



## Intercropping Systems, Prospects and Challenges of Tea Production in Nigeria: A Review

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### Abstract

This paper provides a comprehensive review of intercropping systems, examining the prospects and challenges associated with tea production in Nigeria. The analysis encompasses a global perspective on tea production, emphasizing Nigeria's position within the international landscape and elucidating key trends, challenges, and opportunities. Notable tea-producing regions in Nigeria, including the Jos Plateau in Plateau State, Mambilla Plateau in Taraba State, Gembu in Taraba State, and Obudu in Cross River State, are highlighted. The tea industry in Nigeria has experienced growth in terms of quantity, quality, variety, and consumption rates. The study identifies China, India, Kenya, Sri Lanka, and Vietnam as the top global tea-producing countries. Challenges faced by the Nigerian tea production industry encompass climate change, pests, diseases, labour issues, fluctuating prices, small production levels, inadequate infrastructure, limited access to finance, low productivity, and poor tea quality. Prospects for the industry include the development of new tea varieties, the introduction of lowland tea production, favourable climatic conditions, and increasing global demand for tea. Intercropping practices in Nigerian tea production involve the cultivation of crops such as maize, soybean, peanuts, and citrus alongside tea plants. The paper concludes that addressing the identified challenges and implementing strategic measures are essential for enhancing the productivity, quality, and market competitiveness of the tea industry in Nigeria.

**Keywords:** *Tea production, Trends, Challenges, Prospects*

### Introduction

Tea is an evergreen shrub tree that produces more new branches by supervised trimming to maintain a plucking table for standard tea leaves (Ipinmoroti *et al.*, 2018). In its natural state, the tea plant can reach a height of up to 15 meters and has a root system that ranges from the taproot to the oblique root system (Mondal *et al.*, 2004). The plant can thrive in subtropical climates to tropical climatic conditions, but often needs a lot of humidity and precipitation at the time of the growing season (Han *et al.*, 2018). High humidity, fog, and mist are ideal conditions for young leaves and thick buds. The growth and development of tea is dependent heavily, on maintaining an annual temperature range of 18 degrees Celsius to 21 degree Celsius (Xiang *et al.*, 2022). Tea production is a significant contributor to the global economy, generating employment and foreign exchange earnings. In Nigeria, tea production has been identified as a potential avenue for economic diversification and

growth. However, despite its vast potential, the tea industry in Nigeria faces numerous challenges. This review aims to examine the global tea production landscape, analyze tea production in Nigeria, identify the economic opportunities and challenges of tea production in Nigeria, and provide prospects for the industry's future. Tea (*Camellia sinensis*) is a popular stimulant consumed by people of all ages (Siraj *et al.*, 2021). Globally, more than three billion cups of tea are consumed daily (Phong *et al.*, 2016). Tea consumption has been linked to numerous health advantages. Studies propose that consuming 2-3 cups of tea daily is correlated with a decreased risk of premature death, heart disease, stroke, and type 2 diabetes. Both green and black tea have been extensively examined for their potential positive impacts on cardiovascular health (Khan & Mukhtar, 2013). There is evidence to suggest that tea flavonoids may play a role in maintaining blood vessels' smoothness and elasticity, thereby contributing

to heart health. Furthermore, the polyphenolic compounds in tea have been connected to anti-inflammatory, antimicrobial, and anticarcinogenic properties, potentially assisting in the prevention of diseases such as cancer, diabetes, and cardiovascular disease (Hayat *et al.*, 2015). The global surge in tea consumption is partially attributed to the growing awareness of its health and well-being benefits, which are regarded as significant factors driving its prospective growth. The projections from market analyses indicate a significant growth trajectory, with the tea market expected to achieve a valuation of approximately 6.77 billion USD by the year 2025 (Statista, 2023). However, the current consumption level is quite low (Oluyole *et al.*, 2023). This foreseen expansion points towards a widening market for tea products in Nigeria. Although the growth rate is anticipated to be more gradual in comparison to the reviewed period, the forecasted positive trajectory suggests that tea sales are positioned for growth in the forthcoming years. The factors contributing to this predicted growth are likely multifaceted, encompassing potential shifts in consumer preferences, heightened awareness of the health benefits linked to tea consumption, and marketing initiatives undertaken by tea producers. As the tea market undergoes continuous evolution, it becomes intriguing to observe the production and intercropping practices, challenges and prospects of tea production in Nigeria.

