

Assessment of Mechanization Application in Crop Production a Case Study of Ado Ekiti, Nigeria

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Abstract—The assessment of the level of mechanization of crop production in the farm settlement in Ado Ekiti was investigated and analysed. The work was carried out to advise government on how to encourage youth to be interested in crop production. Structured questionnaire was designed to extract information on factors that can make crop production attractive to the youth through mechanisation base on land clearing, ploughing, harrowing, ridging, planting, weeding, fertilizer application and harvesting. Other information also extracted are gender, age, marital status, crop grown, farm size and farming methods. The level at which each of the farm make use of various implement/machines such as tractor, harrow, ridger, planter and harvester was also investigated and analysed. The analysis revealed that 7.2%, 54.4%, 0% and 40.8% of the farmers interviewed had fully mechanized the following crop production steps ridging, pest control, harvesting and irrigation respectively. None of them had ventured into mechanizing harvesting stage. Therefore, the level of mechanisation in Ado Ekiti is low mainly due to the small size of farm land and mixed farming that pre-dominant in the area. Others factors responsible for low turnout of youth in mechanized farming are lack of infrastructure, marketing and financial credits facility.

Keywords— Ado-Ekiti, Assessment, Crop, Level, Mechanization, Questionnaire and Production.

I. INTRODUCTION

Background to the Study

Growing the various native crops to diverse local area within the world's ecosystem is the basically depending on agricultural system. This diversity entails taking different systems of agricultural technologies which is appropriate for each area. Different state of agricultural systems must be provided which matches the level of mechanization and technologies. The level, right choice and successive proper utilization of agricultural mechanization has a immediate and considerable impact on achievable levels of land productivity, labour productivity, the profitability of farming, the sustainability, the environmental and on the quality of life of people engaged in agriculture. A lot of works have been put in place in Iran to develop a mechanical way of improving agricultural production in the area, and this attempt has resulted to a successful one. However, an integrated system whereby researchers, developers, manufacturers and distributors are available locally and engaging in collaborating efforts to solve farmers' mechanization problems locally to meet the demands of each local area it is necessary (Clarke, 2000). The level of agricultural mechanization performs a vital part in increasing agricultural production in order to improve supply of food in the country and its quality to the level of agriculture should be noted. The word 'Mechanisation' is generally the use of machinery to replace human or animal labour especially in agriculture and industry. Suitable contribution of mechanization to agriculture has a good way of increasing the labour efficient, profitable farms, and excellent life to those involved in agriculture (Clerk, 2000). Crop production is a branch of agricultural science that specify on crops to be cultivated based on a particular climate and type of soil, management of water practices should also follow to increase productivity. According to agricultural scientist the

total production by improving productivity is resulting in food security.

Agrochemicals are essential in agricultural inputs to protect crops from diseases, pests and weeds. Use of agrochemicals added to healthy growth of crops and animals, it also to increase farm work efficiency and stable supply of tasty agricultural produce. The chemicals contain fertilizers, pesticides, herbicides, rodenticides which are used to remove the presence of any organism that causes harm, diseases/damage to the crops which decreases production. Although many kinds of chemicals are used in agriculture, they can be categorized into simple groups according to the functions they performed. This includes insecticides, herbicides, fungicides, molluscides, and rodenticides (Ayoola, 1990).

For management of the level of mechanization to succeed, some other inputs upon which it will develop must be available. These include good and focused political manner of governance capable of formulating and implementing policies and laws that can accelerate the process of economic growth and development. The use of hand and animal operated tools and implements, as well as motorized equipments to lower human effort, increase the promptness and quality of various farm operations, thereby increasing yields, quality of product, and overall efficiency. This is in line with the work Raoult-Wack and Bricas (2001) which stated that the responsibility of Mechanization management is to address the challenges facing the future of food demand and supply.

The level of mechanization of crop production for land preparation, planting, fertilizer application, weed control and harvesting at Ado Ekiti contribute immensely to its level of mechanization. In view of the different levels of mechanization of crop production mentioned above question arising includes does the level of mechanization contribute immensely to crop production, do farmers have interest in

mechanized farming and does their farm size encourage mechanized farming.

II. LITERATURE REVIEW

Ado Ekiti

Ado Ekiti is a town in South-western Nigeria; it is the head quarter and the Capital of Ekiti State. It residences are majorly of the Ekiti sub-ethnic categories of Yoruba. The crops produced in the area include yam, cocoyam, cassava, maize, plantain, banana, rice, beans, pepper, tomato, varieties of vegetables, and cotton.

