Gender Involvement in Fadama Farming activities in Ogun State Nigeria

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ABSTRACT

The study examined gender involvement in fadama farming activities in Ogun State. A multi-stage sampling method was used in selecting districts, villages and farmers. An interview guide was used to elicit information from 240 fadama farmers and stratified into 102 male and 138 female farmers. The results of the findings showed that a large proportion of sampled male and female farmers were between 31-50 years of age. Majority of the farmers both male and female (82.35%) and (71.74%) respectively were married. About 75% of the male farmers had completed one form of formal schooling while (45.00%) of the female farmers had one form of formal schooling. The findings revealed that (57.84%) of the male had between 4-6 years of farming experience while about (43.48%) of the female had 1-3 years of farming experience. Findings revealed that both male and female farmers cultivated Corchorus olitorus (ewedu) (87.50%). Amaranthus spp (tete) (87.50%) and pepper (88.75%). Results also indicated that male farmers engaged in fadama activities such as land clearing (90.19%; ± = 2.84), bed preparation (81.37%; ± = 2.84) and weeding (19.17%; ± = 2.88). On the other hand female farmers engaged in fadama activities such as harvesting (93.47%; ± = 2.89), storage (94.20%; ± = 2.90) and marketing (98.55%; ± = 2.99). However lack of credit facilities (84.16%) ranked highest as the major constraint to fadama farming. T-test analysis revealed that there was a significant difference between male and female farmers involvement in fadama farming activities (t = 4.25; P = 0.02) that is female farmers engaged in fadama farming than the male farmers. The study recommended that male farmers should be motivated and encouraged to engage more in fadama farming. Also female farmers should be given opportunity to have access to and control over land for cultivation in order to increase their farm size and enhance productivity.

Keywords: Fadama, Gender, Involvement, Farming activities

INTRODUCTION

Fadama may be defined as flood plains or swamps which are terrestrially flat area of land within a river, lake, valley or ocean channel which are elevated above the level of the main river, or ocean channel (Adeniyi, 1995 and Michael, 1990). It possess rich alluvial soil useful in farming as a result of river over flowing their bank during raining season (Ita *et al.*, 1996). The water reserves are extensively used for dry season crop production by irrigation and residual soil moisture (Rizvi, 1993).

Livestock and fish also derived substantial benefit from fadama. During the wet season, rain fed annual grasses provide food for the very large population of livestock that characterized the region.

Presently a programme tagged Fadama II is going on in Ogun State Agricultural Development Programme (OGADEP) and in some other seventeen (17) States in Nigeria. The programme is to alleviate poverty among beneficiaries in the participating states and also to empower the community especially women associations to play the role of primary decision maker and to encourage gender involvement in fadama farming (Adesokan, 2000; Sangari, 1996).

Gender is a concept used in social science analysis to look at the role and activities of men and women. Generally rural women 36.4% by population constitutes over 70% labour force to agricultural production (Agboola, 2001). It is believed that women tend to concentrate their agricultural activities around homestead because of their domestic and reproductive role in the household and society (Adesina, 2003). Fadama farming provides a better means of providing profit for both men and women farmers as a result of the high prices crops command during dry seasons. Sustainable food security calls for both men and women involvement in fadama production (FAO 1999). Major crop cultivated in fadama by men and women include leafy vegetables such as *Cochorus spp* (ewedu), *Celosia spp* (soko), *Amaranthus spp* (tete), Gabbage, lettuce, Telfaria and fruit vegetables such as tomato, pepper cucumber, water melon; grain and cereals such as rice, maize and millet.

In other to achieve food security round the year there is the need to motivate men and women to involve in fadama farming thereby increasing agricultural growth and production. The important role of men and women cannot be overlooked in fadama farming since vegetables and cereals are most of the crop grown in fadama therefore, men are more involved in clearing, logging and cultivation while women are involved in planting and marketing. Based on this background the study have the following objectives:

1. describe the demographic characteristics of the fadama male and female farmers.
2. identify the types of crops grown by men and women in fadama farming.
3. examine the level of involvement by men and women in fadama farming.
4. identify the constraints faced by men and women in fadama farming.
5. determine the significance difference in fadama farming between men and women in the study area.

