



Socio-Economic Survey of Wheat (*Triticumaestivum*L.) Production under Irrigation in Marte Local Government Area, Borno State, Nigeria

^{1*}Joshua, S. D., ¹Hussaini, M. and ²Gwary, M. M.

¹Department of Crop Production, ²Department of Agricultural Extension Services
University of Maiduguri, Maiduguri, Nigeria

ABSTRACT

A survey on wheat (*Triticumaestivum*L.) production under irrigation in Marte Local Government Area of Borno State was carried out between October and December, 2011. Structured questionnaires were administered to thirty (30) randomly selected farmers in three communities (Kirenowa, Baranga and Garadai) of the area where wheat is cultivated by irrigation water from the Chad Basin Development Authority (CBDA) dam. The focus of the research involved analysis of the socio-economic characteristics of the respondents, determination of costs and returns as well as constraints to wheat production in the study area. Result on socio-economic profile of the respondents indicates that 86.7% were males, 50% of them were between 46-60 years of age; 90% married with 60% having pursued Qur'anic education with a high proportion (63%) having a family size of between 1- 10 people and majority (60%) with farming experience of more than 10 years. In terms of variables relating to their farm enterprise, most (66.7%) had a farm size of 1- 5 hectares, 90% used mechanized farming, hired labour (93.3%) and fertilizer (100%) as an input in wheat cultivation. Gross margin analysis revealed that the respondents expended ₦110,000 realizing revenue of ₦200,000 per hectare, resulting in a gross margin of ₦90,000 per hectare and a net farm income of ₦41,000. This shows that wheat production is a profitable venture in the study area. The major constraints include lack of financial support, high cost of inputs and incidence of pests and diseases. Ensuring access to credit, production inputs and efficient extension services were therefore recommended to continuously boost wheat production in the area.

Key words: Socio-economic Survey; Wheat; Irrigation; Marte; Borno State

INTRODUCTION

Wheat (*Triticumaestivum*L.) is the most widely cultivated cereal in the world. It is grown in a wide range of environments but thrives best in temperate zones where there is moderate rainfall and low temperature. Wheat is essentially a temperate crop, whose production is mainly in Europe, America, Asia, North, East and Southern Africa. Wheat cultivation dates back to sixteenth century. Wheat is successfully cultivated under irrigation in small quantity in West and Central Africa on high altitudes and during the dry cool season. In Nigeria it thrives under the dry and cold season in the savanna ecological zones especially between latitudes 10⁰N and 14⁰N and altitude 240-360m above sea level (Falaki, 1994). The production of the crop in Nigeria is restricted to the River Basins and Fadama areas from November to March. The area around Borno, Sokoto, Kano, Kaduna and Katsina where there is cool dry harmattan and the high lands of Jos, Mambilla and Obudu with prevailing low temperature and cool weather constitute the main producing areas in the country.

Reports indicated that up to 1985, domestic wheat production in Nigeria was about 66,000 tons. However, in 1988/89 crop production season about 600,000 tons of wheat was produced from a total of 214,000

*Corresponding email: asdjoshua@yahoo.com

hectares with an average yield of 2 tons per hectare (Olugbemi, 1991). It was reported that world production of wheat is 651.4 million metric tons. In the order of international wheat production, India produces 80.7 million metric tons(MT), USA 60.1 m MT, Russia 41.5 m MT, France 38.2 m MT, Germany 24.1 m MT and the UK 14.9 m MT, respectively (Olugbemi, 1990).The projected production figure of wheat in Nigeria was estimated at 1,196,000 metric tons by the year 2010, while the gross demand projection for the same year was 12,028,000 metric tons given an annual population growth rate of 3.2% (Shaib *et al.*, 1997; Hamidu *et al.*, 2003).

In Northeastern Nigeria, wheat was first grown by Chad Basin Development Authority and it accounted for more than half of total country production (Fada, 1990). Wheat crop prefers soil ranging from sandy loam to clay loam with good internal drainage, containing fair amount of humus and having neutral to slightly alkaline pH. However, it can be successfully grown on a wider variety of soils with appropriate management practices. Wheat grows well in temperature range of 15-32°C with adequate moisture and drier condition at time of harvest. Wheat is produced mainly for human consumption due to the fact that it has high nutritive value and outstanding palatability which is versatile. According to Kumar *et al.* (1990) wheat is one of the few foods that could be eaten at any meal by almost any cultural group. It is used in making products such as bread, pastas, cakes, crackers, and macaroni. Small amounts are used for manufacturing alcohol and beverages, and the by-product such as wheat bran is used as animal feeds, the straw provides valuable fodder.

