



ASSESSMENT OF AWARENESS OF ACHA PRODUCTION AND POST-HARVEST INNOVATIONS AMONG ACHA FARMERS IN NASARAWA AND PLATEAU STATES, NIGERIA

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ABSTRACT

The Study was carried out to ascertain the level of awareness of Acha production and Post-harvest innovations in Nasarawa and Plateau States, Nigeria. Data were collected from 232 Acha farmers using multistage sampling technique. Questionnaire was used for data collection. Analytical tools were descriptive statistics. The pooled results revealed that, majority (49.57%, 46.55%, and 56.47%) of the farmers were not aware of tractor mounted truck, fertilizer application and herbicide application respectively. Most (66.81%, 65.52%, 84.49%, 60%, 77%, 70%, 61%, 79%, 75.86%, 83.19%, 80.17%, 76.29%, 84.05%, 75.86%, 82.76% and 73.28%) of the farmers were not aware of ploughing, harrowing, ridging, improved planting materials, planting by dibbling, planting by drilling, mechanical threshing, mechanical winnowing, dehulling mechanical dehusking and value addition innovations respectively. Most (67.24%) of the respondents were highly aware of spraying innovations in Acha farming. All (100%) of the farmers were not aware mechanical harvesting, drying and sprinkling innovations in acha production and post-harvest practices. The major (68.10% and 65.52%) sources of information Acha farmers were friends and relatives (68.10%) as well as extension agents (65.52%) respectively. Acha production and post-harvest practices were predominated with manual methods in the study area. A few number of farmers used machine cum manual. It was recommended that extension workers should create more awareness of Acha production and post-harvest innovations. Government and other relevant stakeholders should mechanize acha farming activities and fund their spread through extension services.

Keywords: Awareness, Acha, Production, Post-harvest and Innovations.

INTRODUCTION

Awareness is one of the stages of adoption process. Awareness creation according Matovero (2006) is a critical resource in the operation and management of the agricultural enterprises which enable people to make informed choices towards improving their livelihood. To create awareness, good channel of communication should be used to reach a

large audience at a given time (Abuh, 2014). Such channels include radio, television, mobile phone, journals, extension bulletins, cinema, posters on accelerated production of crops and livestock especially if the technology in question is efficiently utilized by the small scale farmers. Hence, Abubakar, Anyo and Buhari (2009) underscored the fact that creating awareness on a new research findings and technologies in agriculture to rural farmers remain a promising strategy for increasing agricultural production. Agbamu (1995) posited that adequate information is one of the major prerequisites for widespread acceptance of agricultural innovations. According to Akubuilu (2009) the stage, a person hears about the new idea, practice or acid test for the first time, he needs to have the details of the new idea at this time. Agwu (2006) in his adoption study discovered high adoption level for improved technologies as a result of farmers' awareness that the technologies increase yields and minimize losses. In an adoption study on agrochemicals, Okwoche, Obinne and Onugba (2011) showed that majority of the rural farmers were aware of herbicides and the availability of fertilizers for farming. It is worthy of note that the first phase of any adoption of innovation begins when an individual first hears of the new technology and began to find out about it. Several other studies have shown high level of awareness of improved farm technologies especially as most rural communities had, though inadequate number of extension contacts (Onoh *et al.*, 2012). Awareness plays a major role in adoption of improved Acha production and post-harvest innovations.

Acha (*Digitaria specie*) or fonio is a great crop of antiquity and the most indigenous cereal of West Africa with cultivation history dating back 7000 years (Cruz, 2004) but has low yield of 931kg/ha-1 (FAO, 2011). It is the most important of the diverse group of wild and domesticated *Digitaria* species that are harvested in the savanna of West Africa, the smallest seed of all species of millets (Christian and Henry, 2002). Currently, Acha is the most vital food materials for millions of people in the world. Acha is a low input demanding crop which tolerates a wide range of soils, including loamy, sandy, stony and shallow but not waterlogged clayey soil (Philips and Itodo, 2006). Among the cereals, Acha is the most nutritious grain containing crude protein (7%) that is high in leucine (19.8%), methionine and cysteine (7%) and valine (5.8%)



(Temple and Bassa, 1991). Acha is also reported to have lower glycemic index than sorghum, corn and white rice which are intermediary in glycemic indexes (Belton and John, 2002).

