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ORGANIC AGRICULTURE RESEARCH OUTPUT: DISSEMINATION, AWARENESS AND IMPLEMENTATION IN SELECTED SOUTH-EASTERN AND SOUTH-SOUTH NIGERIAN STATES

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Abstract

A survey was carried out to assess the research outputs on organic agriculture in south-southern and south-eastern Nigerian Universities. Random sampling technique was employed to select six Federal Universities from the study area. At least eighteen (18) respondents were selected from each of the six Universities. A total of 110 well-structured questionnaires were administered to the respondents although only 90 (81.8%) people responded. Information regarding areas of organic research conducted, publications on organic agriculture, means of dissemination of findings to farmers and constraints encountered in organic agriculture research by the respondents were collected, collated and analyzed. Results showed that organic agriculture research is still very low in the study area compared to research in conventional agriculture publications on organic agriculture were mostly in Journals. Area of organic agriculture mostly researched was soil fertility management (37%) followed by organic fertilizer formulation (22.8%). The least researched area was organic weed management (7.6%) and mechanization (7.6%). Radio was mostly used as dissemination strategy. The most serious constraints in organic agriculture research as well as dissemination of information in the study area were inadequate funding, government policy and poor incentives. Hence, it was recommended that funding organic agriculture research, providing incentives and formulating appropriate policies by government to support organic agriculture research will promote researches in organic agriculture with the corresponding technological innovations towards food security.

Keywords: Organic Agriculture output, dissemination, awareness, implementation

Introduction

Organic agriculture (OA) principles and practices are geared towards the best management practices which preserve the ecosystem, animal, human and soil health. The adverse effect of consistent use of agrochemicals in agricultural production on the ecosystem, animal, human and soil health have become issues of national and international concern (Maria *et al*., 2013; Polyxeni *et al*., 2016). The adoption of organic agriculture practices is viewed as a good alternative and safer strategy in ameliorating these adverse effects because it combines traditional, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved (IFOAM, 2004). It takes into account potential environmental and social impacts, eliminating the use of synthetic inputs (Ahmed, 2011). It uses agronomic, biological and mechanical methods to accomplish specific functions within the production system as opposed to using synthetic materials (FAO/WHO Codex Alimentarius Commission, 1999). According to FAO (2002), "OA" refers to a process that uses methods considered to be environment-friendly from the production stages to handling and processing. Organic production is not merely concerned with a product, but also with the whole system used to produce and deliver the product to the ultimate consumer.

Most farmers and even researchers do not have a clear perception of organic agriculture, its merits, principles and practices compared with conventional agriculture (Kutama *et al*., 2013). Besides, most farmers are obstinate to conventional agricultural practices. They have a very big misconception of organic agriculture because most of them feel that natural/traditional farming is the same as organic farming.

Agricultural research and technological development are prerequisites for increasing agricultural productivity and generating income for farmers and the rural work force; thereby solving societal and national problems (Adeoye, 2005; Osabohien *et al*, 2019). According to Olanrewaju (2011), scientists have the potential of developing technologies with favourable perception of promoting organic agriculture as a measure to climate change effects and increased farmers' income through sustainable practices. Conventional agriculture has the potential to deplete the ecosystem via land degradation, reduced biodiversity, adversely affect plants and animals, thereby ultimately affecting human health. However, the benefits of OA, agro-ecology maintenance through best agricultural management practices are yet to be

recognized by the society. The dissemination of the research findings (though insufficient) is limited; hence, this survey is designed to assess the extent of organic agriculture research and the dissemination of findings to the farmers and consumers in the area under study.

The constant deterioration in animal and man's health over the past few years have made people conscious of the safety and quality of the food they consume. This deterioration in health as well as environmental degradation could be traced to the incessant use of agro-chemicals in both production and processing of agricultural produce. This unpleasant situation could be addressed through problem solving, demand driven and innovative researches in organic farming and agriculture. This will help develop sufficient adaptable technologies towards best management practices in organic agriculture, which if adopted by the stakeholders, would improve and enhance production of quality and healthy food, conserve the ecosystem and sustain soil productivity. These benefits would help arouse the interest of farmers and consumers in organic agriculture production and safe food consumption.

