

**(A REVIEW)****CONSTRAINTS OF RICE
(*Oryza Sativa*)
PRODUCTION IN NIGERIA.*****ABDULLAHI B.; **YAKELLU B.;
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DOI: <https://doi.org/10.70382/mejav.s.v9i1.031>

Abstract

Rice (*Oryza sativa*) remains one of Nigeria's most significant staple crops, serving as a vital component of food security, employment generation, and rural livelihoods. Despite notable growth in its production and consumption over recent decades, Nigeria still faces a wide range of constraints that hinder optimal rice productivity and self-sufficiency. This review explores the multifaceted challenges affecting rice production in Nigeria, including limited access to modern agricultural inputs, declining soil fertility, climate-related disruptions, pest and disease infestations, and infrastructural deficiencies such as poor road networks and inadequate storage facilities. In particular, the paper highlights the underexplored threat of plant-parasitic nematodes, which contribute substantially to yield

losses, yet remain poorly managed and understood by local farmers. Additionally, inefficiencies across the rice value chain, from pre-production to postharvest handling and marketing, are

Keywords: Rice production, constraints, Nigeria, value chain, pests, climate change, research gaps, food security.

discussed. Research gaps were identified in areas such as climate impact studies, farmer technology adoption, and postharvest value chain analysis. Opportunities exist to boost rice productivity through improved mechanization, irrigation development, adoption of resistant varieties, and

enhanced extension services. The review concludes that targeted investments, policy reforms, and research-driven innovations are crucial to transforming Nigeria's rice sector into a sustainable and self-reliant sub-sector

capable of meeting national demand and contributing to regional food security.

Introduction

The cereal crop known as rice (*Oryza sativa*) is a member of the Gramineae (Poaceae) family, a sizable monocotyledonous group that includes more than 600 genera and over 10,000 species. A group of hunter-gatherers near China's Yangtze River, where cultivation began many years ago, made the initial discovery of it (Song, Chen, and Zhao, 2018). After maize and wheat, it is the third most produced crop in the world (Olayemi et al., 2021). Rice is the main source of calories for almost half of the world's population (FAO, 2003). Furthermore, based on all available data, rice production is rapidly emerging as one of the economy's fastest-growing subsectors, a significant source of revenue and employment opportunities, and a vital part of Nigerian cuisine, which has transitioned from a ceremonial to a staple in many Nigerian customs (Bose et al., 2020). With the low-yielding native red grain species *Oryza glaberrima*, rice production began in Nigeria about 1500 BC. Later, it spread throughout the Niger Delta region. Employment in the rice value chain is profitable, according to studies. Participating in rice farming is profitable, claims Nwahia (2020). According to a review of the literature by Hussaini et al., (2021), jobs in Nigeria that include the production, harvesting, processing, and marketing of rice are profitable. According to Ewuzie et al., (2020), there is equity in the rice value chain and rice farming, processing, and trading are all very profitable.

From roughly two million hectares in 2000 to roughly three million hectares in 2018, Nigeria's rice-growing land area grew dramatically. During the same period, the quantity of milled rice increased from about two million metric tons in the year 2000 to almost four million metric tons in the year 2018 (FAO, 2019).

Even though rice production has increased dramatically, there is still not enough to meet the growing population and rising demand for the grain. According to FAO (2019) data, there was a three million metric ton shortfall between domestic production and consumption, which was approximately four million metric tons vs seven million metric tons, respectively. Rice (*Oryza sativa*) makes up one-third of all grain crops grown worldwide. Tayefe and associates (2014). As the population continues to grow, rice consumption in Nigeria has skyrocketed at a pace of about 10% annually. According to Omofonmwan et al., (2017), Nigeria's rice production is out of proportion to its consumption patterns.

Nigeria consumes a greater amount of rice than it produces. The structural growth in rice consumption over time appears to have been caused by a number of variables, with consumption expanding across all socioeconomic strata, including the poor. (Filli *et al.*, 2023).

Because local and regional consumption of rice products is expected to increase with a rate of population growth, rice offers plenty of opportunity for income growth, poverty eradication, alleviation, and improvement of livelihood among rice producers if value chain and market participation are increased.