The main objective of the study was to carry out a socio-economic survey of wheat production under irrigation in Marte Local Government area of Borno State. Specifically the research was undertaken to:

- i) identify the socio-economic characteristics of the wheat farmers;
- ii) ascertain management practices used by the respondents in wheat production;
- iii) analyze the cost and returns in wheat production under irrigation, and
- iv) determine constraints to irrigated wheat production in the study area.

METHODOLOGY

Study area

This research was carried out in Marte Local Government Area. It is located on the Western coast of Lake Chad in Northern Borno State with an area of 3,154km² having an average population of 129,370 according to 2006 census (NPC, 2006). The study area is located in the Chad Basin Area. The strategic location of the Chad Basin Development Authority, an institution that assists farmers in the region with extension package for on-farm research and improved subsistence agricultural production is important. It can improve the socio-economic livelihood of the farmers if the opportunities are explored by these farmers to produce crops such as wheat under irrigation during the off-season. The research area is inhabited by major tribes: Kanuri, Shuwa Arab, Kwayam and Fulani and few other ethnic groups. Marte Local Government Area (Kirenowa) is in the Sudano – sahelian zone of Northeast Nigeria. Marte is a semi–arid area characterized by distinct annual long dry season (9 months or more) and short rainy season (3 months or less). Rainfall is mono-modal starting in May – June with a peak in August and terminating in September/October. The soil of the area is clay loam (LCRI, 2010). The major crops grown in the area are wheat, rice, sorghum, and vegetables.

Sampling and data collection

Three communities were purposively selected for the study. This is based on the fact that wheat is predominately grown or cultivated in those areas. The communities are Kirenowa, Baranga, and Garadai from which ten farmers were selected randomly from each of the communities making a total of thirty (30) respondents who were administered questionnaires. The sources of information for the research include primary and secondary data. Primary data were collected through structured questionnaire that

were administered to the respondents. Secondary information were collected from text books, Journals, internet and Lake Chad Research Institute (LCRI) reports.

Analytical tools

The analytical tools used in this study include descriptive statistics, gross margin and net farm income to determine profitability of wheat production in the area. The descriptive statistics used include frequency, percentage and ranking. This was used to satisfy objectives 1 and 2. Gross margin and net farm income were computed to determine the costs and returns associated with wheat production as a basis to evaluate the profitability of the enterprise. This was done to satisfy objective 3. The models were specified as follows (Olukosi and Erhabor, 2005):

$$GM = GR - TVC \dots\dots\dots(1)$$

Where:

GM = Gross margin (₦) per hectare

GR = Gross Revenue (₦) per hectare

TVC = Total variable Costs(₦) per hectare

$$NFI=TGM-TFC \dots\dots\dots (2)$$

Where NFI=Net Farm Income (₦) per hectare

TGM= Total Gross Margin (₦) per hectare

TFC= Total Fixed Cost (₦) per hectare

RESULTS AND DISCUSSION

Socio-economic characteristics of the farmers

The personal and socio-economic characteristics of farmers including age, gender, marital status, family size, level of education, farm size, farming experience and, landownership pattern of the respondents in the study area are presented in Table 1. The result revealed that a high proportion (50.00%) and some (26.67%) of them fell within the age group of 46 – 60 years and 31 – 45 years respectively. This is followed by 23.33% which were within the age group of 16 – 30 years. The relatively old farmers (over 61 years old) and those that were below 15 years did not participate in farming activities. This shows that greater proportions of the farmers were within 46 – 60 years which means that the farmers are in the middle ages. Thus wheat production in the study area is mainly under taken by able bodied and economically active people.

The gender distribution of farmers shows that the majority (86.67%) were male. This shows that most of the farmers in the study area were male with only few female. In terms of marital status, the result indicates that almost all the respondents (90.00%) were married while the single ones represent only 10.00% of them. The result underscores the need to generate income in order to meet the family's subsistence requirements. Entries in Table 1 also show the family size of the respondents. The family size with 1 – 5 persons and 6 – 10 persons have the same percentage (33.33%) while farmers with 23.33% and 10.00% were having family size of > 10 persons and none, respectively. Family size of the respondents therefore varies between 1-10 members. Large family size in the study area may be associated with the polygamous nature of the society as sanctioned by the major religious practice in the area, Islam which allows marriage of more than one wife which could result in many children. The implication is increased availability of family labour to boost wheat production.

