

Agricultural Extension Needs of Spinach (*Basella spp.*) Farmers in Rivers State, Nigeria

<https://dx.doi.org/10.4314/jae.v22i1.11>

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Abstract

*This study examined the agricultural extension needs for spinach (*Basella spp.*) production by farmers' in Rivers state, Nigeria. Multi-stage sampling procedure involving purposive technique was used to select 110 respondents from 10 communities in the selected rural households. Data were collected through questionnaire and analyzed with descriptive statistics. About 47.0% of the respondents' were between the ages of 36-40 years, 73.0% were females, 78.0% married and 67.0% were part-time farmers with 5 years mean of farming experience. The majority (77%) of the respondents' had 1ha of land, 58.0% inherited lands. The mean household size was 7 persons with monthly expenditure of ₦33,350.00, 61.0% were aware that spinach enhance digestion and emptying of bowel, while 52.0% agreed that spinach reduces symptoms of menopause in women. Their major extension needs in spinach production among others were: source of farm inputs in spinach production ($\bar{X}=3.63$); credit facilities in spinach production ($\bar{X}= 3.62$). The level of effectiveness of extension services provided for farmers were very low. They include: proper management of pests/diseases; health benefits and use of spinach ($\bar{X}= 0.41$) each. The perceived*

sufficiency of extension services provided was inadequate with supply of farm inputs being the highest ($\bar{X}=1.21$). The major constraints were shortage in supply of spinach to match demand, increasing price of spinach, and low consumer acceptability of spinach products. The study recommended increase in the level of extension services provided by extension agents to meet the farmers' extension needs in spinach production.

Keywords: Households, agricultural extension, spinach production

Introduction

Spinach is a widely distributed annual vegetable of two major cultivars, *Basella alba* which has green stem and *basella rubra* with purplish stem belonging to the Basellaceae Family. It is called vine or Ceylon spinach in English, Malabar spinach in India and mgbolodi oyibo in Igbo. It is grown widely in tropical zones such as Asia, Africa. Spinach can be grown in a variety of fertile organic matter soil, and it's a green leafy vegetables grown in Nigeria (Holmer, 1998; and Douglas, 2001), and takes an important place in the population diet because of its affordability and the nutrients it provides (Holmer, 1998). It has a long history of use as both medicinal and an edible plant (Nebel and Heinrich, 2009). Spinach like every other vegetable play the role of maintaining the body cells; organs and also resist diseases by helping in the build-up and repair of the human body. Spinach is known to contribute vitamins, minerals and fibers to diet and, is a good source of vitamin C which prevents and cures scurvy (Hanif, Iqbal, and Rasheed, 2006). It contains phyto-nutrients, with large amount of vitamins (A, C, B-complex such as folate), mineral (Potassium, manganese, calcium, magnesium, and copper) and anti-oxidants which protects the body and fights carcinogenic cells and it is low in calories and fats (Goebel, Taylor and Lyons, 2010)

The purplish specie *Basella Rubia* is rich in carotenoid pigment anti-oxidants such as B-carotene, lutein, zeaxanthin. They therefore protect the body against aging, malnutrition and processes of various diseases (Olujide and Oladele, (2007); Umesh, (2009)). Regular consumption of spinach (*basella*) prevents osteoporosis, iron-deficiency anemia (Umesh, 2009). It contains magnesium which is important in bone formation, energy transfer in cells, nerve and muscle function. There is calcium which is important mineral for the growth and maintenance of bones and teeth. Zinc also acts as immunity for body growth, carbohydrate metabolism, DNA and protein formation.

Medicinally spinach has been traditionally used as an anti-inflammatory, anti convulsant, antifungal, analgesic, anticancer agent; to lower high blood pressure, cure of irregular monthly periods, treatment of anemia, treat boils and to treat dysentery ((Roshan, Naveen and Shruthi, 2012). They further revealed that the mucilaginous liquid from the leaves and stalks is used as remedy for headaches.