### Global Tea Production

Tea production is a significant sector in the globe, with an estimated 5.8 million tons of tea produced worldwide in 2020 (FAO, 2021). Global tea production has undergone significant expansion in terms of quantity, quality, variety, and consumption rate (Ndege, 2021). Between 2000 and 2010, the area under tea cultivation increased from 2,727.42 thousand hectares to 3,691.87 thousand hectares at a compound growth rate of 3.32 percent, with China, India, Sri Lanka, Kenya, and Vietnam as the world's largest producers (Ndege, 2021). Other countries, such as Vietnam, Burundi, Malawi, Tanzania, Uganda, Zambia, Argentina, Brazil, Iran, and Russia, produce relatively smaller quantities of tea. Small-scale farmers make up 73%, 60% and 47% of the total tea production in Sri Lanka, Kenya and Indonesia, respectively (Han *et al.*, 2018). Figure 1 below shows the top ten global tea producers in 2020 and 2021 respectively. It can be observed that the landscape of global tea production hasn't changed significantly from what was observed in 2010. Although the majority of the countries reported a lower production level in 2020 due to the Covid 19' pandemic, there remains an evident growth in production. The value of global tea production amounts to more than \$17 billion annually and the world trade of tea is valued at about \$9.5 billion annually (FAO, 2021). One trend in the global tea production industry is the growing demand for specialty tea. Consumers are increasingly interested in unique, high-quality teas that offer different flavours and aromas. This trend has led to the development of specialty tea markets, which focus on high-quality tea, such as green

tea, white tea, and oolong tea (Xia *et al.*, 2020). The rising demand for organic and fair trade tea, which are produced sustainably and ethically is considered as another trend in global tea production (Wijerathne & Hettiarachchi, 2018). This trend is driven by consumers' increasing concern for the environment and social justice issues. Tea exports and imports have also increased correspondingly, although China and India export less relative to their tea production since they consume much of their tea domestically. In 2018, only 14 percent of the tea produced was available for export in China, and 19 percent was available for export in India. The global tea market was valued at 21 billion US Dollars in 2020, with 3 million metric tons of dried tea produced annually (FAO, 2021). Black tea accounts for 78 percent of total tea production, Green tea accounts for 20 percent, and Oolong for 2 percent, with Green tea and Oolong consumed mainly in China, India, Europe, and the United States. Other tea varieties include white and yellow, compressed, instant, and granulated tea, all determined by manufacturing techniques. According to the Food and Agriculture Organization (FAO, 2021), global tea production is projected to reach 7.63 million tons in 2023, up from 7.37 million tons in 2021. Although Nigeria does not feature in the top echelon of global tea producers. Nigeria still holds a substantial position in the global tea trade, experiencing noteworthy growth and expansion in its tea market. Projections indicate a 13.11% growth in the Nigerian tea market from 2023 to 2028, leading to an anticipated market volume of €7.6 billion by 2028. In 2023, the country's tea market generated a revenue of US\$4.5 billion (Statista, 2023). The growth in Nigeria's tea exports is also notable, with China, Ghana, and Benin emerging as the primary markets for Nigerian tea, collectively constituting 66% of total exports (Indexbox, 2023). Tea production in Nigeria is relatively small compared to other African countries, and the industry is faced with various challenges. Nigeria's tea production is still quite small, accounting for only 0.01% of global production (FAO, 2021). Contrastingly, the country's tea imports have shown a noticeable contraction in recent years, plummeting to 1,933 tons in 2022, reflecting a 20% decline compared to the figures in 2021. Despite this decline, overall tea imports have exhibited a modest upturn, reaching their zenith at 2698 tons in 2022 (Indexbox, 2023).

