A Strategic Assessment of Adoption and Perceived Benefits of Organic Farming Practices by Vegetable Farmers in Calabar Agricultural Zone of Cross River State

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ABSTRACT

This study aimed at strategically finding out the adoption and perceived benefits of organic farming by vegetable farmers in Calabar Agricultural Zone of Cross River State. The study was carried out in Calabar Agricultural Zone of Cross River State which comprised seven Local Government Areas. Specifically, three Local Government Areas – Calabar South, Calabar Municipality and Odukpani were purposively selected and used for the study on the basis of intensity and scale of vegetable production in those LGAs. The population of the study comprised all the vegetable farmers in the study area. The sample was drawn using purposive and random sampling techniques, with a sample size of two hundred and fifty (250) respondents. Data for analysis were collected from the respondents through the use of a structured questionnaire and oral interview. The instrument was face and content validated by experts in the field. The questionnaire was tested for reliability using rest retest technique. Data collected were analyzed using descriptive statistics. The findings from the study revealed that the rate of adoption of the various organic farming practices varied widely among vegetable farmers in Calabar agricultural zone of Cross River state. The findings also showed that the most widely adopted practices were manual tillage, while the least was the use of animal droppings as manure, also production of healthy vegetables, maintenance of soil fertility, conservation of environment, longer shellfire of crops, lower economic costs of production and compatibility are ensured with adoption of organic farming. It was recommended that the government should make policies that guard against agricultural practices that degrade the environment while encouraging and enforcing the adoption and practice of organic farming. The provision of incentives could also go a long way to boost the rate of adoption.

KEYWORDS: Rate of adoption, benefits, organic farming, vegetable farmers

Introduction

The global increase in population has brought about increased demand for healthy food and widespread concern about food safety and the environmental impact of farming practices adopted by farmers (Mortensen, Bastiaans & Sattin (2000), Setboonsarng (2006). Although the Food and Agriculture Organization (FAO,2009) projected that the number of undernourished people will decline between 1999 and 2030, the organization however warns that high rates of poverty and food insecurity are expected to continue with the present models of food production and consumption, along with further natural resources degradation.

The Green Revolution was introduced as an effort to increase and diversify yields in agriculturally less advanced regions by the introduction of modern farming techniques, higher yielding and pest resistant crops. According to USDA (2010), as the use of synthetic fertilizers is prohibited in organic agriculture, they are replaced by organic fertilizers (compost, animal manure, green manure) and through the use of greater biodiversity (in terms of species cultivated and permanent vegetation), enhancing soil structure and water infiltration. Well managed organic systems with better nutrient retentive abilities greatly reduce the risk of ground water pollution. In some areas where pollution is a real problem, conversion to organic agriculture is highly encouraged as a restorative measure. Fred (2007) observes that organic agriculture reduces non-renewable energy use by decreasing agrochemical needs (these require high quantities of fossil fuels to be produced). Organic agriculture contributes to mitigating the green greenhouse effect and global warning through its ability to sequester carbon in the soil. Thus, its adoption is of immense benefits both to the farmer and the environment as it enhances sustainable environment.

Statement of Problem

In many agriculture areas, as well as in Nigeria, pollution of ground water courses with synthetic fertilizers and pesticides is a major problem. This problem has called for the concern of international agricultural organizations who have come up with green resolution technologies in order to reduce the adverse effects of synthetic fertilizers and other agro chemicals on the soil and also ameliorate these on the environment. Regrettably though, it has been observed that these alien agricultural practices have not been totally adopted but vegetable farmers still resort to bush burning, use of fertilizers and other farming practices that have added to the increase of green-house gases and subsequent depletion of the ozone layer. This study therefore sets out to assess the rate of adoption and the benefits which accrue from adopting the organic farming by vegetable farmers in Calabar Agricultural zone of Cross River state, Nigeria.

Objectives of the Study

The main aim of this study was to examine the rate of adoption and perceived benefits of organic farming practices by vegetable farmers in Calabar Agricultural Zone of Cross River State. The specific objectives of the study were to:

i. Find out the rate of adoption of organic farming practices by vegetable farmers in the Calabar agricultural zone of Cross River state;

ii. Ascertain the perceived benefits of organic farming by vegetable farmers in the study area;

Research Questions

i. What is the rate of adoption of organic farming practices among vegetable farmers in the study area?

ii. What are the perceived benefits of organic farming practices by vegetable farmers?

Review of Related Literature

Theoretical Framework

This study was based on the Innovations diffusion theory put forward by Rogers.

