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## Survey and Identification of Acha Varieties in Some Local Governments of Plateau and Bauchi States, Nigeria

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### **Abstract:**

A total of fourteen different acha varieties were identified in a survey carried out in four selected local Governemnts (Bogoro, Barkin Ladi, Mangu and Bokkos) of Bauchi and Plateau state, Nigeria. They are: Badama, Whey swello, Whey Rwey, Chin ryey, Chidt Kusum/kukum, Jakalak/mara, Chidt fyali/kal others are: Wandat, Achikara, Zor, Nhibang, Nkin, Kurep and Sun. The locations have their general name for acha which are: Chun, Chidt, Kinh, Forh and Kusak. The fourteen varieties identified were all used to produce fermented and non-fermented pap, as it has not been used in pap production before. Farming, harvesting and processing of acha are majorly done manually which is very tedious, as such the major cereal grow in the area is maize. The large number of people involved in acha production are female with 77% and those with lower educational qualification, (Primary 36.8% and secondary school 33.8%) respectively. Despite the challenges faced in growing acha, the farmers still hold acha in high esteem compared to other cereals, this has kept the existence of the crop for years. There is therefore need for the mechanization of acha farming, harvesting and processing to have greater yield meeting the demands of the consumers.

**Keywords:** Acha varieties, pap production, farming, harvesting and processing

### **1. Introduction**

The importance of cereal grain as sources of food for man cannot be over emphasized particularly in the developing nations. Acha (*digitaria exilis*) as one of the cereals belongs to the family Graminae and the sub-family maize, sorghum and millet (Pablo *et al* 2007). The plant belongs to the monocoty ledonous family. It grows on poor sandy soil, under conditions of low rainfall which often will not support the growth of some of the more popular cereal, like maize, sorghum and rice (Jideani 1999).

Acha (*digitaria exilis*) is grown in commercial quantity in Northern parts of Nigeria. Plateau state is the largest producer of acha in Nigeria, this is so, because majority of the local Governments in the state produce acha. (Gyang and Wuyep 2005). There is significant out put of acha in some part of Bauchi State (Tafawa-Balewa and Bogoro), Niger and Kaduna States are known to cultivate acha.

In an earlier study (Ibrahim 2001, Dachi and Gana, 2008) reported that acha grain can be cultivated twice a year since its early varieties mature within 6 to 8 weeks (42 to 56 days) after they are planted. While the late varieties take 120 to 150 days to mature.

The grain is being used in variety of ways it is used for *porridges* (*gwate*), *tuwo*, *couscous*, *pudding*, *kununzaki*, milled and mixed with flour to make *bread* and *biscuit*. The methods of producing these foods varied from locality to locality, particularly in the culture, recipes and additives used which could be due to the culture of the people, (lawal *et al* 2009). The grain has not been used at all in the production of pap in the study area.

Therefore the study is aimed at surveying and identifying the different varieties of acha grain in the area under study. It also intends to create the awareness that acha grain can be used to produce pap.

### **2. Materials and Method**

Structured questionnaire was designed and administered to 500 randomly selected acha farmers in four selected acha farming local Governments (Bogoro, Barkin Ladi, Mangu and Bokkos) of Bauchi and Plateau States, Nigeria. This was used to determine the demographic characteristics and agricultural profile. The demographic characteristics considered were age, gender and educational status. While agricultural profile determined were type of cereals and acha variety grown, time of planting and harvesting, best local food products processing methods, factors influencing the choice of variety and the value with which acha is held compared to other cereal crops.

The different varieties identified from the four locations were obtained directly from the producers in the study area. These were used to produce fermented and non-fermented pap, because the grain has not been used at all in pap production in the region surveyed as

indicated by the people in the community. The processing and preparation method are presented on a flow chart in fig. 1 and 2 respectively.

### 2.1. Method of Processing Acha Pap

Acha grains were washed with cold clean water repeatedly until the water becomes clear, thereafter; they were destoned using water and two calabashes. The action makes the heavier sand settles at the bottom of the calabash as vibration was gently being applied and it was repeated from one calabash to the other, until grains were free of sand. For the preparation of non-fermented pap, the washed acha grains were drained very well and spread on a clean sack or mat and sundry for 2 – 3 days, after which the grains were milled in dry grinding machine into flour (fig.2). The flour was then sieved through a 400UM mesh screen to give a uniform particle size (Umoh and Fields, 1981, Osungbaro, 2009). For the preparation of fermented pap, the washed grains were steeped in cold clean water for 4 – 6 hours. The steeping water was then decanted and the grains were wet milled using wet grinding machine and filtered using muslin cloth, to obtain the wet fermented acha starch which was then covered and allowed to stay for 48 – 72 hours with change of water at interval. A process referred to as souring during which further fermentation proceeds. (Adegoke, 2004, Osungbaro, 2009).

