Journal of Biology, Agriculture and Healthcare
ISSN 2224-3208 (Paper) ISSN 2225-093X (Online)
Vol.5, No.4, 2015

Land Clearing and Seedbed Preparation Ethno – Machinery In Nigeria Agriculture: A Study Of The Igalas

Negedu, Tom Onu
Department of Agricultural Science Education, Kogi state college of education,, P.M.B 1033, ANKPA.
Email: negedutomonu@yahoo.com.

Abstract
This work is a survey of land clearing and seedbed preparation ethno-machinery of the Igala ethnic group. The survey studied the design and performance of land clearing and seedbed preparation ethno-machinery with a view to recommending areas of improvement if need be. A catalogue of farm tools for land clearing and seedbed preparation activities as available and used in the study area are presented. The theoretical and actual mechanical advantages and efficiency as applicable were computed and determined for these machinery. Structured questionnaires were the instruments used to determine the demographic characteristics of the farmers. The physical and technical specifications of the ethno-machinery were determined by measurement. Strength of the soil was determined by the use of a cone penetrometer and the weight of the soil samples obtained by weighing with a scale. The result showed that the cutlass and axe had an efficiency of 77% and 32% respectively. The cultivation hoes types 1_A & 1_B, 2 and 3 have an efficiency of 39%, 45%, 25% and 60% respectively. Generally the efficiency of these implements can be classified as low, this indicates that thare is a need for a gradual shift to modern simple machines which will enhance the output of farmers.
Keywords: Land Clearing, Seedbed Preparation, Efficiency,Ethno-Machinery.

Introduction

Nigeria is made up of 450 ethnic groups, each with a predominant population engaged in active agriculture. The technologies applied on these farms varies very much as the culture and tradition of these ethnic groups. The farmers can be classified as small-scale farmers because they cultivate land holdings of less than 2.5 Ha (survey 1998). This practice commonly referred to as subsistence agriculture is mainly to provide various crop types for family consumption. Social indicators shows that 75% of Nigerians live below poverty level (UNO, 2014). The high level of poverty in Nigeria has continued to pose problems to the socio-economic development of the country. This may be attributable to the style and practice of our agriculture.
Soil tillage is one of the oldest operations in the history of crop production, and as a result tools and implements for tillage are more in variety than other machines for crop production. The Igala ethnic group have various agricultural machinery which include land clearing implements such as the cutlass, axe and seedbed preparation implements such as the hoes.
Fashina (1981) classified agricultural mechanization into three levels;

- Elementary stage – (i) use of human power
- Intermediate stage – (i) use of human power and animal power
  (ii) use of human power supplemented with motorization power.
- Advanced stage – (i) complete use of motorization power
  (ii) Use of both motorization and automation power

The level of mechanization in the study area is at the intermediate stage as farmers use human power rarely supplemented with motorization power. This level of technology makes use of tools and implements that rely solely on human power as the prime mover. In some cases, this is referred to as hoe farming dominated by the peasant or small scale farmers. Eight-six percent of land preparation operations in Nigeria are carried out using such hand tools (Mrema&Odigboh, 1993).
With the ever growing population of the country and the need to produce enough food to feed her citizens as well as make available enough raw materials for our agro-based industries thereby creating employment opportunities, the level of our mechanization needs to be stepped up either by way of making improvements on our hand operated tools or by the gradual introduction of simple machines to help boost our agricultural production.

Government has introduced several radical agricultural programmes such as operation feed the nation (OFN), Green revolution (GR) National Agricultural development authority (NALDA) and now the agricultural transformation agenda via the growth enhancement support scheme (GES). These programmes have still not yielded the desired results partly because the technologies on these farms have not been taken into account. Although the drudgery in farm work can be recognized in the use of these various ethno-implements, a careful analysis need be undertaken to determine whether further specific modifications of these implements can be

encouraged or a gradual shift to motorized agriculture be adopted. It is on the above background that the study is out to determine whether these ethno implements need further scientific improvements, aimed at improving the output per farmers in the Igala ethnic group.