In actualizing the state of agricultural mechanization in Ado Ekiti, it is important to acquired crucial information about the existing situation and the impediments facing the growth of mechanized agriculture. Otherwise, any long-, middle-, and short-term plans will be ineffective and finally problematic and they will lead to a waste of capital and time. This is of crucial importance in both developing and undeveloped areas because of limited capital and economic depression. However there are many areas with potential for development in these States. One of the main reasons, and probably the most important one, for this kind of social structure is the dependence of these states on mechanized and traditional agricultural systems (Ranjbar, 1989). Therefore, attempts to find a solution to enhance the effectiveness of agriculture in the economy of these countries must be taken into consideration as one of the main goals. Mechanization can be describe in agriculture as the "application of mechanical implements or as a whole, the application of the agriculture to increase productivity and to reach sustainable agriculture".

Crop Production in Ekiti State

Crop production, encompassing the series of processes involved in the growing of crops – from land preparation through planting to its yield attain the farm gate, should not do things separately but rather constitutes an integral part of a farming system, which in turn is a constituent of the broader agro-ecosystem and landscape (FAO, 2012). The purpose of crop production is to provide food protection, give to sustainable diets, raw materials for industries and generally, to improve and sustain livelihoods. The connections between the crop production to agricultural production systems and is more beneficial in socio-economic plans that are therefore visible (FAO, 2012). The major cash crops are oil palm, coffee, kolanut, cashew and cocoa. Similar crops include mango, citrus fruits, coconut, sugar-cane, guava and pine apple. Due to the favourable to climatic condition, they benefit good vegetation. The food crops include: yam, cocoyam, cassava, maize, plantain/banana, rice, beans, pepper, tomato and varieties of vegetables

Constraints to Crop Production in Ado Ekiti

A lot of difficulties has been confronting agriculture though; agriculture has been the major source of food and sustenance in Ado Ekiti. Parts of these challenges are neglected from government sectors, Lack of confidence has become the issue of land tenure and ecological approach, hardship and lack of skills of our farmers and land declination

as well also. The land declination implies decrease in the quantity of land to increase the output of more crop and its potentials for ecological operation.

Land Tenure System and Land Degradation

This implies having possession or ability to have ownership of land. This system of communal land ownership prevails among the people of Ado Ekiti, in which individual ownership of land is firmly or securely surrounded in groups occupancy. Collective proprietary right of land in Ado Ekiti related with some difficulties of lack of safety of the land, lack of transportation for the farmers and unavoidable breaking up between the future generations. The important issue has increase personal ownership of land, particularly the southern Nigeria. Over population has increased the values of land and established motivations of selling more lands. Claims on housing and industries has also become an issue, and some owners of land has set out the land for urban and peri-urban lands anxiety of not allowing government taken possession of the lands (Onyebinama, 2004). Eades (1980) revealed that, land tenancy is a great challenge. The confusion concerning land tenancy and insufficient approach to land has been a serious demand to mechanized farming in Ado Ekiti. Furthermore, the available land in Ado Ekiti is overly subdivided into small and uneconomic units, resulting generally in fragmented production systems and low productivity.

Poor Agricultural Pricing Policies

The history of agricultural (inputs and outputs) prices is proportional to the extend agricultural technology and its products subsidy policies is been applied (Fulginiti and Perrin, 1993; Antle 1993). The rate of production can be improved upon through the application of fertilizer (Frisvold and Ingram, 1995). Fertilizer use is promoted primarily by the fertilizer subsidy policy in Nigeria. The main challenge in this regard is that the fertilizer subsidy has been so scarce and has also increase market participation of the people (Department of International Development, 2002). Issues to keep in mind when formulating input subsidy policy include access, which is aimed at improved volume, varieties and quality of agricultural inputs. Also important is affordability; agricultural inputs must be priced within reach of farmers. Despite of the reformation of an economic, fertilizer subsidies have remained. Input subsidies were widely practiced from the 1960s through the 1980s. The costs of subsidies became high and unsustainable. Within 1978 and 1982, the value of subsidizing fertilizers as a percentage of the total costs of subsidizing all eligible inputs and services (bush clearing, agricultural machinery and tractor hire services, equipment sale, pesticides, and seeds) in Ado Ekiti varied from 62 to 77 percent (Olufokunbi and Titilola 1993).

The Resource Poor Farmers and Farms

Generally, the people are poor and most of them are small scale farmers who produce majority of the food in Ado Ekiti. They are said to be resource poor and practice small scale farming (0.1-3 ha). As there are many poor and developing mechanized farmers who produce in large portions and

hectares of land and the excess after family requirements and needs are met are pulled together for the markets to feed other families who cannot farm or have limited access to land resources as well as meeting up with the labour market in a large scale. The mechanized farming is central in food and fibre production. They play significant role in economy stabilization and in hunger mitigation. Paarlberg (2002) stated that other State and towns as a whole between 1970 and 2000, per capita food production increased by 51 percent and this is reasonable if it were secured. The only way out of the woods of hunger is through investing more in mechanized farming in other to increase production of crop through confirmed experiments (adapted on farm research) that can improve productivity.

Soil Quality and Fertility as a Constraint in Food Production

Soil is a natural body upon the earth on which crops grow, and its quality varies widely, ranging from very old, weathered and leached rocks to soils inherently low in nutrient because of their clay and organic matter content (DFID, 2002). In addition to the natural nutrient deficiencies in the soil, soil fertility is declining by the year through nutrient mining “whereby nutrients are removed over the harvest period and lost through leaching erosion or in any other means. According to UNU-INRA/World Bank report, (1999), nutrient levels have declined over the past 30 years, resulting in low levels of minerals like nitrogen (N), phosphorus (P) and potassium (K).

Changes in our Agro-Ecology

The changes in the ecosystems could alter the location of the major crops production regions on the earth. Agricultural production is predominantly at risk and affected by weather (IFPRI, 2004). To strive against the happening induced by weather and climate changes, we have to produce more food, fibre and energy including other commodities and to secure them thereafter, to cope with increasing population under diminishing per capital arable land, water, degrading soil resources and expanding biotic stresses (Paarlberg, 2002). Therefore, the induced instability by climate and weather in food, fibre and energy supplies will alter social and economic stability and regional competitiveness and global consciousness.

Pest and Diseases

The aspect of pest and disease in reducing crop productivity cannot be over emphasized. Pests are all organisms causing significant economic damage to crops while diseases are disorders or physiological disturbances of the normal functions of plants caused by physical, chemical or biological factors. These pests and disease reduce the income of the farmer, crop yield, market prices and value of the affected crop. Food and cash crops comprise the majority of agriculture production and the yield is generally known to be low in many regions of Nigeria. This is partly due to losses from pests and diseases which nearly all crops suffer. These losses in most cases begin with the planting of the seed and continue throughout the field phases of production, storage and processing. They range from hidden losses due to soil

inhabiting nematodes, insects, fungi, bacteria, viruses and other organisms. According to Umeh *et al.*, (2000), diseases are estimated to cause about 20-30 percent loss of annual agricultural production in developing countries.

Agricultural Mechanization

Mechanization is simply the application of machines, scientific innovations and devices to farm operation thereby reducing human labour. Mechanized operation having to do with the use of land for food and fibre production describes farm mechanization. Agricultural mechanization may be interpreted in several ways. According to Anazodo, (1988) agricultural mechanization is defined as developmental establishment of mechanized assistance of all forms and at any level of technological difficulty in agricultural production in order to reduce human labour, improve opportunity and performance of various farm operation and bringing additional land under farming.

Agricultural Mechanization is said to embrace the design and development, manufacture, selection, testing, adoption, distribution, operation, repairs of prime movers and methods for agricultural land development, crop production and primary processing (Olufayo, 2002); while Adegboye (1999), expressed Agricultural Mechanization as the use of engineering ideology and knowledge in agricultural production and processing.

According to Mijinyawa, (2000) agricultural mechanization is not merely the use of tractors and motorized equipment in farming, but rather a process of improving farming operations and farm structures by the use of hand-powered tools, animal-powered implements, engine-powered equipment's and other technological device such as electric motors, pumps, solar driers, silos, irrigation and drainage equipment. Use of machines instead of human effort for agricultural production, processing, handling, preservation and Storage is Agricultural mechanization. It is not an end but a means of eliminating drudgery in farming and eventually increasing food production.

According to Spore, (2002) agricultural mechanization brings about changes in production methods, logistics and equipment. There is the need to adapt processes and tools to the mechanics of elderly and youthful bodies alike. The ergonomics option involves technological development of production tools and equipment as well as improvement in the harvesting, handling and processing methods in order to reduce drudgery and make agricultural production processes more interesting and attractive. Such tasks or operations, according to Odigboh, (1996) includes reduction of human labour, improvement of timeliness and efficiency of various agricultural operations, bringing more land under cultivation, preserving the quality of agricultural products, providing better rural living conditions and markedly improving the growth of economic.