METHODOLOGY

The study area is Obafemi Owode Local Government area of Ogun State. The choice of this area is based on the fact that is one of the six zones of large scale production of fadama produce (OGADEP, 2003). The local government has a land area of about 194,737.07m^2 and a population of 207,998 projected from 1991 census figure (NPC, 1991).

Sampling Procedure and Sample Size

Multi stage sampling technique was used to select the sample size. The first stage was the selection of four districts out of six. Second stage involved selection of three villages from each district. The third stage involved random selection of twenty farmers from each of the selected villages. A total of 240 respondents stratified into 102 males and 138 female farmers were selected and the sample was stratified randomly to ensure gender representatives sample of the fadama farmers. An interview guide was designed to obtain information on the farmers personal characteristics and non demographic characteristics.

Measurement of Variables

The important variables measured were

a. Involvement of men and women in fadama farming activities. Fourteen fadama farming activities identified were measured on the basis of 3 point scale ranging from Always involved = 3, occasionally involved = 2 points and not involved = 1 point. The total scores of respondents for the number of fadama activities were expressed with maximum of 42 and minimum of 14 points. The mean was set at 2.00. Therefore any fadama activities that has 2.00 and above were considered high involvement and any activities that has below 2.00 were low involvement.

b. Constraints to gender involvement in fadama farming. The respondents were asked to indicate as many constraints as they experienced in fadama farming and rank them as 1 = Most serious constraint, 2 = second serious constraint, 3 = third serious constraint.

Data Analysis

Frequencies and percentages and mean scores were employed in data analysis. T-test was used to test the significant difference between men and women in fadama farming activities.

RESULTS AND DISCUSSION

Respondents personal characteristics

TABLE 1: Distribution of respondents on personal characteristics

Variables	Categories	Male	Mean	Female	Mean	Total
Age	<30	14(13.73)		23(116.67)		37(15.42)
	31-40	56(54.90)		72(52.17)		128(53.33)
	41-50	22(21.57)	43.10	35(25.36)	40.03	57(23.75)
	51-60	8(7.84)	years	5(3.63)	years	13(54.42)
	above 61	2(1.96)		3(2.17)		5(2.08)
Marital	Single	15(14.71)		3(2.74)		18(7.50)
status	Married	84(82.35)		19(71.74)		183(76.25)
	Widowed	2(1.90)		27(19.57)		29(12.08)
	Divorced	1(0.98)		9(6.52)		10(4.17)
Educational	No formal	26(25.49)		77(55.80)		103)42.02)
level	Adult literacy	3(2.94)		5(3.63)		8(3.33)
	Primary	51(50.00)		42(30.43)		93(38.75)
	Education	18(17.65)		13(0.42)		31(12.92)
	Secondary	4(3.92)		1(0.72)		5(2.08)
	education					
	Tertiary					
	education					
Religion	Christianity	67(65.69)		69(50.00)		136(56.67)
	Islam	33(32.35)		63(45.65)		96(40.00)
	Traditional	2(1.96)		6(4.35)		8(3.33)
Household	1-4	43(42.16)		84(60.87)		127(52.92)
size	5-8	51(50.00)		50(36.23)		101(42.08)
	9-12	5(4.90)	7.37	2(1.46)	4.35	7(2.92)
	13-16	2(1.96)	people	1(0.72)	people	3(1.25)
	above 17	1(0.98)		1(0.72)		2(0.83)
Farm size	>1	7(6.86)		71(51.45)		78(32.50)
	1-2	50(50.98)	2.4	59(42.75)	1.1	111(46.25)
	3-4	41(40.10)	hectares	7(5.08)	hectare	48(20.00)
	above 5	2(1.96)		1(0.72)		3(1.25)
Farming	1-3	36(35.30)		60(43.48)		96(40.00)
experience	4-6	59(57.84)		40(34.78)		107(44.58)
	7-9	4(3.92)	4.7 years	19(13.77)	3.82	23(9.58)
	above 10	3(2.94)		11(7.97)	years	14(5.84)

Table 1 revealed that a large proportion of sampled male and female (76.47%) and (77.53%) respectively were between 31-50 years. The mean age of male and female farmers were 43.10 and 40.03 years respectively. This finding was in conformity with report of Akinsanya, (2003) which states that most male and female farmers in Nigeria are between 40-45 years. Majority of the farmers both male and female (82.35%) and (71.74%) were marked. About 75% of the male farmers had completed one form of formal schooling while about (45%) of the female farmers had one form of formal schooling. Over half of the respondents both male and female were Christian. The household sizes mean for male and female farmers were 7.32 people and 4.35 people. The household sizes in the sampled area were generally medium size. Majority of the male respondents (90%) had farm size 2-4 hectares while half 51.45% of female farmers had farm size less than 1 hectare. This has

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Involvement in fadama farming activities

TABLE 2: Mean distribution of respondents based on their involvement in fadama farming activities

.ctivities	Male	Mean scores	Female	Mean scores	Total	Mean scores
and clearing	92(90.19)	2.82	102(73.91)	2.46	194(80.83)	2.65
ed preparation	83(81.37)	2.62	97(70.28)	2.44	180(75.00)	2.52
eed treatment	7169.60)	2.42	89(64.49)	2.23	160(66.67)	2.33
lursery raising	88(86.27)	2.63	99(71.73)	2.40	187(77.91)	2.53
lanting	91(89.21)	2.67	121(87.68)	2.65	212(88.33)	2.66
ransplanting	78(79.47)	2.48	112(81.15)	2.62	190(79.16)	2.55
ertilizer pplication	63(61.76)	2.21	90(65.21)	2.40	159(66.25)	2.30
.pplication of ıanure	76(74.50)	2.44	104(75.36)	2.45	180(75.00)	2.45
Veeding	93(91.17)	2.88	122(88.40)	2.66	215(89.58)	2.77
:ontrol of ests/diseases	79(77.45)	2.47	115(83.33)	2.63	194(80.83)	2.55
larvesting	94(92.15)	2.85	129(93.47)	2.85	223(92.91)	2.87
ransportation	78(76.47)	2.46	101(73.18)	2.45	179(74.58)	2.45
larketing	84(82.35)	2.61	136(98.55)	2.99	220(91.66)	2.80
torage	60(58.82)	2.20	130(94.20)	2.90	190(79.16)	2.55

Multiple responses provided

Table 2 revealed that male respondents were more active in fadama farming activities such as land clearing (90.19%; ± = 2.84), weeding (91.17%; ± = 2.88), and bed preparation (81.37%; ± = 2.84). However, activities such as harvesting (93.47%; ± = 2.89), storage (94.20%; ± = 2.90) and marketing (98.55%; ± = 2.99) were carried out by female farmers. The higher percentage of the male respondents involved in land preparation and weeding was due to the fact that men are more energetic than women. This was in conformity with Agboola (2001) which opined that the important role of women in agriculture in Nigeria has been under estimated however the consequence has been the erroneous conception of women being economically inactive. Okojie (1990) also identified the specific tasks performed by women as marketing and storage. Other fadama activities such as transplanting (79.16%; x = 2.55), nursery raising (77.91%; x = 2.53) and application of manure (75.00%; x = 2.45) were engaged in by both male and female farmers.

Constraints to Fadama farming activities

TABLE 3: Rank order distribution of respondents based on constraints to fadama farming activities

Constraints to Fadama farming	Male	Female	Total	Rank
Lack of credit facilities	81(79.41)	121(87.68)	202(84.16)	1st
Poor road for transportation	49(48.03)	80(57.97)	129(53.75)	9th
Lack of storage facilities	79(77.45)	119(86.23)	198(82.50)	2nd
Invasion of pests and diseases	73(71.56)	112((81.15)	185(77.08)	3rd
Lack of planting materials	70(68.62)	111(80.43)	181(75.41)	4th
Pilfering	65(63.72)	102(73.91)	167(69.58)	5th
Scarcity of farmland	61(59.80)	910(71.01)	159(66.25)	6th
Lack of adequate funding	46(45.09)	67(49.55)	113(47.08)	10th
Unfavourable weather conditions	40(39.21)	61(44.02)	101(42.08)	12th
High cost of fertilizer	37(36.27)	60(43.47)	97(40.41)	11th
Inability to afford irrigation facilities	60(58.82)	92(66.67)	152(63.33)	7th
Scarcity of organic manure	51(50.00)	84(60.86)	135(56.25)	8th