### Tea Production in Nigeria

Tea, scientifically identified as *Camellia sinensis*, found its way to Nigeria in 1952, brought from Kenya by the Nigerian Beverage Production Company (NBPC). The commencement of commercial tea production in Nigeria took place in 1982. In 1982, the Cocoa Research Institute of Nigeria initiated tea research, focusing on tea breeding, by acquiring 33 clones from NBPC (Ipinmoroti *et al.*, 2002). In addition to the predominant varieties, *Camellia sinensis* var. *sinensis* (Chinese tea) and *Camellia sinensis* var. *assamica* (Assam tea or Indian tea), other tea varieties have been identified and provided to farmers in the Mambilla highland in Nigeria. These include clones 35, 68, 143, 236, and 318

(Oloyede *et al.*, 2012; Oloyede *et al.*, 2017). The Mambilla plateau, a significant highland region in Nigeria, serves as a crucial area for extensive tea cultivation, largely due to its favourable rainfall and temperature patterns. The cool temperatures and abundant rainfall on the Mambilla Plateau create an ideal environment for the growth of tea bushes. These bushes are known to thrive in areas with temperatures ranging from 13-30°C and an annual rainfall of at least 1,000 mm (Oladipo *et al.*, 2019). The history of tea cultivation in Nigeria dates back to the 1950s, leading to the establishment of several tea plantations in the Mambilla Plateau area. The largest among them is the Highland Tea Plantation, covering approximately 3,800 hectares (Bamikole *et al.*, 2021). The region's high altitude, fertile soil, abundant rainfall, and cold winter temperatures have sustained tea plant production for many years. The favourable conditions on the Mambilla Plateau played a pivotal role in the establishment of the Nigeria Beverage Production Company Limited, often known as Mambilla Beverages Nigerian Limited (Oruonye *et al.*, 2022).

### **Intercrop Practices in Tea Production in Nigeria**

Intercropping, the agricultural practice of cultivating two or more crops simultaneously on the same plot of land, offers a range of benefits and has become an integral strategy for farmers. One key advantage is the potential increase in farmers' income, driven by the combined yields of multiple crops within the same space. Additionally, intercropping contributes to weed suppression, as the varied crop types can create a more diverse and competitive environment for unwanted vegetation. Moreover, when the main crop is compatible with the supporting crops, intercropping has the potential to enhance overall crop yield. In the context of Nigeria, where limited land area and specific climatic conditions favour tea cultivation, intercropping has become a significant agricultural practice, particularly in Taraba state, a major tea-producing region (Oluyole *et al.*, 2022). Various crops are commonly intercropped with tea in this area, including maize, sweet potatoes, beans, guinea corn, guava, pear, cassava, pineapple, and cocoyam. This diversification of crops within the tea cultivation system not only maximizes land use but also leverages the complementary relationships between different crops. Studies in Taraba state have indicated the profitability of the tea intercrop system, with 68.6% of the total production cost in a tea intercrop system translating into profit (Oluyole *et al.*, 2022). Furthermore, research by Ipinmoroti *et al.* (2018) highlights that peas and bananas are commonly intercropped with tea, emphasizing maize as the most frequently intercropped arable crop. Additionally, Aikpokpodion (2020) has observed the practice of intercropping Eucalyptus plants with tea on the Mambilla Plateau in Taraba State. This practice is driven by the effective maximization of land use and the generation of highly profitable financial returns from combining these specific crops. Overall, the adoption of intercropping strategies in tea cultivation not only addresses land constraints but also offers financial

incentives, making it a valuable and sustainable agricultural approach.

