(RESEARCH ARTICLE)

Usage of indigenous production and preservation practices by maize farmers in Ugbokolo, Benue State, Nigeria

Mary Ojotule Agada *, Victor Akwu Otene and Sunday Ogwuche Adikwu

Department of Agricultural Extension and Communication, Federal University of Agriculture, PMB 2373, Makurdi, Benue State, Nigeria.

Abstract

This study assessed the usage of indigenous knowledge in the production and preservation of maize by farmers in Ugbokolo, Benue State, Nigeria. Maize farmers formed the population of the study, of which a sample of 148 respondents were selected. Data were collected using a structured questionnaire, and analyzed using descriptive statistics. Findings revealed that 61.3% of the respondents were male, the mean age was 51.02 years, 47.3% possessed primary education, the mean household size was 7 persons, mean farm size was 2.79 Ha, and the mean output was 7.241 bags (100kg bags). The most used indigenous production practices were early planting of maize (87.9%) and intercropping of maize (83.1%), while the most used preservation practices were sun-drying of maize cobs (79.9%) and storage of maize in sacks (69.6%). The major reasons for using indigenous knowledge were accessibility (71.3%), sustainability (66.7%) and affordability (64.0%). The major constraints to use of indigenous production and preservation practices in maize was lack of documentation of IK in maize ($\bar{x}$ = 1.93). Based on these findings, it was recommended that improved storage be introduced to the farmers, while IK is documented for the use of future generations.

Keywords: Usage; Indigenous Knowledge; Production; Preservation; Maize farmers

1. Introduction

Indigenous knowledge (IK) refers to the knowledge possessed by people, and developed out of their personal experiences and from past generations (Steve, 1999). It is knowledge derived from experiences and observations, both from current and past generations (Tella, 2007). Warren (1991) defined IK as the knowledge used by local people to make a living in a particular environment, while Johnson (1992) defined IK as a body of knowledge built up by a group of people through generations of living in close contact with nature.

A major responsibility of agricultural extension is the dissemination of relevant agricultural information to farmers (Otene *et al.*, 2020). The success of this responsibility is more easily achieved when the IK of the farmers are recognized and respected (Louise, 1998). One of the principles of agricultural extension is that knowledge must begin at the level of the farmers (Senanayake, 2006). Knowledge must be built on something, which is the previous knowledge of the farmers. Neglect of the IK base of farmers often lead to failure of agricultural extension programmes. While agricultural information is an important aspect of production, the IK of the farmers must not be ignored. Having an idea of what the farmers know and use on their farms will be of great relevance to agricultural extension agencies.

Maize (*Zea mays L.)* is an important crop in Nigeria, and other parts of the world (FAOSTAT, 2018). FAO (2013) rated maize as the second food crop in Nigeria after cassava. Efforts at increasing the output of maize farmers, and their

* Corresponding author: Mary Ojotule Agada
Department of Agricultural Extension and Communication, Federal University of Agriculture, PMB 2373, Makurdi, Benue State, Nigeria.

productivity will therefore be a beneficial enterprise in Nigeria. One of the ways the farmers can be assisted in enhancing their output is by providing relevant information that will scale up their production, and encouraging the farmers to adopt and use the information in the course of their production. Such information provided to the farmers are often extraneous. Maize farmers have been in production over a long period of time, an indication that they possess some level of IK. Such IK can be enhanced upon only if they are identified.

This paper was therefore intended to identify the production and preservation IK used by maize farmers in Ugbokolo, a major maize producing area in Benue State. Specific objectives of the study were to:

- Describe the socio-economic characteristics of maize farmers in Ugbokolo, Benue State;
- Identify the indigenous production and preservation practices used by maize farmers in the study area;
- Determine the reasons for using production and preservation IK by maize farmers in the study area; and
- Determine the constraints to the usage of IK by maize farmers in the study area.

2. Material and methods

2.1. The Study Area

This study was carried out in Ugbokolo, Okpokwu Local Government Area (LGA) of Benue State, Nigeria. It occupies a landmass of 731 km², with a population of about 176,647 inhabitants (National Population Commission (NPC), 2006). The Local Government lies between latitude 7.158711 and longitude 7.79873 (Distanceto, 2020). It derives its name from River Okpokwu, with the headquarters at Okpoga and is made up of three main districts and twelve council wards. Residents in the study area are predominantly farmers, with maize cultivation as its main source of livelihood (Okpokwu LGA, 2013).

2.2. Population and Sample Selection

Maize farming households formed the population for the study. A sample size of 150 households were randomly selected across 5 villages. A random sample of 30 farmers aged above 40 years was drawn from each village. This older people are believed to be better custodians of indigenous knowledge [16]

2.3. Method of Data Collection

Primary data were used for the study, collected using a structured questionnaire. Trained enumerators were used to collect the data, under the supervision of the researchers. The questionnaire was designed to capture the specific objectives of the study. The collected data were analyzed using descriptive statistics. Two of the administered questionnaire were mutilated, so 148 were used for the analysis.

