Present Level of Application of Threshing Machines by Farmers in Nigeria

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Abstract- *A survey of the present level of application of threshing machines by farmers in Nigeria was conducted in view of scarce information on the subject matter. The survey was tailored to harness baseline information for policy formulation and implementation towards promotion of cereals and legumes production in Nigeria. A structured questionnaire was administered in six states (Akwa-Ibom, Benue, Ebonyi, Kebbi, Ogun and Taraba) from each geopolitical zone of Nigeria to gather the required information. The data obtained was analysed using IBM SPSS statistics version 25 computer package. The result from the analysis showed that 16.0% of the farmers used threshing machines while the remaining percentage (84%) of the farmers applied drums, sticks and other manual threshing techniques in Nigeria. This low level of application of threshing machines was found to be synonymous to the increasing postharvest grain losses, contamination and low productivity which has negative effect on food quality and food security in the nation. Hence, intervention policies with capacity to promote the availability, adoption and application of threshing machines in Nigeria by the three tiers of Nigerian government, international donors and the private sector are recommended to reduce postharvest losses of cereals and legumes to achieve food sufficiency in Nigeria.*

Index Terms—Application level, Food security, Mechanization, Nigerian farmers, Threshing machine.

I. INTRODUCTION

Cereals and legumes crops are usually threshed to obtain it grains for food purposes. They constitute important part of dietaries and contribute substantially to nutrient intake of human beings globally. Cereals and legumes are significant source of energy, protein, dietary fibre, vitamins, minerals and phytochemicals [1]. Legumes have been consumed for at least 10,000 years ago and are among the most extensively used staple foods worldwide, both for food and animal feed [2]. Whole cereals and legumes are found to possess immense nutritional potential which could complement one another if appropriately processed and combined [3] since they contain protein and carbohydrate which is superior to animal based foods. Cereals and legumes include rice, guinea corn, wheat, soybean, cowpea etc. and serve as raw materials for food and drug industries. Many scientific studies supported the observation that the consumption of whole cereals and legumes can protect against ageing, diabetes, obesity, constipation, cardiovascular disease and cancer [4] and [5].

Postharvest processing of cereals and legumes is an essential component of their production before consumption [1]. The morphological of these crops necessitate threshing to detach and isolate their seeds/grains from the pinnacles, pods, stalks and trash for human and animal consumption. In developed world, crop threshing is majorly done mechanically since manual threshing methods does not support large scale farming and productivity. The use of threshing machines reduces postharvest losses and leads to higher productivity, adequate food supply and quality of cereals and legumes products to meet food demands of human population that is increasing at a geometric rate.

Processing alters the nutritional quality of grains and the degree of denaturing depends upon the crop type and severity of the process [1] which tend to negatively affect acceptability and market value of the products. So, the importance of the method and level of crop threshing cannot be overemphasized.

Threshing methods include manual method (hand, drum and stick and rubbing under feet techniques) and mechanical threshing method [6] and [7]. In Nigeria, manual threshing method is predominantly used by the farmers, since majority of the producers are peasant farmers who cannot access and afford to hire and own threshing machines or a combine harvester. According to [7], by using one of these manual threshing techniques, a worker can obtain 15 – 40kg of product per hour. So, the use of these manual threshing techniques leads to low productivity, development of internal cracks in grains, fatigue, drudgery, poor product quality and supply deficit that leads to food insecurity. These techniques are also responsible for the presence of sand and other foreign materials that are commonly seen in grain products such as rice, millet, sesame seed, corn etc.

In Nigeria, information about the level of application of threshing machines by farmers to support policy formulation and implementation towards the achievement of food security is scarce. Since [8] pointed that mechanized threshing has the potential to significantly improve labour productivity and metamorphose into an industry capable of producing products

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of acceptable quality. Hence, the objective of this work was to investigate the level of application of threshing machines by farmers to aid policy formulation toward sustainable production of cereals and legumes in Nigeria.

II. MATERIALS AND METHODS

A. Study Area

This survey was undertaken in Akwa-Ibom, Benue, Ebonyi, Kebbi, Ogun and Taraba from the six (6) geopolitical regions in Nigeria which lies between longitudes 3 - 14° E and latitudes 4 - 140° N. The farmers in agrarian communities in each state were targeted and randomly sampled and studied.

B. Sampling Techniques

A stratified sampling design was used in the study. Seventy two (72) enumerators were selected from States' Agricultural Development Programmes (ADPs) and trained for effective administering of a structured questionnaire in six (6) geopolitical regions in Nigeria. One (1) state in each region, three (3) senatorial districts in each state, two (2) local government areas per senatorial district and three (3) agrarian sites/communities in each local government area were selected and considered in the study. A total of 3240 respondents were sampled and investigated but 3201 questionnaires representing 98.80% were retrieved out of the 3,240 administered questionnaires (526 respondents were from Akwa-Ibom, 530 from Benue, 540 from Ebonyi, 527 from Kebbi, 542 from Ogun and 536 from Taraba).

C. Data Analysis

A quantitative data analysis approach was adopted and used in the study. The data obtained were analysed using IBM SPSS statistics version 25 computer package.