### **Challenges of Tea Production in Nigeria**

The tea industry in Nigeria faces numerous challenges, including inadequate infrastructure, lack of access to finance, low productivity, and poor quality of tea produced. Other challenges include the prevalence of pests and diseases, limited research and development, and inadequate extension services (Oladipo *et al.*, 2019). These challenges have led to a decline in tea production in Nigeria over the years, with the country's tea output estimated at only 5,000 metric tons per annum (Iheanacho *et al.*, 2021). The soil type and condition are crucial factors in the commercial growth of tea. It must be well drained to a depth of 2 metres and have a pH range between 4.5 and 6.5, beyond which tea growth may be retarded. Unfortunately, all these suitable conditions are found only on the Mambilla plateau in Taraba state (nature's gift to Nigeria) and no other place in the West African subregion. This makes the demand for tea exceed the supply as the production is limited to Taraba state alone. Tea production in Nigeria faces various challenges, which affect the quality and quantity of tea produced. One major challenge is the unfavourable weather conditions, including high temperature and low rainfall, which affect the growth and development of tea plants especially in the Southern region (Kuye, 2014). In addition, the area is prone to pests and diseases, such as red spider mite and blister blight, which can reduce tea yield and quality (Akoroda *et al.*, 2010). Furthermore, inadequate infrastructure, including poor road networks, lack of electricity, and limited access to credit facilities, affect the transportation of tea products, processing, and storage (Ukwungwu *et al.*, 2019). This can result in post-harvest losses, poor quality, and reduced profitability of tea production in the area. Another challenge is the limited technical knowledge and skills of farmers on best practices in tea production and processing, which can lead to poor quality tea and low yields (Kuye, 2014). This is further compounded by the lack of government support and investment in the tea industry, which hinders the growth and development of tea production in the southern region (Ukwungwu *et al.*, 2019). The lack of tea production in Southern Nigeria is a major challenge for the country, and it has been compounded by the concentration of production only in the Mambilla plateau in Taraba State. This has engendered a shortage in the supply of tea, thereby making it difficult for Nigeria to compete with top tea-producing nations in the world. One of the primary reasons for the lack of tea production in Southern Nigeria is the inadequate attention given to tea production as an agricultural crop. The government has not made significant investments in tea production infrastructure, such as processing plants and research institutions. Another reason for the concentration of tea production in the Mambilla plateau is the favourable climatic conditions that exist in the region. The plateau is characterized by a high altitude, cool temperatures, and abundant rainfall, which are ideal conditions for tea cultivation. Other regions in



Southern Nigeria may not have the same climatic conditions, which limits the potential for tea production. The concentration of tea production in the Mambilla plateau also limits the variety of tea produced in Nigeria. The country's tea industry is currently dominated by the production of black tea, which is produced in the Mambilla plateau. However, there is a growing global demand for specialty teas such as green, white, and herbal teas. The concentration of tea production in the Mambilla plateau makes it difficult for Nigeria to diversify its tea production and meet this growing demand. Furthermore, the shortage in the supply of tea has led to an overreliance on imports to meet local and international demands. This has made it difficult for Nigeria to compete with top tea-producing nations in the world, as it is unable to produce enough tea to meet the demands of its population and export markets.

### **Insect Pests and Diseases Affecting Tea Production in Nigeria**

Tea production in Nigeria faces numerous challenges stemming from the impact of various insect pests and diseases, all of which can harm crops and diminish overall yield. Among the notable adversaries is the tea mosquito, a minuscule yet significant pest that feeds on tea leaves, causing considerable harm to plants and consequently reducing both yield and tea quality. Similarly, the tea green leafhopper, another major pest in Nigeria, also inflicts damage by feeding on tea leaves, leading to diminished yield and quality (Oluyole *et al.*, 2022). Additionally, the tea aphid, though tiny, poses a substantial threat as it feeds on tea leaves, causing significant damage that results in reduced yield and quality. Caterpillars also contribute to the predicament by feeding on tea leaves, causing harm to the plants and ultimately reducing the yield and quality of the tea. In addition to insect pests, various diseases afflict tea crops in Nigeria. Tea dwarfism, a disease characterized by stunted and dwarfed tea bushes, leads to reduced yield and diminished tea quality. The tea mosaic virus poses another threat, affecting tea plants by inducing mottling and distortion of the leaves, resulting in decreased yield and quality. The tea gall midge, an insect that prompts the formation of gall-like growths on tea leaves, further contributes to reduced yield and quality (Otieno, 1996). To confront these challenges, farmers can employ a range of strategies. Implementing biological control methods, incorporating integrated pest management practices, and maintaining proper crop hygiene are among the key approaches that can help minimize the risks associated with diseases and pests in tea production (Oluyole *et al.*, 2022). By adopting these strategies, farmers can enhance the resilience of tea crops and sustain the overall productivity and quality of tea cultivation in Nigeria.