Innovations Diffusion Theory

The diffusion of innovations theory is a theory that seeks to explain how, why and at what rate new ideas and technologies spread through cultures (Wikipedia, 2012). The original diffusion research was done as early as 1903 by the French sociologist Gabriel Tarde who plotted the original S-shaped diffusion curve. The theory was popularized by Everett Rogers (1962 and 1995). Surry (1997) posits that there is not one, well-defined, unified, and comprehensive theory of diffusion of innovations. Instead, a large number of theories, from a wide variety of disciplines, each focusing on a different element of the innovation process, combine to create a meta-theory of diffusion. On that note, Rate of Adoption theory which is one of the innovation theories states that innovations are diffused over time in a pattern that resembles an s-shaped curve. Rogers assert that most innovations have an "S" shaped curve which shows that an innovation goes through a period of slow, gradual growth before experiencing a period of relatively dramatic and rapid growth. Afterwards, it will become stable and then gradually decline (Rogers 1995). The decline may be due to the emergence of a better innovation (as perceived by the users), hence the rate of adoption might be high or low.

Conceptual Review

Organic agricultural land and the global market have been reported to be on the increase in many countries. According to Willer (2011), there are 37.2 million hectares of organic land, with 1.8 million producers globally as at the time of the report. Forty percent of the world's organic producers are in Asia, followed by Africa (28%). Five hundred thousand producers were reported in Africa. However, Benet et al (2009) reported that certified organic farming is relatively undeveloped in Africa, with West Africa lagging behind other regions. Kelsey (2013) specifically pointed out that sub-Saharan Africa has lagged behind Asia in adoption of new technologies.

As observed by IFAD (2008), most traditional farming practices in Africa are organic by nature. These practices share organic agriculture's dependency on ecological processes (Benet et al., 2009). IFOAM, (2013) described farms in this category as generally undeveloped and lack well planned and well managed systems due to extreme poverty, insecure land tenure issues, inconsistent/inadequate rainfall, lack of access to training and advice and also insufficient means to purchase the most basic of inputs such as local seed varieties.

Several literatures reviewed showed a low rate adoption of organic farming practices by farmers. For instance, farmers adopted five (5) out of fourteen (14) listed organic farming practices, giving an adoption rate of 35.7% (Adesope, et al., 2012). Also worthy of note is that how a farmer perceives an innovation can either increase or reduce the rate of adoption. Farmers who perceive an innovation to be beneficial to them will adopt it more than those who have a negative or indifferent perception. For instance, adoption increased with farmers' perception towards *imazapyr*-resistant maize (IRM) for *Striga* control (Mignouna, Manyong, Rusike, Mutabazi & Sekondo, 2011). In Adesope et.al (2011), 84% of the respondents perceived that organic farming practices are compatible with their own cultural systems.

Wilson (2007), examined the benefits of organic farming and he noted that organic farming enhances natural resources, preserves the environment's balance and guarantees tastier products. It does not contain any chemical and so it produces safe and healthy food. In organic farming, the farmers can observe all stages from production to consumption. Peters (2007) further maintained that organic farming ensures sustainability over the long term. Many changes observed in the environment are long term, occurring slowly over time. Organic agriculture considers the medium and long term effect of agriculture interventions on the agro-ecosystem. It aims to produce food while establishing an ecological balance to prevent soil fertility or pest problems. Organic agriculture takes a proactive approach as opposed to treating problems after they emerge.

Many management practices used in organic agriculture (such as minimum tillage, returning crop residues to the soil, the use of cover crops and rotations, and the greater integration of nitrogen-fixing legumes), increase the return of carbon to the soil, raising prdouctivty and favouring carbon storage. A number of studies revealed that soil organic carbon content under organic farming are considerably higher. The more organic carbon is retained in the soil, the more the mitigation potential of agriculture against climate change is higher. Organic vegetable offers recurring benefits not only to long-term soil health, but also provides a lasting stability in production by importing better resistance against various biotic and abiotic stresses (Maity & Tripathy, 2010). A recent study reporting on a meta-analysis of 766 scientific papers concluded that organic farming produces more biodiversity than other farming systems (FAO 2009).

The impact of organic agriculture on natural resources favours interactions within the agro-ecosystem that is vital for both agricultural production and nature conservation. Ecological services derived include soil farming and conditioning, soil stabilization, waste recycling, carbon sequestration, nutrients cycling, predation, pollination and habitant. By optioning for organic products, the consumer through his/her purchasing power promotes a less polluting agricultural system. The hidden costs of agriculture to the environment in terms of natural resource degradation are reduced (Fisher, 2008).

Materials and Methods

Study area

The study was carried out in the Calabar Agricultural Zone of Cross River State.