The crop can be relied in semi-arid areas where rain is scarce and unreliable and on marginal or poor soil not suited to other crops. According to FAO (2011), world production, harvested area and global yield of Acha are put at 558,937mts, 686,000ha and 931kg/ha respectively. It is grown mainly in the Republic of Benin, Burkina Faso, Gambia, Mali, Niger, Nigeria, Togo, Senegal and other countries of West Africa (FAO, 2011). Increasing the productivity and finding markets for the produce of this crops in Nigeria has the potential to reduce poverty, improve livelihoods and food security (Okeme, 2017). In spite of the role of Acha production in the socio-economic development in Nigeria; it appears there is low per capita Acha productivity in Nigeria, Nasarawa and Plateau State in particular. This study, therefore addresses some basic research questions as: to what level has the awareness of Acha production and Post-harvest innovations been created among rural farmers in the study area? What are the sources of agricultural information available to farmers on Acha production and post-harvest innovations? What are the existing production and post-harvest practices in the study area?

OBJECTIVES OF THE STUDY

The broad objective of this study is to assess the awareness of Acha production and process innovations among rural farmers in Nasarawa and Plateau State, Nigeria. The specific objectives are to:

- i. Determine the level of awareness of Acha production and post-harvest innovations in the study area.
- ii. Identify existing and Acha production and post-harvest practices in the study area and
- iii. Identify sources of agricultural information available to farmers on production and post-harvest practices in the study area.

METHODOLOGY

The study was carried out in Nasarawa and Plateau States, Nigeria. Nasarawa State is situated between Latitude 8° to 10°N and between

Longitude $7^{\circ} 10'$ to $9^{\circ} 20'E$ in the guinea savanna of Nigeria. It has an estimated population of about 2,479,231 people (MPC, 2006) with land area of about 27,117 km². Plateau State is located between Longitude $80^{\circ} 32'$ and $100^{\circ} 38'$ and Latitude $80^{\circ} 24'N$. It has an estimated population of about 3.5 Million people (NPC, 2006) with land area of about 26,899km². Both States are agrarian area with about 70 percent of the population involved in Agriculture.

The population for this study consisted of all Acha farmers in Nasarawa and Plateau States. Due to the enormity of this population, a total sample size of 232 respondents was selected using a multistage sampling technique comprising purposive, stratified and simple random sampling techniques. Data for this study were gathered mainly from primary sources using a well structured questionnaire. The collected data were analyzed using descriptive statistics. A sample frame was developed for each of the agricultural zones of the study area via; Southern (58) and Central Zones (58) for Nasarawa State, Northern (58) and Central Zones (58) for Plateau States using a proportional allocation, 50% of each was taken and subjected to simple random sampling to arrive at various sample sizes.

RESULTS AND DISCUSSION

Level of Awareness about Acha Production and Post-Harvest Innovations in Nasarawa and Plateau States

Tractor Mounted Truck: Results on table 4 showed that majority (51.72%) of the respondents in Nasarawa State were not aware of tractor mounted truck. It further showed that, 25.86% and 22.41% of the respondents were slightly aware of tractor mounted truck respectively. The findings also indicated that, in Plateau State, majority (47.41%) were not aware of tractor mounted truck while 27.59% and 25% of the respondents were slightly aware and aware of tractor mounted truck accordingly. The pooled result showed that, majority (49.57%), 26.72% and 23.71% were not aware, slightly aware and aware of tractor mounted truck respectively.

Ploughing: Entries on table 14 revealed that in Nasarawa State most (77.59%) respondents were not aware of ploughing while 13.79 and 8.62%



were slightly aware and aware of ploughing accordingly. The result also showed that, in Plateau State majority (56.03%) were not aware 23.86% were slightly aware and 18.11% of the respondents were aware of ploughing as one of the land preparation methods on Acha Farms. The pooled result indicated most (66.81%), 19.83% and 13.36% were not aware, slightly aware and aware of ploughing respectively.

Harrowing: Results on table 4 showed that the awareness levels of harrowing by respondents in Nasarawa State as not aware (74.14%) slightly aware (15.52%) and aware (10.34%) while the response in Plateau State indicated as follows; not aware (56.90%) slightly aware (25.86%) and aware (18.11%). The pooled result revealed the awareness level as not aware (65.52%) slightly aware (20.69%) and aware (13.79%).