### **Opportunities for Tea Production in Nigeria**

Despite the challenges facing the tea industry in Nigeria, there are vast opportunities for the sector's growth and development. The Nigerian government has initiated policies and programs to support the industry, such as the National Tea and Seed Development Program. Tea

production and supply in Nigeria have great prospects, especially in lowland areas, according to a report by the Cocoa Research Institute of Nigeria (CRIN). The report highlights that the evaluation of fifteen tea clones in six lowland areas of Nigeria shows that tea production can thrive in these regions (Ipinmoroti *et al.*, 2018). The lowland areas evaluated include Iyanomo (Edo), Akwete (Abia), Ajassor (Cross River), Ikorodu (Lagos), Mayo Selbe (Taraba), and Ibadan plantation in Nigeria. The study found that two clones, 143 and 318, were the most adaptable to lowland areas. This finding is significant because it means that these clones are more likely to survive and produce high-quality tea in lowland areas of Nigeria than the other clones evaluated. Therefore, the cultivation of these two clones in lowland areas could lead to increased tea production in Nigeria. Furthermore, lowland tea production in Nigeria has several advantages, including a longer harvesting period, higher yields, and lower production costs compared to highland tea production. Lowland areas also offer a more favourable climate for tea cultivation, with higher temperatures and rainfall that are ideal for tea plants' growth.

### **Conclusion**

Tea production has the prospects of contributing significantly to Nigeria's economy, generate employment, and reduce the country's dependence on oil revenue. Nigeria's position in global tea production is not encouraging however, the recent growth in the Nigerian tea market could propel the country into greater production levels. Intercropping practices in tea production are not uncommon in Nigeria, especially in Mambilla Taraba state. Intercropping in tea production often maximizes land use and leverages complementary relationships between different crops ultimately resulting in increased profits for the farmers in Nigeria. Notable tea intercrops in Nigeria include maize, sweet potatoes, beans, guinea corn, guava, pear, cassava, pineapple, and cocoyam. The lack of tea production in Southern Nigeria and the concentration of production only in the Mambilla plateau in Taraba State are major hindrances to Nigeria's ability to compete with top tea-producing nations in the world. Some of the other challenges identified include inadequate infrastructure, lack of access to finance, low productivity, poor quality of tea produced and incidence of pests and diseases. Major tea pests and diseases identified in Nigeria include tea mosquito, tea green leafhopper, tea aphids, tea dwarfism, tea mosaic virus and tea gall midge. Addressing the challenges of inadequate attention given to tea production, limited climatic conditions, and limited tea production infrastructure could expand the country's tea production and increase its competitiveness in the global market. However, to realize the industry's potential, there is a need for concerted efforts from all stakeholders, including the government, private sector, and research institutions. Investment in infrastructure, research and development, and extension services, and access to finance are necessary for the growth and development of the tea industry in Nigeria. Farmers in the lowland regions of

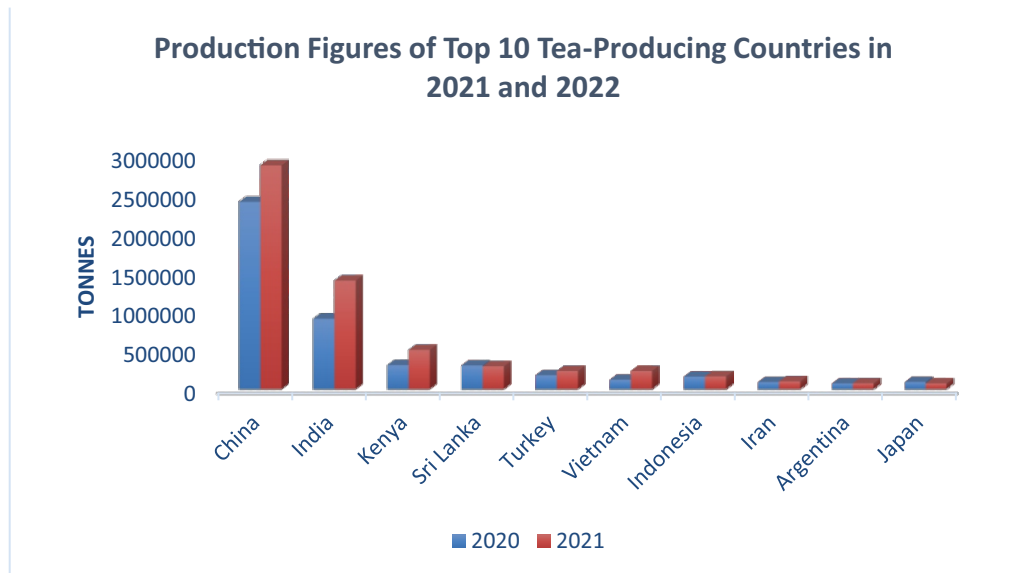
the country should be educated and encouraged to engage in tea production as this will increase tea production and export in Nigeria as well as provide an alternative source of livelihood for farmers.