Growing spinach as well as other vegetables is particularly suitable for small-scale farmers and their families, because it requires moderate difficulty and limited expenditure for production (Robert, 2003). Farmers earn their living through, using limited farm inputs in its production (Orefi and Demenongo,

2011). Spinach and other vegetables are the most constantly and extensively cultivated food and income generating crops in many parts of Africa (Orefi and Demenongo, 2011). Spinach can give high yield per unit area of land; hence generate high income for the farmers (Mohammed, 2002).

Poor dissemination of technological information has resulted in low farm income, weak financial position, and to poor funding of small- holder farmer's economic activities. The level of commercial spinach production is perceived to be low, and observed to be scarce and expensive in the local Nigerian markets where they are available.

Farmers use of resources and information technologies efficiently is of importance in Nigeria agricultural production (Rahji and Omotesho, 2006). This will reduce the level of starvation, increase food production and cushion the effect of food security. Increasing quantity of spinach production, means increase in amount consumed and invariably reducing the amount of starchy food consumed. According to Roshan, et al, (2012), Spinach contains fiber which provides roughage in diets thereby reducing the intake of starchy foods, to prevention of constipation and diabetes mellitus.

It is against this backdrop that the study ascertained the agricultural extension needs for spinach production by rural households in Rivers State, Nigeria. Specifically, the study:

1. examined the socio-economic characteristics of spinach producers;
2. ascertained the level of awareness of spinach production among farmers;
3. ascertained the sources of information on spinach production among farmers;
4. identified the extension needs of rural households in spinach production;
5. ascertained the level of effectiveness of extension services provided for spinach producers;
6. determined the perceived sufficiency of extension services provided for rural households; and
7. identified the constraints in spinach production among the farmers.

Methodology

The study took place in Rivers State, one of the 36 states of Nigeria. It is made up of 23 Local Government Areas with Port Harcourt as the capital. The State covers a landmass of about 11,077 km². The provisional census result of 2006 figure recorded 2,673,026 males and 2,525,690 females are in Rivers State (National Population Commission, 2006); located between latitude 5° 'N) and longitude 7°E) of the Greenwich Meridian (Howard, 2007). The state is delineated into three agricultural zones. The total annual rainfall is about 4,700mm on the coast to about 1,700mm in north of the State (Onoja and Emodi, 2012). Rainfall is all year round for vegetable production in the State. The mean monthly temperature is in the range of 25° to 28°C. The main vegetable productions are fruited pumpkin, Amaratius, Vine spinach, lettuce, melon, pineapples and plantain. Crops such as oil palm products, coconut, yam, cassava and cocoyam and grains such as maize, lowland rice and beans are produced.

All rural households in production of spinach (*Basella Alba*) constituted the population for the study. Both purposive and multistage simple random sampling techniques were used in the selection of sample for the study. First, two (1 and 3 zones) of Agricultural Zones were selected because of the large quantity of spinach plant in the zones. In the second stage, one Local Government Area (LGA) each was purposively selected from each Agricultural Zone (Oyigbo from Zone 1 and Etche from Zone 3), giving a total of two LGAs. In the third stage, 5 communities were randomly selected from each LGA, giving a total of 10 communities. Finally, 11 farmers were purposively selected from each

community since the actual population frame of the spinach farmers was unknown for the study. A total of 110 farmers were used for the study. However, only one hundred (100) rural households that correctly completed their questionnaire were eventually used in the analysis.

Results and Discussion

Socio-Economic Characteristics of Rural Households

Table 1 shows that greater proportion (73.0%) of the respondent were female. This finding may not be unconnected with seemingly less labour stress in vegetable production since it concerns women who seem to be of weaker sex. This supports the findings of Owombo, Adiyeloja, Koledoye, Ijibade and Adeagbo, (2012), that female (64.0%) are more involved in spinach farming as compared to the (36.0%) male. About 47.0% of the respondents were in the age range of 36-40 years. The mean age was 39.8 years. This indicates that the farmers are in their active age and could meet their daily energy requirement in carrying out their farm activities. The majority (78.0%) of the respondents were married. This implies that majority of the respondents are faced with the responsibility of caring for their families and that such families can be of help in providing cheap labour. This result is in line with the findings of Eme, Okeke, Madukwe, Nwabunze and Obiweluzo (2013), who reported that high percentage of married people favour provision of cheap labour especially in farm labour.

The results also show that the majority (97.0%) of the respondents were Nigerians, while 3.0% of them were Non- Nigerians. This implies that as much as spinach is not of Nigeria origin, most spinach producers were Nigerians. This is in line with the findings of Holmer (1998), who reported that spinach is a very rich leafy vegetable which is cheap and highly appreciated in Nigerian diets.

Table 1: Percentage distribution of rural households by socio-economic characteristics

Characteristics	Percentage (%)	Mean (\bar{X})
Sex		
Male	27.0	
Female	73.0	
Age		
26-30	3.0	39.8 years
31-35	23.0	
36-40	47.0	
41 and above	27.0	
Marital status		
Single	2.0	
Married	78.0	
Divorced	5.0	
Widowed	7.0	
Nigerian		
Yes	97.0	
No	3.0	
Primary Occupation		
Full-time farming	8.0	
Part-time farming	67.0	
Teaching	8.0	
Trading	17.0	
Farming experience		
0-5	51.0	
6-10	45.0	
11-15	4.0	
Farm size (ha)		
1	77.0	
2	18.0	
3	5.0	
Land ownership		
Inherited	58.0	33.33
Leased/Rent	39.0	
Purchased	3.0	
Household size		
1-5	20.0	7 persons
6-10	75.0	
10-15	5.0	
Monthly expenditure (₦)		
20,000- 30,000	30.0	33,350.00
31,000- 40,000	60.0	
41,000- 50,000	10.0	

Source: Field survey, 2016

Table 1 shows that the majority (51.0%) of the respondents had farming experience of 0-5 years in spinach production, 45.0% of them had farming experience of 6-10 years, while 4.0% of them had farming experience of 11-15 years in spinach production. The mean years of farming experience was 5 years. Results also show that the greater proportion (77.0%) of the respondents' had farm size of 1ha, 18.0% of them had farm size of 2ha, while 5.0% of them had farm size of 3ha. This implies that

spinach can thrive even in a small land area just like every other vegetable. This could infer that most of the spinach producers are small scale farmers and practice subsistence farming.

The majority (58.0%) of the respondents' farm on inherited farmlands, 39.0% of them had leased/rented farmlands, while 3.0% of the farmers' had purchased farmlands. The findings imply that most rural households had inherited land for farming. This implies that most of these rural farmers are indigenes of Rivers State and are Nigerians. Entries in Table 1 further show that the majority (75.0%) of farmers' had household size of 6-10 persons, about 20.0% of them had household size of 1-5 persons, while 5.0% of farmers had household size of 10-15 persons. The household size mean was 7 persons. This implies that the households can conveniently manage the farm labour without employing extra outside labour in farm management. In support, Emodi (2010), observed that large rural households have clear advantage in distribution and tackling of tasks in agricultural production. The result in Table 1 also shows that the majority (60%) of the respondents' monthly expenditure was between ₦31,000- ₦40,000, 30% of them spend between ₦20,000- ₦30,000 monthly, while 10% of them spend between ₦41,000- ₦50,000 monthly. The mean monthly expenditure of respondents was ₦33,350.00. This implies that spinach production is a lucrative business.

Awareness of the Importance of Spinach Production

The entries in Table 2 reveal that 61.0% of the respondents were aware that spinach enhance digestion and emptying of bowel, 52.0% agreed that spinach reduces symptoms of menopause in women, 42.0% of them admitted that spinach is cheap source of treating malnutrition, 37.0% of them said that spinach reduces the risk of asthma, 32.0% agreed that spinach reduces aging and increase blood supply; while 29.0% respondents claimed spinach to help prevent sickness, cancer/heart diseases. This confirms why among the respondents in the study area spinach is named '*hospital far*'. This implies constant eating of spinach reduces illness and visits to doctors.