**Multiple responses*

Table 3 revealed that over (84.16%) of both male and female respondents mentioned lack of credit facilities as a constraint. About 82.50% mentioned lack of storage facilities, while (77.08%) said invasion of pests and diseases, lack of planting materials (75.41%) and pilfering (69.58%) were the most important constraints in fadama farming activities. Inability to afford irrigation facilities was also found to be one of the serious constraints 62.33%. However scarcity of farmland as a constraint was faced by female respondents (71.01%) than male respondents (59.80%) as a result of their access to and control over land.

Types of crops grown

TABLE 4: Distribution of respondents based on types of crop grown

Crops	Male	Female	Total
Vegetables (leafy vegetables)			
Corchorus olitorus (Ewedu)	84(82.35)	121(87.68)	205(85.41)
Celosia orgenita (Soko)	83(81.37)	119(86.23)	202(84.16)
Amarathus spp (Tete)	86(84.31)	124(89.85)	210(87.50)
Lettuce	31(30.39)	52(37.68)	83(34.58)
Telferia occidentalis (Ugwu)	53(51.90)	72(52.17)	125(52.08)
Fruit vegetables			
Tomatoes	93(91.17)	112(81.15)	205(85.41)
Pepper	94(92.15)	119(86.23)	213(88.75)
Melon	29(77.45)	113(81.88)	192(80.00)
Okra	71(69.60)	98(71.01)	169(70.41)
Garden egg	87(85.29)	116(84.05)	205(84.58)
Cereals			
Maize	97(95.09)	131(94.92)	228(95.00)
Rice	23(23.52)	32(23.18)	56(23.33)
Sorghum	2(1.96)	14(10.14)	16(6.67)
Millet	3(2.94)	6(4.34)	9(3.75)
Wheat	1(0.98)	2(1.49)	3(1.25)

Multiple responses provided

Table 4 indicated that both male and female farmers cultivated *Corchorus olitorus* (Ewedu) (85.41%), *Amaranthus spp* (Tete) (87.50%) and pepper (88.75%). This can be attributed to the fact that many people consumed these vegetables thereby result to higher demand in the market. However about (34.58%) of the respondents cultivated lettuce because it has low demand for in the market. Among the cereals cultivated in fadama farm are maize, rice, sorghum, millet and wheat. A high proportion of the respondents both male and female cultivated maize in the fadama farm (95.09%) and (94.92%) respectively. Table 4 also show that a minor percentage of respondents cultivated wheat, millet and sorghum. The reason was based on the fact that these cereals are not well known to them.

T-test analysis of involvement in fadama farming activities

TABLE 5: T-test analysis for the extent of involvement of male and female in fadama farming activities

Variable	No. of cases	Mean	Standard deviation	Standard error	Mean difference	t-test	P	Decision
Male	102	17.33	3.04	0.33	11.92	4.25	0.02	S
Female	138	29.25	4.12	0.39				

Table 5 shows that there was significant difference between male and female farmers' involvement in fadama farming (t = 4.25 and P = 0.02) which is less than 0.05. Male farmers had the mean of 17.33 and standard deviation of 3.04 while female farmers had a mean of 29.26 and standard deviation of 4.12. The implication is that female farmers were more involved in fadama activities than male farmers. However in practice women involved in cultivation of vegetables which are mostly important in our daily food intake and their roles in the diet.

