

## Catfish Farmers Perception of Training Effectiveness of the University of Nigeria-West Africa Agricultural Productivity Programme

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### Abstract

*The study assessed farmers' perception of the effectiveness of University of Nigeria Nsukka-West Africa Agricultural Productivity Programme (UNN-WAAPP) training on catfish production around the University of Nigeria catchment area in Enugu State. Purposive sampling technique was used to select 42 respondents across four town communities that benefited from the project in Nsukka agricultural zone, while structured interview schedule was used to elicit information from the respondents. Results of the study revealed that although the majority of the respondents indicated they received training on feeding (100%), pond fertilization (90.5%) pond water treatment (88.1%), and only 19.0% received training on feed formulation, which is a key area in catfish production. The farmers were satisfied with training on feeding ( $\bar{x} = 1.83$ ), pond water management ( $\bar{x} = 1.55$ ) and pond maintenance ( $\bar{x} = 1.33$ ). However, the farmers were not satisfied with the training on preservation ( $\bar{x} = 0.95$ ), pond construction ( $\bar{x} = 0.86$ ) and feed formulation ( $\bar{x} = 0.17$ ). The respondents indicated that training was effective in terms of the communication methods used by the trainers ( $\bar{x} = 1.83$ ), clarity in asking and answering questions ( $\bar{x} = 1.74$ ) and use of relevant examples to illustrate training activities ( $\bar{x} = 1.71$ ). In order to enhance the entrepreneurial skills of farmers involved in catfish production, there is need for additional training in key areas of catfish production such as feed formulation and pond construction in order to achieve the aim of the project which is focused on improving the wealth status of participating communities.*

**Keywords:** catfish production, entrepreneurial skills, training on catfish, West Africa Agricultural Productivity Programme.

## **Introduction**

The various governments in Nigeria have been pursuing programmes/projects at the federal, state and local levels to boost mass production of livestock so as to ensure the attainment of the food and agriculture organization's mandate of consuming 35g of protein per caput per day. The projects that have been initiated to achieve this are; Agricultural Development Programme (ADP), National Animal Production Research Institute (NAPRI), Farm Settlement Scheme, Micro Scheme for Livestock Production (Ojo & Afolabi, 2000) and the West Africa Agricultural Productivity Programme (WAAPP), among others.

The West African Agricultural Productivity Programme (WAAPP) was established by the Agricultural Research Council of Nigeria under the auspices of the Federal Ministry of Agriculture and World Bank to create impact for increased agricultural productivity around communities 20km from the university using the strategy of the adopted village concept. The objectives of the project were to; increase the income of farmers by improving their skills in agricultural production, improve their food security and help them to be self-sufficient in their agricultural production activities (WAAPP-Nigeria, 2013). The project has four components which are; cassava sticks multiplication, shika bird production, catfish fingerlings multiplication and dissemination of these technologies.

The University of Nigeria, Nsukka (UNN) is one of the thirteen universities in the country that participated in implementing the project. The university carried out some sub-projects like cassava multiplication, improved maize distribution to farmers and catfish production technology dissemination. The Okpuje, Imilike, Obimo and Obukpa communities the University were selected as beneficiaries and farmers were trained on the different stages of catfish technologies ranging from the point of pond preparation to point of sale of the mature catfish, processing and storage of fish products.

Okwu & Ejembi (2005) refer to farmers' training as an intensive learning activity for a group of selected farmers, assisted by competent trainers to understand and practice the skills required in the adoption of technology at a place where appropriate facilities exist and at a time and duration considered suitable by farmers. Training has immense potential in the transfer and utilization of latest technical know-how, leadership development, organization of people, formation of self-help-groups, mobilization of people as well as resources, empowerment of resource-poor rural mass, entrepreneurship development, etc. Training programmes in agriculture is aimed at developing farmers so as to make them better entrepreneurs and decision makers (Famuyiwa, Adesoji & Lawal, 2012). The need for training subsumes a deficit situation in the knowledge and skill level of the practicing farmers as well as the availability of appropriate applicable information, the utilization of which will correct the problem situation. Farmers' training is conducted with the view to changing their behaviour/improving performance through the acquisition of increased knowledge, improved skills and positive changes in attitude and aspirations (Osei, Bakang &

Nimoh, 2013). One important area where farmers need training is on catfish production.