The Table equally shows that large proportion of the farmers had Qur'anic education (60.00%). The remaining farmers had formal education; tertiary education represents 30.00% of the farmers and secondary school education having the least percentage of 10.00% area. The implication of the result is that most of the wheat farmers had western education making it possible for them to benefit from modern techniques as they are more likely to adopt innovations.

Table 1: Distribution of Respondents based on Socio-economic Characteristics (n=30)

| Variable | Frequency | Percentage (%) |
|-----------------------------------|------------------|-----------------------|
| Age | | |
| 16 – 30 | 07 | 23.33 |
| 31 – 45 | 08 | 26.67 |
| 46 – 60 | 15 | 50.00 |
| Gender | | |
| Male | 26 | 86.67 |
| Female | 04 | 13.33 |
| Marital Status | | |
| Married | 27 | 90.00 |
| Single | 03 | 10.00 |
| Family Size | | |
| <5 | 13 | 43.33 |
| 5 – 10 | 10 | 33.33 |
| > 10 | 07 | 23.33 |
| Level of Education | | |
| Secondary | 03 | 10.00 |
| Tertiary | 09 | 30.00 |
| Qur'anic | 18 | 60.00 |
| Farm Size (ha) | | |
| < 1ha | 05 | 16.67 |
| 1 – 5 | 18 | 60.00 |
| 6 – 10 | 07 | 23.33 |
| Farming Experience (Years) | | |
| < 10 | 10 | 33.33 |
| 11 – 20 | 09 | 30.00 |
| 21 – 30 | 07 | 23.33 |
| > 30 | 04 | 13.33 |
| Land Ownership Pattern | | |
| Rented | 20 | 66.67 |
| Bought | 04 | 13.33 |
| Borrowed | 02 | 6.67 |
| Inherited | 04 | 13.33 |

Source: Field Survey Data, 2011

The results in Table 1 indicate that 60.00% of the respondents had farm size within the range of 1 – 5ha while 23.33% fell within the range of 6 – 10ha with 16.6% having less than 1ha. The result implies that majority of the farmers had farm holding of less than or equal to 5ha which means that most of them were small scale farmers producing mainly for subsistence with little marketable surplus. From Table 1 it is evident that most of the respondents spent almost all their lives or half of their lives in farming as the result shows that those with less than 10 years in farming represent 33.33%, those within the range of 11– 20 years represent 30.00%. Some (23.33%) of the farmers fall within the farming experience range of 21 – 30 years with the least in those that are thirty years and above having 13.33%. The analysis shows that 66.67% of the respondents used rented land for their farming activities, while 13.33% owned their land through buying and inheritance, respectively and 6.67% acquired land by borrowing. The result implies varied land tenure system practiced in the area, renting of land being the major method of land

acquisition. Renting of land has negative implication for long term economic investment including investing in irrigation facilities which will negatively affect wheat production.

Management practices and inputs used in wheat production

Analysis of the management practices used by respondents is depicted in Table 2. With respect to use of improved varieties majority (95%) indicated planting improved varieties usually sourced from the LCRI. LCRI has a national mandate to develop improved varieties of wheat. In terms of weeding regime it is apparent that majority of the respondents weed only once with the percentage of 93.33% and two times weeding with 6.67%. This result indicates that weed may not be a major problem in the study area only a single weeding is practiced by most of the respondents. The analysis also shows that majority (90.00%) of the farmers used mechanized land preparation, while 10.00% of the farmers used manual system of farming. Other management systems employed by most of the respondents include use of mechanized channels for irrigation system (90%) and mechanized harvesting (95%).

Table 3 shows that most of the respondents used hired labour (73.33%). The use of hired labour could be because of the scale of production and use of mechanized technology. Irrigated wheat production in the study is mostly done as a commercial venture. The result presented in Table 3 also presents information on input usage by the respondents. The result show high level of input usage, for instance all the respondents (100%) used fertilizer in wheat production. This could partly be due to the fact the wheat farmers are well informed about requisite management practices and the importance of fertilizer application in wheat production. The possible reason is the effect of extension services. Most wheat farmers in the Lake Chad Basin which include the study area receive extension services from the Lake Chad Research Institute. Development of improved varieties of wheat and promotion of wheat production is one of the mandates of the Lake Chad Research Institute. As such, the Institute rendered extension services to farmers on wheat production. This is in addition to extension services the farmers get from the Borno State Agricultural Development Programme (BOSADP).