The awareness of the impact of organic agriculture on the quality of food is still limited especially in Nigeria. Farmers should be aware of the physical, biological and mechanical principles and the ecological benefits of organic agriculture to be able to implement them. Farmers in Nigeria find it difficult to assess relevant information on organic agriculture, hence this survey is aimed at conducting and documenting in-depth assessment of the available organic agriculture research output that have been put into use in South-Eastern Nigeria, specifically:

- Identifying the available organic agriculture research output and technological innovations;
- Determining areas of organic agriculture research;
- Determining the research findings dissemination strategies;
- Identifying the number of farmers reached; and
- Identifying the challenges in disseminating this information.

Methodology

This survey was carried out in South/Eastern Nigeria (South-south and South-east - which is made up of eleven states comprising; Abia, Akwa-Ibom, Anambra, Bayelsa, Cross River, Delta, Ebonyi, Edo, Enugu, Imo, and Rivers states) to assess the available organic agriculture research output in South/Eastern, Nigeria. The area lies between longitude 7º10 ' and 7º14 ' East and latitude 6º30 ' and 6º41 ' North with an elevation of about 400m above sea level (Igwe and Okebalama, 2006). It has a projected population of about 50,784,800 (Nig. Admin. Division, 2016). The vegetation indicates that the area falls within the tropical rainforest and the derived savannah consisting mostly of grasses, shrubs and a few trees. It experiences bimodal rainfall distribution pattern, the rainy season (March - November) with 'August break' in between and the dry season (November – February). The mean annual rainfall is between 1650mm - 2000mm, mean annual temperature ranges from 27°C - 30°C with a relative humidity range of 75% - 80 %. These weather conditions remain fairly uniform throughout the year (Igwe and Nwokocha, 2006; Uguru *et al*., 2011).

The major livelihood activities of the inhabitants of (the study area) South/Eastern Nigeria (SE and SS) are farming, fishing (domesticated and aquatic), crafts and trading, however farming is the most predominant. The crops grown are predominantly cash crops (oil palm, bamboo and fruit trees like avocado/native pear and mangoes) and food crops (maize, cassava, yam, rice, cocoyam, legumes, vegetables and fruits) (Erondu, 2015). The farmers in this region are also involved in small scale animal production (poultry, snail and fish farming) hence, they practice both mixed cropping and mixed farming. The rural farmers in the region are mostly subsistent farmers with a few commercial farmers.

Study population, sampling procedure and sample size

Random sampling technique was used to select six Federal Tertiary Institutions located in six states of the eleven states in South-Eastern and South-Southern Nigeria, as the survey areas, namely: Nnamdi Azikiwe University (Anambra), University of Nigeria Nsukka (Enugu), Federal University of Technology, Owerri (Imo), University of Uyo (Akwa-Ibom), University of Benin (Edo) and University of Port-Harcourt (Rivers). The first three universities are located in South-East while the last three are located in the South-South (Table 1). At least eighteen (18) Lecturers in each of these universities constituted the respondents. A total of 110 well-structured questionnaires, subdivided into five sections were administered to the respondents using random sampling technique. However, only 90 people responded giving 81.8% returns.

Data analysis

The completed and returned questionnaires were verified, coded and keyed into Excel workbook and analysed using IBM SPSS statistics 20 software to get descriptive statistics such as mean, frequencies, and percentages while Spearman Rank Correlation coefficient was used to test the relationship between area of organic agriculture research, its publication and constraint to research and output dissemination.

Results and Discussions

The results and discussions on the five different sections covered in this survey are hereby presented.

Personal characteristics of the respondents

Data on the personal characteristics of the respondents were collected: age, gender, Department, educational qualification, Institution, Academic status/Position and year of experience.