CONCLUSION AND RECOMMENDATION

This paper focused on gender involvement in fadama farming activities in Ogun state. The findings indicated that a large proportion of the sampled male and female farmers were between 31-50 years of age. Results also revealed that more male respondents (75%) had completed one form of formal schooling than female respondents (45%). Findings revealed that both male and female farmers cultivated Corchorus olitorus (Ewedu) (87.50%), Amaranthus spp (tete) (87.50%) and pepper (88.75%). However male respondents were more active in fadama farming activities such as land preparation (90.15%), weeding (91.17%) and harvesting (92.15%) on the other hand activities such as harvesting (93.47%), storage (94.20%) and marketing (98.55%) were engaged in by female farmers. \Results revealed that the very serious constraints to male and female farmers in their fadama farming activities were lack of credit facilities (84.16%) lack of storage facilities (82.50%), invasion of pest and diseases (77.08%) and pilfering (69.58%). In testing of significant differences between the mean of male and female in their involvement in fadama activities t-test analysis indicated that the female farmers are involved in fadama farming than male farmers (t = 4.25, p = 0.02). The study recommended that male farmers should be motivated and encouraged to engage more in fadama farming especially vegetable production and also female farmers be given opportunity to have access to and control over land to increase the size of their farm and enhance their productivity.

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Sustainable Livelihood through Aquaculture in the Niger-Delta, Nigeria

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ABSTRACT

The study was informed by the high consumption of carbohydrates in the Niger-Delta, the rise in fish insufficiency in the rural economy of the area, the gradual but steady withdrawal of fisher folks from artisanal farming due to environmental pollution and the high levels of pollutants in sea foods in the region. Akwa Ibom state was selected purposively as a representative sample and a survey was conducted using questionnaires to determine factors affecting aquaculture as an alternative livelihood strategy in the region. Some factors were found to have relative influence on the extent of fish production and some of the sub components of some factors were also significant. The study determined the output differentials as contributed by the subcomponent of production attribute and which of them could be advantageous to the turnover of farms found in the region. With respect to rurality of production sites, urban aquaculture units produced relatively better than farms located in the peri-urban and rural areas, but the variations in output level were not statistically significant. Other subcomponents of the selected production attributes potentials were ponds constructed with concrete, farms with sizes above 501M^2 and the adoption of poly-cultured methods. Cropping twice in a year and engaging in a full-scale production also portray a means of improving productivity of the fish farms. Despite variations in output across the production attribute, sizes of ponds and number of cropping in a year had remarkable influence on the supply of table size fish. These attributes should be incorporated into any intervention programme for sustainable aquaculture development in the region.

Key Words: Aquaculture, Sustainable livelihood, Niger-Delta, production attributes.

INTRODUCTION

A livelihood strategy includes all activities and social support capabilities accessed by households for survival and in order to improve their standards of living or maintain a given standard of living (Ellis, 1997). It encompasses income, both cash and in kind, as well as the social institutions, gender relations and property rights required to support and to sustain a given standard of living. Aquaculture as a livelihood strategy contributes significantly to the reduction in extreme poverty, unemployment, hunger, and malnutrition and boost fish food security within households (Egziabher, *et al* 1994, Jonas and Halmut, 1997). The steady rise in the Maximum Permissible Concentration (MPC) of crude oil found in the ground water in the Niger Delta (Akingbade, 1991) has given rise to the call for a shift to aquaculture (Lamai *et al,* 2000). The growth in aquaculture in urban and peri-urban areas and its importance in West African regions in the late 1990's has attracted international attention as more people are encouraged to adopt the technology (Smith, 1999). However, the 1990's and 2000 reports on the status of aquaculture adoption by fisheries division of the Akwa Ibom State Ministry of Agriculture and National Resources in 2001 seem to be in the contrary. Sustainability of aquaculture practices has become an age long unresolved problem in Nigeria. Aquaculture as an alternative livelihood strategy for fisher folks in the Niger Delta is practicable especially if they have access to all the necessary production attributes, components and capacity building involved in meaningful fish farming from fingerling to table fish.