Catfish is an important source of omega 3-fatty acids for brain and heart health as well as a good source of protein. Like other food from animal sources, catfish provides a high quality or complete protein that contains all the necessary amino acid building blocks to build and replace protein in the body. It is more sizeable and shows an advantage of survival over other fish (Sikiru, Omobolanle, Ayorinde & Adegoke, 2009). Thus, catfish production is an appropriate system to feed the fast growing population and also plays an important role in household food security especially amongst the rural populace of developing countries where many people are suffering from malnutrition due to inadequate protein in their diet (FAO, 2004). Due to these features, it is important and necessary to invest in catfish production and efforts have been made by farmers, NGO's and the government to do so.

According to Ajieh (2004), catfish production has certain complexities that requires adequate sophistication such as the provision of young fish to stock ponds, pond fertilization and food provision. For the desired result to be achieved, Aphunu & Ajayi (2010) note that farmers need to be competent in the knowledge, skills and techniques involved in the efficient management of cat fish in order to maximize production. Farmers' competency in this regard depends on the effectiveness of the training they received. An effective training on catfish production shall impact new knowledge, teach better skills and bring about a more effective performance in farmer's productivity (Aphunu & Ajayi, 2010)

However, Uguru (2001) notes that farmers training are most times not efficient due to lack of technical knowhow on the part of farmers, and even when there is technical knowhow, there might not be adequate funding and the right equipment for subsequent production. Information creation gadgets are often times not available and this will ultimately affect the timely, accurate and effective training and information dissemination to the farmers (Oladeji, 2011). Also, most farmers depend on information or knowledge gotten from interpersonal sources such as friends or feed sellers possibly because the training received may not be based on their felt needs.

Furthermore, Iwuchukwu, Udoeye & Onwubuya (2013) observe that it is counter-productive to offer training to individuals who do not need it or to offer the wrong kind of training to farmers. Hence, this research tends to ascertain the farmers' perception on the effectiveness of UNN-WAAPP training catfish production by providing answers to the following questions: how effective was the training conducted? how satisfied were the farmers with the training conducted? and what are the identified training needs of the farmers on catfish production?

Specifically, the study sought to: identify areas of farmers' participation in training on catfish production technologies; ascertain the respondents level of satisfaction on the training conducted; ascertain the effectiveness of the training in terms of the level of knowledge of the farmers on catfish production; assess the respondents' perceived effectiveness of the training programme as regards trainers' performance,

organization and administration; and identify the training needs of the farmers on catfish production.

## **Methodology**

The study was carried out in Nsukka agricultural zone of Enugu State. It lies between latitude 5°22'N and longitude 7°24'E. It has a temperature range between 20°C with two prominent climatic seasons in the area which are dry season (November-February) and rainy season (March-October). Nsukka agricultural zone has an area of 1,810km<sup>2</sup> and a population of 309,633 at the 2006 census (National Population Commission, NPC, 2006). The total annual rainfall is about 1580mm per annum with vegetation usually drought resistance. Some patches of relief forest lie mainly on the hilltops or valley sides and an evidence that this area was once a fairly dense forest area (Oformata, 1980). Most of the rural people in Nsukka agricultural zone are farmers and they cultivate crops such as groundnut, rice, cassava, yam and vegetables. Other farming activities include honey production, sheep and goat rearing.

All participants of the UNN-WAAPP catfish project constituted the population for the study. Multistage sampling procedure was employed in selecting respondents for the study. In the first stage, Nsukka agricultural zone was purposively selected out of the six agricultural zones in the state because of the execution of the project in that zone. In the second stage, four (4) town communities (Obukpa, Imilike, Okpuje, and Obimo) where UNN-WAAPP catfish production training was conducted were purposively selected. In the third stage, snowball sampling technique was used in selecting forty-two UNN-WAAPP catfish production trainees from across the four town communities.