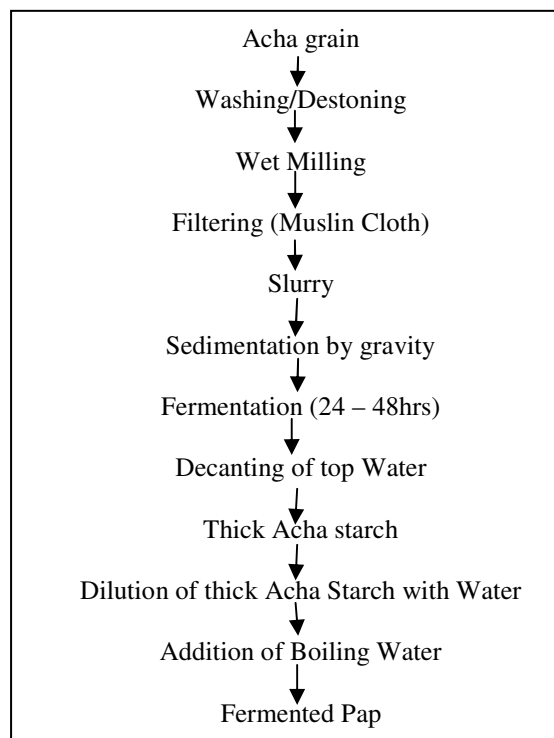


Figure 1: Flow Chart for the preparation of fermented acha pap

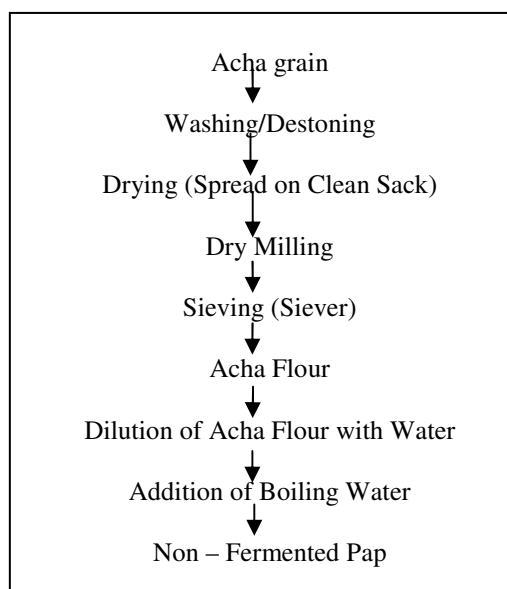


Figure 2: Flow chart for the preparation of non – fermented acha pap

### 3. Results and Discussion

#### 3.1. Demographi Characteristics

A total of 500 persons responded to the questionnaire in the study area, that is 125 persons per location, table 1 summaries the responses. The farmers fell into the following age group with their percentages: - 25 – 30 years (6.6%), 31 – 35 years (21.4%), 36 – 40 years (31.0%), 41 – 45 years (26.2%). The age group of 46 years and above were made up of (14.8%) of the respondents meaning they are growing weak and old and would soon retire completely from acha production considering the labour intensive in the manual cultivation. While the age group of 25 – 30 years may probably not understand the benefits of acha production or may be avoiding the hard task in its production, since is still at a zero mechanization level.

Farmers that had no formal education were (19.6%), while those with primary, secondary and tertiary education were (36.8%, 33.8% and 9.8%) respectively. The large number involved in acha production are those with lower educational qualification, this could be the reason why growing and processing of acha grain still remain a village technology. For so long, as those involved are not enlightened to adopt modern technology to ease their work and improve their yield. Their low financial standing could also be a contributing factor.

In the issue of gender, majority of the grower were female with (77%) while male constituted only (23%). This is not surprising as in most African culture acha is being considered as a domestic activity.

#### 3.2. Agricultural Profile

The major cereal grain grown in the study area include maize, acha, sorghum, millet and rice as indicated by the respondents (42, 32, 16, 5 and 5% respectively). The preference of maize as their major crop could be due to the relatively ease of processing as local and industrial mills are available for their processing. Another reason could be its general acceptability all over the would

Respondents (51%) indicated that acha was their major cereal used, however (49%) rates acha as the second in position interms of usage among other cereals. In spite of the difficulty in processing acha the farmers still hold acha in high esteem compared to other cereals. However, acha consumption has become a major part of the food culture of the people living in the areas especially the Birom in Barkin Ladi and the Mangu people, they used it in place of sorghum or millet for the preparation of semi-liquid (gwate) and thick gruels (tuwo).75.6%of respondents cultivate acha to complement other cereals, while only 24.4% farm it for commercial purpose. That is why is always in short supply and as such the cost price per measure is higher than other grains. The high value farmers attach to acha could be the reason why it is still being cultivated by farmers though at a low level, this has kept the existence of the crop.

Fourteen different varieties of acha grain were identified which have different colours and are grouped into four colour types. Respondents (41%) indicated being accustomed to the white type, while 29%, 22% and 7.4% indicated being accustomed to the brown milk and cream colour types respectively. The reasons given by the farmers on why they preferred to cultivate the white acha were:- availability of planting materials, ease involved in its dehulling preference by consumers and high price value.

The method of harvesting acha grain is still at the village tecnology. Respondents (75%) indicated that harvesting is carried out by cutting the head (containing the grains) using sickles or knives, the whole heads are tied into sheaves waiting threshing. While 25% of the respondent said that the whole plant head in the farm will be packed bit by bit and put in to a calabash or basin and hand brushed properly. The later method of harvesting leads to loss of grains as they are already dried, little shaking could cause the dryseeds to disperse. It has been estimated that loss during harvesting is about 10% of production (Jideani 1990).

De-hulling which is the removal of the husk of the threshed grains is done manually. Respondents (83.4%) indicated the pounding of grain in a wooden mortar many times followed by winnowing to separate the husk from the grain the task is always tedious. While only (16.6%) used de-hulling machine, this is because the machine is not very much available, it was only seen in one of the locations in the study area (i.e Boi village in Bogoro local Government of Bauchi State) fig3. These constraints have discourage the expanded production of acha as well as the intending users (consumers).

SURVEY CHARACTER	NO. OF RESPONDENTS				TOTAL
	B/L	BK	MG	BGR	
Location	125(25.0%)	125(25.0%)	125(25.0%)	125(25.0%)	500(100.0%)
<u>Age</u>					
25 – 30	10(2.0%)	8(1.6%)	7(1.4%)	8(1.6%)	33(6.6%)
31 – 35	30(6.0%)	28(5.6%)	25(5.0%)	24(4.8%)	107(21.4%)
36 – 40	40(8.0%)	37(7.4%)	39(7.8%)	39(7.8%)	155(31.0%)
41 – 45	30(6.0%)	32(6.4%)	35(7.0%)	34(6.8%)	131(26.2%)
Above 46	15(3.0%)	20(4.0%)	19(3.8%)	20(4.0%)	74(14.8%)
<u>Gender</u>					
Male	35(7.0%)	25(5.0%)	40(8.0%)	15(3.0%)	115(23.0%)
Female	90(18.0%)	100(20.0%)	85(17.0%)	110(22.0%)	385(77.0%)

<u>Educational Status</u>					
None	30(6.0%)	23(4.6%)	23(4.6%)	22(4.4%)	98(19.6%)
Primary	47(9.4%)	45(9.0%)	46(9.0%)	46(9.2%)	184(36.8%)
Secondary	43(8.6%)	42(8.4%)	42(8.4%)	42(8.4%)	169(33.8%)
Tertiary	5(1.0%)	15(3.0%)	14(2.8%)	15(3.0%)	49(9.8%)
<u>Major cereal grain grown</u>					
Maize	45(9.0%)	70(14.0%)	70(14.0%)	25(5.0%)	210(92.0%)
Sorghum	25(5.0%)	15(3.0%)	10(2.0%)	30(6.0%)	80(16.0%)
Millet	-	-	-	25(5.0%)	25(5.0%)
Rice	5(1.0%)	-	-	20(4.0%)	25(5.0%)
Acha	50(10.0%)	40(8.0%)	45(9.0%)	25(5.0%)	160(32.0%)
<u>Position of acha among Other grains</u>					
1	85(17.0%)	55(11.0%)	60(12.0%)	55(11.0%)	255(51.0%)
2	40(8.0%)	70(14.0%)	65(13.0%)	70(14.0%)	245(49.0%)
3	-	-	-	-	-
4	-	-	-	-	-
<u>Types of Acha</u>					
White	50(10.0%)	70(14.0%)	50(10.0%)	35(7.0%)	205(41.0%)
Brown	38(7.6%)	55(11.0%)	35(7.0%)	20(4.0%)	148(29.6%)
Cream	37(7.4%)	-	-	-	37(7.4%)
Milky	-	-	40(8.0%)	70(14.0%)	110(22.0%)
<u>Types of soil required for growth of acha</u>					
Sandy-loamy	95(19.0%)	89(17.8%)	93(18.6%)	96(19.2%)	373(74.6%)
Loamy	30(6.0%)	36(7.2%)	32(6.4%)	29(5.8%)	127(25.4%)
Clay	-	-	-	-	-
<u>Time of planting acha</u>					
April-May	83(16.6%)	82(16.4%)	80(16.0%)	-	245(49.0%)
May-June	42(8.4%)	43(8.6%)	45(9.0%)	98(19.6%)	228(45.6%)
June-July	-	-	-	27(5.4%)	27(5.4%)
<u>Time of harvesting</u>					
August	40(8.0%)	42(8.4%)	40(8.0%)	-	122(24.4%)
September	60(12.0%)	58(11.6%)	60(12.0%)	85(17.0%)	263(52.6%)
October	25(5.0%)	25(5.0%)	25(5.0%)	40(8.0%)	115(23.0%)
<u>Method of harvesting</u>					
Cutting the head	125(25.0%)	125(25.0%)	125(25.0%)	-	375(75.0%)
Hand brushing	-	-	-	125(25.0%)	125(25.0%)
<u>Method of dehulling acha</u>					
Pounding in a mortar	102(20.4%)	110(22.0%)	107(21.4%)	98(19.6%)	417(83.4%)
Using dehulling machine	23(4.6%)	15(3.0%)	18(3.6%)	27(5.4%)	83(16.6%)
<u>Best local food products from acha</u>					
Jollof (couscous)	0(2.0%)	10(2.0%)	11(2.2%)	25(5.0%)	56(11.2%)
Kunu zaki	5(1.0%)	8(1.6%)	9(1.8%)	10(2.0%)	32(6.4%)
Tuwo	30(6.0%)	60(12.0%)	65(13.0%)	60(12.0%)	215(43.0%)
Gwate	65(13.0%)	35(7.0%)	30(6.0%)	20(4.0%)	150(30.0%)
Pudding	15(3.0%)	12(2.4%)	10(2.0%)	10(2.0%)	47(9.4%)
<u>Reasons for using acha</u>					
Complement other grain	90(18.0%)	105(21.0%)	103(20.6%)	80(16.0%)	378(75.6%)
Economy	35(7.0%)	20(4.0%)	22(4.4%)	45(9.0%)	122(24.4%)

Table 1: Summary of the Responses from the Questionnaire According To Locations  
Key: B/L= Barkin ladi, BK= Bokkos, MG= Mangu, BGR= Bogoro



Figure 3: Diagram of the de-hulling machine

#### 4. Survey of the Acha Varieties

Fourteen different varieties of acha grains were identified from the four locations in the study area. In Barkin Ladi four were identified, in Bogoro three, while in Bokkos we got two and in Mangu five different types were identified. These grains were indeed different because they differ in size, shape and colour they also have their different local names since there is no acha taxonomy yet. The details is presented in table 2. Research is in progress to determine their nutritional value. This was in agreement with the report of (CIRAD, 2004), which says, there are over 300 *digitaria* species of acha, which are sometimes grown as fodder, only three or four are sometimes grown as cereals. Meaning many more varieties are yet to be discovered and utilized as food.

Acha (*Digitaria exilis*) is variously known as fonio, fundi, findi iburu and the English name hungry rice (Jideani 1990, Ibrahim 2001, Chukwu and Abdul-kadir 2008). At the course of this research we discover that acha can also be referred and called as chun, chidt, kinh, forh and kujuk from the various locality under study, (table2).

S/N	LOCATION	GENERAL NAME FOR ACHA	ACHA TYPE (LOCAL NAME)	COLOUR
1	Barikin Ladi Local Govt		Badama	Milky
2	Barikin Ladi Local Govt	Chun	Whey swello	Cream
3	Barikin Ladi Local Govt		Whey rwey	Cream/yellow
4	Barikin Ladi Local Govt		Chin ryey	Brown
5	Bogoro Local Govt		Chidt kusun/ kukum	Milky
6	Bogoro Local Govt	Chidt/Kinh	Wandat	Brown
7	Bogoro Local Government		Chidt fyali/ kal	White
8	Bokkos Local Government	Forh	Achikara	Brown
9	Bokkos Local Government		Jakalak/mara	White
10	Mangu Local Government		Zor	Milky
11	Mangu Local Government		Nhibang	White
12	Mangu Local Government	Kujuk	Nkin	Brown
13	Mangu Local Government		Kurep	Brown
14	Mangu Local Government		Sun	White

Table 2: Survey of the Different Acha Varieties in the Study Area

All the varieties identified were used to produced fermented and non-fermented pap, and they did well and gave a good product, eventhough they differ in colour. This will go along way to promote the use of the grain and reduced the overdependence of the people on other cereals like maize, sorghum and millet for pap production. It will also serve as an alternative to low sugar food to supplement the diet of the people especially those with diabetes.( Jideani *et al*2011), reported that supplementing diets with acha products would lead to lowering of cholesterol levels, strengthening of the immune system as well as acting as food roughages which aid the digestive system. It is also a good colories and digestible proteins for many people living and depending largely on maize, sorghum and millet grains.

### 5. Conclusion

Majority of the growers are female and those with low educational qualification as well as low financial standing. This could be one of the reason why growing and processing of acha grain still remain a village technology. For so long as those involved can not adapt modern technology to ease their work and improve their yield. The research has also enable us have the understanding about acha, that it has many varieties which differ from each other and can be processed into food product like pap similar to those from other cereal grains (maize, millet and sorghum).

Inspite of the difficulty in processing acha, farmers (growers) still hold acha in high esteem compared to other cereals. The high value attached to this grain is the reason why it is still being cultivated by farmers though at a low level, but this has kept the existence of the crop for years. There is therefore, need for the mechanization of acha farming, harvesting and processing to have greater yield meeting consumers demand.

### 6. References

- i. Jideani I. A. (1999). Traditional and possible technological uses of *Digitaria exilis* (acha) and *Digitaria iburu*: a review plant foods for human nutrition 54:363 – 374
- ii. Lawal A. K, Oyedoyin O. B, and Olatunji O.O. (2009). Fate of pathogenic bacteria during fermentation of cereal porridge (Ogi) – A weaning food formula. Nigerian food Journal. 27: No.1 ISSN1089 – 7241
- iii. Chukwu, O. and Abdul-Kadir (2008). Proximate chemical composition of Acha (*Digitariaexilis* and *Digitariaiburu*) Grains. Journal of food Technology. 6: 214 – 216.
- iv. CIRAD, (2004). An African cereal crop. FrenchAgriculturalResearchCentreforInternationalDevelopent. Fonio cirad. Fr/en/the-plant.
- v. Gyang, J. D., and Wuyep E. O., (2005). Acha: The grain of life. A Bi – annual Publication of the RawMaterialResearchandDevelopmentCouncil. 6 No.1: 39 – 41
- vi. Ibrahim, A. (2001). Hungry rice (Fonio): A neglected cereal crop. NationalQualityStandard (NQS) Newsletter. 6 (4): 4 – 5.
- vii. Dachi, S. N., and Gana, A. S., (2008). Adaptability and yield evaluation of some Acha (*Digitaria exilis* and *Digitaria iburu kippis stapf*) accessions at kusogi – Bida, Niger State Nigeria. African Journal of General Agriculture. 4. 2; 73–77
- viii. Jideani, I. A. (1990). Acha – *Digitaria Exilis*: the neglected Cereal. Agricultural international may Agric. Int'. 142:5.
- ix. Jideani, I. A. and Jideani, V. A. (2011). Developments on the cereal grain *Digitaria exilis*(Acha) and *Digitaria Iburu* (Iburu). Journal of food science and Technology 48 (3) 251– 259.
- x. Pablo, J. M., Richard, J. O., Julio, C., Fransisco, T. (2007). *Digitaria exilis* as a crop in Dominican Republic pp 51 – 53.
- xi. Umoh V. and Fields M. (1981).Fermentation of corn for Nigerian Agidi. Jornal of food science . 46(3) pp 903-905.
- xii. Osungbaro T. O (2009). Physical and nutritive properties of fermented cereal foods. African Jornal of Food Science. 3(2) pp 023-027.
- xiii. Adegoke G. O (2004). Understanding food microbiology 2<sup>nd</sup> edn. Alleluia ventures ltd Ibadan.