Importance and Demand Patterns

Nigeria ranks second in Africa, behind Egypt, and is the biggest producer of rice in West Africa (Umeghalu *et al.*, 2023). With a population density of 212 people per square kilometer and a rural population of 51.4 percent, the country's anticipated population in 2019 was 203 million (Adelowokan *et al.*, 2019). The main employer in the nation in 2017 was agriculture, which employed 36.55% of the economically active population (Adelodun *et al.*, 2018).

Rice has become a cash commodities crop and a food security crop in Nigeria due to rising demand in recent years. Nearly every Nigerian's daily menu includes rice, and the country's current yearly consumption is believed to be at 5 million tons. In several Nigerian states, the primary agricultural activity is the cultivation of rice. Despite the fact that, depending on the variety, rice may be farmed in any zone of Nigeria, only a tiny portion of land is utilized for this purpose. (Olesin *et al.*, 2023). Nigeria has the ability to cultivate over 5 million hectares of rice, but now only uses roughly 3.7 million hectares of land for this purpose (Philip *et al.*, 2018).

According to the FAO (2019), rice plays a major role in reducing poverty and creating jobs. Nigeria still imports rice to meet its rising consumption demand, which is currently 6.4 million tonnes compared to a production capacity of 3.7 million tonnes, despite its high production (PWC, 2017). In order to avoid food insecurity, the government has had to import rice due to this mismatch between supply and demand (Muochebe, 2021). Rice has evolved from a luxury to a necessity, and its consumption is expected to rise in tandem with the expansion of the GDP per capita, suggesting that it is a key component of the Nigerian diet. (Filli *et al.*, 2023)

Constraints in Rice Production

Despite its significance, Nigerian rice production is limited by a number of factors: However, purchasing both permanent and variable inputs—such as tractors, farm equipment, fertilizer, and agrochemicals—was extremely expensive in Nigeria. Farmers

have been discouraged from using farm equipment and inputs, which has increased production costs and decreased their profit margins. (Saleh *et al.*, 2024). in ability to get timely information about new innovations by rice processors is also a constraint to processing of Rice, because processors are not up to date about the newest and latest method of processing and this could be because the extension agent do not get to them fast enough or never even go to train the processor at all.(Olayemi *et al.*, 2021)

Floods, soil erosion, and water scarcity are some of the effects of climate change (Omotayo, 2018). The farming system is characterized by modest landholdings of 0.5 to 2.5 hectares and low-input technology. Food insecurity and extreme poverty plague the nation (Adebayo *et al.*, 2016).

Reduced soil fertility, inadequate transportation infrastructure, and insecurity (Oloyede *et al.*, 2020). The most common form of transportation in rural Nigeria

Head portage is the most common form of transportation in rural Nigeria (Adedeji *et al.*, 2014). The main reasons this mode of transportation continues to be used are inadequate roads and the general state of deterioration of the rural road system, particularly during the wet season.

Limited availability of contemporary technologies and better inputs (Abiola *et al.*, 2021). Despite the potential for 5 million hectares, only 3.7 million hectares are now under rice production (Philip *et al.*, 2018).

The high price of production equipment like tractors and threshers, as well as farmers' conservatism and lack of literacy, make them reluctant to use new methods (Umeghalu *et al.*, 2023), reduction in soil fertility Due to the increased strain on land resources brought on by the fast population growth, farmers are being forced to adopt continuous cropping practices and use insufficient amounts of fertilizer or other soil amendments, which has resulted in a gradual decline in soil fertility in the majority of northern Nigeria (Kamai *et al.*, 2020). Northern Nigeria's arable soils are severely lacking in nutrients, considerably below what is needed to produce the majority of crops, including rice. As a result, rice farmers understand the importance of both organic and chemical fertilizers in their farming operations. (Saleh *et al.*, 2024).

Prior to the introduction of irrigated rice production with the development of pump irrigation schemes starting in the mid-1990s, domestic paddy rice production was restricted to flooded systems. This has allowed rice area and production to grow in recent years in tandem with population growth. (Filli *et al.*, 2023)

The limitations that are inherent in Nigeria's agricultural sector, such as low income, low crop yield per hectare for individual farmers, inadequate infrastructure for increased production, poor coordination of marketing activities, inadequate storage facilities, and

low production capacity to meet the population's food and fiber needs, are among the issues related to rice production and marketing in Nigeria. (Anthony *et al.*, 2021). In Nigeria, there are issues with rice production at every stage of the value chain. According to Babatunde *et al.*, (2019), bird disturbance, a lack of basic rice processing facilities, the high cost of processing equipment, insufficient funding, and a lack of rural infrastructure for rice along the value chain are some of these issues. Another is the high postharvest loss of rice along the value chain. Poor roads, insufficient storage, and ineffective supply chains are the main causes of postharvest losses (Filli *et al.*, 2023). The problem is made worse by the absence of basic facilities for processing rice, the high cost of equipment, and the lack of market integration (Adesiji *et al.*, 2022).

Pests and Diseases

According to Talaka (2023), pest attacks are a major factor in Nigeria's low rice yields. The production of rice in northern Nigeria is severely hampered by a variety of pests, including insects and birds, which thrive on the rice plant (Kamai *et al.*, 2020). In addition to typical rice pests such *Diopsis* spp., African rice gall midge, short horned grasshopper, quelea birds, rice rodents, and grain sucking insect pests, common illnesses linked to rice include blast, rice yellow mottle virus, and brown spot (Talaka, 2023).

An important yet little-known limiting factor is nematodes, especially in tropical areas like Nigeria. According to Coyne *et al.* (2018), they are to blame for yield losses of up to 10% each year. The application of integrated pest management (IPM) techniques is hampered by the absence of reasonably priced nematodes, locally adapted resistant cultivars, and efficient extension services (Bello *et al.*, 2015).

However, a number of biotic stressors have a substantial impact on rice output, with plant-parasitic nematodes being one of the most harmful. Worldwide, nematodes, which are microscopic roundworms, are known to infest a variety of crops and result in significant yield losses (Nicol *et al.*, 2011). Among the plantparasitic nematodes, the rice root nematode (*Hirschmanniella oryzae*), root-knot nematodes (*Meloidogyne* spp.), and root lesion nematodes (*Pratylenchus* spp.) are particularly problematic in rice farming. (Bello *et al.*, 2024).

Numerous studies have reported the existence of nematode pests in rice crops in Nigeria. In Nigerian rice-growing regions, *Meloidogyne* spp., *Hirschmanniella oryzae*, and *Pratylenchus zeae* are some of the most prevalent nematode species found. By attacking the roots of rice plants, these worms cause symptoms like gall formation, root necrosis, and decreased plant growth, which eventually lowers agricultural production. Despite their significance, little is known about Nigerian rice farmers' awareness and knowledge of these pests. (Bello *et al.*, 2024).

Opportunities and Recommendations

The production of rice has the ability to improve livelihoods, reduce poverty, and raise incomes (Anthony *et al.*, 2021). The following actions are advised in order to take advantage of these opportunities:

Road investment has an important part to play in reducing transport costs; however improving short lengths of feeder roads may have little impact if no change in transport mode occurs.(Umeghalu *et al.*, 2023)

- Make investments in irrigation, mechanization, and better seeds.
- Enhance extension services to spread contemporary methods.
- Enhance infrastructure to reduce losses after harvest.

Funds from rice imports should be used to support domestic production; IPM and research on resistant rice varieties should be encouraged (Ibrahim *et al.*, 2023).

Research Gaps

Despite the fact that Nigerian rice production has been extensively studied, there are still a number of gaps:

- Inadequate information on nematode-related economic losses and successful control measures.
- There aren't many regional studies on how rice ecosystems are affected by climate change.
- Research on rural farmers' behavior and uptake of technology is lacking.
- The efficiency of the value chain and the contribution of rural infrastructure to lowering postharvest losses are not well examined.
- There has been little assessment of regional rice processing standards and practices in relation to global standards.

Conclusion

In Nigeria, rice continues to be an essential crop for both economic expansion and food security. However, the industry faces many difficulties, from poor infrastructure and pest infestations to low productivity and environmental limitations. Nigeria may close the output gap, lessen its need on imports, and possibly become an African rice exporting country with targeted research, technological investment, and smart policy changes.

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