The study was informed by the high consumption of carbohydrates in the region (Asanwana, 1994), the rise in fish insufficiency in the rural economy and the gradual loss of fishing as a livelihood strategy by fisher folks in the Niger Delta due to oil spillage. Also, statistics from National Institutes and International organizations on aquaculture portray a considerable un- sustained growth rate, especially in the Niger Delta region. The fish farmers themselves do not help matters as they are yet to imbibe the culture of adequate data taking and documentation. At present, complains of low profitability, negative perception toward adoption of aquaculture systems and withdrawing syndromes are on the increase Knowledge on how significantly different the different attributes are contributing to the overall aquaculture statistics are generally not well documented. The trend rather then ameliorated has continued to be exacerbated despite the sectors great potentials (Wokoma, 1982, Ita and Sado, 1985). Ajani (2000) summed it up by opining that not withstanding the laudable programmes being put in place, there has not been any significant progress but declining productivity from all sectors of the fish industry. Fish statistics in Nigeria, has been observed not to have clear cut distinction, in most cases, between capture fish and cultured fish. Though there are disparities in the aquaculture statistics of the Nigeria Federal Department of Fisheries and the Food and Agriculture Organization (FAO), it could be observed that there has not been a steady increase or decrease in production trend over the years. The study therefore fills the gap by determining the effect of different production attributes on the output of individual fish farms in the Niger Delta. The influences are generally assumed to vary from site to site but in total, all have a general influence on the total output level of aquaculture in the region. The study comparatively determined the significant difference in the production outputs resulting from the effect of some identified production factors / subcomponents and which of the considered production factors have contributed most. It is envisaged that the study would provide the necessary data needed for effective planning and decision making that would enhance realization of the goals of fish food security and a reduction in poverty and malnutrition, and provision of an alternative livelihood strategy for the fisher folks in the Niger Delta region of Nigeria. This is especially so as the captured fish resources in the region is being threatened by environmental and ecological pollution and neglect, which has adversely affected the quality of life and livelihood (Okecha, 2000, Yaro *et al* 2000).

RESEARCH METHODOLOGY

The Study Area

The Niger Delta region of Nigeria is the low-lying actuate deltaic plain with a Northern Apex a little South of Onitsha at Aboh (5033°44'N6031°38' E), a Western Apex by the estuary of the Benin River (5044°11'N, 5003°49'E) and an Eastern Apex at Imo River estuary (4027°16' N,7035° 27'E). The Southernmost part is at Palm Point (4016° 22'N, 6005° 27'E), South of Akasa, at the Nun River (NEST, 1991, World Bank, 1995). The temperature ranges from 20°C to 30°C and covers about 105,000KM^2. It is the largest Delta in Africa (Osuntokun, 2000). About 65% of the people of the area engage in fishing and farming. The states in the Niger Delta region include Akwa Ibom, Cross River, Delta, Rivers and Bayelsa. Others are Imo, Abia, Edo, Anambra and Ondo (Osuntokun, 2000). Akwa Ibom state, with all the representative features of the Niger Delta region, was purposively selected as a representative sample. Akwa Ibom state is located between latitudes 4°37' and 5° 31' North and longitude 7° 35' and 8°25' East with a total land mass of about 7,254, 935KM^2 (Uwatt, 2000), and is bounded at the South by the Atlantic Ocean. It also shares boundaries with Cross River, Abia, and Rivers states. The major ethnic groupings are Ibibio, Annang and Oron.

Sampling and Analytical Methods

Purposive sampling was used to select Akwa Ibom state as a representative sample of states in the Niger Delta. This was because Akwa Ibom sate has all the prominent features of the Niger Delta region. All the one hundred and eighty six (186) registered aquaculture farmers in the state were interviewed using close and open-ended questionnaires. Only 91 of these questionnaires provided adequate data for analysis. Descriptive statistics as well as the analysis of variance was used to analyze the primary data collected.