(i) Age

The age distribution of respondents is presented in Figure 1. Result obtained showed that respondents within 46-55 years constituted the highest percentage (44.6%) followed by 36-45 years (27.4%) age bracket. This may be an indication that there are adequate and viable potentials and opportunities for robust career development in organic agriculture within 25 - 55 age brackets. If adequate funds and relevant incentives are provided for this class of respondents, they will enthusiastically move the organic agriculture principles and practices to the next level through well-articulated researches which would eventually lead to appropriately formulated organic agriculture policies void of external inputs, with prompt and efficient dissemination strategies of research findings and sustenance of soil productivity.

Table 1: **Sampling size of respondents**

Universities	Total No of Agric. lecturers	Target Number	Percentage (%)	Number Returned
Nnamdi Azikiwe University, Awka (UNIZIK)	47	20	42.6%	17
University of Nigeria, Nsukka (UNN)	65	18	27.7%	6
University of Benin (UniBen)	46	18	39.1%	13
Federal University of Technology, Owerri (FUTO)	57	18	31.6%	18
University of Uyo (UniUyo)	100	18	18%	18
University of Port Harcourt (UniPort)	62	18	29%	18
Total Population	**377**	**110**		**90**

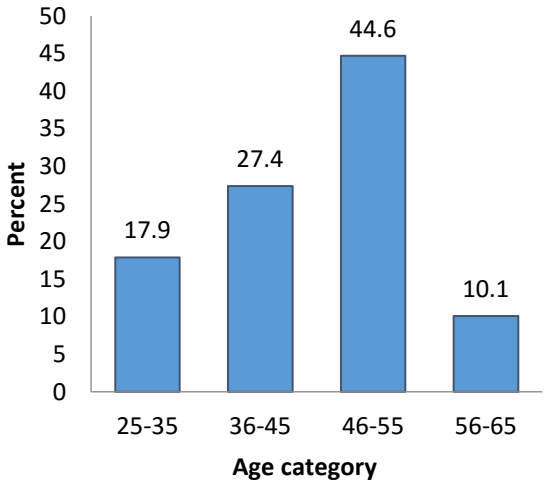

Figure 1: Age distribution of respondents
Source: Field Survey, 2017

(ii) Departments/Units

Result of the survey on the respondents' Departments is shown in Table 2. It indicated that 22.3% of the respondents were from Agricultural Economics and Extension, 21.2% from Agronomy, 17.9% from Soil Science and Land Resources Management, 14.5% from Animal Science and Technology, 10.1 from Fisheries and Aquaculture Technology, 3.9% from Crop Protection, while 3.5%, 2.2%, 2.2% and 2.2% were from Food Science and Technology, Forestry and Wildlife Management, Home Economics and Plant parasitology & applied entomology respectively (Table 2). The percentage of agronomists (21.2%) involved in the project implies that the potential for problem-solving researches on best agronomic practices would be available. Good percentage of agricultural economists and extensionists (22.3%) is an evidence that proper advice on good marketing strategies as well as formulation of acceptable and favourable organic agriculture policies and efficient and prompt dissemination of research findings are guaranteed. Again, the percentage of Soil scientists (17.9%) involved is an indication that issues on soil productivity in organic agriculture production would be adequately addressed through properly articulated researches. Moreover, the number of Departments captured in this survey is evident that though minimal number of researches has been carried out in organic agriculture, it cut across almost all the Departments in the institutions surveyed. The researches into organic agriculture which are very few as indicated in this study agrees with Kutama *et al*. (2013) who asserted that organic agriculture is still very young in many developing countries like Nigeria.

Table 2: Distribution of respondents by Departments

Department/Unit	Respondents (%)
Crop protection	3.9
Agronomy	21.2
Soil Science and Land Resources Management	17.9
Agricultural Economics and Extension	22.3
Animal Science Technology	14.5
Forestry and Wildlife Management	2.2
Fisheries and Aquaculture Technology	10.1
Food Science and Technology	3.5
Home Economics	2.2
Parasitology and applied entomology	2.2

Source: Field Survey, 2017.

(iii) Gender

Result on the gender (sex) of the respondents as shown in Figure 2 indicated that 64% were male and 36% were female implying that more males are involved in agricultural research and innovations than females. This goes ahead to buttress the low rate of women participation in agricultural production and processing probably due to the assumed tedious nature of agricultural practices and women's frequent distractions by domestic and family affairs.

