Print ISSN : 0972-8813
e-ISSN : 2582-2780

[Vol. 21(3) September-December 2023]

Pantnagar Journal of Research

(Formerly International Journal of Basic and Applied Agricultural Research ISSN : 2349-8765)

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PANTNAGAR JOURNAL OF RESEARCH

Vol. 21(3) September-December 2023

CONTENTS

Effect of training and visit (T & V) system on fish production (Aquaculture) in Ogun State, Nigeria

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ABSTRACT: Supply from importation and capture fisheries cannot guarantee food security due to high cost, and low per capita fish consumption. In this study, responses were solicited from 150 aquaculture fish farmers who participated in the Fadama II programme through a questionnaire to examine the effect of their adoption of proven innovations and constraints to technology adoption. Hypotheses were tested using t-test. The study findings showed that the mean age of farmers was forty years, the majority were males (71.3%) and married (50.0%; their mean fish farming experience was 6 years at the inception of Fadama II programme and most (42.0%) were members of a cooperative society with a mean household size of seven persons. Their level of awareness and adoption was 92.0% and 68.9%, respectively, with advice on cropping and harvest being the most highly adopted technology (84.7%) and pond preparation having the highest adoption deficiency (41.4%). The most serious constraint encountered by respondents was inadequate input. There was a significant difference in income and yield before and after T & V extension interventions. The study recommends that to promote sustainable value chain aquaculture, more women be selected to participate in agricultural programmes, and that value chain concept should be actualized in agricultural programme from identification and formation of projects as well as in developing ~~of~~ appropriate strategies for improved agriculture and rural development.

Key words: Aquaculture, effect, extension interventions, fishery extension, Training & Visit

Rapid changes in social and economic environment in many countries are making the level of production of small holders a concern to governments and policy makers. According to Sulaiman *et al*. (2006), declining public funding for extension, especially after the end of the World Bank Funding T & V system, has led to a reduction in staff and inadequate operational budgets, distant and remote areas are often poorly served by public sector and are also weekly integrated into the market. It is in realization of this fact and consideration of sustainable value chain agriculture for food security and economic development that the Nigerian government had to sustain T & V fish production through fadama II programme in many parts of the country. Training and Visit (T & V) based extension emphasized the use of contact farmers in disseminating information, and focused on agricultural extension and rural development agents trained in participatory diagnostics, primarily using rapid rural appraisal tools (Birminghan, 1999). Fish is one of the most important staple foods on the planet and provide a rich source of protein for human consumption, the flesh of fish is also readily digestible and immediately utilized by human body, which makes it sustainable, and complementary for regions of the world with high carbohydrate diet, like Africa (FAO, 2004). Obikieze (1999) observed that fish production is not only important as a source of rich protein, but it can also be used to bring about institutional changes; these changes can offer access to production assets and resources, which can help to empower the poor and directly promote their livelihood. Kumar and Ansari (2023) reiterated that fisheries sector acts as an instrument for the socio-economic development of the country and a powerful tool for improving the livelihoods of marginalized and vulnerable communities. Further, it is obvious that supply from importation and capture cannot guarantee fish food security due to high cost, low per capital fish consumption as well as stagnation and decline in yield. Therefore, filling the gap existing in domestic fish supply shortage put at over 1.6 million metric tons requires triple intensification

of aquaculture practice to meet existing demand (Ifejika *et al.,* 2008). According to Eremie (2006), the role of effective extension is facilitating the development of technology, support its adaptation and adoption by farmer, foster linkages with relevant services provider and institution and provide feedback for further improvement of the system. Realization of food security agenda can be accessed on the performance of agricultural sub-sector of the economy to provide food at right quality and quantity to citizenry with meaningful impact on nutrition, wealth creation and poverty reduction to improve wellbeing (Ifekija *et al.,* 2008). The problem addressed in this research is built around the need to ascertain if T&V based extension actually affect fish production (aquaculture) in Ogun State, Nigeria. Hence, the specific objectives of the study were to examine socio-economic characteristics of aquaculture fish farmer in fadama II programme; examine the effect of T & V on farmers' adoption of technologies; examine the effect of T & V on aquaculture fish production; and, examine constraints encountered by respondents. A null hypothesis that there is no significant difference in yield and income of respondent before and after T&V based extension was formulated for the study.