Ridging: Results on table 4 revealed the respondents level of awareness of mechanical ridging in Nasarawa State as; not aware (68.77%), slightly aware (19.83%), aware (11.20%). The response in Plateau State indicated that, 100% of the respondents were not aware of ridging in Acha Farming. The pooled results on table 4 showed that most (84.49%) of the respondents were not aware, 9.91% were slightly aware while 5.60% were aware of ridging in Acha production.

Mechanical Harvesting, Drying and Sprinkling: The results on table 4 showed that 100% of the respondents in both Nasarawa and Plateau States were not aware of mechanical harvesting, drying and sprinkling in Acha Farming. Similarly, 100% of the respondents in the pooled results indicated same level of awareness as in Nasarawa and Plateau States.

Spraying: It was shown on table 4 that, most (65.52%) of the respondents in Nasarawa State were aware of spraying in Acha production while 18.10% and 16.38% were not aware and slightly aware respectively. Most (68.97%) of the respondents in Plateau State were also aware of spraying while 17.24% were slightly aware. The remaining 13.79% of the respondents were not aware. The pooled result showed that most (67.24%) of the respondents were aware of spraying while 16.81% and 15.95% were slightly aware and not aware of spraying in Acha production.

Fertilizer Application: Results on table 4 showed that, majority of the respondents in Nasarawa State were not aware of fertilizer application in Acha production while were slightly aware and were aware. Majority (43.11%) were not aware of fertilizer application in Acha Farming while 31.03% and 25.86% were slightly aware and not aware respectively. The pooled result on table 4 also indicated that, majority (46.55%) of the respondents were not aware of fertilizer application in Acha production. 29.74% were aware.

Herbicide Application: Results on table 4 indicated that most (65.52%) of the respondents in Nasarawa State were not aware of herbicide application in Acha production while 21.55% and 12.93% were slightly aware and not aware respectively. Majority (47.41%) of the respondents in Plateau State were not aware, 26.72% were aware and 25.86% were slightly aware. The pooled result on Table 4 showed that, majority (56.47%) of the respondents were not aware of herbicide application in Acha Farming while 23.71% were slightly aware. The remaining 19.82% were aware.

Use of Improved Planting Materials: Results on Table 4 revealed that, 100% of the respondents in Nasarawa State were not aware of the use of improved planting materials. Majority (51.72%) of the respondents in Plateau State were not aware, 31.04% were slightly aware and 17.24% were aware. The pooled results indicated that, most (75.86%) of the respondents were not aware of the use of improved planting materials in Acha production while 15.52% and 8.62 were slightly aware and aware respectively.

Planting by Dibbling: The results on Table 4 also showed that, 100% of the respondents in Nasarawa State were not aware of Acha planting method by dibbling. Most (66.38%) of respondents in Plateau State were not aware of planting Acha by dibbling. There was slight awareness by 18.10% of the respondents while 15.52% of the respondents were aware. The pooled results indicated that most (83.19%) of the respondents were not aware of dibbling planting method in Acha production while 9.05% and 7.76% of the respondents were slightly aware and aware of planting by dibbling.



Planting by Drilling: Results on Table 4 revealed that, 100% of the respondents in Nasarawa State were unaware of planting Acha by drilling. Most (60.35%) were not aware, 25.86% were slightly aware and 13.79% were aware of planting Acha by drilling in Plateau State. The pooled result on Table 4 also showed that, most (80.17%) of the respondents were not aware of planting of Acha by drilling method. The results further indicated that, 25.86% and 13.79% were slightly aware and aware respectively. Similarly, the pooled results showed that, most (80.17%) of the respondents were not aware of planting by drilling in Acha Production. It was further shown that 12.93% were slightly aware and 6.90% were aware.

Mechanical Threshing: Results on table 4 also showed that, 100% of the respondents in Nasarawa State were not aware of mechanical threshing of Acha while in Plateau State majority (52.59%) were not aware, 29.31% were slightly aware and 18.10% were aware. The pooled result on Table 4 indicated that most (76.29%) of the respondents were not aware of mechanical threshing of Acha, 14.66% were slightly aware and 9.05% were aware of mechanical threshing of Acha.

Mechanical Winnowing: Results on Table 4 indicated that, 100% of the respondents in Nasarawa State were not aware of winnowing of Acha by mechanical means. The results further revealed that, most (68.10%) of the respondents in Plateau State were unaware of mechanical winnowing of Acha. 17.24% and 14.66% of the respondents were slightly aware and aware of mechanical winnowing of Acha respectively. The pooled results showed that, most of the respondents (84.05%) were not aware, 8.62% were slightly aware and 7.33% were aware of mechanical winnowing of Acha.