Table 3 also depicts information on the type of fertilizer commonly used by the respondents. The data revealed that all (100%) of the respondents used NPK and 50% utilize urea fertilizer for their farming activity. In terms of weed control, the result shows that majority (93.33%) used herbicides to control weeds, while only 6.67% of them used other measures with most (96.67%) of them using pre-emergence herbicide.

Table 2: Distribution of Respondents based on Management Practices Used

| Management practice | Frequency | Percentage (%) |
|----------------------------|-----------|----------------|
| Use of improved variety | | |
| Yes | 95 | 95.00 |
| No | 05 | 5.00 |
| No. of Weeding Regime | | |
| One time | 28 | 93.33 |
| Two times | 02 | 6.67 |
| Method of land preparation | | |
| Mechanized | 27 | 90.00 |
| Manual | 03 | 10.00 |
| Irrigation method used | | |
| Use of wash borehole | 10 | 3.00 |
| Use of mechanized channels | 90 | 90.00 |

Source: Field Survey Data, 2011

Table 3: Distribution of Respondents based on Source and Type of Input Used

| Type of input | Frequency | Percentage (%) |
|---------------------------------|-----------|----------------|
| Source of Labour | | |
| Hired labour | 22 | 73.33 |
| Family labour | 08 | 26.67 |
| Farm inputs | | |
| Used of Fertilizer | 30 | 100.00 |
| Types of fertilizer | | |
| NPK | 15 | 50.00 |
| Urea | 15 | 50.00 |
| Use of Herbicide | | |
| Yes | 28 | 93.33 |
| No | 02 | 6.67 |
| Method of herbicide application | | |
| Pre-emergence | 29 | 96.67 |
| Post-emergence | 01 | 3.33 |

Source: Field Survey Data, 2011

Profitability of irrigated wheat production

Table 4 presents gross margin and net income analysis of wheat production in the study area to determine the profitability of wheat production through irrigation in the study area. Information on gross revenue, costs of variable inputs used and the fixed costs margin per hectare are as indicated in the table (Table 4).

Table 4: Distribution of Respondents based on Costs and Returns per Hectare

| Items | Value (₦/ha) | Percentage of cost (%) |
|----------------------------|-----------------|------------------------|
| Gross revenue | ₦200,000 | |
| Fixed cost | | |
| Water pump | 29,000 | 26.36 |
| Hose | 22,000 | 20.00 |
| Total fixed cost | 49,000 | 46.36 |
| Variable input | | |
| Irrigation | 21,000 | 19.27 |
| Fertilizer | 16,000 | 14.54 |
| Seed | 7,000 | 6.36 |
| Harrowing | 6,500 | 5.90 |
| Manual labour | 6,000 | 5.45 |
| Herbicide | 2,300 | 2.09 |
| Total variable cost | 110,000 | 100 |
| Gross margin | 90,000 | |
| Net farm Income | 41,000 | |

Source: Field Survey Data, 2011

The result in Table 4 shows the average total variable cost per hectare for wheat production during the cropping season was ₦110,000 with a net farm income of ₦41,000 per hectare. The cost of hiring water pump accounted for 26.36% of total cost while that of rented hose accounted for 20.00% making a total of 46.36 being the proportion of fixed cost to the total cost incurred by the farmers per hectare during the growing season under reference. Irrigation, fertilizer and seed accounted for 19.27%, 14.54% and 6.36%

respectively, while harrowing, manual labour and herbicide accounted for 5.90%, 5.45% and 2.09% respectively. The gross revenue and total variable cost (expenditure) were ₦200,000 and ₦110,000 respectively giving a gross margin of ₦90,000 per hectare. The net farm income stood at ₦41,000. The result of both the gross margin and net farm income revealed that wheat production is a profitable venture in the study area.

Constraints of wheat production

Respondents' perceived constraints to irrigated wheat production in the study area were depicted in Table 5. The result shows that lack of financial support and high cost of inputs were the most serious constraints as attested by majority (93.33%) of the respondents. The next most important constraints were pests and diseases (90.00%) and low price for produce (86.66%) which were ranked 3rd and 4th, respectively. The result underscores the importance of credit in agriculture. The need to ensure access to credit and subsidized inputs and market cannot be overemphasized for sustained wheat production in the area.