(iv) Educational Qualification

It was observed from this survey that greater percentage (63.6%) of respondents had PhD degrees,

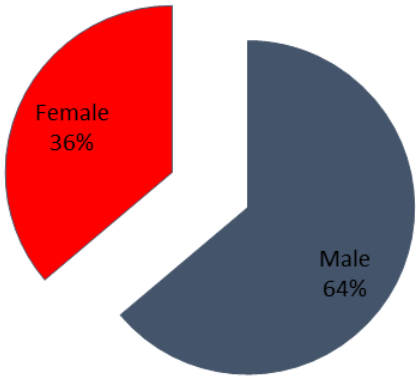

Figure 2: Gender distribution of respondents
Source: Field Survey, 2017.

Masters holders constituted 35.3% while B.Sc./Agric. had 1.1% (Fig. 3). This implies that universities in this zone are properly equipped with research oriented work force with identified potentials of carrying out innovative researches that could promote and enhance organic agriculture practices within the region and the nation at large.

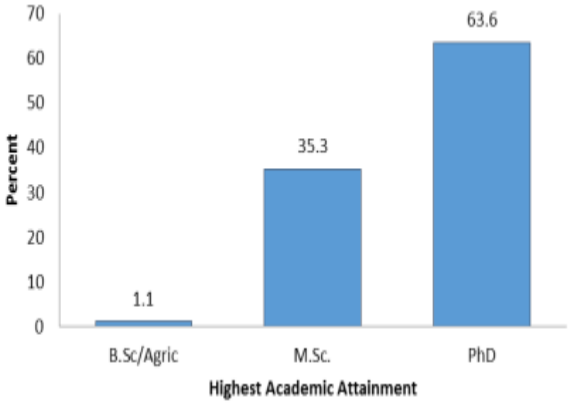

Figure 3: Educational attainment distribution of respondents.
Source: Field Survey, 2017.

(v) Institutions

Percentage distribution of respondents by institution as shown in Fig. 4 is as follows: FUTO, UNIUYO and UNIPORT (20% each), UNIZIK (18.9%), UNIBEN (14.4%) and UNN (6.7%).

(vi) Academic Status/Position

Result of the survey as presented in Table 3 showed that the Percentage of the academic status/position of the respondents were 13.6% for Professors, readers 5.7%, Senior Lecturers 28.4%, Lecturer 119.9%, Lecturer II 14.8% and Assistant Lecturers 17.6%. This indicated that all the Lecturing hierarchy are involved in organic agriculture research in the study area. This is an encouraging development which would eventually move organic agriculture practice forward.

Table 3: Distribution of respondents according to Academic status/Position

Academic status/Position	Percentage of Respondents (%)
Assistant Lecturer	17.6
Lecturer II	14.8
Lecturer I	19.9
Senior Lecturer	28.4
Reader / Associate Professor	5.7
Professor	13.6

Source: Field Survey, 2017.

(vii) Years of Experience

The years of experience of respondents are shown in Figure 5. The result revealed that 63.7% of the respondents had spent 1 - 10 years in research, 26.5% of them had 11 - 20 years' experience, 8.8% had 21 - 30 years' experience and nobody had 31-40 years of experience while only 1.0% had 41 - 50 years' experience. This is an indication that majority of the researchers have many more years to carry out researches which will afford them greater opportunities to be involved in innovative researches in organic agriculture geared towards agricultural development and sustainability.

Organic Agriculture (OA) research areas

Table 4 showed the respective areas of organic research conducted by the respondents. It was observed that 37% of the respondents carried out research on soil fertility management, 22.8% on organic fertilizer formulation, 18.5% on organic animal feed formulation, 17.4% on organic disease management, 16.3% each on organic pesticides and organic storage techniques, 14.1% on organic erosion management technique, 13.0% each on composting technique and organic antibiotics, 12.0% on organic crop processing technique, 10.9% on organic seed production, 9.8% on breeding, 8.7% on organic herbicides and 7.6% on mechanisation.