Mechanical Dehulling: Results on Table 4 showed that, 100% of the respondents in Nasarawa State were not aware of mechanical dehulling in Acha processing while majority (51.72%) of the respondents in Plateau State were not aware, 28.45% were slightly aware and 19.83% were aware. The pooled results showed that, most (75.86%) were not aware 14.22% were slightly aware and 9.91% were aware of mechanical dehulling of Acha.

Mechanical Dehusking: The results on Table 4 also indicated that, 100% of the respondents in Nasarawa State were not aware of mechanical dehusking in post-harvest management of Acha. Most (65.52%) of the respondents were not aware of mechanical dehusking of Acha in Plateau State while 18.10% and 16.38% were slightly aware and aware respectively. The pooled results showed that, most (82.76%) of the Acha by mechanical means, 9.05% were slightly aware and 8.19% were aware.

Value Addition: The results on Table 4 revealed that most (77.59%) of the respondents in Nasarawa State were not aware of value addition in Acha post-harvest practices while 26% were slightly aware. Most (68.96%) of the respondents in Plateau State were not aware of value addition in Acha processing, 19.83% were slightly aware and 11.21% were aware. The pooled results (table 4) indicated that, most (73.28%) of the respondents were not aware, 21.12% were slightly aware and the remaining 5.60% were aware of value addition in Acha processing.

Results on table 4 showed that most of the respondents were not aware of Acha production and post harvest innovations. It also shows in Nasarawa and Plateau States that only a few highly and moderately aware. This can have adverse effect on adoption of improved Acha farming activities because before an individual adopts or rejects an innovation, he/she must first and foremost be aware of the innovation/gathers information about it to know whether the innovation will benefit him/her more than what he used to know, makes a mental application of new practice to his situation, acid-tests the practice and consider the advantages and disadvantages and tries the innovation on a small scale to be sure before finally adopting the innovation. The implication of these findings is that extension work in the study area is very poor and the effort to increased Acha production through awareness and adoption of Acha production and post-harvest management has not genuinely started in Nasarawa and Plateau States. Tologbonse *et al.* (2005) found that, the level of awareness of recommended crop protection practices by sesame farmers in Benue State, Nigeria, correlated positively with adoption. This implies that, the more aware the farming population is of a technology, the more likely they are to adopt it.



Table 1: Distribution of Respondents Based on Level of Awareness Acha Production and Post-Harvest Innovation in Nasarawa and Plateau State (n = 232)

Variables	Nasarawa State (n = 116)		Plateau State (n = 116)		Pooled (232)	
	Freq.	%	Freq.	%	Freq.	%
Tractor mounted truck						
Aware	26	22.41	29	25.00	55	23.71
Slightly aware	30	25.86	32	27.59	62	26.72
Not aware	60	51.73	55	47.41	115	49.57
Sub-total	116	100.00	116	100.00	232	100.00
Ploughing						
Aware	10	8.62	21	18.11	31	13.36
Slightly aware	16	13.79	30	25.86	46	19.83
Not aware	90	77.59	65	56.03	155	66.81
Sub-total	116	100.00	116	100.00	232	100.00
Harrowing						
Aware	12	10.34	20	17.24	32	13.79
Slightly aware	18	15.52	30	25.86	48	20.69
Not aware	86	74.14	66	56.90	152	65.52
Sub-total	116	100.00	116	100.00	232	100.00
Ridging						
Aware	13	11.20	0	0.00	13	5.60
Slightly aware	23	19.83	0	0.00	23	9.91
Not aware	80	68.97	116	100.00	196	84.49
Sub-total	116	100.00	116	100.00	232	100.00

Assessment of Awareness of Acha Production and Post-Harvest Innovations among Acha Farmers in Nasarawa and Plateau States, Nigeria

