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Review Research Paper

Intercropping Rubber with Cassava in Nigeria: Opportunities, Challenges, and Sustainability

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ABSTRACT

Intercropping rubber (*Hevea brasiliensis*) with cassava (*Manihot esculenta*) has gained attention in Nigeria as a viable agroforestry practice for enhancing land productivity, diversifying farmer incomes, and ensuring food security. This review explores the agronomic, economic, and environmental aspects of intercropping rubber with cassava. The study highlights best practices, challenges, and policy recommendations for successful implementation. In addition, it evaluates case studies and recent research findings on the subject, underscoring the importance of adopting sustainable intercropping systems to maximize yields and profitability. Intercropping rubber with cassava presents significant potential for improving food security, increasing rural incomes, and promoting environmental sustainability in Nigeria.

1. Introduction:

Intercropping is the cultivation of two or more crops on the same piece of land, it is a common agricultural practice in Nigeria. The integration of rubber and cassava offers significant potential for optimizing land use, improving food security, and increasing farmers' incomes (Oke *et al.,* 2020). Cassava, a staple food crop in Nigeria, thrives in similar agro-ecological zones as rubber, making it a suitable intercrop during the immature phase of rubber plantations (Adesina *et al*., 2018). Research indicates that intercropping reduces the risk of crop failure, ensures year-round productivity, and contributes to sustainable agricultural systems (FAO, 2022). This review examines the benefits, agronomic practices, and challenges associated with intercropping rubber with cassava in Nigeria.

2. Agronomic Practices in Rubber-Cassava Intercropping:

Intercropping rubber with cassava is typically practiced during the early growth phase of rubber plantation establishment, specifically before the canopy closes and sunlight penetration for undergrowth crops is limited (Oladokun *et al*., 2019). Proper agronomic management is essential for maximizing productivity and minimizing competition between crops:

- **Spacing:** Rubber trees are planted at a spacing of 6m × 6m, while cassava is planted in between rows at a spacing of 1m × 1m (Adesina *et al*., 2018).
- **Crop Rotation:** Introducing rotational planting cycles helps reduce pest and disease incidence in cassava.
- **Fertilization:** Balanced fertilizer application, including nitrogen, phosphorus, and potassium, ensures optimal growth for both crops (FAO, 2022).

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- **Weed Control:** Regular manual or chemical weed control is essential to reduce competition for available water and nutrients.
- **Water Management:** Adequate water supply, especially during dry seasons, ensures higher yields from cassava and rubber trees.

3. Economic Benefits of Rubber-Cassava Intercropping:

- **Income Diversification:** Farmers generate income from cassava sales during the non-productive phase of rubber plantations (Adesina *et al*., 2018).
- **Increased Cash Flow:** Cassava provides short-term returns, bridging financial gaps until rubber trees mature (tapping) (Oladokun *et al*., 2019).
- **Food Security:** Cassava serves as both a subsistence and commercial crop, improving household nutrition and resilience (Oke *et al*., 2020; Esekhade *et al*., 2021).
- **Value Addition:** Cassava by-products, such as starch and flour, create additional income streams (FAO, 2022).
- **Improved Land Use Efficiency:** rubber/ cassava Intercrop enhances the economic value per unit area of land, maximizing farmer returns.
- **Reduction in cost of rubber production:** rubber based cassava intercrop reduces cost of production since the rows and avenue that would have accommodated weed growth and would have required some amount to maintain which ordinary would increase cost of production but with cassava occupying he rows and avenue help to reduce space available for weed growth (Esekhade *et al*., 2021)

4. Environmental Benefits:

- **Soil Fertility Improvement:** The organic matter from cassava residues contributes to soil health and also the micro climate created by cassava in the plantation promote soil flora and fauna (Nair, 1993).
- **Erosion Control:** The dense canopy of cassava reduces surface run-off and prevents soil erosion, particularly on sloped terrain.
- **Biodiversity Conservation:** The diverse plant structure of the intercropping system supports various flora and fauna (Adesina *et al*., 2018).
- **Carbon Sequestration:** Both cassava and rubber trees contribute to carbon sequestration, mitigating climate change effects (FAO, 2022).
- **Efficient Water Utilization:** The combination of deep-rooted rubber trees and shallow-rooted cassava enhances water uptake efficiency.

5. Challenges in Rubber-Cassava Intercropping: Despite the significant benefits, several challenges persist:

- **Nutrient Competition:** Both crops compete for soil nutrients, often resulting in reduced yields if fertilization is inadequate (Adesina *et al*., 2018).
- **Pests and Diseases:** Cassava mosaic disease and root rot pose significant risks, requiring regular monitoring and control (Oladokun *et al*., 2019).
- **Labor Intensity:** Intercropping requires significant labor for planting, weeding, and harvesting, which can increase production costs.
- **Market Access:** Inconsistent markets and poor infrastructure limit farmers' ability to sell cassava and rubber products (FAO, 2022).
- **Knowledge Gaps:** Limited knowledge of optimal intercropping practices among smallholder farmers hinders productivity (Oke et al., 2020).
- **Land Tenure Security:** Insecure land tenure reduces farmers' willingness to invest in long-term intercropping systems.

6. Case Studies and Research Findings:

- **Case Study 1:** A study by Oladokun et al. (2019) in Edo State revealed that rubber-cassava intercropping increased overall farm income by 35% compared to monocropping systems.
- **Case Study 2:** Adesina et al. (2018) reported that intercropping rubber with cassava improved household food security by providing regular cassava harvests.
- **Research Insight:** FAO (2022) highlighted that rubber-cassava intercropping reduced soil degradation and improved crop resilience to climate variability.

7. Policy Recommendations:

- **Extension Services:** Increase farmer training programs on best intercropping practices.
- **Access to Credit:** Provide farmers with affordable credit and subsidies to support initial setup costs.
- **Market Development:** Improve cassava and rubber value chains with better market access and infrastructure.
- **Research Investment:** Support agricultural research focused on developing resilient intercropping models.
- **Incentives:** Introduce government incentives for farmers adopting intercropping systems.

8. Conclusion:

Intercropping rubber with cassava presents significant potential for improving food security, increasing rural incomes, and promoting environmental sustainability in Nigeria. However, challenges such as nutrient competition, labor intensity, and limited technical knowledge must be addressed through targeted interventions and policy support. Research findings and case studies underscore the importance of adopting sustainable practices to maximize the benefits of intercropping.

9. References:

Adesina, F.O., et al. (2018). *Agroforestry Practices and Rural Livelihoods in Nigeria.* Journal of Sustainable Agriculture, 10(2), 112-129.

FAO. (2022). *Agroforestry Systems and Their Role in Sustainable Development.*

Nair, P.K.R. (1993). *An Introduction to Agroforestry.* Springer.

Oke, D.O., et al. (2020). *Rubber Agroforestry in Nigeria.* Agroforestry Systems, 94(4), 785-798.

Oladokun, O., et al. (2019). *Challenges of Rubber Agroforestry in Nigeria.* African Journal of Agricultural Research, 14(7), 302-310.

T.U. Esekhade, S.O. Idoko, C.S. Mesike, C. Okwu-Abolo, S.O. Igberaese, S.O. Ighedosa and L.A. Oghomieje(2021)Economic prospects of a rubber-cassava agroforestry in Nigeria.RUBIS International Workshop on the Resilience of Rubber-based Agroforestry Systems in the Context of Global Change(305)