Table 2: Percentage distribution of level of awareness of spinach production among rural households'

Items	Percentage (100%)
Enhance digestion and emptying of bowel	61.0
Reduces symptoms of menopause in women	52.0
Cheap source of treating malnutrition	42.0
Reduces the risk of asthma	37.0
Reduces aging and increase blood supply	32.0
Help prevent sickness, cancer/heart diseases	29.0

***Multiple response. Source: Field survey, 2016.**

Sources of Information on Spinach Production

Table 3 shows various sources of information on spinach production. 73.0% respondents indicated that information on spinach is from friends and relatives, 30.0% of them agreed that is from health workers in the hospitals, clinics and maternity houses, 20.0% of them from mass media (radio, television and printed media), 15.0% of them source of information was from exhibitions/ training

programmes/workshops, while 12.0% of the respondents gather spinach information from restaurants / hotels and eating centres. This could imply that extension agents were not effective in promoting the importance of spinach production to the health and food security of the rural households., The findings also suggest that health workers provide more information on spinach food security than eating centres.

Table 3: Percentage distribution of sources of information on spinach production among rural households'

Items	Percentage (%)
Friends and relatives	73.0
Health workers in the hospitals, clinics and maternity houses	30.0
Mass media (Radio, Television and printed media)	20.0
Exhibitions/ Training programmes/Workshops by extension	15.0
Restaurants / Hotels and eating centers	12.0

***Multiple response. Source: Field survey, (2016).**

Extension Needs of Rural Households' in Spinach Production

Table 4 shows that all the 10 items investigated were perceived by farmers as extension needs in spinach production. These include: source of farm inputs in spinach production (\bar{X} =3.63). This is in support to Olakunle (2013), that the distribution and supply of farm agricultural inputs (fertilizers and farming materials) to rural farmers from the government will increase spinach production. The findings also show that credit facilities in spinach production (\bar{X} =3.62), effective spinach marketing and training on proper application of fertilizer in the farm were (\bar{X} =3.60) respectively, supply of quality seeds (\bar{X} =3.59), use of herbicides in the farms (\bar{X} =3.58), health benefits and use of spinach (\bar{X} =3.55), effective storage of spinach (\bar{X} =3.54), information on soil fertility (\bar{X} =3.53) and training on pests and diseases control (\bar{X} =3.52). These imply that the respondents need assistance in all the items as it concerns extension services. The findings revealed that the farmers perceived source of farm inputs in spinach production as the most important assistance needed. It seems safe to conclude that without inputs; spinach production cannot be in existence.

Table 4: Mean distribution of extension needs of rural households' in spinach production

Items	Mean (\bar{X})	Standard Deviation (SD)
Information on soil fertility	3.53	0.50
Training on pests and disease control	3.52	0.54
Effective storage of spinach	3.54	0.54
Health benefits and use of spinach	3.55	0.52
Credit facilities in spinach production	3.62	0.49
Supply of quality seeds	3.59	0.52
Effective spinach marketing	3.60	0.54
Use of herbicides in the farms	3.58	0.52
Training on proper application of fertilizer in the farm	3.60	0.54
Source of farm inputs in spinach production	3.63	0.52

Source: Field survey, (2016).

Key: $\bar{X} = \geq 2.50$ shows significance

Effectiveness of Extension Services Provided for Spinach Producers

The mean scores in Table 5 indicate that all the 8 items were considered by the respondents' to be very low. They include: health benefits and use of spinach ($\bar{X} = 0.41$), proper management of pests/diseases ($\bar{X} = 0.41$), training on how best to store spinach ($\bar{X} = 0.39$), proper use of herbicides on spinach farms ($\bar{X} = 0.38$), source of quality spinach seeds ($\bar{X} = 0.36$), proper use and application of fertilizer ($\bar{X} = 0.35$), source for effectively marketing spinach ($\bar{X} = 0.34$) and provision of credit for spinach production ($\bar{X} = 0.30$). The results show that the respondents considered both health benefits and use of spinach, and proper management of pests/diseases as the most effective extension services provided in the study area. The findings confirmed the need for extension services among the rural households in spinach production (Table 4).

