

A Survey of Mechanization Problems of the Small Scale (Peasant) Farmers in the Middle Belt of Nigeria

Jonathan Kuje Yohanna (Corresponding author), Ango Usman Fulani & Williams Aka'ama

Department of Agricultural Engineering

College of Agriculture, P.M.B 33 Lafia, Nasarawa State, Nigeria

Tel: 234-80-3651-2801 E-mail: engrkuje@yahoo.com

Received: September 15, 2010 Accepted: September 30, 2010 doi:10.5539/jas.v3n2p262

Abstract

Food shortage problem is increasing every day among the developing nations. So many farmers are on the land on small scale basis and their production has not been enough. Their farm sizes have not increased over the years due to absence of the relevant mechanization machinery. This study was made to evaluate the level of solutions of the problems of small farm mechanization, which is the only viable means of food production in the developing nations such as Nigeria. From the studies, the various levels of mechanization tools in the various farm operations are as follows: land clearing 21.54%, tillage 24.62%, planting 3.85%, spraying 86.15%, fertilization 2.13%, weeding 3.08%, harvesting 40%, crop processing 7.69% and crop storage 0.00%. Most of the farm sizes (93.85%) range from 1-5 hectares. The mechanization process being emphasized in the country is still beyond the scope of the small scale farmers who produce the bulk of the food. It is recommended among other things that government should set up agricultural machinery industries which should be developed or purchased and hired out to small scale farmers at subsidized rates to increase the level of mechanization of certain farm operations in the middle belt states of the country.

Keywords: Food shortage, Small scale farmers, Mechanization and Nigeria

1. Introduction

The application of machines to agriculture has been one of the outstanding developments in agriculture (Yohanna, 2004). According to Kepner *et al* (1978) some of the increased production that has been realized must be accredited to more essentially the increased utilization of non-human energy and of more effective machines and implements. The wide mechanization of agriculture in the more developed countries during the 20th century has been widely recognized as a key element producing a high standard of living (Reid *et al.*, 2003). For the economic stability of developing countries, more attention must be paid to small holdings farming who are a majority (Hoki *et al.*, 1992 and Yohanna, 2004).

It is a well known fact that the bulk of agricultural production in the developing countries is in the hands of the small holder farmers who depend very much on tools with very low mechanical advantage. The small farmer or peasant farmer is an important client for new technology developed for the purpose of increasing basic food crops in most tropical developing countries is achieved on relatively small farms by people with very limited capital resources. Most of these farmers, at different ecosystems and with their resultant cultural practices, are aware of the biotechnologies and farming systems that are most suitable for their respective agricultural environments. Several traditional practices reveal indigenous biotechnology at work (Matthew, 1990). To apply these technologies at some economic levels, the farmers would of course, need the assistance of some mechanical devices in the form of appropriate farm tools and machines. As early as 1925, a tractor unit farm was started in Agege, Lagos state (Aboaba, 1977). A tractor hiring unit (THU) was started in Northern Nigeria in 1956 (Nwosu, 1989). There is now a significant number of THUs all over the countries of the developing nations. There appears to have been a consensus that THUs provide a viable strategy for promoting mechanization in the developing countries, yet the agriculture of these countries are yet to receive meaningful mechanization (Ukatu, 2005). The facts remain that agricultural mechanization in Nigeria was introduced at a level of 4-wheel tractors where insignificant number of farmers who need the machines immediately can afford any. This is why the farmers who produce most of the food are yet to benefit from the proceeds of mechanization. The Nigeria policy makers had perceived agricultural mechanization on a narrow concept over long period of time and equated agricultural mechanization to tractorization (Yohanna, 2006). Agricultural mechanization to some, it is

synonymous with tractorization while others take it to simply increase production per worker and per hectare of land cultivated (Kutte and Tya, 2001 and Yohanna, 2007). Hoki *et al* (1992) and Yohanna (2001) pointed out that agricultural mechanization can be achieved simply by the introduction of advanced technologies. The immediate mechanization required by the small scale farmers is yet to reach them. The absence of the type of equipment needed by this level of farmers has continued to encourage drudgery and low productivity with its attended poverty of most of the local peasant farmers.