To identify the respondent's areas of participation in training on catfish production technologies, they were requested to provide and also indicate from the list provided the areas of training they participated such as pond construction, liming, water treatment, pond fertilization, pond maintenance, stocking density etc. To assess farmer's level of satisfaction on the training conducted, they were asked to indicate their level of satisfaction on areas of training received such as pond construction, water treatment, pond fertilization, feed formulation, etc. on a three-point Likert-type scale with response options; highly satisfied = 2, satisfied = 1 and not satisfied = 0. The cut-off mean was one. Responses with mean values greater than or equal to one indicated satisfaction with the training received, while responses with mean values less than one indicated unsatisfied training received. The effectiveness of the training received by the farmers in terms of their level of knowledge on catfish production was measured by asking the respondents to tick "yes or no" against a list of twelve positive and negative knowledge questions. Correct responses were assigned a value of one, while incorrect responses were assigned zero. The total knowledge score for correct responses is twelve. The level of knowledge of the farmers was further categorized as; high (9 – 12), moderate (5 – 8), low (1 – 4) and no knowledge (0).

Objective three sought to assess the respondents' perceived effectiveness of the training programme as regards trainers' performance, organization and

administration. This was achieved by measuring their responses on a three point Likert-type scale with options 'very effective = 2, effective = 1 and not effective = 0. The cut off mean was one. Responses with mean values greater than or equal to one were regarded as perceived effective training programme, while responses with mean values less than one were regarded as perceived ineffective training programme in terms of the performance, organization and administration of the trainers. To identify the training needs of farmers on catfish production, a three point Likert-type scale with response option very important = 2, important = 1 and not important = 0, was used. The cut off mean was one. Responses with mean values greater than or equal to one were regarded as important training needs, while responses with mean values less than one were regarded as unimportant training needs. Data for the study was analysed using percentage, frequency and mean score.

## **Results and Discussion**

### **Areas of Respondents' Training on Catfish Production Technologies**

Table 1 shows that all (100%) the respondents received training on feeding of catfish, and 90.5% on pond fertilization. Also, the majority of the respondents received training on harvesting (85.7%), processing (76.2%), marketing (73.8%), stocking density (73.8%) and preservation (71.0%) of catfish. Furthermore, a greater proportion (64.3%) of the respondents received training on record keeping, 59.5% on liming of pond, 45.2% on pond construction and 19.0% on feed formulation. This indicates that a good proportion of the respondents participated in different areas of the training programme on effective catfish production practices. Training on feeding is important as feeding is one of the factors that increases the productivity of the pond and speed up the growth of the fish by providing them with supplemental feed and this is one way of intensifying cat fish production system. It is also encouraging to note that a great percent of the respondents participated in training on pond fertilization as it is the most critical factor for the successful nursing of African catfish larvae. This makes zooplankton readily available during the first week after stocking, as they feed only on live food during this period (de Graaf & Janssen, 1995).

Furthermore, training on harvesting and marketing is important because the frequency of harvests and the quantities and returns realized are key indicators of the economic viability of any aquaculture enterprise. Crammer, Jensen & Southgate (2001) allude to the fact that marketing is an integral aspect of fish production since it is only when the fish gets to the final destination (consumers) that production can be complete. Hence, it is important for the farmers to be trained on effective skills needed in carefully handling, cleaning, processing and packaging in order to market their cat fish products successfully. However, it was not encouraging to note that only few farmers participated in training on feed formulation as it is an alternative to buying feed which is costly as a result of different import taxes imposed on either finished product or raw material for feed production in Nigeria (Anetekhai, 2013). This could result to reduced income if they venture into catfish production.



**Table 1: Distribution of respondents based on areas of training on catfish production technologies**

<b>Training conducted</b>	<b>Percentage</b>
Pond construction	45.2
Liming pond water treatment	59.5
Pond water treatment	88.1
Pond fertilization	90.5
Pond maintenance	83.3
Stocking density	73.8
Feeding	100.0
Feed formulation	19.0
Drug administration	92.9
Harvesting	85.7
Fish processing	76.2
Marketing	73.8
Preservation	71.4
Record keeping	64.3

