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The Exploitation of Orphan Legumes for Food, Income, and Nutrition Security in Sub-Saharan Africa

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Abstract

Poverty, food, and nutrition insecurity in sub-Saharan Africa (SSA) have become major concerns in recent times. The effects of climate change, drought, and unpredictable rainfall patterns threaten food production and sustainable agriculture. More so, insurgency, youth restiveness, and politico-economic instability amidst a burgeoning population requiring a sufficient and healthy diet remain front-burner issues in the region. Overdependence on only a few major staple crops is increasingly promoting the near extinction of many crops, especially orphan legumes, which possess immense potentials as protein and nutritional security crops. The major staple crops are declining in yield partly to their

inability to adapt to the continuously changing climatic conditions. Remarkably, the orphan legumes are climate-smart crops with enormous agronomic features which foster sustainable livelihood. Research efforts on these crops have not attained a reasonable comparative status with most commercial crops. Though many research organizations and scientists have made efforts to promote the improvement and utilization of these orphan legumes, there is still more to be done. These legumes' vast genetic resources and economic utility are grossly under-exploited, but their values and promising impacts are immeasurable. Given the United Nations sustainable development goals (SDGs) of zero hunger, improved nutrition, health, and sustainable agriculture, the need to introduce these crops into food systems in SSA and other poverty-prone regions of the world is now more compelling than ever. This review unveils inherent values in orphan legumes needing focus for exploitation *viz-a-viz* cultivation, commercialization, and social acceptance. More so, this article discusses some of the nutraceutical potentials of the orphan legumes, their global adaptability, and modern plant breeding strategies that could be deployed to develop superior phenotypes to enrich the landraces. Advanced omics technologies, speed breeding, as well as the application of genome editing techniques, could significantly enhance the genetic improvement of these useful but underutilized legumes. Efforts made in this regard and the challenges of these approaches were also discussed.

Keywords: climate change, food security, malnutrition, orphan legumes, sustainable development goals

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Introduction

Africa's population is currently estimated above 1.3 billion, and it is expected to hit 2.5 billion by the year 2050 ([Fischer et al., 2009](#); [Paliwal et al., 2021](#)). This burgeoning figure is mounting pressure on food production. At the same time, factors such as poor soils, land degradation, climate change, lack of access to fertilizers, poor agricultural infrastructures, banditry, and insurgency impede sustainable agriculture. The continent is endowed with a rich agrobiodiversity and has excellent potential for self-sufficiency in food production. However, it is one of the food- and nutrition-deficient regions in the world. Africa's agrobiodiversity is continuously under threat resulting in the erosion of valuable genetic resources ([Popoola et al., 2020](#); [Ikhajiagbe et al., 2021](#)). The destruction of many agricultural fields and farms by overgrazing and unregulated nomadic pastoralism has fueled an upsurge in herder-farmer's conflict in some regions, thereby subjecting many to poverty. Moreover, the internal displacement of persons is on the increase. Traditional agronomic practices for many indigenous species are on the verge of being lost, resulting in low yield and neglect. This could have far-reaching consequences on global food production and the supply chain. Whereas food insecurity and dietary deficiencies are global issues, their severities are more pronounced in Africa and some parts of Asia ([Li and Siddique, 2020](#); [Popoola et al., 2020](#)). Nutritional transitions, overdependence on a few major staple foods, and improved socioeconomic status contribute to food and protein insecurity ([Dixon, 2009](#); [Chakona and Shackleton, 2017](#)). Mitigating the impacts of these problems calls for global attention and concerted efforts by all stakeholders.