To further promote mechanization, the federal government during its third development plan period (1975-1980), established the National Centre for Agricultural Mechanization (NCAM) in Ilorin. Though the centre is doing its best, the fact remains that the small scale farmers are yet to receive their package of equipment. The low level of agricultural production in Nigeria is as a result of poor adaptable farm mechanization technologies and management practices (Yohanna, 2006).

World Bank (1987) stated that the dominant agricultural machinery manufacturers have not devoted much of their efforts to the needs of the developing countries. Most of these designs are not suitable for our cultural practices, and are destructive to our local conditions; very expensive to procure and manage by the small holder farmer, and with technologies which the farmer sees as complex. The aftermath of all these is that the farmer resorts to his low technology implement like cutlasses, hoes, axes, and sickles for his work. This makes him a permanent small holder farmer.

The aim of the work presented here is to look at the bottlenecks to mechanization, so that machines and tools could be developed or modified for them, to enhance the successful traditional farmer systems, either as they are or in some modified forms such that mechanical equipment could easily be adopted to them for increased productivity. The introduction of such machines and tools should be affordable to the farmer thereby increasing his productivity and income. This will, in the long run, contribute to the improvement of the national economy.

2. Methodology

The small-holder full time farmers in some selected areas in the country were reached especially through the assistance of an agricultural extension worker and some agricultural students of the University of Agriculture, Makurdi, College of Agriculture, Garkawa, in Plateau State, Lafia in Nasarawa State, Yandev in Benue State, who were on their industrial training. It is believed that the farming activities in the areas visited reflect those of many areas in the middle belt of Nigeria. The states and towns are as follows: Plateau State: Garkawa, Shendam, Jos North and South, Langtang South, Kanem and Qua'Pan. Benue State: Yandev, Gboko and Oturkpo. Kogi State: Anyangba, Loko. Kwara State: Ilorin. Abuja FCT: Kuje area council, Bwari, Gwagwalada. Niger State: Mokwa, Lapai, Minna, Bida. Nasarawa State: Lafia, Nasarawa Eggon, Akwanga, Doma, Azara in Awe, Keana, Nasarawa and Karu.

Questionnaires were designed and administered to both literate and illiterate farmers to extract information from them. For the illiterate, an assistant was used to interpret and filled the questionnaires for them. Some of the questions asked in the questionnaire are about:

- (i) Sizes of farms, so as to decide on equipment capacity.
- (ii) Crops grown, to ascertain the types of tools needed.
- (iii) Mechanization machines available, to know their suitability visa-a-vie improvement on them, to suit local conditions.
- (iv) Equipment lacking in specific environments with a view to designing entirely new tools.
- (v) Extent of human muscle involvement in various farm operations, to determine the extent of need of mechanization machines in such operations.
- (vi) Ability to operate motorized machines, to know what form of machines to develop.
- (vii) The levels of farmers' proposed investment on farm tools, to ascertain their financial capabilities in purchasing mechanization machines.
- (viii) Availability of crop processing and storage facilities.
- (ix) Farming experience in years, to know the weight of their responses. Many other questions were asked verbally. A total of 130 questionnaires, out of the 200 sent out were responded to, representing 65%.

3. Results and Discussions

The quantity, mechanization tools level (MTL), which is not the same as mechanization level, is calculated from the following equation:

$$MTL = N_{mc}/(N_{mc} + N_{ht})$$

Where, N_{mc} is the number of mechanization machines used for a particular farm operation while N_{ht} is the number of hand tools used for the same operation.

Table 1 shows the results on the equipment used for the various farm operations and the number of users, while Table 2 shows the results of other major items.

From the data of the tables, it could be seen that most small scale farmers still do all their work manually; the survey was made across farmers of various experiences; generally their farm sizes range from 1-5 hectares representing 24.62%; 15.39% of them who practice irrigation used watering cans; only 20% of them have crop processing equipment and no mechanized storage facilities. In fact, those who indicated availability of processing machines mentioned cassava grating machine and Diesel grinding and shelling machines and many of them cannot operate powered machines.