3. Results and discussion

3.1. Socio-economic Characteristics of Respondents

The socio-demographic characteristics of the respondents is presented in Table 1. The gender of the head of households showed that male farmers dominated indigenous production and preservation practices in maize. Similar studies conducted by Issa *et al.* (2016) reported male dominance in maize farming in their respective studies. This is an indication that more male than female smallholder maize farmers may be the custodians of indigenous knowledge system in maize.

The mean age of the farmers was 51.02 years, an indication that the respondents were advanced in age. This was expected because these categories of farmers would have been into maize farming for a long time and possessed a reasonable level of indigenous knowledge. The finding is consistent with the work of Abdulsalam-Saghir and Banmeke (2015) who noted that indigenous knowledge can be acquired through repeated association with older farmers who are the custodians of such knowledge.

Maize farmers in the study area had low educational level as majority possessed only primary education. The finding is in consonance with the study of Jamilu et al. (2014) who reported low level of education among maize farmers in Kaduna State, Nigeria. Literacy is a key factor that enables communities to engage in knowledge exchange in indigenous production and preservation of maize.

The study found that an average of 7 persons lived in a household in Ugbokolo district, Okpokwu LGA of Benue State, Nigeria. This relatively large household size is a guarantee for the availability of family labour for agricultural activities (*Oni et al.*, 2011).

The respondents were small scale farmers, as the mean farm size was 2.79 Hectares, and most of the respondents (62.14%) had yields ranging between 1-5 100Kg bags. This is an indication that the farmers will require help in the form of information that would boost their output and efficiency.

Table 1 Socio-economic Characteristics of Respondents (n=148).

Socio-economic variables	Frequency	Percentage	Mean
Gender			
Male	92	61.3	
Female	58	38.7	
Age (years)			
≤40	16	10.7	
41-50	76	50.7	51.02
51-60	30	20.0	
Above 60	28	18.7	
Level of Education			
No formal education	24	16.0	
Primary	71	47.3	
Secondary	39	26.0	
Tertiary	16	10.7	
Household Size(numbers)			
1-5	56	37.3	
6-10	72	48.0	
11-15	17	11.3	7.00
Above 16	5	3.4	
Farm Size (ha)			
1-3	79	54.1	
3.1-5.0	57	39.0	
5.1-7.0	5	3.4	2.79
Above 7.0	5	3.4	
Maize Yield (100kg bag)			
1-5	87	62.1	
6-10	37	26.4	
11-15	7	5.0	7.241
16-20	4	2.9	
Above 20	5	3.6	

Source: Filed survey, 2019

Table 2 Usage of Indigenous Production and Preservation Practices among Respondents (n = 148)

Production practices	Frequency*	Percentage	Preservation practices	Frequency*	Percentage
Fallowing	77	52.0	Sorting and grading before storage	62	41.9
Shifting cultivation	75	50.7	Hang maize cobs from hut roof	66	44.6
Crop rotation	52	35.1	Sun-drying of maize cobs	118	79.9
Growing suitable varieties	66	44.6	Cut and stalk maize near the home	16	10.8
Maize seed selection	118	79.7	Arrange maize cobs on raised platform over fireplace	45	30.6
Intercropping maize with other crops	123	83.1	Smoke maize by hanging over fire place	98	66.2
Planting maize on black clayey soil	19	12.8	Storing maize in gourds	19	12.8
Mulching	10	6.8	Storing maize in sacks	103	69.6
Early panting of maize	130	87.8	Storing maize in earthen pots	23	15.5
Bush burning	102	68.9	Use of solid wall bins	3`	2.0
Use of organic manure (poultry droppings, cow dungs, compost)	15	10.1	Keeping maize cobs and shelled grains on the floor	37	25.0
Weeding with hand or hand-hoe for crop maintenance	64	43.2	Use a mixture of red pepper for maize storage	36	24.3
			Use of neem leave extract for maize storage	11	7.4
			Storing maize in traditional cribs	19	12.8

* Multiple responses recorded
Source: Filed survey, 2019

3.2. Usage of Indigenous Production and Preservation Practices

The indigenous production and preservation practices used by maize farmers in the study area is presented in Table 2. The most used indigenous production practices were early planting of maize (87.9%), intercropping of maize (83.1%) and maize seed selection (79.7%). Early planting of maize could be as a result of the absence of irrigation farming, as the farmers need to take advantage of the limited period of rainfall to cultivate their crops. Intercropping of maize could be informed by the shortage of farm land, and farmers making maximum use of the limited farm land available. Zhang and Li (2003) identified intercropping as a major production system.

The preservation practices mostly used by the respondents were sun-drying of maize cobs (79.9%), storage of maize in sacks (69.6%) and smoking of maize by hanging over a fire place (66.2%). The farmers therefore practiced primitive preservation practices that will not cost them any financial implication. Provision of modern preservation facilities and technologies will therefore be of benefit to the farmers, as they will be able to store their produce for a longer period of time, and also maintain the quality of their produce. The finding of this study agrees with the work of Kaaya *et al*. (2006) that drying maize on the bare ground is the most common practice used by farmers all over Africa. Udoh (1997) reported that between 3.6 and 12% of the farmers in the different agro-ecological zones of Nigeria used smoke to protect their maize, and afflatoxin levels decreased when smoke was used to protect maize.