Hand tool technology

The major origin of human tool technology is human being and they operate small tools and implements. This simple and primary level of agricultural mechanization utilizes tools and simple implements using human muscle as the main power

source. Hand tool technology are the greatest mechanized level where a human muscle is the source of power utilizing simple tools and implements such as hoes, machetes, sickles, wooden diggers, etc. This level only produces a low and declining agricultural production and productivity (Mrema and Odigboh 1993).

Draught animal technology

Draught animal technology is the implements and machines that make use of animal muscle as the main power source. Draft animals provided a large part of the power requirements of agricultural production. By this time the gasoline-powered internal combustion engine had been developed and proven successful for automotive power for both transportation and agricultural operations and production. As farm tractor design progressed and improved, the use of animal power in agriculture gradually declined and eventually, the industry is becoming more mechanized.

Mechanical power technology

The greatest level of technology in agricultural mechanization is mechanical power technology. It embraces all agricultural machinery which obtains its main power from other sources other than muscular power. The regular occurring known as power source in agriculture today is the tractor which comes in a wide range of types, makes, size, power rating and capabilities. The level of machinery used in agriculture is still low. The danger is that this is even on the decline.

Main Sources of Power in Agriculture

Human power

Human beings are the main source of power for operating small tools and implements. Human beings are involved in the consistence task like: threshing, winnowing, chaff cutting and lifting irrigation Water. It is generally believed that there is surplus human power available for agricultural operations in India. As a result, farming using manual power is arduous, inefficient and characterized by low rates of work.

Draught animal powered technology

It involves the use of such animals as buffalos, oxen, elephants, camels, horses and donkeys to pull specially designed implements for simple tillage operations. This technology is not much in use, if at all, for such field operations as planting, weeding and harvesting though it has been vigorously promoted in sub-Saharan African countries, including Nigeria.. Draught animal powered technology is generally limited to the Sahel and Sudan savannah ecological zones (Northern part) of Nigeria (Gwarzo, 1988). Although this level of technology is believed to be an improvement over the use of hand tool technology, because more work can be accomplished per unit time using work animals. As at 1960s only about 8% of farm operations were carried out using draught animal powered technology in Nigeria (Odigboh, 1996; FAO, 1988; Mrema and Odigboh, 1993).

Engine powered technology

This is highest modern agricultural mechanization level. Odigboh and Onwualu (1994) reported that engine powered agricultural mechanization technology was introduced in the early 1960s through the farm settlement schemes in Nigeria.

The technology includes the use of tractor sizes which are large as mobile power for field operations, mills, irrigation pumps, grinders and self-propelled machines for production, and, harvesting and handling of a wide variety of crops. The level of engine powered technology use in Nigeria is however relatively low (Odigboh and Onwualu 1994). The fundamental problems facing agricultural mechanization in Nigeria and other African countries comprises implementation of mechanization schemes which are frequently proposed by Government and International Agencies who do not pay adequate concentration to the interest of rural farmers and to the progressions of mechanical changes.

Successive administrations had fashioned concentrated exercise anticipated at performing self-adequacy in food production such as Operation Feed the Nation (OFN) and Green Revolution (GR), however their determination could not be accomplish. These can be caused by lack of cohesive suitable method of agricultural mechanization. Setting off the usage of agricultural mechanization innovation in agricultural application is consequently essential feature for multiplying provision and productiveness of agriculture in Nigeria (Simalenga, 2000). Records indicated that 40% of populace in Africa (Nigeria inclusive) lives under intercontinental insufficiency line of US \$1 per day. If this features nothing, it becomes essentially enough approach the condition. This is because in Africa, agriculture employs a greater proportion of the labour force than in any other region of the world, apart from East Asia and the Pacific (CTA, 2008).

Benefits of Appropriate Mechanization Technology

According to Ogunlowo (2003), some of the benefits that can be derived from adoption of appropriate mechanization technology include reduction or elimination of drudgery of farm operation through the replacement to some extent, of human labour with power equipment, increase in the number of cropping per year because there are enough machines to furnish the labour. To ensure this multiple cropping seasons; mechanization provides effective drying and preservation mechanisms coupled with improved transportation system and reduction in farmers' losses. This is made possible because planting can be done at appropriate time and harvesting can be done quickly and effectively to meet market demand. The surplus farm produce from mechanization will serve as raw materials for agro-allied industries. This will aid industrialization which will in turn absorb the labour displaced from farm by mechanization.