### **Respondents' Level of Satisfaction on the Training Conducted**

Farmers were satisfied in the following areas of training: feeding ( $\bar{x} = 1.83$ ), pond water management ( $\bar{x} = 1.55$ ), pond maintenance ( $\bar{x} = 1.33$ ), drug administration ( $\bar{x} = 1.31$ ), harvesting ( $\bar{x} = 1.26$ ), pond fertilization ( $\bar{x} = 1.21$ ), marketing ( $\bar{x} = 1.05$ ), record keeping ( $\bar{x} = 1.02$ ) and liming ( $\bar{x} = 1.02$ ) (Table 2). However, the farmers were not satisfied with the training received on preservation ( $\bar{x} = 0.95$ ), pond construction ( $\bar{x} = 0.86$ ) and feed formulation ( $\bar{x} = 0.17$ ). This shows that farmers were satisfied with the training received on feeding, pond management, drug administration etc. probably because these might be the major and most effective areas being handled by the trainers. However, farmers not being satisfied with the training conducted on preservation, pond construction and feed formulation might be because of the communication method used by the trainers. Communication is a major component of agricultural extension and extension agents utilize various methods to deliver messages to their clientele. According to Jones, Goheen, Dhuyvetter & Kastens, *et.al.* (2007) and Jones, Diekmann & Batte (2010), the use of different methods in extension information delivery maximizes program efficiency, effectiveness and client satisfaction. In addition, Faramarzi & Langerodi (2013) assert that the use of (different) communication channels has positive and significant relationship with farmers' attitude towards extension service.

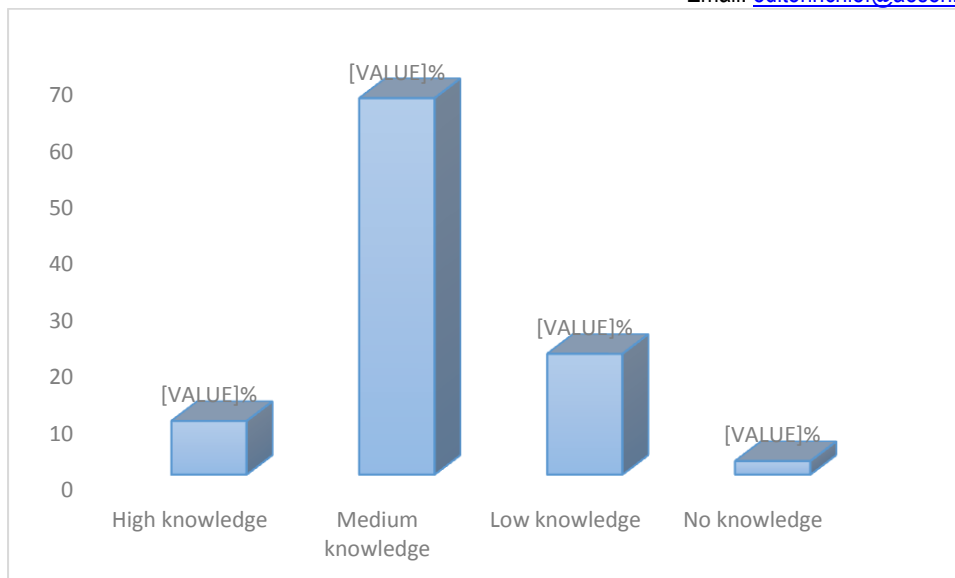
**Table 2: Mean distribution of respondents' based on level of satisfaction with the training conducted**

<b>Trainings conducted</b>	<b>Mean</b>	<b>Standard deviation</b>
Pond construction	0.86	0.843
Pond water treatment	1.55*	0.705
Feed formulation	0.17	0.377
Drug administration	1.31*	0.680
Fish processing	1.05*	0.825
Pond fertilization	1.21*	0.750
Stocking density	1.00*	0.765
Preservation	0.95	0.825
Marketing	1.05*	0.795
Record keeping	1.02*	0.811
Pond maintenance	1.33*	0.721
Harvesting	1.26*	0.798
Feeding	1.83*	0.377
Liming	1.02*	0.950

*\*satisfaction with training conducted*

### **Effectiveness of the Training in Terms of Farmers' Knowledge on Catfish Production**

Figure 1 indicates that the majority (66.7%) of the respondents had medium knowledge on catfish production, while 21.4%, 9.5% and 2.4% of them had low knowledge, high knowledge and no knowledge on catfish production, respectively. This implies that the farmers have moderate knowledge on catfish production and this could have some negative implications as they may not have adequate knowledge needed for a profitable catfish production. Sjoberg (2000) also assert that the level of people's familiarity with an activity defines their tolerance or averseness of risk associated with the activity. In other words, the higher the level of familiarity with an activity, the higher the level of risk tolerance exhibited.