RESULTS AND DISCUSSION

A. Distribution Pattern of Selected Production Factor.

With reference to the rurality of fish farms, production sites are found at the urban, rural and peri-urban areas and these basic fish farm units are evenly distributed in all regions in Akwa Ibom state. Table 1 (a) reveals that 31.30 percent of the farms were located in the rural area, while 32.30 and 36.40 percent were located in the urban and peri-urban areas respectively. The more in the number of fish ponds in the peri-urban region might be as a result of lack of space in the urban centers, increasing effect of population growth, increasing demand and market opportunities in the urban area. This situation is not uncommon in the West African cities as observed by NRI/UST, (1997) and Orechsel, Quansah and Davies (1999), and agricultural activities are even intensified to meet up challenges of feeding the cities.

With reference to types of ponds, Table 1(b) shows that 65.70 percent of farms were constructed with concrete while 34.3 percent of the farms utilized earthen ponds for fish production. Low capital investment is still a problem in the area even though 65.70 percent of the farmers use concrete ponds; they are relatively small in size and invariably cannot support commercial scale of production. It was observed that ignorance; management inefficiency and unmet high expectations have resulted in the erroneous public perception of the sector as not profitable, which has adversely affected its sustainability in the state.

The size of the pond was also considered to be an important production factor and this is presented in Table 1. The table shows that the pond size or production unit of most farms was small. Only 66 percent of farmers were cropping pond sizes less than 550M^2 and pond sizes within such production capacity symbolized limited production output. About 34 percent of fish farms had pond sizes that could be regarded as commercial in scale. In essence, to attain expected output level to meet up population demand for fish food, which is estimated at between 92240 111645 metric tonnes of fish per year (Moses, 2000), increment in the sizes and number of ponds present in the area is inevitable.

The data on table 1(d) shows that majority of the farms (62.90%) adopted monoculture method due to its simplicity and less risk. In order words, it indicates that few farmers (37.40%) have the above average management ability or technical knowledge or have the wherewithal to hire professionals to handle the demands of polyculture-based aquaculture. Due to the low production capacity of most of the ponds in the study area the only envisaged panacea for increased yield is to increase the number of times fish is cropped per year.

Table 1(e) shows that about 58.6 percent of farms sought to maximize production capacity through a twice cropping per year regime while about 41.4 percent could conveniently crop only once in a year. This production decision was attributed to their specie, preference, body weight, marginal revenue and demand trend. About 68.7 percent (table 1 (f)) admitted not producing at full capacity and thus it is an indication of a serious inability to achieve fish food security to complement the already relatively unsafe captured fish population in the region (Inyang, 1995 and Pirie, 1987).

B. Contributions of Advantageous Subcomponents of Production Attributes on Aquaculture Output

Analysis of Variance on the factors of production attributes; to ascertain their influence on the production output revealed that all the attributes shared the assumption of homogeneity of variance (see table 1, levene statistics column). This implies that all the aquaculture output-groups based on the subcomponents groups came from the population having a common or same variance. The insignificance of the levene statistics, led to a further analysis of variance to find out the level of significant differences among the subcomponent of the production attribute or factor.

(I) ***Rurality of fish farms***

The ANOVA result reveals that fish are better produced in the urban area; having a mean production of about 2190.16kg than any other area in Akwa Ibom state. This was followed by peri-urban aquaculture with a mean production of about 1869.49kg and lastly, rural aquaculture yielding the least with an average out put of about 1357 .35kg. Generally, there was no significant difference among the three locations (see table 1(a). The least significant difference comparison test indicates that urban aquaculture produced significantly better than rural aquaculture. It was observed that quantities produced in urban and peri-urban areas did not significantly differ from each other. The socio-economic environment and characteristics of the two areas may be responsible for the non significance as; urban influence would also be felt in peri-urban aquaculture. This finding agrees with Orechel *et al* (1999).

(II) ***Types of Pond***

Though, there was no significant difference at 0.05 level of probability, those producing using concrete ponds had more yield than Earthen Ponds. Concrete ponds turnout an average of 2002.41kg. The output volume doubles those producing with earthen Ponds with average yearly output of 1450.23kg. This production differential could be due to difficulty in effective management,of water quality. Therefore, despite the initial capital investment demands of constructing concrete tanks, long term production investment will definitely pay off.