III. RESEARCH METHODOLOGY

Design of the Research

This is the approach by which information is obtained for analysis. Also it can be defined as the process of inquiry, which includes areas of study, data collection, sample methods, sampling frame and procedure, questionnaire design and questionnaire administration.

Area of Study

This research work was carried out in Ado Ekiti, the capital city of Ekiti State as capture in Fig. 1 by Ejiko and Akinwamide, (2017). It is located in the South Western part of

Nigeria is characterized with eight raining months and coordinates (Long and Lat) of 7.6124° N, 5.2371° E. Ado Ekiti has Neighbourhoods such as Afe Babalola University Farm, Eba Egbira, Ago Aduloju and Ago Ologunja are all part of which the research was carried out.



Fig. 1. Map of Ado-Ekiti and its environs (Ejiko and Akinwaide, 2017)

Research Population

In achieving the objectives of this work, a total of 250 questionnaires were administered within Ado Ekiti to practicing farmers.

Questionnaire Design

Questionnaire is the collection of set of questions, which can be either structured or unstructured. The questionnaire used was structured in such a way that it covered the general background and information on the assessment of the level of mechanization of crop production in Ado Ekiti which also involves different levels of mechanization used in various farm operations.

Questionnaire Administration

Questionnaire processes becomes wrong when the systems of administration follows a wrong pattern in administering the questionnaire. The mode of administration of questionnaire employed was Interviewer-administered survey method. Understanding the questions comes first in an interviewer-administered method, this differs from self-administered method. In self-administered method, Perceiving of information must be the first thing before comprehending it. After getting the information, the layout must be well understood (the visual aspect) including of the words (the verbal aspect) as stated by Brancato *et. al.*, (2006). Therefore, comprehending of words should be the first target of respondents and mode of response. In self-administered method, respondents are often given introductory material and instructions. Also, they must understand the directions to lead them through the questionnaire. In an interviewer-administered questionnaire, the interviewer plays a critical

role in the perceptual process. Clearly we need to understand the perceptual process well enough to exert control over it. In securing the confidence of the respondents the following were put in place, which are confidentiality and anonymity. The followings were properly considered before going into the field that is sample size and the respondents. The questionnaire forms were distributed personally and not through delegated enumerators. This method of administering the questionnaire had the following advantages; it allows the interviewer to assess the person being interviewed, it ensures a quick result, it ensures that accurate results were obtained and it enhance follow-up.

Sources of Data Collected

The main source of data collection during this research was primary data. Primary data are data collected by the investigator from a particular survey at hand and used specifically for the purpose they are collected for. For this research, primary data were collected through administration of questionnaire to the various 250 farmers in Ado Ekiti.

The advantages for the source of data collected are the details about the degree of accuracy were known and the sources of errors were easily traced and corrected thereby minimized possible errors. Its disadvantages includes been very expensive and consumption more time in the planning and execution. The other source of data collection which was not used is called secondary data. These are data put into use for the purpose of analysis, which are not originally collected but are borrowed data.

Sampling Procedures

Broadly speaking, the *sample* is the group of people whom researchers actually examine and the population is the group of people whom the survey's findings are to be applied or generalized.

Why should every member of the population be included in the survey? This is a valid question and, indeed, there is one particular survey type where we do just that: the 'census. 'In most other cases, however, investigating the whole population is not necessary and would in fact be a waste of resources. By adopting appropriate sampling procedures to select a smaller number of people to be questioned we can save a considerable amount of time, cost, and effort and can still come up with accurate results - opinion polls, for example, succeed in providing national projections based on as few as 1 to 250 respondents. The key question, then, is what is the meaning of appropriate sampling procedures? When respondents are asked to complete a self-administered questionnaire, they are being asked to perform a task that from their perspective may be different from the task we wish them to perform. From the respondent's perspective, the task may be similar to asking them to view a picture, in which they are free to start anywhere and to make their own decisions as to which parts of the picture to examine in order.

IV. RESULTS AND DISCUSSIONS

Tables 1 to 10 are the summary of the field survey carried out during the research work. The findings gathered from table

1 show that 75.6% (189 farmers) of the respondents were males while females were for 24.4% (61 farmers). This shows that males were more active in crop production than females in the study area. The standard deviation of 0.43 indicated that men were more involved in crop production. The age distribution as presented in table 2 shows that crop production was a common practice among the young and middle aged farmers in the study area. For instance, 36.8% of the farmers were above 40 years while 27.2% of the farmers were between 20-29 years of age, 26.0% of the farmers were above 30 years, 9.2% were between the ages of 50-59 years while only 0.8% of the farmers were above 60 years. This could be attributed to the fact that activities involved in crop production are very rigorous for old people to undertake, hence, the mid-aged utilize their strength in carrying out the farm operations. Table 3 which highlights the findings on marital status indicated that 60.8% of the farmers were married and 34% are single. 2% were divorced and 3.2% of the farmers did not respond to the question for personal reasons. This implied that married people were more involved in crop production in the study area due to the fact that the family members could serve as a source of labour. The other factor is likely due to the rate of consumption of food among family members, which must have forced them into farming. Education is an important variable to effectively harness and utilize the available resources in the environment. This is because it increases one's knowledge, sharpens one's awareness and increases skill to efficiently utilize the available resources. In the study area, crop production could be said to be the practice of the literates as 47.6% of the farmers attended tertiary institutions. Twenty (20%) had Senior Secondary School Certificate (SSSC) and 16.4% attended Middle School Leaving Certificate (MSLC). This implied that majority of the crop producers in this survey had formal education and will find it easy to adopt latest technology in crop mechanization and management. Other reasons may be due to the fact that there is no collar job and government awareness in operation back to land.

Findings in table 5 revealed that 53.6% of the farmers use 'disc plough' as an implement for tractor power while 7.2 % of the farmers use ridger. 34% of the farmers do not use tractor operation in land preparation. Standard deviation was 3.92. This might be as a result of their small farm size. Table 5 shows the source of power during crop planting, the result showed that 77.2% of the farmers use manual power (human labour) in the planting of their crops while only 22.8% use tractor. Standard deviation was 0.84. This implies that majority of the farmers cultivate small area of land. Table 6 indicated that 46.4% of the farmers selected for this study does not use tractor power in applying fertilizer on their farms while 40.8% use 'fertilizer distributor' as an implement coupled with a tractor in applying fertilizer on the farm. A critical look at the rural settings where the data were collected shows that many of the farmers may not be aware that tractor can be used for weeding, planting or fertilizer application. This calls for the creation of awareness of the uses of tractor and its implements in the study area because farm mechanization does not end in land tillage only. Table 7 gives detail of tools used in insect control, if tractor Findings

showed that 54.4% of the farmers selected for this study use 'boom sprayer' in the control of insect pest on their farms while only 44.4% do not use tractor in the control of insect pest. Table 8 present the sources of power used in harvesting crops. The findings showed that 74% of the farmers selected for the study harvest their crops using 'manual method that is human labour.

TABLE 1. Gender distribution of farmers.

Gender	Frequency	Percentage (%)
Female	61	24.4
Male	189	75.6
Total	250	100.0

TABLE 2. Age distribution of farmers.

Age (Years)	Frequency	Percentage (%)
20-29	68	27.2
30-39	65	26.0
40-49	92	36.8
50-59	23	9.2
60 and above	2	0.8
Total	250	100.0

TABLE 3. Marital status of the respondents.

Status	Frequency	Percentage (%)
Married	152	60.8
Single	85	34.0
Divorced	5	2.0
No response	8	3.2
Total	250	100.0

TABLE 4. Educational distribution of respondents.

Level of education	Frequency	Percentage (%)
Middle School leaving Cert.	41	16.4
No formal education	5	2.0
Primary school	27	10.8
Secondary school	50	20.0
Tertiary institution	119	47.6

TABLE 5. Distribution of farmers according to tractor use in land preparation.

Implement used in land preparation, if tractor	Frequency	Percentage (%)
Disc plough	134	53.6
Mouldboard plough	3	1.2
Ridger	18	7.2
Others	10	4.0
Not in use	85	34.0
Total	250	100.0

TABLE 6. Distribution of farmers according to source of power for planting crops.

Source of power for planting crops	Frequency	Percentage (%)
Manual power (Human labour)	193	77.2
Draught-animal power	0	0
Tractor	57	22.8
Total	250	100.0

TABLE 7. Responses of farmers according to tools used in insect pest control, if tractor.

Tools used in insect pest control, if tractor	Frequency	Percentage (%)
Boom sprayer	136	54.4
Other	3	1.2
No response	111	44.4
Total	250	100.0

Table 9 findings on implement used in harvesting, if tractor power revealed that 90.4% of the selected farmer do not use tractor power in harvesting crops while only 9.6% select others in the use of ‘tractor drawn harvester’ on the farm. While Table 10 highlights the availability of tractor for hiring, majority of the farmers that is 58.4% responded ‘no’ which implies tractor is not readily available for hiring in their location and 38.4% responded ‘yes’ which implies tractors were available for hiring in their locality. This could be attributed to the fact that the farmers are located in different locations and their access may differ as a result of the closeness to urban cities.