It is clear from the studies that farm mechanization process in the middle belt of Nigeria is very far from the actual people on the field. This points to the fact that meaningful improvement in the production of agricultural raw materials in agro-based industries would not be achieved if nothing is done to mechanize this level of farming operations.

4. General remarks and recommendations

The agriculture of all the developed countries started from the small scale level of farming and graduated to the present levels. History has not yet revealed of any nation which has mechanized its agriculture without the leadership of its government. There is the need, therefore, for the federal/state government, through the agricultural engineers and other machinery developers to get to the root of the problem. For the 130 farmers interviewed, only seven (5%) said that they worked hand in hand with an agricultural engineer. What the small holder farmers needs most are improved hand tools which will lessen his drudgery, offer him some mechanical advantage, improve on his timeliness, and simple structures for crop processing and storage. The introduction of motorized machines for such level of farming is likely to gain acceptance, especially for those farmers whose farm sizes are up to five hectares.

The federal government therefore should squarely face the challenges of small-scale farm mechanization practically.

Government should state categorically clear that machines to be developed at each point in time would be back up with the required funding.

Government should set up agricultural machinery industries which should developed or purchased and hired out to farmers at subsidized rates to minimize the level of mechanization of certain farm operations as well as creating mechanization awareness among some farmers in the middle best states of the country.

Government should encourage local fabrication of replaceable parts which should be tested on the farm for at least two farming seasons to ensure reliability before introducing such parts to the farmers.

Government should organized workshop/seminar on farm mechanization and operator training to create awareness on mechanization activities and to avoid damage of machinery due to unskilled personnel.

Ergonomic features should be given a high priority; most especially in this case that much of the power needed to operate the tools will be supplied by the human muscles.

5. Conclusion

A survey of agricultural mechanization bottlenecks of small-scale farmers, who dominate the agriculture of the developing countries, was made for the middle belt states of the country. It is believed that the farming activities in those states reflect those of many states in the country.

It was observed that mechanization is very far from the small scale farmers, who are the major food producers. No country's agricultural mechanization has ever started from above the small-scale level. No country has mechanized its agriculture without its government taking the lead. Emphasis by the federal government has been on the present mechanization level of the western countries. The farmers remain aliens to the process because they do not possess the capability to attain to that level. This makes them permanent small holding farmers. The farmers will do better if simple improved tools, both manually operated and motorized, are made available to them. The federal government should take the lead in the mechanization process, as has been the cases in the countries that have made it.

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Table 1. Equipment used in Farm Operations and the number of users.

Operation	Equipment Used			Mechanization tools level (%)
Land clearing	Cutlass & Hoe 102	Plough -	Herbicide 28	21
Tillage	Hoe 72	Plough 32	Zero/Herbicide 26	24.62
Planting	Cutlass & Hoe 125	Hand Planter 2	Tractor 3	03.85
Spraying	Knap sack 110	Machine 2	None 18	86.15
Fertilizing	Manual 120	Machine 3	None 7	2.31
Weeding	Cutlass & Hoe 126	Machine 4	Tractor 0	3.08
Harvesting	Manual 78	Combine/Reaper 52	None -	40.00
Crop Processing	Manual 120	Machine 10	None -	07.69

Table 2. Results of other Mechanization Components

Item	Components	No.	Percentage (%)
Farming Experience	1-5 years	32	24.62
	6-10 years	25	19.23
	11-15 years	15	11.54
	16-20 years	10	7.69
	21-25 years	10	7.69
	26-30 years	6	4.62
	31-35 years	18	13.85
	36-40 years	10	7.69
	Above 40 years	6	4.62
Farm size	1-5 hectares	122	93.85
	6-10 hectares	08	6.15
Irrigation facilities	Watering Can	20	15.39
	Machines	02	01.54
	No irrigation	108	83.08
Mechanized Crop Processing	Available	26	20.00
	Not available	104	80.00
Mechanized Crop Storage	Available	0	00.00
	Not available	130	100.00
Operation of Motorized machine	Able	30	23.08
	Not able	100	76.92