**Figure 1: Knowledge level of farmers on catfish production**

### **Perceived Effectiveness of Trainers' Performance, Organization and Administration**

Table 3 reveals that farmers rated the trainers' performance as effective; organization and administration: communication methods used by the trainer ( $\bar{x} = 1.83$ ); use of relevant examples to illustrate training ( $\bar{x} = 1.71$ ); asking and answering questions clearly ( $\bar{x} = 1.74$ ); effective style of presentation ( $\bar{x} = 1.38$ ); flexible and allowed respect for training ( $\bar{x} = 1.95$ ); displayed good abilities, self-confidence and knowledgeable ( $\bar{x} = 1.81$ ); gave clear instructions ( $\bar{x} = 1.60$ ); training environment was adequate ( $\bar{x} = 1.60$ ); useful information were provided ( $\bar{x} = 1.31$ ); training objectives were met ( $\bar{x} = 1.02$ ); and content of training was fully relevant to farmers problems. However, the farmers indicated that the training programme was not effective in the following areas: allowed enough time to practice ( $\bar{x} = 0.88$ ); materials and equipment used ( $\bar{x} = 0.45$ ); and adequate training duration and time ( $\bar{x} = 0.86$ ). According to Issahaku (2014), the effectiveness of an extension organization is determined by the ability of extension agents to design, deliver, and evaluate effective educational programs, because they are directly serving the needs of the people. Competencies of staff lead to effectiveness which is a product of an organization's ability to attain and efficiently use existing resources, (particularly human resources) to achieve its goals (Issahaku, 2014). An effective extension service is therefore an essential factor for the accelerated development of agriculture in developing economies (Oyebanji, 1994). This clearly calls for some high level competencies which the extension worker must possess. Hurd & McLean (2004) found that the absence of competencies limits the effectiveness of the individual and the organisation as a whole.



**Table 3: Mean distribution of respondents' perceived effectiveness of trainers' performance, organization and administration**

Trainers' performance, organization and administration	Mean	Std. Deviation
Communication method used by trainer was adequate	1.83*	0.377
Used relevant examples to illustrate training	1.71*	0.457
Answered questions clearly and asked questions	1.74*	0.445
Allowed enough time to practice	0.88	0.861
Had effective style of presentation	1.38*	0.492
Was flexible and allowed respect for training	1.95*	0.216
Displayed good abilities, self-confidence and knowledgeable	1.81*	0.397
Gave clear instructions	1.60*	0.497
Training environments were adequate	1.60*	0.497
Material and equipment were adequate	0.45	0.739
Useful information were provided	1.31*	0.517
Training duration and time were adequate	0.86	0.783
Training objective were met	1.02*	0.749
Content of training was fully relevant to farmers problem	1.50*	0.595

**\*Perceived effective training**

### Training Needs of Farmers on Catfish Production

Table 4 shows that the following as important training needs:

**Preparation of pond:** Farmers indicated that they needed training on liming of ponds and fertilizer management ( $\bar{x} = 1.00$ ) and irrigation and drainage management ( $\bar{x} = 1.00$ ). The training on liming and fertilizer management is necessary as they help in the proper growth and productivity of catfish. Organic fertilizers (manures and composts) use result in the fastest development of zooplankton in ponds. Similarly, periodic draining and drying of ponds is a necessary practice as it helps in harvesting fish, eradicating predators, improving the bottom condition of the ponds, and raising production rates (Ngugi, Bowman & Omolo, 2007).

**Selection of quality seed, species and their stocking density:** Farmers also indicated training on the selection of disease free specie or disease resistant fish species ( $\bar{x} = 1.83$ ) as an important training need. This is important to them because it may save cost and increase their income when they embark on catfish production. Ibrahim, Shamaki, Sanda & Lawal, et al., (2013) assert that the cultivation and growth of disease free specie of freshwater fish could limit losses by farmers, improve income earnings and raise fish farmer's socioeconomic standards. It could also help to close the demand–supply gap that exists nationally, and costs Nigeria about US \$0.5billion per year (Kudi, Bako & Atala, 2008).

**Water quality management:** Measurement of optimum level of water temperature ( $\bar{x} = 1.57$ ) was identified by the farmers as an important training need. Good water quality and lower stocking densities appear to be the best defense against all diseases (Adewumi, 2015).