Purpose of the study

The main purpose of the study is to survey the land clearing and seedbed preparation ethno machinery of the Igala ethnic group.Specifically, the study sought to;

1. Determine the demographic characteristics of the farmers in the study area.
2. Highlight and bring into focus, the design of land clearing and land preparation ethno-machinery of the farmers in the study area.
3. Examine the performance of these ethno machinery with a view to recommending improvements as the case may be.

Research questions

Based on the purpose of the study, the following research questions were formulated to guide the study.

1. What are the demographic characteristics of the farmers in the study area
2. What different machinery exists for land clearing and seedbed preparation in the study area.
3. What is the performance of the ethno-implements used for land clearing and seedbed preparation in the study area.

Research method

The study employed a survey research design. The study population comprised of all the farmers in the nine (9) local government areas of theEastern Senatorial District of kogi state. Random samplingtechnique was used to select ninety (90) farmers from the three (3) zones of three (3) local government each. The instruments for data collection included records on the history of the Igalas, extension service reports from the state agricultural development project zonal offices, and a 15 item structured questionnaire of multiple answer options. The questionnaire was divided into sections A&B. Section A was used to collect the demographic characteristics of the farmers, section B was used to collect the catalogue of the ethno-machinery and to address the real task.

The structured questionnaire items drafted by the researcher was subjected to face and content validation by two (2) experts in farm power machinery drawn from university of agriculture Makurdi. The corrected questionnaires were administered by the researcher himself and collection of the completed questionnaire from the respondents was done via the same way. One hundred percent return was recorded. The date collected were analysed by frequency counts, simple percentage, while the actual mechanical advantage and percentage efficiency were computed from equations (1) and (2) (Ward and Ward, 1977).

i. Actual mechanical advantage $= \frac{\text{load}}{\text{effort arm} \times \sin\emptyset}$ ---------- (1)

Where load = weight of soil + soil strength

Ø = rake angle

ii. % efficiency = Actual mechanical advantage X 100 ----------(2)

Theoretical mechanical advantage of ethno – implements (cutlass and axe) was computed from equation (3) (Abboth 1977)

iii. Mechanical advantage $= \frac{\text{length of effort arm} \times \sin\emptyset}{\text{Length of load arm}}$ ---------- (3)

iv. % efficiency $= \frac{1}{\text{mechanical advantage}} \times 100$ ----------(4)-

Results

The results of the study are presented in the tables below based on the research questions.

Research question 1

What are the demographic characteristics of the farmers in the study area.

Tale 1: Demographic characteristics of Igala farmers

S/No	Item description	No. of respondents	% of respondents
1.	Average age 41yrs		
2.	Average farm size 2.1Ha		
3.	**Religion**		
	Christianity	38	42
	Islam	25	28
	Traditionalist	27	30
4.	**Education**		
	No formal educational	39	43
	Adult education	27	30
	Primary	14	16
	Secondary	10	11
5.	**Source of farm power**		
	Human power	72	80
	Use of tractor	18	20
6.	**Land acquisition**		
	Inheritance	75	83
	Rentage	8	9
	Gift	7	8
7.	**Source of finance**		
	Personal savings	73	81
	Bank loan	12	13
	Money lenders	5	6
8.	**Handling of farm product**		
	Sell & preserve rest by storage		
	process all for sale	36	40
	Consume & sell rest Consume all	4	5
		39	43
		11	12

Table 1 shows the demographic characteristics of the Igala farmers. The mean age of a typical Igala farmer is 41 years. This concludes that the youths are not so much engaged in productive agriculture. The reason may not be far from the quest for white-colar jobs in cities and probably the lack of social infrastructures in the rural communities. This factor affects the general output from the farms. The average farm size of the Igala farmer is 2.1 ha. This is enhanced by the family method of land acquisition, which accounts for 83% of the respondents. The religious characteristics shows that 42% of the farmers are Christians, 28% Muslims, while tradionalists constitute 30%. The educational status shows that 43% of the farmers had no formal education while those that went through adult extension education organized by the agricultural development project is 30%. Most of the tillage operations are carried out by hand operated tools which accounts for 80% only complemented by tractor service of 20%. Source of finance on farms is through personal savings (81%) while assistance from banks accounts for 13%. On the handling of farm produce, 43% of the respondents consume and sell the rest of the products, 40 sell part and preserve some by storage.

