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Finger Millet (*Eleusine coracana* L. Gaertn): Production, Management and Utilization Status in Geo-political Northern Plateau State, Nigeria

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ABSTRACT

The cultivation of finger millet in geo-political northern Plateau State is undertaken manually (89%) on any kind of soil (46.9%) by small holder farm families with low income (<\$1.00/day), who operate at subsistence level on land area between 0.5-3 hectares. Finger millet production is constraint in the study area by non-governmental support in terms of making available improved seeds and seedlings, poor knowledge of agronomic practices such as seeding depth, plant spacing and transplanting period, pests/disease attack and prevalence of stubborn weeds such as *Eleusine indica* which resembles the finger millet (*Eleusine coracana* L. Gaertn) plant. The adoption of new technologies which improved finger millet production in the study area was enhanced by farmers who had secondary education (63.45%) and many years (≥6 years) of finger millet farming experience. Finger millet which stores for over 10 years was found to have many uses and was utilized for many purposes, ranging from food and fodder, medicinal to industrial uses as well as high commercial value (N200.00/mudu); thus, it has high potential of contributing to food security and household income of the farm families in the study area.

Keywords: Finger millet, production, constraints, utilization, potential.

INTRODUCTION

Finger millet belongs to the family poaceae. In Africa, the production of finger millet is still at subsistence level by small holder farmers whose farm size is mostly between 0.5≤3.0ha. Finger millet ranks second among millets cultivated in Africa and accounts for 19% of all millets produced in Africa (Obilana, 2002). Finger millet is a major staple among the poor in Africa for food security and sources of energy and protein. The crop is thought to have originated from Uganda and Ethiopia (Doggette, 1989).

Though mainly a tropical crop, today finger millet is grown both in tropical and subtropical climate. It is widely cultivated in India, Nepal, East, Central and Southern Africa as well as West Africa.

The world production record stands at 4.5 million metric tons with Africa contributing about 2.0 million metric tons (Anon, 1996; FAO, 1997). In Nigeria, the cultivation of finger millet is done mostly in the Northern part of the country, especially in Plateau and Kaduna States. Finger millet serves several purposes to the grower and other users. Besides the fact that it is being used as energy and protein sources, the straw serves as thatch material in some communities. In other communities, the grain is a major source of income while in others, it serves as animal fodder and medicine for treatment of human ailments, especially the leaves (Van Wyk, 2000).

Despite the importance of finger millet at both local and national levels, attempt to improve its productivity is met with several constraints, major among which are inadequate labour during weeding, harvesting, poor soil fertility, drought, pests and diseases, lack of improved varieties and non-adaptation of new technologies during production, management, handling and utilization.

With a view of establishing a framework for research and development in finger millet, the production, management and handling of finger millet was assessed in geo-political northern Plateau State which comprises among others Barkin Ladi; Bassa and Riyom Local Government Areas.

METHODOLOGY

The study was conducted in geo-political Northern Plateau state which comprises of three purposively selected Local Government Areas (LGAs): Barkin Ladi, Bassa and Riyom. Plateau state which is considered an agrarian state has other occupations such as trading, civil service and craftsmanship. The state lies between latitude $8^{\circ}24'N$ and longitude $8^{\circ}32'$ and $10^{\circ}38'$ East and has an estimated population of 3,553,440 (PL/NPC 2006) with a land area of $30,913\text{km}^2$.

A multistage sampling technique was used in the selection of the study sample. The selection of Plateau state was purposive because the State is one of the two northern states where finger millet is produced, and the selection of geo-political Northern Plateau state was also purposive because that is the zone in which the three major finger millet producing LGAs are located. From each of the LGAs, five villages were randomly selected and a list of finger millet farming families was compiled. From each selected village, ten (10) finger millet farming families were selected using random selection techniques. A total of fifty (50) respondents were selected from each LGA resulting in sample size of one hundred and fifty (150), but only one hundred and forty-five questionnaires were retrieved and analyzed. The sample size selection is presented more explicitly in Table 1.