TABLE 8. Responses of farmers according to tractor implement used in harvesting.

Implement used in harvesting crops, if tractor power	Frequency	Percentage (%)
Tractor drawn harvester	0	0.0
Combine harvester	0	0.0
Not in use	226	90.4
Others	24	9.6
Total	250	100.0

TABLE 9. Responses of farmers to availability of tractor for hiring.

Tractor availability for hiring	Frequency	Percentage (%)
Yes	96	38.4
No	146	58.4
No response	8	3.2
Total	250	100.0

TABLE 10. Responses of the farmers according to type of irrigation used.

Type of irrigation used	Frequency	Percentage (%)
Sprinkler	102	40.8
Furrow	30	12.0
Border	14	5.6
Drip	26	10.4
Other	6	2.4
Total	250	100.0

V. CONCLUSION

The assessment of the mechanization level in crop production at Ado Ekiti was carried out and established by assessing the level at which the respondents venture into mechanized farming. The study carried out show that the impediments to crop mechanization are small farm size (majority less than 1- hectare), lack of fund to access farm equipment, land tenure among others. The production steps already being mechanized are land preparation and Cultural practices. The land preparation include: land clearing, ploughing, harrowing and ridging while the cultural practices include weeding, application of fertilizer and insecticide. Nigeria as a nation has almost all the natural and human resources that will make it self-reliant in food production but ironically the country is threatened by food insecurity. Despite the level of literacy and the involvement of higher percentage of youth in this study, source of power to perform or carry out farm operations are still sourced from human (manual) labour and the inability of Nigeria to produce enough food has been attributed to the country’s failure to accept farm mechanization. The greater proportion of the farming population is peasant farmers that depend on manually

operated implements. The output of this research shows the need to encourage agricultural mechanization by introducing more labour saving devices and employment of other power sources in Nigeria. In general, it has never been more critical than now. Due to the arduous nature of agricultural production activities, the educated youths regard their certificates as excuses to shun farming. The huge allocation of funds to agriculture over the years notwithstanding, the real farmers still continue to present the picture of a “Serf” (Slave) class of the society, condemned to perpetual hand-to-mouth existence that seems to hang like a huge signpost screaming on Nigerian youths to ‘keep away’! With continuing manual or low level of mechanization in farm operations, “People may prefer to beg, steal, rob or starve rather than be employed on tasks that will reduce them to the level of beast of burden”.

VI. RECOMMENDATIONS

The improvement on mechanized farming level of crop production in Ado Ekiti, Ekiti State, Nigeria will require the purchase of more tractors and increase the number of hiring points, procure other farm machines such as cultivators, combine harvester by the government to reduce drudgery and encourage the youths in farming. Organization of training for farmers through agricultural institutions on the adoption of new technologies will improve crop quality and yield. The encouragement of farmer into practising mono-cropping will aid majority farmers to venture into mechanized farming

REFERENCES

- [1] T. D. Adegboyega, Agricultural Engineering Development and Prospect in Nigeria, 1999.
- [2] U. G. N. Anazodo, Farm power and machinery management. An invited paper presented at National Workshop on Cost Effectiveness and Management of Agricultural Mechanization Infrastructure, Federal Training Center, Enugu, 13 pages, August 25-27, 1988.
- [3] J. M. Antle, “Environment, development, and trade between high- and low-income countries,” *American Journal of Agricultural Economics*, vol. 75, issue 3, pp. 784-788, 1993.
- [4] O. Ayoola, The effects of Herbicides on crop production and semantic Scholar, 1990.
- [5] G. Branacato, S. Macchia, M. Murgia, M. Signore, and G. Simeoni, Handbook of recommended Practices for Questionnaire Development and Testing in the European Statistical System, 2006.
- [6] CTA Spore; 2008; Special issue –August 2008, Climate change .http://spore.cta.int pp. 2-24.
- [7] L. J. Clarke, Strategies for Agricultural Mechanization Development. Agricultural Support System Division, FAO, Rome, Italy, 7, 2000.
- [8] DFID (Department for International Development), soil fertility and nutrient management. Resource management Key Sheet no. 7, 2002. http://www/odi.org.uk/keysheets/green 7.soil fertility and nutrient_mgt.htm.
- [9] O. A. Eades, Land tenure system in South-western Nigeria part 1, 1980.
- [10] S. O. Ejiko and J. T. Akinwamide, “Development of a Mathematical Model to Evaluate the Compressive Strength of Sandy Soil, A case study of Ado-Ekiti Metropolis,” 12th Engineering Forum, School of Engineering, The Federal Polytechnic, Ado-Ekiti, Ekiti State, 2017.
- [11] FAO, Agricultural Engineering in Development. Guidelines for establishment of village workshops, Agricultural Bulletin, No. 71, Rome, Italy, 1988.
- [12] FAO/PAR (Platform for Agrobiodiversity), Biodiversity for food and agriculture – Contributing to food security and sustainability in a changing world, Rome, 2011 (available at: http://agrobiodiversityplatform.org/files/2011/04/PAR-FAO-book_lr.pdf).

