



Underutilized and Endangered Bioresources in Nigeria: Diversity, Challenges, and Sustainable Utilization Strategies

Prefa, C. A¹., and Enaregha, E. B²

¹Department of Integrated Science, Isaac Jasper Boro College of Education Sagbama, Bayelsa State, Nigeria

²Department of Biology, Isaac Jasper Boro College of Education Sagbama, Bayelsa State, Nigeria

Corresponding Author: prefaada@gmail.com

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ABSTRACT

*Nigeria possesses rich biodiversity comprising thousands of plants, animal, and microbial resources with significant economic, nutritional, and medicinal value. However, a large proportion of these bioresources remain underutilized, while many others are endangered due to anthropogenic pressures. This paper reviews the diversity of underutilized and endangered bioresources in Nigeria, identifies key species and their potentials, examines threats to their sustainability, and proposes strategies for conservation and sustainable exploitation. Findings indicate that although over 5,000 plant species exist in Nigeria; fewer than 20 are fully commercialized, leaving a vast reservoir of untapped bioresources. The study highlights species such as *Dacryodes edulis*, *Irvingia wombolu*, *Detarium microcarpum*, and *Parkia biglobosa* as valuable but neglected resources. Major threats include deforestation, overexploitation, climate change, and lack of research investment. Sustainable utilization through policy support, biotechnology, and community participation is recommended to enhance food security, economic development, and biodiversity conservation.*

Key words: Bioresources, Underutilized species, Endangered species, Biodiversity, Nigeria, Conservation, Food security.

INTRODUCTION

Nigeria is endowed with vast biodiversity resources, including flora, fauna, and microorganisms, which support ecological stability and human livelihoods. Despite this richness, many bioresources remain neglected or underutilized, while others face extinction risks. Underutilized bioresources often referred to as “neglected and underutilized species (NUS)” are species with significant potential that have received little research attention or commercial development. These species are typically adapted to local environments, resistant to stress, and nutritionally rich. Conversely, endangered bioresources are species threatened with extinction due to excessive exploitation and environmental degradation. Neglected and underutilized horticultural crop species (NUHS) are often considered ‘minor crops’ because they are taken to be less important than staple crops and agricultural commodities in terms of global production and market value.

However, from the standpoint of the resource-poor farmers who depend on many of these species for their food security, nutrition and income, they are hardly minor (Osewa *et al.*, 2013). They are also considered as underutilized in terms of their potential to contribute to the income and well-being of the global food security in general (Oloyede *et al.*, 2011). (NUHS) are also described as “neglected” or “orphan” crops since they have received scant attention from research and development, and there is little scientific information about them (Padulosi and Houschle-Zeledon, 2004; Dansi *et al.*, 2012; Oloyede, 2017). (NUS)

play a major role in alleviating nutritional problems and poverty. They are not likely to cause die due to related diseases. They have been found to be viable and potent sources of food, feed, shelter, and medicine, contributing thus to improve in various ways, the quality-of-life well-being of mankind (Oloyede *et al.*, 2012a; Osewa *et al.*, 2013; Oloyede, 2017). In addition, some of these crops can not be adversely affected by climate change and they also require minimum agronomic input to yield optimally (Oloyede, 2011; Oloyede *et al.*, 2012b; Oloyede *et al.*, 2014).

Biodiversity is used to refer to the collective of ecosystems, species, and genes which together comprise the earth (Shannan and Grant, 2007). Crop biodiversity is one of the major inventions of humanity through the process of domestication. It is an important resource for crop improvement to adjust crop production as a measure to mitigate the adverse effects of climate change and to satisfy consumer preference (Hufford *et al.*, 2019). The biodiversity in crops, cultivated crops, and particularly in horticultural crops naturally underpins sustainability, nutritional security, and above all a diversified food basket (Lutaladio *et al.*, 2010; Hufford *et al.*, 2019). Together with natural resources overall, biodiversity in horticulture is the key to crop and dietary diversification, and indeed human well-being and survival (Lutaladio *et al.*, 2010). In addition to food provision, biodiversity in agriculture is important for ensuring nutrient cycling, carbon sequestration, soil erosion control, greenhouse gas emissions reduction and control of hydrological processes (Chivenge *et al.*, 2015).

Around 30,000 of the totals of approximately 250,000 flowering plant species in existence are edible, with the vast majority of the edible species being “minor crops.” These may be culturally important cultigens, semi-wild species, wild species, or weeds; in turn they may be locally cultivated on a small-scale, semi-cultivated in and around settlements, gathered from the wild, or tolerated in cultivated areas, respectively (John, 2015). The broad range of traditional crops, which were previously grown on a sustainable scale in some parts of the world, has been replaced by a narrow range of major crops, grown as large-scale monocultures over a couple of decades leading to a vast reduction in horticultural and agricultural biodiversity among popular species. This has consequently narrowed the number of species upon which global food security depends (John, 2015). Biodiversity conservation of horticultural crops is essential to achieving two of the United Nations Millennium Development Goals (MDGs): halving the proportion of people who suffer from hunger and ensuring environmental sustainability. Diversifying crop production is no doubt a viable climate smart agriculture that must be embraced by all and sundry.

This paper assesses the importance of Nigerian underutilized horticultural crops, the need and how of their conservation for maximal exploitation. Why neglect and underutilization? Ignorance of the crops and their potentials by the elites. According to Oloyede (2011), many NUHS in Nigeria are becoming unknown to the new generation, especially the urban dwellers that have the means to explore their potentials in food, feed, pharmaceutical etc. industries. Rural women cultivate some of the crops for their immediate use and no serious cultivation attention is given to them by any farmer in the country. There is deficiency of documented knowledge in the nutritional composition of NUHS as well (Amujoyegbe, 2007; Amujoyegbe *et al.*, 2015, Oloyede, 2021). Increasing population pressure, deforestation, and urbanization have intensified biodiversity loss in Nigeria. This paper aims to:

- Identify key underutilized and endangered bioresources in Nigeria
- Examine their ecological and economic importance
- Analyze threats to their sustainability
- Propose strategies for conservation and utilization

MATERIALS AND METHODS

This study adopts a systematic literature review approach, drawing from peer-reviewed journals, institutional reports, and biodiversity databases. Sources were selected based on relevance to Nigerian biodiversity, underutilized species, and conservation strategies. Data were analyzed qualitatively to identify patterns in:

- Species diversity
- Utilization levels
- Threat factors
- Conservation practices

Definition and Characteristics

Underutilized bioresources are biological species with:

- Limited commercial use
- High nutritional or medicinal value
- Adaptation to local environmental conditions
- Cultural or traditional importance

These species are often overlooked due to low awareness, poor research investment, and perception as “subsistence” crops.

Underutilized Plant Bioresources

Fruit Trees and Oil Crops

- *Dacryodes edulis* (African pear)
- *Irvingia wombolu* (wild mango)
- *Pentaclethra macrophylla* (African oil bean)

These species contain high oil content and industrial potential for food, cosmetics, and pharmaceuticals.

Legumes and Cereals

- *Bambara groundnut* (*Vigna subterranea*)
- Fonio (*Digitaria exilis*)
- Underutilized legumes with high protein content and drought tolerance

Medicinal Plants

- *Garcinia kola*
- *Zanthoxylum spp.*
- *Ficus exasperata*

These plants are widely used in ethnomedicine and contain bioactive compounds.

Wild Edible Species

- *Detarium microcarpum* - edible fruit and medicinal uses
- *Dialium guineense* - fruit for beverages

These species contribute to rural diets and livelihoods.

Endangered Bioresources in Nigeria

Endangered bioresources in Nigeria include:

- Timber species (e.g., mahogany)
- Medicinal plants
- Non-timber forest products
- Aquatic species

Causes of Endangerment

Major drivers include:

1. Deforestation: Expansion of agriculture and logging activities leads to habitat destruction.
2. Overexploitation: Unsustainable harvesting for fuelwood, medicine, and trade exceeds regeneration rates.
3. Urbanization: Infrastructure development reduces natural habitats.
4. Climate Change: Alters species distribution and survival patterns.
5. Lack of Conservation Awareness

Limited knowledge leads to poor resource management. These pressures have caused population declines and, in some cases, local extinction.

Importance of Underutilized and Endangered Bioresources

- Food and Nutritional Security: Underutilized crops are rich in micronutrients and can combat malnutrition in Nigeria.
- Economic Development

These resources can:

- Generate income
- Reduce import dependency
- Promote agro-industrial development

Medicinal Value: Many species possess pharmacological properties useful in traditional and modern medicine.

Climate Resilience: Indigenous species are more tolerant to drought and poor soils, making them suitable for climate-smart agriculture.

Cultural and Ecological Value: They preserve indigenous knowledge and support ecosystem balance.

Challenges to Utilization and Conservation

- Limited research and documentation
- Poor domestication and cultivation practices
- Weak policy frameworks
- Market constraints and low commercialization
- Genetic erosion and biodiversity loss
- Poor germination and propagation challenges in some species

Conservation and Sustainable Utilization Strategies

In-situ Conservation

- Protection of natural habitats
- Establishment of forest reserves

Ex-situ Conservation

- Seed banks and gene banks
- Botanical gardens and field gene banks

Nigeria's national gene bank conserves hundreds of indigenous species for future use.

Research and Development

- Biotechnology applications
- Crop improvement and domestication

Policy and Institutional Support

- National biodiversity policies
- Funding for conservation programs

Community Participation

- Indigenous knowledge integration

- Awareness campaigns

Value Chain Development

- Processing and commercialization
- Linking farmers to industries

DISCUSSION

The underutilization of Nigeria's bioresources represents a missed opportunity for economic diversification and food security. While global agriculture focuses on a few major crops, Nigeria possesses a wealth of indigenous species that are resilient and nutritionally superior. However, the coexistence of underutilization and endangerment presents a paradox: species with high potential are simultaneously neglected and threatened. Addressing this requires a multidisciplinary approach involving science, policy, and local communities.

CONCLUSION

Nigeria's underutilized and endangered bioresources hold immense potential for sustainable development. Their conservation and proper utilization can:

- Enhance food security
- Boost economic growth
- Preserve biodiversity

Urgent action is needed to integrate these resources into mainstream agriculture and conservation frameworks. Strategic investment in research, policy support, and awareness will ensure their sustainability for future generations.

RECOMMENDATIONS

Based on the research results the following findings were made:

1. Increased funding for biodiversity research
2. Establishment of more gene banks and conservation centres
3. Promotion of underutilized crops in agricultural policies
4. Development of local and international markets
5. Integration of indigenous knowledge systems
6. Public awareness campaigns on biodiversity conservation

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