III. RESULTS AND DISCUSSION

A. Socio-economic characteristics of respondents

The socio-economic characteristics of the respondents/ farmers studied in this work are shown in Table 1. It included gender, marital status, age, education level, household size and geo-political zone distribution.

The result in Table 1 revealed that majority of the farmers are males (83.13%), married (88.69%) with household size in the range of 6 - 10 people (47.49%) and their ages in the range of 41 - 50 years (44.33%). The low participation of youth and women observed in farming activities can be attributed to lack of threshers and the fatigue involved. It was observed that farmers with household size ranging from 6 - 10 people dominated in the study which may be attributed to free access to human labour. It was also observed that literacy level was low among the farmers since only 27.15% and 35.83% of them attained tertiary and secondary education respectively. This calls for the development of mechanized farming to attract literate citizens to the sector for more productivity. Each geo-political zone of the nation was adequately covered in the study since the percentage of the number of respondents/ farmers from all the zones ranged from 16.43 – 16.93% as shown in Table 1. This indicated that the outcome of this study is a fair representation of the level of application of threshing machines by farmers in Nigeria.

B. Level of application of threshing machines by farmers

Threshing methods and the number of users in the sampled states of Nigeria are shown in Table 2. Figure 1 presents the percentages of the use of threshing machines, drum, sticks and other threshing techniques by farmers in Nigeria.

The result in Table 2 revealed that a higher number of farmers used drum, stick and other techniques while very few of them used threshing machines. Akwa Ibom and Benue states recorded the least number of farmers who used threshing machines while Taraba and Kebbi state got the highest number. This suggests that serious intervention efforts and policies by the international community, Nigerian government and private investors should be channelled towards Akwa Ibom, Benue states and the other sampled states to promote mechanization level and enhance the productivity of cereal and legume products.

TABLE I. SOCIO-CHARRACTERISTICS OF RESPONDENTS

Item	**Frequency**	**Percentage (%)**
Sex		
Male	2661	83.13
Female	540	16.87
Marital status		
Single	153	4.78
Married	2839	88.69
Divorced	26	0.81
Widow	150	4.69
Separated	33	1.03
Age (years)		
Below 20	20	0.62
21-30	187	5.84
31-40	823	25.71
41-50	1419	44.33
Above 50	752	23.49
Educational level		
No Formal	215	6.72
Quranic	253	7.90
Adult	139	4.34
Primary	578	18.06
Secondary	1147	35.83
Tertiary	869	27.15
Household size		
1-5	989	30.90
6-10	1520	47.49
Above 10	692	21.62
Geo-political zone distribution		
North West	527	16.46
North East	536	16.74
North Central	530	16.56
South West	542	16.93
South East	540	16.87
South South	526	16.43

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The percentages of the users of threshing machines, drum, sticks and other threshing techniques in Nigeria are presented in Figure 1. The study revealed that only 16% of the farmers in Nigeria used threshing machines while the remaining percentage (84%) used drums, sticks and other manual techniques to thresh their crops. This very low level of application of threshing machines observed in Nigeria to a large extent could be responsible for the loss of 20 – 30% of total grains produced yearly [9], contamination of products with stones, different levels of grain damage which reduces the quality and market value as well as adequate supply of threshed food products in the nation.

TABLE II. THRESHING METHODS PRACTISED BY RESPONDENTS

Crop threshing methods	State	Frequency of respondents
Drum and stick	Taraba	371
	Kebbi	370
	Benue	424
	Ebonyi	230
	Ogun	158
	Akwa Ibom	110
Threshing machine	Taraba	161
	Kebbi	155
	Benue	30
	Ebonyi	96
	Ogun	62
	Akwa Ibom	4
Others	Taraba	4
	Kebbi	2
	Benue	76
	Ebonyi	214
	Ogun	322
	Akwa Ibom	412

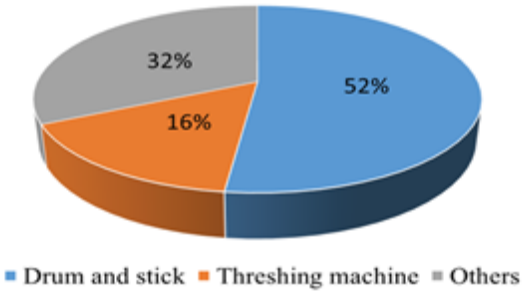

Fig. 1. Percentage of application of threshing machines, drum, sticks and other threshing techniques in Nigeria

IV. CONCLUSION

The level of application of threshing machines by farmers in Nigeria was successfully investigated to aid policy formulation toward sustainable production of cereals and legumes in Nigeria. The study showed very low application of threshing machines by farmers in Nigeria but high application of manual threshing techniques that are not efficient, productive, gender friendly, attractive to youth and women, and supportive to food security in Nigeria which has an estimated population of over 200 million people. Hence, intervention policies with capacity to promote the availability, adoption and application of threshing machines in Nigeria by the three tiers of Nigerian government, international donors and the private sector are recommended to reduce postharvest losses of cereals and legumes, fatigue associated with manual threshing methods and contamination to enhance youth participation, higher productivity, product acceptability and food security in Nigeria.

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