The observed data indicated that research into organic agriculture components are still very few and minimal. However, with the cream of researchers identified through the respondents' characteristics in this survey,

the area under study is a fertile area to be explored in organic agriculture research. It is however worthy of note that research is the backbone of all developments hence, to facilitate agricultural development, enhance food security, ameliorate climate change effect as well as improve soil fertility and productivity, the available viable potential identified among the respondents need to be properly tapped into.

Publications on organic agriculture research output and technological innovations

Table 5 showed the distribution of respondents' publications on organic agriculture research and technological innovations.

Table 4: Distribution of respondents by OA research areas, n = 90

SN	Areas of research	Frequency (f)	Percent (%)
1.	Soil fertility management	34	37.0
2.	Breeding	9	9.8
3.	Organic disease management	16	17.4
4.	Organic weed management	7	7.6
5.	Organic fertilizer formulation	21	22.8
6.	Mechanisation	7	7.6
7.	Organic storage techniques	15	16.3
8.	Organic erosion management techniques	13	14.1
9.	Organic crop processing techniques	11	12.0
10.	Organic antibiotics	12	13.0
11.	Organic animal feed production	17	18.5
12.	Organic seed production	10	10.9
13.	Organic pesticides	15	16.3
14.	Organic herbicides	8	8.7
15.	Composting techniques	12	13.0

Source: Field Survey, 2017

Data from this study revealed that researchers published greater part of their works in journals (mean [$\bar{x}$] score of 4.49), next to journal publication, is proceedings ($\bar{x}$ = 2.63) while technical report with a mean score of 1.44 ranks the least among the three. Evidently, majority of works on organic agriculture both by the farmers and researchers are yet to be published, this does not encourage or promote organic agriculture practices. There is however a serious worry as to how many farmers have access to journals, proceedings and technical reports. If the research findings are resting on the researcher's shelves and farmers' field experiences are not taken note of, then information dissemination becomes paralysed.

Table 5: Distribution of respondents' publications in organic agriculture research output and technological innovations

SN	Publications	Mean ($\bar{x}$)	Standard deviation
1	Journal	4.48980	28.41654
2.	Proceedings	2.63158	8.34322
3.	Technical Reports	1.44444	1.05327

Source: Field Survey, 2017.

Respondents' Dissemination strategies and Number of Farmers reached

Observed data from the survey (Table 6) indicated that radio with a mean value of 5674.67 ranked highest as a means of communicating research findings to the farmers. This is followed by television ($\bar{x}$ = 275.06), personal contact/demonstration ($\bar{x}$ = 135), seminar and workshop ($\bar{x}$ = 90), internet ($\bar{x}$ = 55.97), handbill ($\bar{x}$ = 25.67), extension agents ($\bar{x}$ = 16.50), journals ($\bar{x}$ = 10), video show ($\bar{x}$ = 7.890), newspaper ($\bar{x}$ = 2.78), and drama ($\bar{x}$ = 1.72). This result showed that the fastest means of disseminating information to the farmers is through radio, since majority of the farmers could afford radios. This agrees with Ajayi (2003) who asserted that the most frequent means of getting information to the farmers was radio, as the poorest of the farmers could afford radio compared to other means of communication. It is, therefore, advised that organic agriculture information be aired on radio in order to carry most organic agriculture farmers and stakeholders along in the practice of organic agriculture.

Again, since most of the organic agriculture findings are either not published or published in journals, proceedings or technical reports, the extension agents lack adequate knowledge on organic agriculture principles, practices and so are limited in technical know-how. This does not encourage and promote organic agriculture practices. Trainings, seminars, workshops and demonstrations (which would enhance one on one contact with the farmers) is highly advocated to ensure that majority of the farmers and organic agriculture stakeholders are reached with

developed, improved and acceptable technologies in Organic Agriculture.