Population of the study

The population of this study comprised all the vegetable farmers in Calabar agricultural zone. Data available at the Agriculture Development Programme ADP, Calabar zone, indicates that there were four hundred and fifty-three (453) registered vegetable farmers in the area.

Sample and sampling technique

Multi-stage sampling procedure was used to select zone, blocks, cells and individual farmers for the study. The blocks are the Local Government Areas under the zone while the cells refer to the communities in the different local government areas where vegetable is produced. Ninety-four vegetable farmers were randomly selected in Calabar South and one hundred and four in Odukpani while fifty-two were selected in Calabar Municipality based on the proportion of farmers in each site making a total of 250 respondents.

Instrumentation

The instrument used for data collection was a structured questionnaire and oral interview.

Validation of instrument

The validity of the instrument was determined by professionals in the field.

Reliability of the instrument

The reliability of the instrument was determined using a test retest technique. A pilot test was conducted with 10 percent (25) of the respondents. The result of the correlation recorded a coefficient of 0.88, which implied that the instrument was 88% reliable.

Procedure for data analysis

Descriptive statistics was used to analyze data generated from the study.

Result and Discussion

Research Question 1

The research question sought to find out the rate of adoption of organic farming by vegetable farmers in the study area. Descriptive analysis was applied on the data and the result is as shown in Table 1.

TABLE 1: Organic farming practices and rate of adoption/utilization by vegetable farmers

Variable	Rate of adoption/Utilization									
	(4) Very High		(3) High		(2) Rarely		(1) Never		∑Fx	X
	F	%	F	%	F	%	F	%		
Use of Local seeds	190	76.17	38	15.83	12	5.00	0	0	898	3.74
Crop rotation	10	4.17	21	8.75	119	49.58	90	37.50	43	11.80
Mixed cropping	31	12.92	26	10.83	72	30.00	111	46.25	457	1.90
Hand/manual weeding	182	75.83	56	23.33	2	0.83	0	0	900	3.75
Use of green manure	31.25	0	0	51	21.25	0	186	77.50	300	1.25
Use of compost manure	0	0	0	0	10	4.17	230	95.83	250	1.04
Use of animal dropping	68	28.33	72	30.00	86	35.83	14	5.83	674	2.81
Organic Mulching	19	7.92	45	18.75	60	25.00	116	48.33	447	1.86
Intercropping	0	0	4	1.67	162	67.50	74	30.83	410	1.7
Handpicking of insects	0	0	7	2.92	33	13.75	200	83.33	287	1.20
Use of plants to Control pests	0	0	0	0	2	0.83	238	99.17	242	1.01
Use of animals to Control weeds	0	0	0	0	19	7.92	221	92.08	259	1.08
Manual harvesting of Vegetables	170	0	39	0	31	0	0	0	859	3.58
Manual tillage	220	20	0	0	0	0	0	0	940	3.92
Manual planting of Seeds	186	0	54	0	0	0	0	0	906	3.78

Source: Field Survey, 2014. Decision Rule $\bar{X}$=2.50; (N = 240)

Table 1 show the various types of organic farming practices and rate of adoption/utilization by vegetable farmers in the study area. The result reveals a great variation in the rate of adoption of the identified organic vegetable farming practices by the respondents. Specifically, the most frequently adopted organic farming practices/technologies in the area were manual tillage/land preparation ($\bar{\chi}$=3.92) and manual planting of seeds ($\bar{\chi}$=3.78). This finding is hardly surprising given the fact that vegetable farmers in the area were largely small-scale farmers with small land holdings and produces relatively small quantities of vegetable for family consumption and the local markets. With this system of production, the farmers depended mainly on manual and especially family labour and mechanized planting, tillage and harvesting were often inconceivable.

Other organic farming practices such as hand/manual weeding ($\bar{\chi}$=3.75), use of local inputs – seeds ($\bar{\chi}$=3.74) manual harvesting ($\bar{\chi}$ = 3.58) and use of animal (manure) dropping ($\bar{\chi}$ = 2.81) were

prevalent among vegetable farmers in the area. This is associated with a number of variables. On the one hand, since the farmers were not large-scale industrial farmers, they utilized mainly local planting materials and operations such as weed control and harvesting could not be mechanized. On the other hand, farmers are generally concerned about the yield of the crops and historically farmers have recognized that good yields cannot be achieved without paying attention to the fertility needs of the soil and nutrient requirement of plants. This could be the reason why a substantial proportion of the respondents adopted the use of farmyard/animal manure in vegetable production ($\bar{\chi} = 2.81$) in the area to a very high extent.