## References

- Aikpokpodion, P.E. (2020). Eucalyptus agroforestry in tea plantation on the Mambilla Plateau: Influence on carbon sequestration and soil organic carbon. *Nigerian Journal of Pharmaceutical and Applied Science Research*, 9(1), 25–30. Retrieved from <https://nijophasr.net/index.php/nijophasr/article/view/327>.
- Akoroda, M.O., Adekoya, M.A., & Oyediran, W.O. (2010). Tea production in Nigeria: Prospects and challenges. *Journal of Agriculture and Social Research*, 10(1), 21-28.
- Bamikole, O., Olajire, A.A., and Ajibade, F.O. (2021). Characterisation of tea growing regions in Nigeria: a review. *Nigerian Journal of Agriculture, Food and Environment*, 17(1), 24-33.
- Food and Agriculture Organization. (2021). FAOSTAT database. Retrieved from <http://www.fao.org/faostat/en/#data/QC>
- Han, W. Y., X. Li, and G. J. Ahammed. (2018). *Stress physiology of tea in the face of climate change*. 1st ed. Singapore: Springer. doi: <https://doi.org/10.1007/978-981-13-2140-5>.
- Hayat, K., Iqbal, H., Malik, U., Bilal, U., & Mushtaq, S. (2015). Tea and its consumption: benefits and risks. *Critical reviews in food science and nutrition*, 55(7), 939–954. <https://doi.org/10.1080/10408398.2012.678949>
- Heaney, S., Koidis, A., & Morin, J. M. (2018). *Tea and flavoured tea. Handbook of Food Authenticity: A Guide to Food Authenticity Issues and Analytical Solutions*. Elsevier, 315-331.
- Indexbox Report (2023). Nigeria - Tea - Market Analysis, Forecast, Size, Trends and Insights Available online: <https://www.indexbox.io/store/nigeria-tea-market-analysis-forecast-size-trends-and-insights/>. Accessed on 8<sup>th</sup> December, 2023.
- Ipinmoroti, R. R., Adedeji, A. R., Olaniyi, O. O., Aroyeun, S. O., Oloyede, A. A., Oluyole, K. A., ... & Agbebaku, E. (2018). Assessment of problems confronting sustainable tea production along the value chain in Nigeria. *Acta Horticulturae*, 1225, 321-327.
- Ipinmoroti, R.R., Daniel, M.A., & Obatolu, C.R. (2002). Effect of organomineral fertilizer on tea growth at Kusuku Mambilla Plateau, Nigeria. *Moore Journal of Agricultural Research* 3(2), 180–183.
- Khan, N., & Mukhtar, H. (2013). Tea and health: studies in humans. *Current pharmaceutical design*, 19(34), 6141–6147. <https://doi.org/10.2174/1381612811319340008>
- Kuye, O.L. (2014). An assessment of the tea industry in Nigeria. *African Journal of Food, Agriculture, Nutrition and Development*, 14(2), 8702-8714.
- Mondal, T. K., Bhattacharya, A., Laxmikumaran, M., & Singh Ahuja, P. (2004). Recent advances in tea (Camellia sinensis) biotechnology. *Plant Cell, Tissue and Organ Culture*, 76, 195-254.
- National Bureau of Statistics. (2022). Agricultural production data. Retrieved from <http://www.nigerianstat.gov.ng/nada/index.php/catalog/90>
- Ndege, P. O. (2021). “All time is tea time”: The prospects and challenges of the global tea industry. Retrieved from [https://www.africamultiple.uni-bayreuth.de/en/news/2021/2021-05-17\\_tea/index.html](https://www.africamultiple.uni-bayreuth.de/en/news/2021/2021-05-17_tea/index.html)