Research question 2: What different machinery exists for land clearing and seedbed preparation in the study area?

TABLE 2: CATALOGUE OF MACHINERY FOR LAND CLEARING AND SEEDBED PREPARATION OF THE IGALA ETHNIC GROUP

			PHYSICAL SPECIFICATIONS					TECHNICAL SPECIFICATIONS			
S/No	Name of machinery	Classificatio/ use	Length of handle (cm)	Length of blade (cm)	Thickness of blade(cm)	Width of blade(cm)	Length of index (cm)	Materials for construction of handle	Material for construction of blade	Rake angle	Remarks
1	Cutlass (opia)	Land clearing	15	45	1.6	10	-	Hardwood	Mild steel	--	
2.	Axe (okanyi)	Land clearing	72	15	1.5	8	8.5	Hardwood	Mild steel	85^0	
3.	Cultivation hoe 1A and 1B (Akagbogw)	Seedbed preparation	A B 54 46.5	A B 31 25	A B 3 2.5	A B 24 21	A B 9 8	A B Hardwood Hardwood	A B Mild steel mild steel	A B 60^0 45^0	
4.	Cultivation hoe 2(Atamu)	Seedbed preparation	52	30	2	24	8	Hard wood	Mild steel	50^0	
5.	Weeding hoe (Ukpekwu)	Weeding/ harvesting	49	19	1.5	8.5	7.5	Hard wood	Mild steel	40^0	Dual purpose

Table 2 shows the catalogue of farm tools used by the Igala farmer. The cutlass is a chopping tool used to clear land and cut trees. It is not fabricated by the Igala blacksmith. The axe is also a land clearing tool, used for falling trees when clearing a virgin land or an existing farmland. It is fabricated by the native blacksmith. Cultivation hoes found in the study area are of three (3) types. Cultivation hoe type 1_A and $1_B$are used in heavy wet clay soils, this account for the extra thickness of the blade and strength of the wooden handle. Type 1_A is used by adults, while type 1_B is used by the youths. Cultivation hoe type 2 is the general seedbed preparation hoe in Igala land. The weeding hoe is a post-planting operation tool used for weeding and sometimes used as a harvesting implement.

Research question3:

What is the performance of the ethno-implements used for land clearing and seedbed preparation in the study area?

Table 3: ACTUAL/THEORETICAL MECHANICAL ADVANTAGES AND PERCENTAGE EFFICIENCY OF IGALA ETHNO – IMPLEMENTS

S/N	Name of implements	Native name	Mechanical advantage	Percentage efficiency	Remarks
1.	LANDCLEARING				
i.	Cutlass	Opia	1.3^{+}	77^{+}	Good
ii.	Axe	Okanyi	3.1^{+}	32.3^{+}	low
2.	SEEDBED PREPARATION				
	Cultivation hoe type 1A				
i.	Cultivation hoe type 1B				
	Cultivation hoe type 2	Akagbogwu	0.39^{x}	39^{x}	low
ii	Weeding hoe	-			
		Akagbogwu	0.45^{X}	45^{X}	fair
iii					
		Atamu	0.25^{X}	25^{+}	low
iv		Ukpekwu	1.7^{+}	60^{+}	good

\+ Theoretical values (mech. advantage and efficiency)
X Actual values (mech. advantage and efficiency)

Table 3 contains the actual and theoretical mechanical advantages and percentage efficiency of these machinery. The non-availability of certain data like strength of the wood species and fibrous trees found in the area, made the computation of mechanical advantage and percentage efficiency of tools like the cutlass, axe and weeding hoe to be based on theoretical values. The cutlass has an efficiency of 77% this is high and no further improvement may be considered except that the handle needs to be padded to cushion the blistering effects on its user. The axe has an efficiency of 32%, which is considered very low.