MATERIALS AND METHODS

Thirty (30) respondents each were selected from Abeoukuta North, Odeda, Yawe North, Ifo, Ogun waterside Local Government Areas (LGAs) of Ogun State to give a total of 150 respondents for the study. This five LGAs were randomly selected from the ten LGAs that were involved in FADAMA II programme. Data were collected with the use of questionnaire, and the instrument was validated by expert judgment. Respondents indicated their income and yield through memory recall which was validated by FADAMA II facilitator's records. Constraints encountered by respondents was measured on a 5-point rating scale of very serious = 5, serious = 4, little serious = 3, not serious = 2, and not a problem = 1. A mean score of 3.0 and above was taken to mean that a particular constraint was serious. Analysis of data was achieved using frequency, percentage and mean, hypothesis was tested using T-test.

RESULTS AND DISCUSSION

Socio economic characteristics

Table 1 showed that T&V based extension for fish production in the fadama II in Ogun State was dominated by males (71.3%) and a mean age of 51 years with the male dominance in fishing, implies laborious nature of fishing operation right from pond construction which the female counterpart cannot easily undertake. This confirms the view of Ofuoku *et al.* (2008), that gender related roles of men mostly in fish farm operation also account for male dominance in fish farming with 19.4% of the respondents were above 60 years. This shows that the farmers were ageing, an indication that some of the respondents may have retired from active service into fish farming as a means of livelihood. The 50% (Married) and other respondents were earlier married, with only 13.3% single, which indicate that a high degree of responsibility and a great capacity for sound rational decision among the farmers. This factor is likely to encourage the sustainability of adoption decisions as observed by Ejembi *et al.* (2006), Onasanya (2007) that most farmers are married and Soyebo (2005) that agriculture is much practiced among married people to make ends meet and cater for their children. The study reveals that 32.7% of the respondents had one form of tertiary education or the other while 30.7% had secondary education and 20.0% had no formal education, 13.3% had primary education while 3.3% had other form of education which may be skilled or other form of adult education. This implies that majority of the respondents were literate, and this characteristic may contribute to their level of innovation adoption.

The study reveals that majority (63.3%) of fish farmers had less than 6 years' experience in fish farming, with a mean fish farming experience of 5 years, which indicates that of the ageing people who are involved in fadama II, T&V fish farmers may have retired from services outside fish farming.

Majority (42.0%) subscribed to cooperative societies while 32.0% held membership of Fish Farm

Association. This result is expected as those that subscribed to cooperative societies did so mainly to have credit inputs and aids from government and extension service, and those involved in fish farm association did so because of easy access to extension service, market and credit facilities (Ofuoku *et al*., 2008).Majority of the respondents (57.3%) were of household of less than six (6), while 24.7% had household number between 6 and 10. This implies that respondents may have hired labour for operation of their fish farms.

Innovation Awareness and Adoption

The pooled level of awareness (92.0%) and adoption (68.9%) of innovation in this study reflected the general adoption behaviour of the fish farmers which were very high and this is due to the fact that majority (80.0%) of them were literate (Table 1). This agreed with Ejembi *et al. (*2006), a farmer that can read can follow the direction of adoption of a recommended practice more effectively. The highest (84.7%) adoption was in cropping/harvesting which recorded only 35.3% adoption deficiency this can be expected as respondents in expectation of returns on investment would be desirous of cropping harvesting/technologies, most (80.7%) of the respondents adopted fish farmer cooperative. This could be as a result of benefits derived from cooperatives, are used to achieve help (common economic, social and cultural needs) from members as a group in a jointly owned democratically controlled enterprise, hence fish farmers can use it as means of pulling resources together to acquire input for farming. This result is further endorsed by the finding of Ofuoku *et al.* (2008) that as a result of credit, input and aids they can get from government.