Interestingly, the result reveals further that organic farming practices such as mixed cropping ($\bar{\chi} = 1.90$), organic mulching ($\bar{\chi} = 1.86$), crop rotation ($\bar{\chi} = 1.80$), and intercropping ($\bar{\chi} = 1.71$) were marginally adopted by vegetable farmers in the area. However, handpicking of insects ($\bar{\chi} = 1.20$), use of animal to control weeds and pests ($\bar{\chi} = 1.08$) and in particular the use of plants ($\bar{\chi} = 1.01$) as a means of pests control were scarcely associated with vegetable farmers in the area. It could be assumed on the basis of this finding that vegetable farmers in the area generally do not adopt biological methods of weeds and pest/insect control but probably depended on the other methods such as the use of insecticides or herbicides which are rather inorganic. The result indicates generally that there were a wide range of organic farming practices available to vegetable farmers to adopt in the area but the rate of adoption of these practices varied widely among the farmers.

This result corroborates the submissions of Farnworth (2009) and Setboonsarng (2006) that farmers attitude toward organic farming techniques varies from one practice or technique and locality to the other depending on the socio-cultural environment, local needs, popularity of the technique and the technicalities involved in adopting the practice. They argued that vegetable farmers often used organic fertility management practices such as use of farmyard manure, cropping systems, mulching etc, to improve crop yield. Vegetable farmers are familiar with a variety of organic farming practices but the rate of adoption of these practices varies from one locality and farmer to the other.

Research Question 2

The research question sought to find out the perceived benefits of organic farming by vegetable farmers in the study area. Descriptive analysis had been applied on the data and the result is as shown in Table 2.

TABLE 2: Benefits of organic vegetable farming (N = 240), decision mean ($\overline{X}$) = 2.50

Variable	SA (4)	Means A(3)	Remarks D (2)	SD (1)	∑FX	(X)	(RK)
Production of healthy Vegetables	161 (64.4)	54 (162)	5 (10)	20(20)	836	3.48	Accepted
Maintenance of soil Fertility	156 (6.24)	60 (180)	-	24(24)	828	3.45	Accepted
Production of tasty and nutritious vegetables	10 (40)	26 (78)	19(38)	185(185)	341	1.42	Rejected
Conservation of environment	80 (320)	114 (342)	18(36)	28(28)	726	3.03	Accepted
Longer Shelflife/ Storability	110 (440)	49 (147)	72(144)	9(9)	740	3.08	Accepted
Lower economic burden to farmers	99 (396)	87 (261)	54 (108)	-	765	3.19	Accepted
Efficient use of local Resources	40 (160)	181 (543)	9(18)	10(10)	731	3.05	Accepted
High Preference by Consumers	2 (8)	7 (21)	-	231(231)	260	1.08	Rejected
Compatible with Traditional and Cultural methods	71 (284)	98 (294)	63(126)	8(8)	712	2.97	Accepted
High yields	30 (120)	11 (33)	91(182)	108(108)	443	1.85	Rejected

Source: Field Survey, 2014
Note: RK = Remark; A = acceptance; R = Rejection; $\overline{X}$ = mean

The results of the analysis in Table 2 show the benefits associated with adoption of organic farming practices by vegetable farmers. It indicates that farmers accepted seven and rejected three of the ten identified benefits that organic farming. In particular, the respondents admitted that organic farming practices could result in the production of healthy vegetables (X = 3.48), maintenance of soil fertility (x = 3.45) and conservation of environment (x – 3.03). This agrees with the submission of Maity and Tripathy (2009) that organic farming enhances crop yield and growth by improving soil fertility. Studies by Robinson and Christian (2010) shows that application of organic manure (e.g. green manure, compost, animal droppings etc.) has the potential of improving soil nutrient and structure by improving soil organic matter content which could lead to production of healthy crops.

The result reveals also that adoption of organic farming practices could enhance the shelf-life/storability of vegetables. This is hardly surprising given the traditionally held belief that crops grown using inorganic substances (e.g. fertilizers, insecticides etc.) do not store well. This agrees with Williams (2008) but disagrees with Peters (2007) who argues that there is no empirical correlation between the use of inorganic fertilizers and other pest control measures in production and the shelf life of a given crop produce. He maintains that the widely held belief that inorganically produced crops do not last long in storage is superstitious and scientifically baseless.

The study indicates that other benefits of organic vegetable farming were lower economic burden to farmers (X = 3.19), efficient use of local resources (X = 3.05) and compatibility with traditional and cultural methods (X = 2.97). The implication of this is that organic farming practices are not expensive because they depend largely on local materials and resource. In other words, farmers spend less money utilizing organic farming techniques rather than enduring the high costs associated with inorganic inputs. For example, it is far cheaper to obtain plant and animal-based manure than acquiring a bag of N.P.K. fertilizer (FAO, 2009).