Table 5: Distribution of Respondents based on Perceived Major Constraints

| Constraints | Yes (%) | No (%) | Rank |
|---------------------------|------------|------------|-----------------|
| Lack of financial support | 28(93.33%) | 2(6.66%) | 1 st |
| High cost of inputs | 28(93.33%) | 2(6.66%) | 2 nd |
| Pests and diseases | 27(90.00%) | 3(10.00%) | 3 rd |
| Lack of good market price | 26(86.66%) | 4(13.33%) | 4 th |
| Irrigation facilities | 25(83.33%) | 5(16.66%) | 5 th |
| Transportation | 20(66.66%) | 10(33.33%) | 6 th |

Source: Field Survey Data, 2011

Conclusion and recommendations

The results of the study revealed that the respondents of diverse socio-economic characteristics were engaged in wheat production in the study area. A myriad of problems militate against irrigated wheat production with the major ones including lack of financial support, high cost of farm inputs, transportation and irrigation facilities. The survey also shows that wheat production is a profitable venture.

To continuously promote wheat cultivation under irrigation in Marte Local Government Area, the following are recommended:

- 1) Production credit, transport system, farm inputs and modern farm machineries should be made available and to be at the disposal of the farmers to enable them carter for their immediate problems to ease their production difficulties.
- 2) Government is called upon to come to the aid of these small scale farmers through provision of effective extension services in forms of training, support and education on modern practices in irrigation farming.
- 3) The wheat farmers should be encouraged to form cooperative society to ensure access to credit and government assistance and support as well as to reap benefits from economies of scale in marketing, transportation and storage.

REFERENCES

- Fada, B. (1990). Wheat production in Borno State; Achievement Failure and Potential. First National Conference in Wheat Production, Processing and Utilization in Nigeria, Maiduguri 28/2/1990.

- Falaki A. M (1994). The response of dwarf wheat varieties (*Triticumaestivum* L.) under different water stress levels, dates of sowing and nitrogen fertilization. Unpublished Ph.D. Thesis, Department of Agronomy, Ahmadu Bello University Zaria, Nigeria.
- Hamidu, B. M., Bivan, G. M., Garba, A. and Iro, I. (2003). Resource use efficiency in dry season wheat production in Dustin Ma Local Government Area of Katsina State. *Nigeria Journal of Agriculture Technology*, 11:71 – 75.
- Kumar, V. J. J. Owonubi and A. M. Falaki (1990). Agronomy of irrigated wheat in the Nigerian savanna In: A. J. Rayar, B. K. Kaigama and A. B. Anaso (eds). *Wheat in Nigeria: production, processing and utilization*.
- LCRI (2010). Lake Chad Research Institute in House Review, Meeting and Northeast Zone Refils Workshop Report on Cereals Research, 2010. Maiduguri, Nigeria, 17pp.
- National Population Commission (NPC) (2006). *National Population Census: A Report of Census Exercise, 2006. Published by NPC Headquarters, Abuja, Nigeria.*
- Olagoke, M. A. (1991). Efficiency of resource use in Rice production systems in Anambra State, Nigeria. In: Doss, C. R. and Olson, (Eds.). *Issues in African Rural Development*, Winrock International Institute for Agricultural Development, Arlington, Virginia.
- Olugbemi, L. B. (1990). Major constraints and remedies to wheat production in Nigeria. In: *Wheat in Nigeria: production, processing and utilization* by A. J. Rayar, B. K. Kaigama and A. B. Anaso (eds). 3 – 9.
- Olugbemi, L. B. (1991). Wheat cultivation in Nigeria: problems, progress and prospects. In: D. A. Sanders (ed). *Wheat for non- traditional warm areas in Mexico*, 525 – 529.
- Olukosi, J. O. and Erhabo, P. O. (2005). *Introduction to Farm Management Economics: Principles and Applications*, 2nd Edition. Agitab Publishers, Zaria, Nigeria, 77-83.
- Shaib, B; Aliyu, A. and Bakshi, J. S. (1997). *National Agricultural Research Strategy Plan 1996 – 2010*. Africa Book Builders Limited, Ibadan. 335pp.