Variables	Nasarawa State (n = 116)		Plateau State (n = 116)		Pooled (232)	
	Freq.	%	Freq.	%	Freq.	%
Mechanical harvesting						
Aware	0	0.00	0	0.00	0	0.00
Slightly aware	0	0.00	0	0.00	0	0.00
Not aware	116	100.00	116	100.00	232	100.00
Sub-total	116	100.00	116	100.00	232	100.00
Spraying						
Aware	76	65.52	80	68.97	156	67.24
Slightly aware	19	16.38	120	17.24	39	16.81
Not aware	21	18.10	16	13.79	37	15.95
Sub-total	116	100.00	116	100.00	232	100.00
Mechanical Sprinkling						
Aware	0	0.00	0	0.00	0	0.00
Slightly aware	0	0.00	0	0.00	0	0.00
Not aware	116	100.00	116	100.00	232	100.00
Sub-total	116	100.00	116	100.00	232	100.00
Fertilizer Application						
Aware	25	21.55	30	25.86	55	23.71
Slightly aware	33	28.45	36	31.03	69	29.74
Not aware	58	50.00	50	43.11	108	46.55
Sub-total	116	100.00	116	100.00	232	100.00
Herbicide Application						
Aware	15	12.93	31	26.72	46	19.82
Slightly aware	25	21.55	30	25.86	55	23.71



Variables	Nasarawa State (n = 116)		Plateau State (n = 116)		Pooled (232)	
	Freq.	%	Freq.	%	Freq.	%
Not aware	76	65.52	55	47.41	131	56.47
Sub-total	116	100.00	116	100.00	232	100.00
Use of Improved Planting Materials						
Aware	0	0.00	20	17.24	20	8.62
Slightly aware	0	0.00	36	31.04	36	15.52
Not aware	116	100.00	60	51.72	176	75.86
Sub-total	116	100.00	116	100.00	232	100.00
Planting by Dibbling						
Aware	0	0.00	18	15.52	18	7.76
Slightly aware	0	0.00	21	18.10	21	9.05
Not aware	116	100.00	77	66.38	193	83.19
Sub-total	116	100.00	116	100.00	232	100.00
Planting by drilling						
Aware	0	0.00	16	13.79	16	6.90
Slightly aware	0	0.00	30	25.86	30	12.93
Not aware	116	100.00	70	60.35	186	80.17
Sub-total	116	100.00	116	100.00	232	100.00
Mechanical Threshing						
Aware	0	0.00	21	18.10	21	9.05
Slightly aware	0	0.00	34	29.31	34	14.66
Not aware	116	100.00	61	52.59	177	76.29
Sub-total	116	100.00	116	100.00	232	100.00

Assessment of Awareness of Acha Production and Post-Harvest Innovations among Acha Farmers in Nasarawa and Plateau States, Nigeria

Variables	Nasarawa State (n = 116)		Plateau State (n = 116)		Pooled (232)	
	Freq.	%	Freq.	%	Freq.	%
Mechanical Winnowing						
Aware	0	0.00	17	14.66	17	7.33
Slightly aware	0	0.00	20	17.24	20	8.62
Not aware	116	100.00	79	68.10	195	84.05
Sub-total	116	100.00	116	100.00	232	100.00
Mechanical dehulling						
Aware	0	0.00	23	19.83	23	9.91
Slightly aware	0	0.00	33	28.45	33	14.22
Not aware	116	100.00	60	51.72	176	75.86
Sub-total	116	100.00	116	100.00	232	100.00
Mechanical dehusking						
Aware	0	0.00	19	16.38	19	8.19
Slightly aware	0	0.00	21	18.10	21	9.05
Not aware	116	100.00	76	65.52	192	82.76
Sub-total	116	100.00	116	100.00	232	100.00
Mechanical drying						
Aware	0	0.00	0	0.00	0	0.00
Slightly aware	0	0.00	0	0.00	0	0.00
Not aware	116	100.00	116	100.00	232	100.00
Sub-total	116	100.00	116	100.00	232	100.00
Value addition						
Aware	0	0.00	13	11.21	13	5.60
Slightly aware	26	22.41	33	19.83	49	21.12



Variables	Nasarawa State (n = 116)		Plateau State (n = 116)		Pooled (232)	
	Freq.	%	Freq.	%	Freq.	%
Not aware	90	77.59	70	68.96	170	73.28
Sub-total	116	100.00	116	100.00	232	100.00

Source: Field Survey (2019)

Sources of Agricultural Information on Acha Production and Post-Harvest Innovations

The results in Table 7 revealed that, in Nasarawa State, most (64.66%) of the respondents sampled got their information from friends and relatives, 59.48% got information from extension agents 12.93% of the sampled farmers got their information from non-governmental organizations. Whereas 7.76 % got theirs from other farmers, about 10.34% obtained their information from contact farmers, 6.03% got theirs from neighbours while 4.31% obtained information from National Cereals Research Institute (NCRI). The remaining 2.59% obtained information from media. In Plateau State, most (71.56%) of the respondents obtained information on Acha production and post-harvest innovations from friends and relatives, 62.33% got theirs from agricultural extension agents, 44.83% got information from National Cereals Research Institute, others got information as follows, contact farmers (18.10%), neighbors (14.66%), non-governmental organizations (1.21%), other farmers (8.12%) and the media (4.31%).

The pooled results also indicated that most (69.10%) of the respondents in Nasarawa and Plateau States obtained their information on Acha production and post-harvest innovations from friends and relatives, 65.52% got information from agricultural extension agents, whereas 24.57% got theirs from National Cereals Research Institute. The pooled results further showed information sources of the sampled respondents as; non-governmental organizations (12.07%), neighbors (10.34%), other farmers (6.90%). The remaining 3.44% got their information from media. This finding agrees with that of Effiong *et al.* (2016) which stated that, the use of neighbors, friends, relatives, radio, extension agents and other farmers were some of the major sources from which farmers generally seek information. This is also in line with the finding of Ayoola (2012) which indicated in high awareness percentage (98%) of yam minisett technology by farmers whose major sources of information were family, friends as well as agricultural extension agents.



Table 2: Sources of Information on Acha Production and Post-Harvest Innovation in Nasarawa and Plateau State.

Variables	Nasarawa State (n = 116)		Plateau State (n = 116)		Pooled (232)	
	Freq.	%	Freq.	%	Freq.	%
Neighbors	7	6.03	17	14.66	24	10.34
Friends and relatives	75	64.66	83	71.56	158	68.10
Other farmers	9	7.76	7	8.12	16	6.90
Media (TV, Radio, Newspapers, Mobile Phone)	3	2.59	5	4.31	8	3.45
Contact farmers	12	10.34	21	18.10	33	14.22
Non-governmental Organizations	15	12.93	13	11.21	28	12.07
National Cereals Research Institute (NCRI)	5	4.31	52	44.83	57	24.57
Extension Agents	69	59.48	73	62.93	142	65.52

Multiple Responses

Source: Field Survey (2019)

Existing Methods of Acha Production and Post Harvest Practices in Nasarawa and Plateau States

Land Preparation: Results on Table 3 showed that, in Nasarawa State, most (81.90%) of the respondents used manual method only for land preparation, none used machine only while 18.10% used Manual and Machine. In Plateau State, most (78.45%) of respondents utilized manual method only 0% used machine only, 21.55% used manual and machine for land preparation. The pooled results on Table 3 showed that, (80.17%) of the respondents made use of manual method only for land preparation in Acha Farming, none of the respondents used machine only while 19.83% utilized manual and machine.

Planting, Harvesting and Value addition: Results on Table 3 showed that, in both Nasarawa and Plateau States, 100% of the respondents used manual method only for planting, harvesting and value addition in Acha Farming. The pooled results indicated same with none of the respondents using either machine only or combination of manual and machine in the performance of the aforementioned operations in Nasarawa and Plateau States. **Weeding:** Entries on Table 3 revealed that in Nasarawa State, 100% of the respondents used only manual method for weeding their Acha Farm whereas Plateau had most (84.48%) of the respondents using manual method of weeding only on their Acha Farms with none using machine only while 15.52% used combination of both manual and machine. Similarly, the pooled result indicated that, most (12.24%) of the respondents utilized manual method only for weeding their Acha Farm with the remaining 7.76% using machine and manual for weeding on their Acha Farm.

Fertilizer Application: Results on Table 3 showed that, in Nasarawa State most (82.76%) of the respondents used manual method only in fertilizer application to Acha on their farms. Machine only was not used by any of the respondents on their farms. 17.24% of the respondents used combination of manual and machine for fertilizer application on their farms. Most (67.24%) of the respondents in Plateau State utilized manual method only in fertilizer application to Acha on their farms while 32.76% used manual and machine as methods of fertilizer applications on their Acha Farm.



The pooled result on Table 3 showed that 75% of the respondents used manual only, while 25% used combination of manual and machine in applying fertilizer to Acha on their farms.

Herbicide Application: Entries in Table 3 showed that, 100% of the respondents in Nasarawa State used only manual method in applying Herbicide on their Acha farms. Similarly, 100% of the respondents utilized combination of manual and machine in herbicide application to Acha farms in Plateau State. The pooled result indicated that, 50% and 50% of the respondents used manual and combination of manual and machine respectively.

Threshing: Results on Table 3 revealed that 100% of the respondents used manual method in threshing Acha in Nasarawa State while most (85.34%) and 14% of the respondents used manual and combination of machine and manual methods respectively. The pooled result showed most (92.67%) used only manual method in threshing Acha while the remaining 7.33% used combination of manual and machine for threshing Acha on their farms.

Winnowing: Results on Table 3 further showed that, in Nasarawa State 100% of the respondents undertook winnowing of Acha with manual method only, while most (82.78%) in Plateau State, used manual method and the remaining 17.24% used machine and manual methods for winnowing. The pooled result indicated that, most (91.38%) utilized manual method of winnowing while 8.62% of the respondents used combination of manual and machine.

Dehulling: Entries on Table 3 revealed that, 100% of the respondents in Nasarawa State used manual method for dehulling Acha while most (87.93%) also dehuls Acha with manual method. The balance of 12.07% respondents used manual and machine for dehulling. Similarly, the pooled result showed that, 93.97% and 6.03% of the respondents used manual and combination of manual and machine for dehulling respectively.

Dehusking: Results on Table 3 showed that, 100% of the respondents in Nasarawa State used manual method for dehusking Acha. Most

(84.48%) of the respondents in Plateau State used manual method while the remaining 15.52% utilized manual and machine for dehusking. The pooled result on Table 3 also indicated 92.24% used manual method while the remaining 7.76% used manual and machine for dehusking Acha.

Value Addition: Results on Table 3 indicated that 100% of the respondents in Nasarawa and Plateau States used manual method in value addition to Acha. The pooled result also indicated that, all the respondents used manual method in value addition to Acha. These findings implies that the existing methods of Acha production and post-harvest practices In Nasarawa and Plateau States were predominately manual. Majority of the respondents used manual method for land preparation, planting, weeding, fertilizer application, application of herbicide, pesticide application, threshing, dehulling, winnowing and dehusking. This implies that Acha farmers in Nasarawa and Plateau States still resort to traditional production and processing technologies which does not augur well for increased Acha Production. This agrees with the study conducted by Soyebo *et al.* (2005) which stated that, while all personal processors (59.5%) adopted traditional processing methods most farmers were poor and could not afford hand operated press, hence the output at single pressing will always be minimal since it involved only manual labour. This findings also corroborated that of NAERLS and EMARD (2012) which found that, there was low level of application and use of agricultural machinery and equipment among Nigeria farmers and traditional farm tools dominate agriculture in Nigeria and a dis-incentive for food security.

It was discovered that 100% of the respondents used only manual method for planting, harvesting and value addition in Acha Farming. This might be due to little or no innovation in these areas of Acha production and post-harvest management. This agrees with the study carried out by Danbaba (2014) which stated that Acha planting and harvesting had virtually no mechanization in Nigeria. The findings also revealed that, on a relative note 100% of the respondents in Nasarawa State used only manual method for weeding, application of herbicide, threshing, winnowing, dehusking and dehulling while in Plateau State 18% of the respondents used combination of manual and machine for weeding. 100%



used manual and machine for herbicide application. Others that used manual and machine in Plateau State were 17% for threshing, 20% for winnowing, 14% for dehulling and 18% for dehusking.

The existence of the above listed variables in Plateau might be as a result of the presence of Acha based research organizations in Plateau State. For instance, Acha research sub-station of National Cereals Research Institute is sited in Riyom, Plateau State, KWARA, Acha Processing Firm is located in Jos South, Plateau State. These organizations might be the basis of the farmers' knowledge of Acha production and post-harvest innovations and acquisitions of same by few of them in Plateau State. This finding is corroborated by Dashi *et al.* (2013) who stated that, farmers nearness to innovation demonstration base facilitate acquisition and adoption of improved technologies.