3.3. Farmers' Reasons for Using Indigenous Production and Preservation Practices in Maize

The major reasons for using indigenous maize production and preservation practices is presented in Table 3. The major reasons for using indigenous knowledge were accessibility (71.3%), sustainability (66.7%) and affordability (64.0%). The farmers were therefore interested in production and preservation technologies that will be readily available to them, and this should be considered by agricultural extension agents when making a choice of the technologies to be introduced to the farmers. Technologies that are not accessible to the farmers may not be adopted and used.

The technologies to be introduced to the maize farmers should also be sustainable, and should not cost the farmers so much. Affordability was a major reason for the farmers using indigenous knowledge to produce and preserve their crops, so technologies that are expensive may not be adopted by the farmers.

Table 3 Nigerian Smallholder Farmers' Reasons for Using Indigenous Production and Preservation Practices in Maize (n = 148)

Reasons	Frequency	Percentage
Accessible	107	71.3
Affordable	96	64.0
Compatible with local culture and environment	54	36.0
Available	53	35.3
Reliable	39	26.0
Safe	67	44.7
Convenient	44	29.3
Sustainable	100	66.7

*Multiple responses recorded
Source: Field survey, 2019

3.4. Farmers' Perceptions of Constraints to Use of Indigenous Production and Preservation Practices

The perceived constraints to use of indigenous production and preservation practices in maize are depicted in Table 4. Findings showed that lack of documentation of IK in maize (no records) (x = 1.93), association of indigenous practices with ignorance, illiteracy and poverty (x = 1.93) and selfishness is passing knowledge across to others (x = 1.92) were the most serious constraints faced by maize farmers in the study area. Abdulsalam-Saghir and Banmeke (2015) also found lack of proper documentation of methods as the major constraint faced by farmers in Ogun State, Nigeria.

Where indigenous knowledge is properly documented, it can be easily transferred from one generation to the next. This will avoid the extinction of some agronomic practices. Also, the knowledge of the farmers should be acknowledged and respected, as the negative perceptions they have about their knowledge could discourage the use of such practices.

Table 4 Perceived Constraints to Use of Indigenous Production and Preservation Practices (n = 148)

Constraints	Very Severe	Severe	Not Severe	Mean
Selfishness that makes people not to pass the knowledge to others	49 (32.9)	38 (25.5)	61(40.9)	1.92
Ineffectiveness of IK in maize production and preservation practices	44 (29.5)	46 (30.9)	59 (39.6)	1.91
Limited cooperation among farmers to share knowledge on indigenous maize production and preservation practices	46 (30.9)	41(27.5)	62 (41.6)	1.91
Lack of documentation of IK in maize (no records)	33 (22.2)	71 (47.7)	45 (30.2)	1.93
Increased interest in new technologies	34 (22.8)	35 (23.5)	80 (53.7)	1.70
Lack of standards in using IK	40 (26.9)	60 (40.3)	49 (32.9)	1.95
Associating the use of indigenous practices with ignorance, illiteracy and poverty	45 (30.2)	47 (31.5)	57 (38.3)	1.93
Negative attitudes of exposed and educated people towards use of indigenous knowledge and practices	31 (20.8)	45 (30.2)	73(49.0)	1.73
Western influence that make local people to quickly abandon their traditional ways of agricultural practices	32 (21.5)	54 (36.2)	63(42.3)	1.80

Values in parentheses are percentages

Source: Field survey, 2019

4. Conclusion and recommendations

Findings of this study reveal that most of the farmers were male, advanced in age and possess low level of formal education. The household size of the respondents was relatively high, while their farm size and output were low. The major production practices used by the respondents were early planting, intercropping and maize seed selection, while the preservation practices mostly used were sun-drying, storage of maize in sacks and drying of maize over fire place.

The reasons for using indigenous practices among the respondents included accessibility, sustainability and affordability of the practices. The perceived constraints to the use of indigenous practices were lack of documentation, association of indigenous knowledge to ignorance, illiteracy and poverty, and unwillingness to share indigenous knowledge. Based on these findings, the following recommendations are made:

- Provision of more efficient storage facilities in the study area by agricultural agencies and officers.
- Maize production and preservation technologies to be introduced to the farmers should be accessible, sustainable and affordable.
- The indigenous knowledge of the farmers should be documented for easy preservation and transmission to future generations.
- Financial incentives could be made available to the farmers by extension officers to encourage the sharing of indigenous knowledge.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare that there is no conflict of interest.

Authors' contribution

Agada Mary Ojotule and Adikwu Sunday Ogwuche personally collected for the study, while Victor Akwu Otene analyzed the data presented in this paper. All authors have read and approved the final manuscript

Statement of informed consent

Informed consent was obtained from all participants interviewed in the study.

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