- Oladipo, O. O., Oluwatoyinbo, F. I., & Awe, G. O. (2019). Tea cultivation in Nigeria: A review. *Journal of Horticulture and Forestry*, 11(9), 159-166.
- Oloyede, S. A., Adegoke, M. A., & Afolayan, R. A. (2012). Genetic variability and heritability estimates of some tea (Camellia sinensis L.) accessions grown in Nigeria. *International Journal of Agricultural Research*, 7(3), 126-136.
- Oloyede, S. A., Adegoke, M. A., & Olumide, B. O. (2017). Selection of tea (Camellia sinensis (L.) O. Kuntze) clones for growth, yield, and quality traits in the Mambilla highland, Nigeria. *Journal of Crop Science and Biotechnology*, 20(4), 281-288.
- Oluyole, K. A., Oladokun, Y. O.M., & Yahaya, A. (2023). Analysis of Tea Consumption in South-West Nigeria. *British Journal of Multidisciplinary and Advanced Studies*, 4(4), 40–48. <https://doi.org/10.37745/bjmas.2022.0253>
- Oluyole, K., Oladokun, Y., Yahaya, A., & Dada, A. (2022). Cost and Returns Analysis of Intercropped Tea Farms in Taraba State, Nigeria. *Ife Journal of Agriculture*, 34(2), 1-9.
- Oruonye, E. D., Babanyaya, B. M., & Ngamdu, M. B. (2022). Assessment of Level of Local Community Awareness of the Activities of State Institutions in Environmental Protection in Taraba State, Nigeria. *Advances in Social Science and Culture*, 4(2), 33-48.
- Phong, N.H., Pongnak, W., Soyotong, K., Poeaim, S., & Poeaim, A. (2016). Diversity of tea (Camellia sinensis) grown in Vietnam based on morphological characteristics and interprimer binding sites (iPBS) marker. *International Journal of Agriculture and Biology*, 18(02), 385–392.
- Siraj, J., Mekonen, S., Astatkie, H., & Gure, A. (2021). Organochlorine pesticide residues in tea and their potential risks to consumers in Ethiopia. *Heliyon*, 7(7), e07667.
- Statista Tea Market Report (2023). Available online: <https://www.statista.com/outlook/cmo/hot-drinks/tea/nigeria#revenue>. Accessed on 8<sup>th</sup> December, 2023.
- Ukwungwu, M.N., Nweke, C.C., & Ukwungwu, R.N. (2019). Assessing the challenges of tea production in Nigeria: A case study of Obudu, Cross River State. *Journal of Economics and Sustainable Development*, 10(3), 37-43.
- Wijerathne, E.M.R.N.K. & Hettiarachchi, H.A.J. (2018). The impact of climate change on Sri Lanka's tea industry. *Journal of the National*

*Science Foundation of Sri Lanka*, 46(3), 209-219.  
Xia, E.H., Tong, W., Wu, Q., Wei, S., Zhao, J., Zhang, Z.Z., ... & Wan, X.C. (2020). Tea plant genomics: Achievements, challenges and perspectives. *Horticulture Research*, 7(7), 1-19.

Xiang, J., Rao, S., Chen, Q., Zhang, W., Cheng, S., Cong, X., ... & Xu, F. (2022). Research progress on the effects of selenium on the growth and quality of tea plants. *Plants*, 11(19), 2491.



**Figure 1** Top ten Tea producing countries in 2021 and 2022  
**Source:** Food and Agriculture Organization (FAO), 2021