Table 5: Mean distribution of level of effectiveness of extension services provided for spinach producers

S/N	Items	Mean (\bar{X})	Standard Deviation (sd)
1	Provision of credit for spinach production	0.30	0.50
2	Source for effectively marketing spinach	0.34	0.55
3	Proper use and application of fertilizer on farms	0.35	0.55
4	Training on how best to store spinach	0.39	0.59
5	Source of quality spinach seeds for improved production	0.36	0.53
6	Proper management of pests/disease	0.41	0.58
7	Proper use of herbicides on spinach farms	0.38	0.54
8	Health benefits and use of spinach	0.41	0.55

Source: Field survey, (2016). Key: $\bar{X} = \geq 3.00$ shows significance

Perceived Sufficiency of Extension Services Provided for Rural Households'

Table 6 shows that all the 10 extension services provided for rural households were perceived to be inadequate by the respondents'. These include: guide on fertilizer application (\bar{X} = 1.33), best place in marketing spinach (\bar{X} = 1.31), source of credit facilities in spinach production (\bar{X} = 1.30), guide on constraints in spinach production (\bar{X} = 1.30), health benefits and use of spinach (\bar{X} = 1.30), information on natural pests/diseases control (\bar{X} = 1.29), source of quality spinach seeds for improved production (\bar{X} = 1.29), regularity of extension agents visit (\bar{X} = 1.28), information on spinach storage (\bar{X} = 1.27) and supply of inputs by extension agents (\bar{X} = 1.21). The results show that the rural households perceived the supply of inputs by extension agents as the most inadequate service provided. This confirms the findings in Table 5, that the level of effectiveness of extension services provided for spinach producers is low. In support, the result in Table 4 confirms that farmers had inadequate farm inputs in spinach production.

Table 6: Mean distribution of perceived sufficiency of extension services provided for rural households'

Items	Mean (\bar{X})	Standard Deviation(SD)
Supply of inputs by extension agents	1.21	0.41
Information on spinach storage	1.27	0.46
Regularity of extension agents visit	1.28	0.44
Source of quality spinach seeds for improved production	1.29	0.44
Information on natural pests/diseases control	1.29	0.44
Health benefits and use of spinach	1.30	0.44
Guide on constraints in spinach production	1.30	0.43
Source of credit facilities in spinach production	1.30	0.42
Best place in marketing spinach	1.31	0.42
Guide on fertilizer application	1.33	0.43

Source: Field survey, (2016). Key: \bar{X} = \geq 2.50 shows significance

Constraints to Spinach Production Among Rural Households'

Table 7 reveals that the majority (67.0%) of the respondents indicated shortage of spinach supply to match demand, 53.0% of them confirmed increased price of spinach, 50.0% of them said spinach had low consumer acceptability, 45.0% of them said that spinach cannot be consumed under fresh conditions, 41.0% of them indicated that spinach is completely new in the dietary culture of the people, 40.0% of them confirmed spinach as tedious in processing at household level, 39.0% of them indicated that there is lack of technology for processing spinach at households' level, while 33.0% of the respondents' agreed that spinach has low shelf life of processed products.

Table7: Percentage distribution of constraints in spinach production among rural households'

Items	Percentage (%)
Shortage of supply to match demand	67.0
Lack of technology for processing spinach at households level	39.0
Cannot be consumed under fresh conditions	45.0
Low consumer acceptability of spinach products	50.0
Completely new in the dietary culture of the people	41.0
Increasing price of spinach	53.0
Tedious in processing at the household level	40.0
Low shelf life of processed spinach products	33.0
Total	

***Multiple response. Source: Field survey, (2016).**

Conclusion and Recommendation

Sufficiency of extension services as perceived by farmers were not adequate. However, if the level of effectiveness of extension services provided for spinach producers is greatly increased, through dissemination of information by extension agents, and community based efforts, the rural households' agricultural extension needs will be met and the perceived sufficiency will be very adequate. There will be increase in rate of awareness and quantity of spinach produced to meet consumers' demand.

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