Table 6: Dissemination strategies and number of farmers reached

S/N	Strategies	Mean	Rank
1.	Radio	5674.67	1
2.	Television	275.06	2
3.	Personal contact/Demonstration	135	3
4.	Seminar/workshop	90	4
5.	Internet	55.97	5
6.	Handbills	25.67	6
7.	Extension Agents	16.50	7
8.	Journal	10	8
9.	Video show	7.89	9
10.	Newspaper	2.78	10
11.	Drama	1.72	11

Source: Field survey, 2017.

Constraints in organic agriculture research and dissemination of findings

The constraints associated with research in organic agriculture and the dissemination of the findings is presented in Table 7. Data obtained showed these constraints in order of their seriousness by the respondents are as follows: inadequate fund (74.74%), Poor incentives and government policies (41.05% each), inadequate technical know-how (32.63%), inadequate exposure to organic farming (31.58%), inadequate extension agents (25.26%), intensive labour (23.16%), certification problem (22.11%), unavailability of raw materials (20%), low demand of organic research output by farmers (15.79%), Illiteracy (14.74%), incompatibility of research output to farmers' problems (13.68%), language barrier (12.63%), lack of market for organic products (10.53%) and criticisms of organic agriculture by the public (4.21%).

From the result of the survey, it would be observed that the most prominent and serious setback to research and dissemination of the findings is inadequate fund, as well as poor incentives and government policies. This corroborated with Dikko (2017) who reported that absence of loanable funds for business owners is dissuading many Nigerians from embracing entrepreneurship. This agrees with Redfern (2013) report that African funding of agriculture is inadequate and cannot cushion countries against food insecurity.

Incidentally, research into and dissemination of organic agriculture principles and practices is a prerequisite to agricultural and national development. Little wonder then Lilongwe (2017) asserted that lack of huge investments in research and innovations derail the progress needed for meaningful and valuable development.

Table 7: Constraints in organic agriculture research and dissemination of findings

SN	Constraints	Serious constraint	Mild constraint	Not a constraint
1	Inadequate technical know how	32.63	20.65	13.68
2	Inadequate fund	74.74	4.21	2.11
3.	Labour intensive	23.16	29.47	21.05
4.	Inadequate exposure to organic farming	31.58	29.47	11.58
5.	Unavailability of raw materials	20.00	27.37	25.26
6.	Low demand for organic research outputs by farmers	15.79	28.42	26.32
7.	Criticisms of organic agriculture by public	4.21	23.16	41.05
8.	Low market for organic product	10.53	25.26	31.58
9.	Certification problem	22.11	27.37	15.79
10.	Incompatibility of research outputs to farmers problems	13.68	28.42	27.37
11.	Language barrier	12.63	16.84	38.95
12.	Illiteracy	14.74	30.53	22.11
13.	Inadequate/incapable extension agents	25.26	28.42	12.63
14.	Poor incentives	41.05	25.26	6.32
15.	Government policy	41.05	18.95	8.42

Source: Field survey, 2017

Conclusion and Recommendations

This study showed that there is the availability of adequate, vibrant, consistent, viable, enthusiastic, articulate and capable potential workforce who would carry out articulated and innovative research in organic agriculture which would promote and sustain organic agriculture practices since majority of the researchers in South Eastern Nigeria (South South/South East) are within the age range of 46-55 years.

Respondents constitute more of Agricultural Economists and Extensionists, Agronomists and Soil

Scientists and so would enhance the formulation of favourable and efficient organic agriculture policies, efficient and prompt dissemination of research findings to consumers and adequate maintenance of soil productivity in course of organic agriculture practices. Very low and few Organic Agriculture research in the study area compared to conventional agriculture is probably due to inadequate awareness. It is advocated that developments and information on organic agriculture should be aired more over the radio among other means of communication since majority of the information are disseminated through radio.

All hands must be on deck through the provision of adequate fund, improvement in incentives and government policies as well as appropriate handling of other constraints. These will ensure that organic agriculture is moved forward bearing in mind the merits of organic agriculture to animals and human health, sustenance of ecosystem and soil productivity through articulated research. Furthermore, this will enhance prompt and efficient dissemination of these findings to the stakeholders (by mobilizing extension workers), thereby achieving food security, leading to national growth and development.

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