**Insect and disease control:** Identification of disease ( $\bar{x} = 1.60$ ), ways of disease control ( $\bar{x} = 1.57$ ), ways of using insecticide/pesticide and aqua drugs ( $\bar{x} = 1.45$ ) and preventive measure of disease ( $\bar{x} = 1.31$ ) were areas identified by the farmers as important training needs on catfish production. Training on insect and disease control is necessary as diseases of catfish usually result from exposure to excessive stress in the environment, which lowers their resistance to disease organisms. Ngugi *et. al.* (2007) point out that common sources of stress for fish include: poor nutrition, poor sanitation and environmental conditions, overcrowding in ponds, rough handling of fish by farm workers and presence of disease vectors and intermediate hosts. Similarly, predator control is important as they can cause significant loss of fish if preventive measures are not taking. Regular monitoring of fish pond will help identify potential problems early and prevent the development of full-scale disease or parasite problems. Training provided on preventing such problems will help farmers to more likely have a large crop of healthy fishes at harvest time.

**Table 4: Mean distribution of respondents based on training needs on catfish production**

<b>Training needs</b>	<b>Mean</b>	<b>Standard deviation</b>
<b>Preparation of pond</b>		
Weed management	0.07	0.346
Lime and fertilizer management	1.00*	0.733
Irrigation and drainage management	1.00*	0.855
<b>Selection of quality seed, species and their stocking density</b>		
Selection of disease free fry species	1.83*	0.490
Stocking density of fish species	0.86	0.647
<b>Water quality management</b>		
Measurement of optimum level of water temperature	1.57*	0.668
Ways of water exchange	0.05	0.216
<b>Feed and fertilizer management</b>		
Ways of feed application	0.00	0.000
Proper time of feed application	0.02	0.154
Doses of fertilizer application	0.74	0.701
<b>Insects and diseases control</b>		
Identification of diseases	1.60*	0.665
Preventive measures of disease	1.31*	0.869
Ways of diseases control	1.57*	0.737
Ways of using insecticides/pesticides and aqua drugs	1.45*	0.739
<b>Harvesting, fish preservation and marketing of product</b>		
Time of harvesting	0.17	0.377
Method of harvesting	0.21	0.470
Techniques of preservation	0.74	0.627
Ways of marketing	0.40	0.767

**\*Important training needs**

## **Conclusion and Recommendations**

A great proportion of respondents participated in different areas of the training programme on effective catfish production practices. They were satisfied with the training received in various areas of catfish production, there were some areas of the training where they expressed dissatisfaction. The respondents also had a fairly good perception of the effectiveness of the UNN-WAAP training programme in knowledge acquired, trainers' performance, organization and administration. Even

though the respondents rated most areas effective, they noted that some areas of the training conducted, especially regarding the training time and duration, was not effective.

There is need to review the duration and times of training to enable farmers utilize the knowledge and skills gained at the appropriate time. To enhance the entrepreneurial skills of farmers involved in catfish production, there is need for additional training in key areas of catfish production such as feed formulation and pond construction in order to achieve the aim of the project which is focused on improving the wealth status of participating communities.

