S.M.A., Farooq, H., Zubair, M. and Gull, T. (2013). Biomass production and nutritional quality of Moringa oleifera as field crop. Turk J Agric Forest; Vol.37 410–419.
19. Odeyinka, S. M, Torimiro, D. O., Oyedele, J. O. and Asaolu, V. O. (2007). Farmers Awareness and Knowledge of Moringa oleifera in South western Nigeria. A perceptional analysis. Asian Journal of Plant Science. Vol. 6 320-325.
20. Olson, M.E. (2002). Combining data from DNA sequences and morphology for a phylogeny of Moringaceae (Brassicales). Syst Bot. Vol.27 55–73.
21. Olson, M.E. and Carlquist, S. (2001). Stem and root anatomical correlations with life form diversity, ecology, and systematics in Moringa (Moringaceae). Bot J Linn Soc; Vol.135 315–348.
22. Palada, M.C., Chang, L.C., Yang, R.Y. and Engle, L.M. (2007). Introduction and varietal screening of drumstick tree (Moringa spp.) for horticultural traits and adaptation in Taiwan. Acta Hort. Vol. 752 249–253.
23. Ramchandran, C., Peter, K.V. and Gopalakrishnan, P.K. (1980). Drumstick (Moringa oleifera): A multipurpose Indian vegetable. Econo Bot. Vol.34 276–283.
24. Sanchez, N.R., Stig, L. and Inger, L. (2006). Biomass production and chemical composition of Moringa oleifera under different management regimes in Nicaragua. Agrofores Sys. Vol.66 231–242.
25. Siddhuraju, P and Berker, K (2003). Antioxidant properties of various solvent extracts of total phenolic constituent from three different Agroclimatic origins of drumstick tree (Moringa oleifera Lam) J. Agric. Food Chem., 15:2144-2155
26. Suarez, M., Entenza. J.M., Doerries, C., Meyer, E., Bourquin, L., Sutherland, J., Marison, I., Moreillon, P. and Mermod, N. (2003). Expression of a plant-derived peptide harboring water-cleaning and antimicrobial activities. Biotechnol Bioeng. Vol.81 13–20.
27. The Wealth of India (1962). A Dictionary of Indian Raw Materials and Industrial Products. Raw Materials, Vol. VI: L-M; Council of Scientific and Industrial Research: New Delhi, 425– 429.
28. Verdcourt, B. (1985). A synopsis of the Moringaceae. Kew Bull. Vol. 40 1–15.