Effect of T & V on Number of Ponds, Fingerling Stocked, Fish Yield and Income

Table 3 showed mean difference in fish production before and after T & V extension intervention. For number of ponds (16-24^{2}m) size, there was an increase from 5.3% to 60% of respondents that could now own 5 ponds because of T &V; for fingerlings stocked, before T &V intervention, 8.3% could stock between 2001-3000, while after the intervention, 56.0% of the respondents could stock between 2001 and 3000 fingerlings. Table 3 also showed before T &V extension intervention, only about 8.7% of the respondents could achieve fish output of between 2001 and 4000 kg, whereas 45.3% could achieve the same output after the intervention and the mean difference in income before and after T &V was = ₦ 308,000, and no respondent could have an income of above N–700,000 before T &V but after T&V (19.0%) could achieve income above ₦ 700,000. The mean of fingerling stocked before extension contact

Table 1:Distribution of Respondents by Socio-Economic Characteristics

Variable	Frequency	Frequency (%)	Mean
Age (Years)			
<31	44	29.3	
31-40	38	25.3	
41-50	26	17.3	
51-60	13	8.7	
>60	29	19.4	51
Sex			
Male	107	71.3	
Female	43	28.7	
Marital Status			
Single	20	13.3	
Married	75	50.0	
Divorced	27	18.0	
Separated	12	8.0	
Widow	16	10.7	
Education			
No Formal Education	30	20.0	
Primary	20	13.3	
Secondary	46	30.7	
Tertiary	49	32.7	
Others	5	3.3	
Fish Farming Experience (years)			
<6	95	63.3	
6-10	35	23.3	
11-15	16	10.8	
16-20	2	1.3	5.2
>20	2	1.3	
Membership Of Social Group			
Fish Farmer Association	48	32.0	
Cooperative Society	63	42.0	
Monthly/Weekly Contributed	9	6.0	
None	16	10.7	
Others	14	9.3	
House Hold Size			
<6	86	57.3	
6-10	37	24.7	
11-15	17	11.3	
16-20	7	4.7	
>20	3	2.0	6.0

(Source: Field Survey Data)

was 1,559 while the mean after contact were 2,250 fingerlings. Majority (56.0%) stocked between 2001-3000 fingerlings per pond while 14.7% stocked 3001 and above. These were made possible utilizing technology of water management. The yield per pond of fish farmer before extension were low (2,907 kg)

Table 2: Distribution of Respondents by Innovation, Awareness and Adoption

Innovation	Awareness		Adoption		Adoption deficiency
	Freq*	%	Freq*	%	%
Pond preparation	134	89.3	85	58.6	41.4
Pond Management	140	93.3	101	67.3	32.7
Improved fingerlings/spawning	134	89.3	94	62.7	37.3
Fist feed preparation:					
Fish feed preparation with animal ingredient	124	82.7	89	59.3	40.7
Pest harvest handling/preservation	137	91.3	101	67.7	32.2
Market information	139	92.7	115	76.7	23.3
Pest and disease control	142	94.7	100	66.7	33.3
Fish farmer cooperative	144	96.0	121	80.7	19.3
Fish feed preparation with planning ingredient	135	90.0	10.3	68.7	31.3
Fertilizer application	150	100	94	62.7	37.3
Cropping /harvest	142	94.7	127	84.7	35.3
Mean	138.25	92.0	103.3	68.9	31.1

Source: Field Survey Data, *multiple responses

Table 3: Effect of T&V Extension on Fish Production by respondents (n=150)

Effect	Before			After		
	Frequency	Percentage	Mean	Frequency	Percentage	Mean
No. of ponds owned						
(16-24)m²:						
1	44	29.3		3	2.0	
2	52	34.7		14	9.3	
3	18	12.0		17	11.3	
4	28	18.7		26	17.3	
5	8	5.3	2.4	90	60.0	4.2
Fingerlings Stock						
500-1000	56	37.4		22	14.7	
1001-2000	65	43.3		22	14.7	
2001-3000	13	8.3		84	56.0	
3001-4000	11	7.3		21	14.0	
>4000	5	3.3	1,559	1	0.7	2,250
Fish output (Kg):						
500-2000	64	42.7		12	8.7	
2001-4000	63	42.0		46	30.7	
4001-6000	13	8.7		68	45.3	
6001-8000	10	6.7		15	10.0	
>8000	-		2,907	9	0.7	4,567
Income (¦):						
>100,000	25	16.7		6	4.0	
100,001-200,000	47	31.3		11	7.3	
200,001-300,000	45	30.3		14	9.3	
300,001-400,000	20	13.3		14	9.3	
400,001-500,000	8	5.3		27	18.0	
500,001-600,000	4	2.7		28	18.7	
600,001-700,000	1	0.7		31	20.7	
>700,000	-	-	220.66	19	12.7	528.00