It was found however that the production of tasty and nutritious vegetables (X = 1.42), high preference by consumers (X = 1.08) and high yield (X = 1.85) are not benefits of organic farming as all these three variables recorded means below the decision benchmark of 2.50. This could be attributed to a number of reasons. There is no scientific evidence that vegetables produced organically have taste and nutritional superiority over those produced using inorganic methods – an inorganic methods belief held also by the respondents. Besides, Peter (2007) observed that consumer preference for vegetables is not connected with the practices involved or adopted in production but rather on other economic and socio-cultural factors such as cost, product quality and quantity etc. Wilson (2008) also agrees that the use of organic farming practices has no practical correlation, with consumer preference.

Conclusion

The study showed that the rate of adoption of the various organic farming practices varied widely among vegetable farmers. The most widely adopted practices were manual tillage (rank = 1^{st}), while the least was the use of animal droppings as manure (ranked 6^{th}). The study also indicated that adoption of organic vegetable farming practices is associated with a couple of benefits. Importantly, organic farming ensures the production of healthy vegetables, maintenance of soil fertility, conservation of environment, longer shellfire of crops, lower economic costs of production and compatibility was traditional methods.

Recommendations

From the analysis and reviews of similar work, the researcher recommended that:

(i) There should be a regular public enlightenment programmes to inform and remind the farmers about organic agriculture, its technologies, methods of application, and benefits.

(ii) Extension Agents and Agricultural Organizations should research and educated farmers on the need to adopt recent innovations in vegetable farming, encouraging them that if the practices are applied, increased yield can be guaranteed.

(iii) The government should make policies that guard against agricultural practices that degrade the environment while encouraging and enforcing the adoption and practice of organic farming. The provision of incentives could also go a long way to boost the rate of adoption.

REFERENCES

Adesope, O. M. Mathews – Njoku, Oguzor, N. S. and Ugwuja, V. C. (2012). *Effect of socio-economic characteristics of farmers on the adoption of organic farming practices*. Intech open access publisher.

Bennett, M., & Franzel, S. (2009). *Can organic and resource-conserving agriculture improve livelihoods? A meta-analysis and conceptual framework for site-specific evaluation*. World Agroforestry Centre (11).

FAO. (2009). *The state of food insecurity in the world*: Economic crises-impacts and lessons learned.

Farnworth, C. R., & Hutchings, J. (2009). *Organic agriculture and womens' empowerment*. [International federation of organic agriculture movements](IFOAM)].

Fisher, K. L. (2008). *Advance Research Methods & Statistics*. Colorado: Independence books, 108-114.

Fred, S. H. (2007). Micro Vegetable Production and Poverty Eradication in Sub-Saharan Africa. *The Economy*, 1(1), 32-40.

Khan, A. S., Ahmad, S. & Amjad, M. (2012). Prospects and challenges of organic fruit production in Pakistan. *International organic fruit symposium* 1(1), 57-64.

Maity, T. K., & Tripathy, P. (2009). *Organic Farming of Vegetables in India*: Problems and Prospects". Department of vegetables crops, faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya. Available at www.share.4dev.info/kb/documents/2997.pdf

Mignouna, D. B. Manyong, V. M., Rusike, J. Mutabazi, KDS., & Sekondo, E. M. (2011). Determinants of adopting Imazapyr-ressistant maize technological and its impact on household income in Western Kenya. *Journal of Agrobiotechnology Management & Economics*, 14(3), Article 7.

Mortensen, D.A., Bastiaans, L. & Sattin, M. (2000). The role of ecology in the development of weed management systems: An Outlook. *WEED RESEARCH-OXFORD*, 40(1), 49-62.

Peters, U. G. (2007). Organic Farming – between science and traditional beliefs: A case of Ondo State. *Global Perspective*. 1(1), 19-28.

Robinson, N. & Christian, P. F. (2010). *Evaluating the benefits and challenges of organic farming techniques in Tanzania: Readings in Agriculture.* Darres Salam: University Press: 129-136.

Setboonsarng, S. (2006). *Organic Agriculture, Poverty Reduction, and the Millennium Development Goals*: Discussion Paper, p. 6.

United States Department of Agriculture (USDA, 2010). *Impacts of agricultural practices on environment*: Issues and review annual report No. 9:1-27.

Williams, R. S. (2008). *Advance crop production: theory and practices* (revise edition). Ibadan: Wisdom Press: 164.

Wilson, J. (2008). *Conserving world ecosystems.* New Jersey: 100-107.