Table 1: Selection of Finger Millet Farmers in Geo-political Northern Plateau State, Nigeria

LGAs	Districts	Villages	Sample Size
Barkin Ladi	Fan	Dorowa	10
	Rop	Gana Rop	10
	Heipang	Tabo Kabong	10
	Gashish	Gindin Akwati	10
	Foron	Koron	10
Bassa	Kakek	Igbak	10
	Buji	Kwana	10
	Kishika	Bimbob	10
	Zabolo	Tsayo	10
	Amo	Katak	10
Riyom	Bachit	Fang	10
		Shinong	10
	Riyom	Rim	10
		Makera	10
	Ganawuri	Kwakwi	10

Source: Field Survey, 2011

Based on 2011 cropping season, primary data were collected on demographic characteristics of the finger millet farmers; production and management of finger millet and on the harvesting, handling and utilization of finger millet. Descriptive statistics was employed in analyzing the data.

RESULTS AND DISCUSSION

Socio-economic characteristics of finger millet farmers: Results in Table 2 revealed that majority of the farmers were married (82.07%), men (88.97%) who fall within the active age ranging from 21-30 years (13.10%), 31-40 years (35.86%) and 41-50 years (28.97%) and a few (22.06%) were aged (51 – 60 years). A look at the result revealed that the most active groups of men involved in finger millet farming are in harmony with the findings of Onuk, et al. (2010) that men always have right to land as a productive resource than women in most African communities. The involvement of mostly married farmers, who are within their active age in finger millet farming, is an indication of availability of cheap family labour needed to cope with the much drudgery associated with finger millet farming.

Findings in Table 2 also revealed that majority of the finger millet farmers have had one form of education or the other, ranging from primary (11.03%), secondary (51.03%) and tertiary (37.94%) education. Table 2 further showed that majority of the finger millet farmers had long years of experience in finger millet farming, ranging from 6 – 10 years (41.37%), 21- 25 years, (23.44%), 11 – 15 years (13.10%) and 11.03% of the farmers had over 26 years of experience in finger millet farming. The farmers' long years of experience in finger millet farming coupled with their educational attainment, though mostly at the lower level, according to Alabi, et al. (2005), Murtala, et al. (2004) and

Shehu (2009) enhanced farmer's efficiency of production, adoption of improved technologies, decision making on the farm and also improved their capacity and ability of evaluating and managing risk which help in determining success in any farm enterprise.

Table 2: Socio-economic Characteristics of Finger Millet Farmers

Variable	Range	Frequency	Percentage
a. Age (years)	21 – 30	19	13.10
	31 – 40	52	35.86
	41 – 50	42	28.97
	51 – 60	32	22.06
Total		145	100
b. Gender	Male	129	88.97
	Female	16	11.03
Total		145	100
c. Marital Status	Single	26	17.93
	Married	119	82.07
Total		145	100
d. Educational Attainment	Primary	16	11.03
	Secondary/GR.II	74	51.03
	Tertiary	55	37.94
Total		145	100
e. Farming Experience (Years)	1 – 5	16	11.03
	6 – 10	60	4.37
	11 – 15	19	13.10
	16 – 20	-	-
	21 – 25	34	23.44
	>26	16	11.03
Total		145	100
f. Farm Size Per Household (Ha)	≤0.5	41	28.28
	0.6 – 1.0	55	37.93
	1.1 – 2.0	49	33.79
Total		145	100

Source: Field Survey, 2011

Production and Management Profiles in Finger Millet

Results in Table 3 indicated that majority (46.10%) of the finger millet farmers cultivate finger millet on a combination of clay, loam and lateritic type of soils. Table 3 further revealed that 20.68% of the farmers produced finger millet solely on lateritic soils while 6.7% produced on sandy soil. The variation in response, particularly, that the majority (46.10%) of respondents are involved in finger millet production on a combination of soils rather than a definite type of soil aligns with the findings of Van Wyk and Gericke (2000), who posed that finger millet can be grown on any type of soil.

Regarding farm operation methods, majority of the respondents (89%) operate their farm manually- a few of them practice mechanization method and no animal traction usage at all. The non-usage of animal traction could be associated with the terrain of the study area which is fairly hilly and gravelly and therefore could not allow for animal traction operation. In the contrary, Tenywa, et al (1999) reported that animal traction was the major means of land preparation in Kumi, Paly and Kamuli districts of Uganda.

With respect to the sources of seeds used by farmers, 89.66% of the respondents provided themselves with seeds and this was usually reserved from their previous harvest, 10.34% obtained their seeds from friends and neighbours who are also finger millet producers with no government participation.

Two planting methods were in use. Most of the respondents (93%) indicated that they transplant their finger millet seedlings and only 7% used direct seeding method with usually greater than or equal to 11 seeds per hole. Under transplanting practice, 41.37% of the respondents transplanted at 61 – 60cm apart and obtained high yield while only 13.79% transplants at 20 – 40cm apart and obtained low yield. This finding contradicts Nyende, et al (2001) who reported that plant height and yield are associated with narrow spaced plants. Results in Table 3 g

showed that majority (75.86%) of the finger millet farmers used a combination of organic and inorganic fertilizers as against either organic (13.79%) or inorganic (10.34%) fertilizers. This could be due to the educational status of the farmers and their farming experience (Table 2 d and e). Since majority (51.63%) of the farmers had secondary education and 41.37% of the farmers had 6 – 10 years farming experience, they were better positioned to use a combination of organic and inorganic fertilizers as they could be better informed on the fact that inorganic fertilizers are released in a crop environment faster than the organic which is slowly released. Consequently, the choice of a combination as this is likely to enhance the crop performance throughout the growing season rather than for a short while. The choice of drilling method of fertilizer application (48.27%) above broadcasting (31.03%) and ring method (20.70%) seemed to be linked to the educational awareness of the farmers also. Shehu (2009) reported that educational achievement (secondary) of small scale soya bean farmers enabled them to perform better than their counterparts who had primary education.

An examination of some common weeds in finger millet productivity reveals that *Eleusine indica* (63.45%) affected finger millet farm more than other weeds. This was closely followed by *cynodon dactylon* (12.41%), *Agropyron repens* (8.97%), *Imparata cylindrical* (8.28%) with *striga harmotheca* (6.80%) contributing the least damage in finger millet. This finding is in line with Nyende (2001) who posited that *Eleusine indica* resembles *Eleusine coracana* (finger millet). Hence it is the most difficult weed to eradicate in finger millet production system. Among farmers that used chemicals to control weed in finger millet, 87.58% preferred and used pre-emergence chemicals rather than post emergence (12.41%).

The stages at which most farmers control weeds in the production system was at the nursery/field stage (87.58%). Majority of the farmers (93.10%) indicated that birds were the most serious pest of finger millet (Table 3L) while blast was the most serious disease. A similar blast effect had been reported in Uganda by Esele (1989). Of the methods of disease and pest control in finger millet, cultural method (72.41%) was rated above other methods of pest and disease control in finger millet. Integrated approach method was least; this was probably due to the technicality involved in the use of either chemical method (19.31%) or biological method which no respondent attempted using.

Table 3: Production and Management in Finger Millet

Variables	Frequency	Percentage
a. Soil type for finger millet production		
Sandy	10	6.70
Clay	15	10.34
Loam	22	15.17
Lateritic	30	20.68
Clay/loam/lateritic	68	46.10
Total	145	100.00
b. Farm operation method in finger millet production		
Manual	129	89.00
Mechanized	16	11.03
Animal traction	0	0.00
Total	145	100.00
c. Source of finger millet seeds		
Farmer's farm	130	89.66
Other farmer's farm	15	10.34
Government	0	0.00
Total	145	100.00
d. Planting method of finger millet		
Direct seeding	10	7.00
Transplanting	135	93.00
Total	145	100.00
e. Seeds/hole (direct seeding)		
2 – 5	15	10.30
5 – 10	35	24.14
≥11	95	65.52
Total	145	100.00
f. Spacing in transplanting (cm)		
20 – 40	20	13.79
41 – 60	20	13.79
61 – 80	60	41.37