Source: Field Survey Data

Table 4: Effect of the T & V Extension Service on Respondent's Production (t-test)

Performance Variable	Contact/ Access to Extension Services				
Fingerlings stocked	Before	After	Difference	(T-test)	Prob. Level
	1,559	2,255	696	7.32*	P<0.05
Number of ponds owned	2.36	4.24	1.88	16.07*	P<0.05
Fish Output (Kg)	2906	4566	1660	12.24*	P<0.05
Income	220,666.67	582,000	361,333.33	21.07*	P<0.05

Source: computed form Field Survey Data, *significant at 0.05 level

compared to yield/pond after contact (4,567 kg). The result reveals that before the extension service contact, majority (91.3%) earn below 400,000 while 8.7% earn above 400,000 indicating that those with more than four ponds were earning above 400,000 due to the number of ponds owned and the years of farming. After the contact with extension service, the income of majority (70.1%) increased above 400,000 while 29.9% of the respondents were still below 400,000. This may be as a result of their inability to adopt and utilize the innovations disseminated by extension agents; this may also be attributed to respondents' ability to manage innovations. This increased production justify investments in the T&V extension of FADAMA II in Ogun State. These results agree with Bindish and Evenson (1997) that in areas served by T&V extension in Kenya and Burkinafaso, highest yields were achieved by farmers who participate directly in extension activities. The result actualizes the objective of T&V as outlined by Swanson and Clear (1984) i.e., to increase individual farm and income.

Effect of T & V Extension Service on Production (t-Test)

The fingerlings stocked before and after access to extension service was 1,559 and 2,255, respectively. The t-test results (t-7.32) reveals that the difference was significant at the 5% level (P<0.05). This means that the access to the extension service had a significant effect on quantity of fingerlings stocked by the respondents. The mean of ponds own by the respondents were 2.36 (Before) and 4.24 (After) respectively. The t-test result (16.07) reveals that the difference was significant at the 5% level (P<0.05). This implies that the fish farmers contact with extension service had led to increase in their number of ponds owned.

Table 5: Farmers Constraint in T &V Extension System

Constraints	Mean	Std. Deviation
Inadequate inputs	3.45*	1.202
Inadequate funds	3.44*	1.308
Inadequate training	3.01*	1.198
Lack of understanding Innovation	2.97	1.223
Far Distance of Extension Service Centers	2.83	1.482
Inadequate Extension Contact	2.83	1.454

Source: Field Survey Data, *Serious (mean $\geq$ 3.0)

The t-test result (12.24) for the effect of T & V extension system on respondent yield (output) is positive and significant at 5% level (P<0.05). The before and after access to the extension service were 2,906 and 4,566kg (Average) respectively. The yield realized after contact with the T & V extension service is significantly higher than yield before access to extension service. The t-test for the effect of T & V extension system on respondents' income is positive and significant at the 5%level (t=21.07, P<0.05). The income before and after access to extension service were 220,666.67 and 582,000 respectively. The income realized after T & V extension service is significantly higher than their income before access to T & V extension service.

Constraints Faced by farmers in T & V Extension System

The study reveals that the greatest constraint to fish farmer were inadequate input (3.45), inadequate funds (3.44), inadequate training (3.01), which were above the mean 3.00 (serious (mean e" 3.00). This result agrees with findings of Bindlish and Evenson (1997) that farmers in Kenya that had access to T &V extension were limited by funds, to purchase inputs.

CONCLUSION

The study showed that majority of the contact farmers in the Fadama II, the T&V based extension agriculture, were males; pond preparation technology had the highest adoption deficiency. Besides, T&V extension had positive effect on aquaculture, that is, number of ponds and fingerlings stocked, yield and income of respondents.

RECOMMENDATIONS

Based on study findings, the following recommendations are made:

1) In order to enhance a sustainable effect on fish production, more women should be selected to participate in the programme.
2) The Ogun State ADP should improve training effort on fish technologies with high level of adoption deficiencies pond preparation, fish feed preparation with animal ingredient and fertilizer application
3) In order to check the constraints of funding and input, state government through the Ministry of Agriculture should subsidize inputs for fish production to allow farmers access to these resources.
4) Ogun State ADP should conduct regular and more timely visits to farmers as a follow-up to disseminate the fish technologies; this will check farmers technology management level and adoption.

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Received: November 7, 2023
Accepted: December 8, 2023