## Reference

- Adewumi, A.A. (2015) Aquaculture in Nigeria: Sustainability issues and challenges. *Direct Resource Journal of Agriculture and Food Science*, 3(12). Retrieved online at: [http://directresearchpublisher.org/journal/driafs\\_on\\_23/2/2016](http://directresearchpublisher.org/journal/driafs_on_23/2/2016)
- Anetekhai, M.A. (2013). Catfish aquaculture industry assessment in Nigeria. African Union – Inter African Bureau for Animal Resources.
- Crammer, G.L., C.W. Jensen & D.D. Southgate (2001). *Agricultural Economics and Agribusiness* (Eight Edition). New York, U.S.A: John Wiley and Sons, Inc.
- De Graaf, G. & Janssen, J. (1996). Artificial reproduction and pond rearing of the African catfish *Clarias gariepinus* in sub-Saharan Africa – A handbook. *FAO Fisheries Technical Paper, No. 362*. Rome, FAO, p. 73. Retrieved online: <ftp://ftp.fao.org/docrep/fao/003/w3595e/w3595e00.pdf>
- Faramarzi, N. & Langerodi, M. C. (2013). Investigating farmers' attitude regarding advisory services of agricultural technical and engineering in Sari township. *International Journal of Agriculture and Crop Science*, 5(23): 2878-2884.
- Food and Agricultural Organization, FAO (2004). Report of the FAO-World Fish Center workshop on small-scale aquaculture in sub-Saharan Africa: Revisiting the aquaculture target group paradigm, In: J. Moehl, M. Halwart & R.E. Brummett, (eds.), *CIFA Occasional Paper 25*. Rome, Italy: FAO.
- Hurd, A. R. & McLean, D. D., (2004). Agricultural information access by small holder tea farmers in Bureti District, Kenya. *Asian Journal of Agricultural Sciences*, 5(5): 102-107
- Ibrahim, U.I., Shamaki, B.U., Sanda, K.A., Lawal, J.R. Saidu, A.M., Majama, Y.B. & Gambo, B.G. (2013). Socio-economic variables affecting aquaculture production practices in Borgu LGA, Niger State, Nigerian. *Journal of Agriculture and Social Research*, 7(2): 20 - 29.
- Issahaku, A. (2014). Perceived competencies of agriculture extension workers in extension services delivery in northern region of Ghana: Perspectives from literature. *Developing Country Studies*, 4 (15), 107.
- Iwuchukwu, J.C., Udoye, C.E. & Onwubuya, E.A. (2013). Training needs of pineapple farmers in Enugu State, Nigeria. *Journal of Agricultural Extension*, 13 (1), 89 – 99. Available online: <http://dx.doi.org/10.4314/jae.v17i1.9>
- Jones, R., Goheen, A., Dhuyvetter, K., Kastens, T. & Amanor, Boadu, V. (2007). Using distance education in extension programming. *Journal of Agriculture and Applied Economics*, 39(2): 265-274.

- Jones, L. E., Diekmann, F. & Batte, M. T. (2010). Staying in touch through extension: An analysis of farmers' use of alternative extension information products. *Journal of Agriculture and Applied Economics*, 42(2): 229-246.
- Kudi, T. M., Bako F. P. & Atala, T. K. (2008). Economics of fish production in Kaduna State. *Journal of Agricultural and Biological Science*. 3(5-6): 17-21.
- National Population Commission, NPC (2006). *Human population figures of census in Nigeria*. Available online: <http://www.africamasterweb>.
- Ngugi, C.C., Bowman, R.J., & Omolo, B.O. (2007). A new guide to fish farming in Kenya. Aquaculture Collaborative Research Support Programme.
- Oformato, G.E.K. (1980). Perspectives on environmental deterioration in Nigeria. *The Tropical Environment*, 1: 6 – 19.
- Ojo, S. O. & Afolabi, J. A. (2000). Economic analysis of replacing the fish meal component of broiler starter mash with *Gliricidia sepium*. In: Ukachuckwu, S. N. (ed.), *Animal production in the new millennium, challenges and options*. Book of Proceedings.
- Osei, C.K., Bakang, J.A & Nimoh F. (2013). Accounting for training effectiveness: The case of MIDIA training in enterprise and commercial agriculture on behaviour and practices of rice farmer-based organizations. *Asian Journal of Agriculture and Rural Development*, 3 (5): 311 – 320.
- Oyebanji, O. O. (1994). The development of agricultural extension in Nigeria. In: Judit N. Wolf (ed.). *Agricultural extension in Africa*. Proceedings of an International Workshop held in Yaounde, Cameroon, Volume II, January, 1994. Wageningen, The Netherland: Technical Centre for Agricultural and Rural Cooperation (CTA).
- Sikiru, B.O., Omobolanle, N.M., Ayorinde, B.J.O. & Adegoke, O.O. (2009). *Improving Clarias productivity towards achieving food security in Ijebu-Ode, Ogun state, Nigeria* (Ph. D thesis). Michael Okpara University of Agriculture, Umudike, Umuahia.
- Sjoberg, L. (2000). Factors in risk perception. *Risk Analysis*. DOI: 10.1111/0272-4332.00001. Retrieved from: <http://onlinelibrary.wiley.com/doi/10.1111/0272-4332.00001/abstract>
- WAAPP-NIGERIA (2013a). A Bulletin of the West Africa Agricultural Productivity Programme in Nigeria (April Edition), pp 3-5.