(III) ***Sizes of pond***

Farms with pond sizes less than $500M^2$ produce about 1517.67kg on the average while those above $500M^2$ produce an average of 2412.92kg. This implies that with expansion of pond sizes the farms will supply more fish to meet up the challenges of feeding mega population growth in the state. The marked 1:2 ratio difference in average production is supported by the ANOVA result, that there is a significant output difference between the categories producing with pond size above $500M^2$. Increment in pond sizes will therefore, be a good approach towards enhancing aquaculture productivity.

(IV) ***Adopted cultural method***

At present in the study area, there exist two broad approaches to cultured fishing monoculture and poly-culture. However, because of low technical capacity to cultivate different species within the same production unit, majority of the fish farmers practice monoculture.

(V) ***Number of cropping in a year***

There was a significant difference between the output of those farms cropping twice and once a year. The average output for about 58.6 percent of farms producing two times a year (2235.67kg) was twice the mean production of 1214.54kg for about 41.4 percent of farms cropping once a year. The twice yearly cropping pattern is expected to provide more fish for household consumption and for the regional economy. The duration of cropping of species is greatly influenced by the rate of species weight gain, market demands and management decision of the farms. It could therefore be asserted that the state and the entire region will benefit more should there be an introduction of improved and easily adaptable fish species with the above qualities.

(VI) ***Mode of production***

Full scale capacity aquaculturists had higher average yield than those of partial production scale. Their mean production of 1913.53kg was a little above the total average output of 1812.77kg of partial scale capacity. Thus, contributing more to the fish food supply than the partial scale producers, with an average production of 1766.8kg. This emphasizes the fact that maximal production will ensure good profit maximization and fish food sufficiency. The average production of full capacity and partial capacity producers was not wide enough to be significant, most (68%) of farmers admitted operating at partial capacity of their expected production capacity. However, table (f) indicates the non-significance of the differences in means of the full and partial scale of production output groups. This suggests that almost all farms are producing at low capacity even though there was no generally agreed standard measures due to different fish sizes and the influences of peculiarities of some species.

CONCLUSION AND RECOMMENDATION

Accomplishing the goal of supplementing the inadequate supply of captured fish in the state and providing an alternative means of livelihood for the fisher folks is not a mirage. The study confirmed that cropping at least twice in a year and also in expansive units of not less than $500M^2$ would guarantee good volumes of aquaculture outputs in the state and the entire Niger Delta region. It was discovered that urban and peri-urban based farms were placed at productive advantage over the rural based farms due to ease of accessibility of aquaculture information and technical services, as well as easy access to infrastructural facilities. Sub-components of production attributes (such as types of pond, adopted cultural method, number of cropping in a year and mode of production) indicating higher average production should be enhanced and be integrated into the planning phase of any intervention programme for aquaculture development in the region.

TABLE 1: **Percentage Distribution, Mean Production of fish and ANOVA Results of Selected Production Attributes (N=91)**

Items	Production Attributes	Percentage (%)	Mean production (Kg)	Levene Value	statistics	F-value	Sig.	P-value
a	Rurality of farms							
	Rural	31.3*	1357.35	1.415	0.248	2.230**	0.113	0.05
	Urban	32.3	2190.16					
	Peri Urban	36.4	1869.49					
b	Types of pond							
	Earthen	34.3	1450.23	3.628	0.060	2.714**	0.103	0.05
	Concrete	65.7	2002.41					
c	Sizes of Pond							
	Less than 500M2	66.4	1517.67					
	501M2 and above	33.6	2412.92	1.611	0.207	7.181*	0.009	0.05
d	Adopted Culture method							
	Monoculture	62.9	1663.28	0.138	0.711	1.459**	0.230	0.05
	Polyculture d	37.4	2063.28					
e	Number of Cropping in a year							
	once	41.4	1214.54	0.882	0.350	10.79*	0.001	0.05
	Twice	58.6	2235.66					
f	Mode of production							
	Full scale	31.3	1913.53	1.302	0.257	0.178**	0.674	0.05
	Partial scale	68.7	1766.84					

Source: Field Survey, 2004.

** Significant at 0.05 probability level*

*** Not significant.*

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