	≥81	45	31.03
	Total	145	100.00
g.	Type of manure used in finger millet production		
	Organic	20	13.79
	Inorganic	15	10.34
	Organic/inorganic	110	75.86
	Total	145	100.00
h.	Methods of fertilizer application		
	Broadcasting	45	31.03
	Ring (cycle)	30	20.70
	Drilling	70	48.27
	Total	145	100.00
i.	Common weeds in finger millet		
	Eleusine indica	92	63.45
	Cynodon dactylon	18	12.41
	Agropyron repens	13	8.97
	Imperata cylindrical	12	8.28
	Striga (witch grass)	10	6.89
	Total	145	100.00
j.	Method of chemical weed control		
	Pre-emergence	127	87.58
	Post-emergence	18	12.41
	Total	145	100.00
k.	Stages of weed control		
	Nursery	9	6.21
	Field	9	6.21
	Nursery/Field	127	87.58
	Total	145	100.00
l.	Major pest of finger millet		
	Army worms	10	6.89
	Birds	135	93.10
	Total	145	100.00
m.	Major diseases of finger millet		
	Root rot	6.0	4.13
	Blast	139.0	95.86
	Total	145	100.00
n.	Methods of pests and disease control		
	Chemical	28	19.31
	Cultural	105	72.41
	Biological	0	-
	Integrated	12	8.27
	Total	145	100.00

Source: Field Survey, 2011

Harvesting, Handling and Utilization of Finger Millet

Results in Table 4 revealed that all the finger millet farmers (100%) used knives and sickles in harvesting the crop. Mechanized harvesting was not practiced. This might have been due to the problem of land fragmentation as well as for the fact that agricultural practice in the study area and Nigeria at large is still at subsistence level. Majority of the respondents (82.8%) produced yield of less than or equal to 1000kg/ha while their major method of storage was in 'Rumbu' and sacks (55.2% and 24.1%, respectively). It was also found out that finger millet stores well.

Most (86.3%) respondents admitted that they stored finger millet for over 11 years, this finding agrees with Esele (1989) who reported that finger millet can store for over 10 years under good moisture condition.

With respect to both potential and current uses of finger millet, 62.1% finger millet farmers indicated that finger millet is used for making "kunu", "pup" and "tuwo", while 31% indicated that they use finger millet in producing

alcohol and “Burukutu”, a type of alcoholic drink. Finger millet was also found to be a good income earner for most farmers (72.4%), attracting N200.00 per measure (mudu), thus reducing their poverty level.

Table 4: Harvest, Handling and Utilization of Finger Millet

Variables		Frequency	Percentage
o.	Methods of harvesting finger millet	145	145
	i. Knife/sickle	0	0
	ii. Mechanized		
	Total	145	100.00
p.	Yield/ha (kg)		
	≤1000	120	82.76
	1001 – 1500	18	12.41
	1501 – 2000	7	4.82
	Total	145	100.00
q.	Storage methods		
	Bags	30	20.68
	Sacks/bags	80	24.14
	Rumbu	35	55.17
	Total	145	100.00
r.	Storage period (years)		
	6 – 10	20	13.70
	≥11	125	86.30
	Total	145	100.00
s.	Uses of finger millet		
	‘Kunu’ ‘Pup’/tuwo	90	62.10
	Alcohol/burukutu	45	31.03
	Medicine	5	3.45
	All above	5	3.45
	Total	145	100.00
t.	Price/Mudu of finger millet		
	N100.00	5	3.45
	N150.00	30	20.68
	N200.00	105	72.41
	≥N201.00	5	3.45
	Total	145	100.00

Source: Field Survey, 2011

CONCLUSION

The potential to step up finger millet production is enormous. It is an important security crop in areas grown. However, farmers, government and researchers are faced with challenges ranging from poor agronomic practice to handling and storage of the product/produce. The participation of government through agricultural extension agents and funding of research would no doubt increase productivity, processing, packaging, better handling and storage of the product and/or produce.

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CONFLICT OF INTEREST

No conflict of interest

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