The cultivation hoe type 1_A and 1_B has an efficiency of 39% and 45% respectively. The type 2 and the weeding hoe has an efficiency of 25% and 60% each.

Major Findings

The followings were the major findings

1. There exists ethno-implements for land clearing and seedbed preparation in the study area. While some are specific for each farm operation others are multi-purpose for instance, the cutlass and the weeding hoe are also used for harvesting purposes.
2. Most of the land clearing and seedbed preparation (tillage) activities are done using the primitive hand propelled tools.
3. The actual efficiency of the cultivation hoes types 1A and 1B and type 2 are 39% 45% and 25% respectively.
4. The theoretical efficiency of the cutlass, axe, and weeding hoe are; 77%, 32%, and 60% respectively.

Discussion of Findings

Findings of the study reveal that there are various ethno-implements used for land clearing and seedbed preparation in the study area. Study also shows that due to the level of mechanization in the area, most of the seedbed preparation (tillage) activities are done using the primitive hand propelled tools. This phenomenon is consistent with the findings of Adamu and Abdulrazaq (2004), when they stated that arable farming in Nigeria is characterized predominantly by the use of traditional tools (hoes) for tillage operations. This finding concurs with mrema and odigboh (1993), when they observed and stated that 86% of land preparation operations in Nigeria are carried out using such hand tools.

The performance of the ethno-machinery, is not satisfactory. This has greatly affected the yields from most farms. This also agrees with Ekpe and Obaten (2004), when they remarked that due to the use of crude farming tools and planting materials, low level of productivity continues to linger despite rapid changes in agricultural technology.

Implication of the Study

The findings and discussions of this study will greatly assist to expose the inadequacies of the ethno-machinery used in agriculture by the Igala ethnic group. The continuous use of these primitive tools cannot ensure timeliness and efficiency in farming operations, it cannot increase the output/farmer and consequently the structure of agriculture will not change.

The results points to the fact that the importance of technology is not its development but its subsequent adoption by farmers for expected change towards increased productivity.

Conclusion

Based on the findings and discussions of this study, the following recommendations are proffered;

1. Since these ethno-machinery have been re-designed over time and their efficiency is still low, simple hand propelled implements should be gradually introduced alongside the existing ethno-tools
2. Proto type machines for our local agriculture, that litter the workshops of universities and polytechnics should be evaluated, standardized and commissioned for production and introduced into our food production system. The national centre for agricultural mechanization,Ilorin,should take up this challenge.
3. Government should rejuvenate and equip her tractor hiring agencies so as to make tractor services available for land clearing and seedbed preparation to complement the power of human muscles.
4. Land development schemes should be opened, so that farmers that have no land can access land for productive purposes.

References

Abbott A.F. (1977).Ordinary level physics, London: Hermann educational books Ltd,

Adamu S. & Abdulrazaq (2004).Effects of tillage on the growth and yield of groundnut (Arachis Hypogea) at Bauchi in the guinea savannah zone of Nigeria.International journal of food and agricultural research (1) 1 & 2, 48-53.

Daily Independent Nig. Com/2014/1 Between Atiku and Nigeria's worsening poverty level.

Ekpe E. & Obaten E.O. (2004). Factors affecting adoption behavior of Maize and cassava farmers in Yakuri agric. Sub. Zone of cross river State Nigeria. International Journal of food and agricultural research. (1) 1 &2:76-83.

Fashina, A.B. (1981). Introducing an appropriate agricultural mechanization in Nigeria.Some basic concepts. Contribution agricultural education Bulletin Zaria 2(1): 15

Mrema G.C. &Odigboh E.U. (1993). Agricultural development and Mechanization in Africa. Policy respectives network for agricultural Mechanization in Africa.NAMA newsletter 1(3) 11-50.

United Nations Organisation (2004) www.Daily Independent Nig.Com/2004/01.

Ward E.H. & Ward A.H. (1977). Essential senior physics in S.I. units. London: Thomas Nelson & sons Ltd.

www.poverties.org. Poverty in Nigeria: Rich country, poor people.

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

Academic conference: http://www.iiste.org/conference/upcoming-conferences-call-for-paper/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar