



**CONSTRAINTS TO EFFECTIVE PARTICIPATION IN SMALL SCALE DRY SEASON
RICE PRODUCTION BY RURAL FARMERS OF GOMBE STATE, NIGERIA**

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ABSTRACT

The study examined the constraints to effective participation in small-scale dry season rice production by rural farmers of Gombe State Nigeria. A multi-stage sampling techniques were used to select 357 respondents from eighteen villages for their popularity in the dry season rice production. Data were collected from primary sources using structured questionnaires supported with oral interview and then subjected to descriptive statistics such as the; frequency distribution, tables, mean percentage and Garrett's ranking technique for analysis. The results revealed a wide range of production constraints, and thus, out of the fifteen identified major constraints to dry season rice farming in Gombe State, the inadequate capital and credit sources were the most critical issue, ranked the first having 86 Garrett's mean score with 3.33% position. Moreover, rice farmers have identified other constraints affecting dry season rice farming in the following Garrett's rank order as; high costs of input resources (2nd) with 10.0% position; inadequate extension contact (3rd) with 16.67% position; crop pest and diseases (4th) with 23.33%; land fragmentation (5th) having 30.0% position; inadequate farm machinery (6th) with 36.67% position; inadequate improved seeds/planting materials (7th) with 43.33% position; hike in transportation costs (8th) having 50.0% position. Moreover, the poor processing/storage facilities (56.67%), low market prices of paddy rice (63.33%), high cost of hired labour (70.0%), depletion of soil fertility (76.67%), incessant security challenges (83.33%), Natural disaster/climate change (90.0%), and as well as inadequate irrigation water (96.67%) were among the constraints to effective participation in the dry season rice production in the study area. This implies that, small-scale dry season rice farmers are faced with multidimensional problems. The study therefore, recommends holistic approach involving government and non-governmental agencies should be employed to tackle the identified challenges so as to improve productivity and general well-being of the farmers.

Keywords: Constraints, Dry- season, Farmers, Rice and Small-scale

INTRODUCTION

Rice (*Oryza spp.*) is an important cereal crop, produced in different agro-ecological zones in Nigeria. Nigeria has good climatic conditions and soil requirement suitable for rice production, these implies that rice can grow in any season and everywhere in the country. Rice is indispensable in food security and poverty reduction strategies. It is the fourth most important cereal crop (after maize, millet and sorghum), contributes to employment and income generating opportunities, and thus helps to reduce financial stress and poverty among farmers (Food and Agriculture Organisation; FAO, 2019). Also, rice production has emerged as one of the fastest growing subsector of the economy, a source of farm income and as well essential component of food consumption in Nigeria, which moved from a ceremonial to staple food in many Nigerian norms (Bose *et al.*, 2020). Traditionally, the small-scale paddy rice production in Gombe State was limited to flooded system until irrigated rice production was introduced with the development of pump irrigation schemes beginning in the mid-1990s; and this has permitted rice area and production to expand at par with population growth in recent years (Adamu *et al.*, 2018).



Hence, according to Encyclopedia of Accounting tool (2022), a production constrain is a restriction on the output of a system. Constraint acts as a throttle, essentially establishing an upper limit on the amount of output that can be created. However, constraint can be circumvented by designing a process or system to work around it or by outsourcing work to another entity that is not subject to the same constraint. Thus, Rahman (2008), viewed constraint as anything that, prevents a particular system from achieving its set objectives which can be from within or outside the system. However, the main constraints towards farmers are focused in three dimensions; agro-ecological, technological and socio-economic constraints for understanding the real situation farm business. Thus, rice production is currently subjected to climate change, thus resulting in difficulties such as the effects of natural disasters, soil erosion and in accessing water Omotayo (2018). At the same time, producers also encounter difficulties related to accessing land suitable for rice production, inadequate road infrastructure, declining soil fertility levels, and above all, a lack of agricultural inputs. In general, the quantitative and qualitative needs of rice producers for inputs are still being poorly met (Demont *et al.*, 2017).

However, Gombe State has the potential to be self-sufficient in rice production for food, industrial raw material needs and for export. However, a number of constraints have been identified as limiting to rice production efforts by farmers (Talaka, 2023). The constraints facing farmers in the rice production chain are peculiar to each stage of production. These constraints reduce rice output and when the output is also not well processed, the economic value of the products becomes reduced. The constraints also frustrate efforts to make the local variety qualitative and more attractive to consumers (Akinbile *et al.*, 2018). Thus, it is worthwhile to study the constraints to effective participation of rice farmers in dry season farming in Gombe State Nigeria. To this effect, the study is therefore made to identify and describe constraints to dry season rice production in the study area.

MATERIALS AND METHODS

The Study Area

Gombe State is one of the six states of the North-eastern Nigeria, situated on 9°30' – 12°30' N and 08°05' – 12°45' E coordinates, covering an area of 20,265 km² with human population of 2,857,042 million, of which 50.1% were males and 49.9% were females (National Population Commission; NPC, 2006); with annual population growth rate of 3.2% (Kurfi, 2019). Gombe State is located in the Sudan Savannah region interspersed by many rivers and waterways of the Upper Benue River Basin, a feature that supports livestock and crop productions. The study area is regarded a confluence State of economic activities in the region, and the hub for agrobusiness of surrounding States of Adamawa, Bauchi, Borno, Taraba and Yobe. This advantage, made the State vibrant in all respects of the economy (Gombe State Economic Empowerment and Development Strategy; GOSEEDS, 2019). According to Gombe State Government; GSG (2015), the State is multi-ethnic, which constitutes mainly of; Fulani, Tera, Bolewa, Tangale-waja, Kanuri and Hausa. Major crops produced in the State include; cereals, vegetables and fruits (GOSEED, 2019). The climate of the area is mainly characterised with a warm climate, having a mean diurnal temperatures of 35°C – 40°C during the hottest months of (March to May) and to about less than 30°C during harmattan (GSG, 2015). The area has two distinct seasons based on the amount of rainfall received; the dry season (November to April) and the wet/rainy season (May to October) with an average (850 mm) amount of rainfall received per annum in 110 to 125 days (GOSEEDS, 2019). The State is endowed with numerous solid minerals and oil deposits. Climate change due



to human activities; flooding, deforestation, poor wastes management, quarry works and mineral extraction are emerging environmental challenges of the State. (GSG, 2015).

Sampling Procedure and Sample Size

A multistage sampling technique was employed so that every member in the survey could have unbiased chance of being selected for the study. In stage I; three (3) local government areas (*Balanga, Kwami* and *Yamaltu-Deba*) notable for dry season rice production were purposively selected. In stage II, three (3) notable districts for dry season rice production were purposively selected from each of the local government areas for the study. These include; *Dadiya, Cham, Talasse* (in Balanga local government area), *Malleri, Daban-fulanai, Gaji-bauchi* (In Kwami local government area), and *Jagaji, Yemaltu, Pata* (in Yamaltu-Deba local government area). In Stage III; two (2) villages each from the nine (9) districts were purposively selected based on their outstanding rice productivity levels in the dry seasons. These are; *Dadiya, Babambam, Kindiyo, Kulani, Bakassi, Wadaci, Malleri, Tinda, Daba, Jurara, Malam-bura, Bakari-taffi, Maiqaho, Dasan-yunusa, Dadinkowa, Gwani, Kurjele and Dumbu*. In stage IV, a total of 357 small-scale dry season rice producers were selected using simple random sampling technique proportionate to their population in each village. Thus, in determining the sample size appropriate for this study, the Taro-Yamane's model was used. The model in its implicit form is expressed below as was employed by (Mubigiri, 2016);

$$n_i = \frac{N}{1+N(e)^2} \quad \dots (1)$$

where;

n_i = sample size (number of dry season rice farmers for the study)

N = Number of registered dry season rice farmers with the Rice Farmers' Association of Nigeria (RIFAN)

e = sampling error (0.05)

1 = unity (constant)

Moreover, the Bowley's proportional allocation technique was used to determine the corrected sample size drawn from each of the selected village. The model is expressed by Ngene (2017), as was adopted by Udeh *et al.* (2018), as follows;

$$nh = n * \frac{Nh}{N} \quad \dots (2)$$

where:

nh = Proportional number of small-scale dry season sampled from each village

n = sample size (number of dry season rice farmers to participate in the study),

Nh = Total number of small-scale dry season rice farmers drawn from each village

N = Number of registered dry season rice farmers in the study area.

Method of Data Collection

Data for the study were collected from the primary sources using structured questionnaires and supported with oral interview in situations where the respondents did not understand the questions. Also, an informal *in situ* interviews to note responses and observe the socio-economic activities relative to the information required in the questionnaire were conducted to allow for generation of qualitative information not captured in the questionnaire. Hence, the questionnaire contained some open-ended questions that allowed the dry season rice farmers express themselves freely on particular issues of their concerns.



Method of Data Analysis

To achieve objectives of the study, the descriptive statistics such as; the frequency distribution, tables, means, percentage and Garrett's ranking, were used for data analysis. Essentially the descriptive statistics are assumed to show the distributions of the variables, they are characterised by simplicity, straight forwardness, utility and dependability (Nasir, 2005).

RESULTS AND DISCUSSION

Constraints to Dry Season Rice Farmers in Gombe State

Rice production always depends on the season, which can influence production activity. Hence, increasing dry season rice production is important not only to obtain greater economic returns but also to meet rice self-sufficiency requirements at different levels. However, a wide range of constraints to rice production mostly grouped as abiotic, biotic, socio-economic and management issues (Ngala, 2013). While the abiotic constraints include; drought and erratic rainfall, the biotic constraints comprise of pests, diseases and weeds, and the socio-economic and management issues include; land ownership, capital, wealth, high cost of machineries/inputs, poor infrastructure, unskilled farmers, slow technological advance transfer, poor access to credit and uncoordinated marketing (Idowu, 2021). However, the constraints were ranked based on the Garrett's mean scores of the responses to the constraints by the dry season rice farmers, since the options were made for multiples responses and presented in Table 1.

- i) Inadequate capital and credit sources were the most critical issue, ranked the first with 86 Garrett's mean score. The results aligned with the works of Chidiebere-Mark (2019), who posited that, adequate capital and access to credit by rice farmers in Ekiti State Nigeria, facilitated the scope of production by enabling farmers to purchase the needed input resources and in adequate quantities. However, the inherent risk in rice productivity has been reported to affect the ability of rural farmers to obtain credit from formal institutions. This was in consonance with the studies of Ayuba *et al.* (2020), who reported that cumbersome protocol and complex procedure in getting farm credits were the major constraint to rice farming in Kebbi, Bauchi and Plateau States respectively. Hence, Sasa and Umar (2017), added that compulsory bank savings with high interest rates were the major impediments in accessing credit facilities for women agricultural entrepreneurs in Gombe Microfinance Bank, Nigeria. Thus, Bassim and Hayat (2022), concluded that, the problem of lack of adequate capital faced by the rice farmers could be reduced by increasing incomes through the acquisition of non-interest loans, which implies higher efficiency by rice farmers.
- ii) High costs of input resources was identified as the next constraint affecting dry season rice farming in the following Garrett's rank order as the (2nd). Similarly, Banseka *et al.* (2023), reported that, there has been high costs of variable inputs for rice production in Taraba State Nigeria, which was unconnected with the high competition for resource inputs against low supplies of the inputs. Hence, Banseka (2023) concluded that, most farmers were in daring need of farm inputs, but, very often, the inputs were not available.
- iii) Inadequate extension contact ranked the (3rd) constraint to dry season rice farmers in the study area. According to Akinbile *et al.* (2023), reliance on contacts with frontline extension agents has not enhanced farmers' access to information in Ekiti State Nigeria, as the extension agent-farmer ratio has dwindled over time. This may lead to farmers not having sufficient and accurate information for them to make an informed decision. Therefore, there is the need for non-contact form of extension delivery with wider reach so as to ensure that rice farmers could



have meaningful access to relevant information about their farm business and general well-being.

- iv) Problem of crop pest and diseases (4th). Subsequently, Talaka (2023), posited that, one of the major reasons for the low yields of rice in Nigeria is attack by pests. The rice plant is an ideal host for a large number of pests ranging from insects to birds which are major constraints to rice production in northern Nigeria (Kamai *et al.*, 2020). Most of the local varieties of rice are vulnerable to pests and diseases. The common diseases associated with rice include; blast, rice yellow mottle virus and brown spot while common rice pests include; *Diopsis spp.*, African rice gall midge, short horned grasshopper, quelea birds, rice rats and grain sucking insect pests (Talaka, 2023). This according to Akinbile *et al.* (2023), where weeds and with constant pest and disease attacks are found to be major constraints facing farmers' ability to increase their productivity could render the whole farm business, great loss and also accrue more costs on agro-chemicals. Hence, the result disagreed with the findings of Longtau (2003), who reported that, the incidence of pests and diseases as a constraint in rice production in Ebonyi State Nigeria was low. This may imply that majority of the farmers used agro-chemicals adequately and hence do not suffer major setbacks from disease and pest infestation.
- v) Problem of land fragmentation (5th). Land ownership system has led to land fragmentation in potential areas as population increases. Land fragmentation also, has implications on farm resource planning, this has made it difficult to utilise mechanisation in dry rice farming processes leading to reliance on manual labour which rises production costs and also narrowing profit margins for farmers (Ohen and Ajah, 2015). While Kassahun (2009) noted that, shortage of farmland is a major constraint on adapting to climate change and rice productivity in Nile basin of Ethiopia, Enete and Onyekuru (2011), reported land tenure system was a major challenge of agricultural development and livelihood strategy among rural farmers in the south-eastern parts of Nigeria.
- vi) Inadequate farm machinery (6th). However, the cost of acquiring fixed and variable inputs such as; machineries, tractors, farm implements, fertilizers, agro-chemical was so high in Nigeria. This has been a disincentive to farmers on use of machineries and farm inputs, which has driven production cost high; reducing farmers' profits margins (Bulus *et al.*, 2022). Through direct observation it was realized that farmers lose a lot of the paddy during harvesting when they use the manual harvesting instead of using farm machinery (Nimoh *et al.*, 2012). According to Loko *et al.* (2022), farm machinery involves the use of all machines and modern tools/implements to support various farm operations at all levels in order to reduce manual labour. Hence, the small-scale rice farms in Nigeria are faced with the inadequate access to farm machinery due to high costs of the machines, cost of complementary inputs (fuel and electricity), cost of maintenance, and as well as the inadequate legal capacity to protect the rights of owners of machinery, and poor implementation of policies (Lamidi and Akande, 2013).
- vii) Hike in transportation costs ranked (8th) in order of Garrett's position (43.33%). Chima *et al.* (2022), posited that, access roads have the propensity to bring the rural population to the main stream of economic activities because good road networks will reduce transport cost, encourage efficient delivery of farm inputs and agricultural production and distribution of the farm produce. Chidiebere-Mark (2017), further added that, high transportation cost coupled with hike in prices of fuel was identified as a major constraint to rice production in Ebonyi State Nigeria, and therefore, led to increase in costs of production and thus a reduction in farm



revenue. In a related study, Nwankwo, *et al.* (2002) observed that, rice farmers in Ideato North of Imo State, were constrained by inadequate good road network to transport their rice to distant markets where they could attract better prices. The bad state of the access roads makes it difficult for the rice farmers to cart the paddy from the fields to the main road so they have to employ casual labour to move them to the roadside, which brings extra costs (Alarima *et al.*, 2011).

- viii) Low market prices of paddy rice (10th). In this case Osanyinlusi and Adenegan (2016) opined that, market failures contribute to decrease in rice production margins. Suwanmaneepong *et al.* (2020) added that, price and profitability differences across market segments within the rice distribution channels may be due to poor market information, thereby making farmers ineffective to participate in production.
- ix) High cost of hired labour (11th). Obih and Baiyegunhi (2018), further revealed that, the high cost of labour applies to various stages of rice cultivation and hinders farmers' productivity. Furthermore, the lack of fair price discourages farmers from commercial cultivation of rice, thereby reducing the general productivity. Alarima *et al.* (2011), advocated that, the high cost of labour may be attributed to the fact that food production in the study area is labour-intensive and shortage of labour in relation to the demand as a result of competition for available labour raises the cost of labour.
- x) Depletion of soil fertility (12th). Hence, soil fertility in most parts of northern Nigeria has progressively declined due to increased pressure on land resources arising from rapid population expansion, which is forcing farmers to adopt continuous cropping coupled with the use of an inadequate amount of fertilizer or other soil amendments (Kamai *et al.*, 2020). Fertilizer availability has been a pressing issue for a long time, where the price keeps on skyrocketing (Mohammed *et al.*, 2019). Thus, Akinbile *et al.* (2018) posited that, the lack of availability of fertilizer was considered as severe production constraints militating against the dry season rice enterprise in Nigeria. Hence, there was also high cost of fertilizer, which was attributed to distribution systems and the artificial hoarding of fertilizer by the middlemen (Njimoh, *et al.*, 2012). According to Kamal *et al.* (2020), arable soils in Northern Nigeria are deficient in nutrients, being far below critical levels for the production of most crops, including rice. Thus, rice farmers are mindful of the significance of fertilizers that is both organic and inorganic in their farming activity (Talaka, 2023).
- xi) Incessant security challenges (13th). According to Banseka *et al.* (2023), security challenges in terms farmer-herder conflicts, banditry and burglary had led to great destructions in human lives, rice farms, stored paddy rice and animals in conflict prone area of Taraba State Nigeria. The finding of this study is in agreement with the work of Oguntolu & Sani (2021), who in their studies established the fact that, destructions in crops, properties, livestock and as well as the disruption of peace and conflict resolution processes by some mischief makers, were the major effects of farm productivity and agricultural development in Benue State, Nigeria. Climate change affects crop production and output.
- xii) Natural disaster/climate change (14th). According to Ozor *et al.* (2010), the lack of source of information about climate change and also, farmers' lack of access to weather forecast technologies could be major barriers to development of dry season farm business among households in Southern Nigeria. However, the absence of this facility will undoubtedly make the farmers become ignorant of the weather and situations and hence become vulnerable to the impact of changes in the climate and weather. Thus, Nwalieji and Uzuegbunam (2012) reported that the negative effects of climate change on rice production includes; reduction in



crop yield and grain quality, destruction of farm land by flood, high incidence of weeds, pests and diseases, decrease in soil fertility, etc.

- xiii) Inadequate irrigation water (15th). Also, some dry season rice farmers in Dangme West District of Ghana attributed the lower yields of paddy rice to low rainfall received during the year, meaning that, the amount of rainfall plays a part in the yield of rice even in an irrigated field (Nimoh *et al.*, 2012). Thus, Ayodele (2016), stated that, late discharge of irrigation water from the dams was the most important constraint to rice production in Kura local government area of Kano State. The decision about the time and amount of water to be released is purely the responsibility of the irrigation authority (Ayodele, 2016).

Table 1: Constraints to dry season rice farmers in Gombe State (n = 357)

| Constraints | * Responses | Percent Position | Mean score | Rank |
|------------------------------------|--------------------|-------------------------|-------------------|------------------|
| Inadequate capital/credit sources | 341 | 3.33 | 86 | 1 st |
| High costs of input resources | 323 | 10.0 | 75 | 2 nd |
| Inadequate extension contact | 329 | 16.67 | 69 | 3 rd |
| Crop pest and diseases | 317 | 23.33 | 64 | 4 th |
| Land fragmentation | 314 | 30.0 | 60 | 5 th |
| Inadequate farm machinery | 311 | 36.67 | 56 | 6 th |
| Inadequate improved seeds | 309 | 43.33 | 53 | 7 th |
| Hike in transportation costs | 305 | 50.0 | 50 | 8 th |
| Poor processing/storage facilities | 302 | 56.67 | 47 | 9 th |
| Low market prices of paddy rice | 296 | 63.33 | 43 | 10 th |
| High cost of hired labour | 293 | 70.0 | 40 | 11 th |
| Depletion of soil fertility | 288 | 76.67 | 36 | 12 th |
| Incessant security challenges | 275 | 83.33 | 31 | 13 th |
| Natural disaster/climate change | 209 | 90.0 | 24 | 14 th |
| Inadequate irrigation water | 194 | 96.67 | 15 | 15 th |

Source: Field survey, 2023.

* Multiple responses

CONCLUSION AND RECOMMENDATIONS

Based on the results obtained from this study, it may be concluded that the dry season rice production is practiced at subsistent level characterised by many poor farmers, operating on several scattered fragmented plots of land using traditional methods and crude implements, who barely produce enough for households' needs with little or none to offer for sales. The dry season rice farmers were small-scale with inadequate capital, mostly sourced from their friends, relatives and personal savings. This was because they do not have enough credit facilities, especially formal loans. However, a wide range of constraints to rice production mostly grouped as abiotic, biotic, socio-economic and management issues include; inadequate capital and credit sources; high costs of input resources; inadequate extension contact; crop pest and diseases; land fragmentation; inadequate farm machinery; inadequate improved seeds/planting materials; hike in transportation costs; poor processing/storage facilities; low market prices of paddy rice; high cost of hired labour etc. In order to improve farmers' efficiency and productivity the following recommendations were made:

- i) There is the need to bring more land under dry season rice cultivation for improvement of the rice value chain. Governments, and private irrigation management authorities should encourage increased rice production, by formulating policies guided to make more land available for irrigated rice production.
- ii) Thus, if governments and other stakeholders in the inputs-supply chain should ensure adequate, affordable and timely provision of modern tools, inputs and production technology to farmers;



- hence, yield and production will be increased which can help farmers to increase farm and non-farm incomes and as well improve their living standards.
- iii) The rice farmers should be oriented through the extension services in adopting the irrigated production system, on best practices for optimal production and income maximisation, thereby leading to improvement in standard of living.
 - iv) Government and private stakeholders, should encourage dry season rice farmers to be more committed in enterprise diversification in order to heighten their livelihoods. The poor farmers should as well handle their farm work as real business and no longer just a tradition of merely achieving rice self-sufficiency requirements at households' level.
 - v) Government, financial agencies and non-governmental organisations should endeavour to provide support to the dry season rice farming households through provision of soft loans, grants, incentives and subsidies so as to enable them balance their livelihood.

REFERENCES

- Adamu, Y., Suleh, Y. G. and Jika, H. (2018). Comparative Profitability Analysis of Rice (*Oryza sativa* L.) Production under Dadin kowa Irrigation Scheme, Gombe State Nigeria. *FAMAN Journal*, **18**(1):148 – 159.
- Akinbile, A. L., Aminu, O. O. and Sokeye, I. G. (2018). Constraints Encountered in Rice Production by Farmers in Ogun State. *Nigerian Journal of Rural Sociology*, **18**(1):85 – 92.
- Akinbile, L. A., Akingbade, M. and Salaudeen, A. O. (2023). Contributions of Anchor Borrowers Programme to Rice Farmers' Productivity in Ekiti State. *Journal of Agricultural Extension*, **27**(1):49–60.
<https://dx.doi.org/10.4314/jae.v27i1.5>
- Alarima, C. I., Adamu, C. O., Masunaga, T. and Wakatsuki, T. (2011). Constraints to Sawah Rice Production System in Nigeria. *Journal of Humanity and Ecology*, **36**(2):121 – 133.
- Ayodele, O. J. (2016). Economic Analysis of Irrigated Rice Production in Kura Local Government Area of Kano State, Nigeria. Unpublished M.Sc. Dissertation submitted to the School of Postgraduate Studies, Ahmadu Bello University, Zaria, 70pp.
- Ayuba, G., Mahmud, A., Ogolekwu, A. I., Maikasuwa, M. A. and Kaka, Y. (2020). Effect of Anchor Borrowers Programme (ABP) on Profitability and Income of Beneficiary Rice Farmers in Kebbi State, Nigeria. *International Journal of Sustainable Development Research*, **6**(3):43 – 48.
- Banseka, R. F., Sani, M. H., Murtala, N. and Sani, R. M. (2023). Socio-Economic and Constraints Analysis of Faro-44 rice Farmers under Fadama III Additional Finance II in Taraba State, Nigeria. *Journal of Agripreneurship and Sustainable Development (JASD)*, **6**(1):122 – 135. www.jasd.daeec.atbu.edu.ng
- Bassim, H. K. and Hayat, K. O. (2022). Constraints Facing Rice Farmers in Iraq. Paper presented at the IOP Conference Series: Earth and Environmental Science, IOP; CS., Pp 1 – 10.
- Bose, A. A., Jatbong, J. N., Danwanka, H. A. 1 and Zayyad, B. (2020). Assessment of Small Scale Paddy Rice Processing and Marketing in Dass Local Government Area, Bauchi State, Nigeria. *International Journal of Science and Advanced Innovative Research*, **5**(2):29 – 39. <http://www.casirmediapublishing.com>
- Bulus, G., Tikon, F. U. and Sangari, H. I. (2022). Resource use efficiency in rain-fed paddy rice production: A case study of Donga Local Government Area of Taraba State, Nigeria. *Journal of Agripreneurship and Sustainable Development (JASD)*, **5**(4):1 – 9.
- Chidiebere-Mark, N. M. (2017). Analysis of Value Chain in Rice Production Systems in Ebonyi State, Nigeria. Unpublished Ph.D. Thesis, submitted to Department of Agricultural Economics, Federal University of Technology, Owerri, Imo State, 204pp.
- Chidiebere-Mark, N., Ohajianya, D., Obasi, P. and Onyeagocha, S. (2019). Profitability of rice production in different production systems in Ebonyi State, Nigeria. *Open Agriculture*. **2019**; **4**: 237 – 246.
- Chima, U., Cosmas, C. E. and Obila, D. C. (2022). An evaluation of the technical efficiency and constraining factors to upland Rice Production in Afikpo-North Local Government Area of Ebonyi State, Nigeria. *Journal of Economics and Business Studies*, **5**(2):188 – 193.
- Demont, M., Fiamohé, R., and Kinkpé, T. (2017). Comparative advantage in demand and the development of rice value chains in West Africa. *World Development*, **96**: 578 – 590.
<https://doi.org/10.1016/j.worlddev.2017.04.004>
- Enete, A. A. and Onyekuru, A. N. (2011). Challenges of agricultural adaptation to climate change: Empirical evidence



- Food and Agriculture Organisation, FAO (2019). “Nigeria at a Glance.” Accessed on 12/09/2022, at www.fao.org/nigeria/fao-in-nigeria/nigeria-at-a-glance/en
- Gombe State Economic Empowerment and Development Strategy, GOSEEDS (2019). GOSEEDS Handbook, Abuja, Dandafid Nig. Ltd., Pp 1 – 62. <http://www.gombestate.gov.ng/geninformation.html> on 30/01/2021
- Gombe State Government, GSG (2015). Gombe State Government: 2015 Profile. Retrieved from; <http://www.tiptopglobe.com/cities-nigeria?region=55&n=Gombe&a=G> on 15/03/2017.
- Idowu, A. C. (2021). Constraints to Farmers’ Adoption of Agricultural Technology: A Case of Sawah Eco-technology among Farming Households in Kebbi State Nigeria. *Dutse International Journal of Social and Economic Research*, **6**(1): 119 – 127.
- Kamai, N., Omoigui, L. O., Kamara, A. Y. and Ekeleme, F. (2020). Guide to Rice Production in Northern Nigeria. *International Institute of Tropical Agriculture (IITA)*. **3**(2):1 – 7. www.iita.org.
- Kassahun, M. M. (2009). Climate change and crop agriculture in Nile Basin of Ethiopia: measuring impacts and adaptation options. Unpublished MSc, Thesis submitted to Department of Economics, School of Graduate Studies, Addis Ababa University, Ethiopia, 211pp.
- Kurfi, A. (2019). ***Know Your Country and Beyond: Katsina State***, Ibadan, Safari Books LTD, 248pp.
- Lamidi, W. A. and Akande, L. O. (2013). A study of status challenges and prospects of Agricultural Mechanization in Osun Article info. Pp. 1 – 8.
- Loko, Y. L., Charlemagne, E., Gbemavo, D. S. J., Djedatin, G., Ewedje, E., Orobiyi, A. *et al.* (2022). Characterization of rice farming systems, production constraints and determinants of adoption of improved varieties by smallholder farmers of the Republic of Benin. *Scientific Reports*, No. 12:3959 <https://doi.org/10.1038/s41598-022-07946-2> Pp 1 - 19.
- Longtau, S. R. (2003). Multi-agency partnerships in West African Agriculture: A review and description of rice production systems in Nigeria. Eco-Systems Development Organisation, Jos, Plateau, Nigeria, 2003; Pp 5 – 23.
- Mubirigi, A. (2016). Assessment of the Factors Influencing the Performance of Agricultural Cooperatives in Gatsibo District, Rwanda. *International Journal of Information Research and Review*, **3**(9): 2755 – 2763.
- Nasir, M. B. (2005). ***Introduction to Research Process in Education***, Mides equitable Publishers Kaura-Namoda, Zamfara State, 117pp.
- National Population Commission, NPC (2006). Population Census of the Federal Republic of Nigeria: Analytical Report at the National Population Commission, Abuja. Available at; <http://www.qtsnigeria.com>; <http://www.nigerianstat.gov.ng>
- Ngala, G. N. (2013). Constraints to increased quality rice production for food, market and development with special reference to tropical Africa. *Proceedings of the African Crop Science Conference*, 11: Pp 617 – 620.
- Ngene, A. H., Oyeduntan, A. E. and Mgboji, O. A. (2017). Audience Perception of EFCC Media Trial: A Case Study of President Muhammadu Buhari’s Anti-Corruption War. *Global Journal of Human-Social Science*, **17**(5): 20 – 30.
- Nimoh, F., Tham-Agyekum, E, K. and Nyarko, P. K. (2012). Resource Use Efficiency in Rice Production: The Case of Kpong Irrigation Project in the Dangme West District of Ghana.
- Nwalieji, H. U. and Uzuegbunam, C. O. (2012). Effect of climate change on rice production in Anambra State, Nigeria. *Journal of Agricultural Extension*, **16**(2):81 – 91.
- Nwankwo, O. O., Nwajiuba, C. U. and Onuh, M. O. (2002). Analysis of the market strategies adopted by rice farmers in Ideato North L.G.A. of Imo State. *Journal of Applied Chemistry and Agricultural Resources*, **8**: 18 – 27.
- Obih, U. and Baiyegunhi, L. (2018). Financing Smallholder Rice Farmers: A Field-Based Evidence Review of Anchor Borrowers Programme (ABP) Model in Nigeria. *Journal of Economics and Behavioral Studies*, **10**(6):229 – 239.
- Oguntolu, F. R. and Sani, M. H. (2021). Crop farmers-pastoralists perception of resolution strategies to end recurring conflicts in Benue, State Nigeria. *Journal of Agripreneurship and Sustainable Development*, **4**(4):1 – 9.
- Ohen, S. B. and Ajah, E. A. (2015). Cost and return analysis in small scale rice production in Cross River State, Nigeria. *International Research Journal of Agricultural Science and Soil Science*, **5**(1): 22 – 27.
- Omotayo, A. O. (2018). Climate change and food insecurity dynamics in the rural Limpopo Province of South Africa. *Journal of Economics and Behavioral Studies*, **10**(1): 22 – 32.
- Osanyinlusi, O. I. and Adenegan, K. O. (2016). The Determinants of Rice Farmers’ Productivity in Ekiti State, Nigeria. *Greener Journal of Agricultural Sciences*, **6**(2):49 – 58.



- Ozor, N., Madukwe, M. C., Enete, A. A., Amaechina, E. C., Onokola, P., Eboh, E. C., Ujah, O. and Garforth, C. J. (2010). Barriers to Climate Change Adaptation among Farming Households of Southern Nigeria. *Journal of Agricultural Extension*, **14**(1):114 – 124.
- Rahman, S. A. (2008). Women's Involvement in Agriculture in Northern and Southern Kaduna State, Nigeria. *Journal of Gender Studies*, **17**(1):17 – 26.
- Saleh, A., Ahmad, M. E., Hassan, A., Aliyu, D. and Umaru, B. Y. (2019). Microeconomic Analysis of saving determinants among millet producers in Gombe State, Nigeria. *Journal of Agripreneurship and Sustainable Development*, **2**(1):100 – 113.
- Sasa, S. A. and Umar, D. (2017). Determinants of Credit Facility for Women Agricultural Entrepreneurs in Gombe Microfinance Bank in Gombe Metropolis, Gombe State, Nigeria. Proceedings of the 31st Annual Conference of Farm Management Association of Nigeria, Bauchi 2017. Pp 787– 794.
- Suleiman, A. A., Garba, M. and Mohammed, S. (2017). Constraints of Women's Access to Farm Credits in Bauchi Metropolis, Nigeria: An Impediment to Agripreneurship Development. Proceedings of the 31st Annual Conference of Farm Management Association of Nigeria, Bauchi 2017. Pp 780 – 785.
- Suwanmaneepong, S., Kerdsriserm, C., Lepcha, N., Cavite, H. J. and Llonas, C. A. (2020). Cost and return analysis of organic and conventional rice production in Chachoengsao Province, Thailand. Organic Agriculture available at <https://doi.org/10.1007/s13165-020-00280-9>.
- Talaka, A. (2023). Production of Rice (*Oryza sativa*) in Northern Parts of Nigeria and its Constraints: An Overview. *International Journal of Life Sciences Research*, **11**(1):92 – 96.
- Udeh, M., Christopher, E. O. and Olotu, O. A. (2018). Analysis of the Marketing Margin of Soybeans in Benue State, Nigeria. *International Journal of Environment, Agriculture and Biotechnology (IJEAB)*, **3**(3):944 – 950.