Table 3: Distribution of Respondents Based on Existing Methods of Acha Production and Post-Harvest Practice in Nasarawa and Plateau State (n = 232)

Variables	Nasarawa State (n = 116)		Plateau State (n = 116)		Pooled (232)	
	Freq.	%	Freq.	%	Freq.	%
Land Preparation						
Manual only	95	81.90	91	78.45	186	80.17
Machine only	0	0.00	0	0.00	0	0.00
Manual and Machine	21	18.10	25	21.55	46	19.83
Sub-total	116	100.00	116	100.00	232	100.00
Planting						
Manual only	116	100.00	116	100.00	232	100.00
Machine only	0	0.00	0	0.00	0	0.00
Manual and Machine	0	0.00	0	0.00	0	0.00
Sub-total	116	100.00	116	100.00	232	100.00
Weeding						
Manual only	116	100.00	98	84.48	214	92.24
Machine only	0	0.00	0	0.00	0	0.00
Manual and Machine	0	0.00	18	15.52	18	7.76
Sub-total	116	100.00	116	100.00	232	100.00



Variables	Nasarawa State (n = 116)		Plateau State (n = 116)		Pooled (232)	
	Freq.	%	Freq.	%	Freq.	%
Fertilizer Application						
Manual only	96	82.76	78	67.24	174	75.00
Machine only	0	0.00	0	0.00	0	0.00
Manual and Machine	20	17.24	38	32.76	58	25.00
Sub-total	116	100.00	116	100.00	232	100.00
Application of Herbicide						
Manual only	116	100.00	0	0.00	116	50.00
Machine only	0	0.00	0	0.00	0	0.00
Manual and Machine	0	0.00	116	100.00	116	50.00
Sub-total	116	100.00	116	100.00	232	100.00
Pesticide Application						
Manual only	101	87.07	64	55.17	165	71.12
Machine only	0	0.00	22	18.97	22	9.48
Manual and Machine	15	12.93	30	25.86	45	19.40
Sub-total	116	100.00	116	100.00	232	100.00
Harvesting						
Manual only	116	100.00	116	100.00	232	100.00

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Variables	Nasarawa State (n = 116)		Plateau State (n = 116)		Pooled (232)	
	Freq.	%	Freq.	%	Freq.	%
Machine only	0	0.00	0	0.00	0	0.00
Manual and Machine	0	0.00	0	0.00	0	0.00
Sub-total	116	100.00	116	100.00	232	100.00
Threshing						
Manual only	116	100.00	99	85.34	215	92.67
Machine only	0	0.00	0	0.00	0	0.00
Manual and Machine	0	0.00	17	14.66	17	7.33
Sub-total	116	100.00	116	100.00	232	100.00
Winnowing						
Manual only	116	100.00	96	82.76	212	91.38
Machine only	0	0.00	0	0.00	0	0.00
Manual and Machine	0	0.00	20	17.24	20	8.62
Sub-total	116	100.00	116	100.00	232	100.00
Dehulling						
Manual only	116	100.00	102	87.93	218	93.97
Machine only	0	0.00	0	0.00	0	0.00



Variables	Nasarawa State (n = 116)		Plateau State (n = 116)		Pooled (232)	
	Freq.	%	Freq.	%	Freq.	%
Manual and Machine	0	0.00	14	12.07	14	6.03
Sub-total	116	100.00	116	100.00	232	100.00
Dehusking						
Manual only	116	100.00	98	84.48	214	92.24
Machine only	0	0.00	0	0.00	0	0.00
Manual and Machine	0	0.00	18	15.52	18	7.76
Sub-total	116	100.00	116	100.00	232	100.00
Value Addition						
Manual only	116	100.00	116	100.00	232	100.00
Machine only	0	0.00	0	0.00	0	0.00
Manual and Machine	0	0.00	0	0.00	0	0.00
Sub-total	116	100.00	116	100.00	232	100.00

Source: Field Survey (2019).

CONCLUSION

The results of the study indicated that most of the farmers were not aware of Acha production and post-harvest innovations. Information on existing Acha production and post-harvest innovations was mostly gotten from friends and relatives. It was also revealed that, most of the farmers in the study area used manual methods in acha production and post-harvest operations.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are hereby made;

1. Extension workers must get to work and ensure that they create more awareness among farmers of the concept of Acha production and post-harvest innovations.
2. The use of media such as radio, television as information source should be encouraged by broadcasting Acha production and post-harvest innovations regularly and timely.
3. Agricultural scientists, engineers, individuals and governments should mechanize Acha farming and fund their spread through extension services and credits to farmers.
4. There is urgent need for the Acha production and post-harvest equipment to be subsidized or giving in kind to Acha farmers.

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