- [13] L. E. Fulginiti and R. K. Perrin, "Prices and productivity in agriculture," *The Review of Economics and Statistics*, vol. 75, no. 3, pp. 471-482, 1993.
- [14] L. E. Fulginiti and R. K. Perrin, "Agricultural productivity in developing countries," *AgricEcon*, vol. 19, issue 1-2, pp. 45-51, 1998.
- [15] Mijinyawa et al., *Agricultural Mechanization and Agricultural Transformation Agricultural Mechanization in sub-Saharan Africa*, 2000.
- [16] B. Olufokunbi and T. Titilola, "Fertilizer pricing and subsidies in Nigeria: Issues and implications," In *Alternative pricing and distribution systems for fertilizers in Nigeria*, 1993
- [17] U. A. U. Onyebinama, "Land reform, security of tenure and environmental conservation in Nigeria," *Int. J. Agric. Rural Dev*, vol. 5, pp. 86-90, 2004.
- [18] N. U. Ndaeyo, Gabriel S. Umoh, and E. O. Ekpe, "Farming systems in South eastern Nigeria: Implications for sustainable agricultural production," *J. Sust. Agr.*, vol. 17, issue 4, pp. 75-89, 2001.
- [19] IFPRI (International Food Policy Research Institute) 2004: Assuring food and nutrition security in Africa by 2020. prioritizing actions, strengthening actors and facilitating partnerships. *Proceedings of Researcher* 2010; 2(8) 72.
- [20] L. R. Paarlberg, "Governance and food security in an age of Globalization food, agriculture and the environment discussion paper 36. IFPRI pp. 1-50, 2002.
- [21] UNU-INRA/World Bank (United Nations University, Institute for National Resources in Africa and World bank of the United Nations)1999: Africa can feed just 40% of its population in 2025. Press release for world food day, Legon, Ghana and Washington D.C.
- [22] V. C. Umeh, A. N. Ibekwe, and C. A. Amih, "Citrus fruit damage by Hemipteaconceidal in parts of Southeastern Nigeria," *Proceedings of 18th Annual Conference of Horticultural Society of Nigeria 28th May – 1st June 2000*, Ahmadu Bello University, Zaria, Nigeria, 2000.
- [23] Spore, Ageing and Agriculture: A Hard Rock of Age. ACT-Information for Agricultural Development in ACP Countries, 102:1 – 2, 2002.
- [24] A. S. Ogunlowo, *Appropriate Technologies: Bedrock for Industrial Renaissance in Nigeria*, Inaugural Lecture Series, 2003.
- [25] A. Gwarzo, *Animal Draught Power for Rural Agricultural Development*. Paper Presented at AERLS National Seminar and Exhibition on Appropriate Technology Equipment for Nigerian Agriculture, Ahmadu Bello University, Zaria, 1988.
- [26] G. C. Mrema, and E. U. Odigboh, "Agricultural development and mechanization in Africa: Policy perspectives," *NAMA Newsletter*, vol. 1, issue 3, pp. 11-50, 1993.
- [27] E. U. Odigboh, and A. P. Onwualu, "Mechanization of agriculture in Nigeria: A critical appraisal," *Journal of Agricultural Engineering Technology*, vol. 2, issue 2, pp. 1-37, 1994.
- [28] E. U. Odigboh, *Skill Development in Low-cost Agricultural Mechanization Practices*, A Keynote Address presented at the National Workshop on Appropriate Agricultural Mechanization for Skill Development in Low-cost Agricultural Mechanization Practices, NCAM, Ilorin, 1996.
- [29] T. E. Simalenga, "Entrepreneurship in mechanized agriculture technology oriented operations," *Journal of AMA*, vol. 31, issue 3, pp. 61-68, 2000.