



Underutilized Vegetable Crops: Potential for Nutritional Security and Sustainable Agriculture

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Abstract

Underutilized vegetable crops are plant species that are traditionally grown in limited areas but possess high nutritional, medicinal, and economic value. Despite their adaptability to marginal environments and resilience to climate stresses, these crops have remained neglected in mainstream agriculture. In the context of increasing food and nutritional insecurity, underutilized vegetables offer a promising solution due to their rich content of vitamins, minerals, antioxidants, and bioactive compounds. Crops such as spine gourd, drumstick, amaranthus, and ivy gourd are recognized for their superior nutritional quality and ability to thrive under low-input conditions. These crops also contribute significantly to biodiversity conservation and sustainable farming systems. However, lack of awareness, limited research, poor market linkages, and absence of improved varieties hinder their large-scale adoption. Promoting underutilized vegetable crops through research, policy support, value addition, and market development can play a crucial role in improving livelihoods, ensuring nutritional security, and achieving sustainable agriculture (Padulosi *et al.*, 2013; Chivenge *et al.*, 2015; Mabhaudhi *et al.*, 2019).

Keywords: Underutilized crops, vegetables, nutritional security, biodiversity, sustainable agriculture

Introduction

Global agriculture is dominated by a few staple crops, leading to reduced dietary diversity and increased vulnerability to food and nutritional insecurity. Underutilized vegetable



crops, also referred to as neglected and underexploited species (NUS), are those that have not been widely commercialized but possess significant potential for improving nutrition, livelihoods, and environmental sustainability (Padulosi *et al.*, 2013). These crops are often well adapted to local agro-climatic conditions, require fewer inputs, and are more resilient to climatic stresses, making them particularly suitable for small and marginal farmers. In India, several underutilized vegetables such as spine gourd (*Momordica dioica*), drumstick (*Moringa oleifera*), and colocasia (*Colocasia esculenta*) are traditionally cultivated and consumed but remain underexploited at the commercial level (Mabhaudhi *et al.*, 2019).

Characteristics of Underutilized Vegetable Crops

Underutilized vegetable crops are characterized by their high nutritional value, adaptability to marginal and stress-prone environments, and low input requirements. They are often resistant to pests and diseases and hold significant cultural and traditional importance in local diets. These characteristics make them highly suitable for sustainable agriculture and climate-resilient farming systems. Their ability to grow under adverse conditions with minimal external inputs makes them ideal candidates for promoting eco-friendly and low-cost farming practices (Chivenge *et al.*, 2015; Dawson *et al.*, 2019).

Nutritional Importance

Underutilized vegetables are rich sources of essential nutrients and bioactive compounds. For instance, drumstick leaves are rich in iron, calcium, and protein, while amaranthus provides substantial amounts of vitamins A and C. Spine gourd is valued for its medicinal properties and nutritional richness. The inclusion of these crops in daily diets can significantly help in combating micronutrient deficiencies, commonly referred to as hidden hunger, and improve overall human health (Chivenge *et al.*, 2015; Tontisirin *et al.*, 2016). Furthermore, their high antioxidant content contributes to the prevention of chronic diseases and enhances immune function.

Role in Sustainable Agriculture

Underutilized vegetable crops play a crucial role in promoting sustainable agriculture by enhancing biodiversity, improving soil health, and reducing dependency on chemical inputs. Their adaptability to diverse environmental conditions and resilience to climate variability make them important components of climate-smart agriculture. These crops contribute to diversified



cropping systems, which improve ecosystem stability and reduce production risks. Their low input requirement also supports organic farming systems and reduces the environmental footprint of agriculture (Mabhaudhi *et al.*, 2019; Dawson *et al.*, 2019).

Economic Potential

Underutilized vegetable crops offer significant economic opportunities for farmers, particularly through niche markets, organic production, and value-added products. With increasing consumer awareness regarding health, nutrition, and sustainable food systems, the demand for such crops is gradually rising. These crops can provide additional income sources for smallholder farmers and contribute to rural livelihood improvement. Development of value chains, processing industries, and market linkages can further enhance their commercial viability (Padulosi *et al.*, 2013).

Constraints in Adoption

Despite their numerous advantages, the adoption of underutilized vegetable crops is limited due to several constraints. These include the lack of improved varieties and quality seeds, limited research and extension support, poor market infrastructure, and low consumer awareness. In addition, absence of organized supply chains and inadequate policy support further hinder their commercialization. Addressing these constraints is essential for unlocking the potential of these crops.

Strategies for Promotion

Promotion of underutilized vegetable crops requires a multi-dimensional approach involving research, policy support, and market development. Efforts should focus on the development of improved varieties, strengthening seed systems, and enhancing research on agronomic practices. Awareness programs and training for farmers and consumers are essential to increase adoption and consumption. Additionally, the development of value chains, market linkages, and inclusion of these crops in government nutrition and agricultural programs can significantly boost their cultivation and utilization (Mabhaudhi *et al.*, 2019).

Conclusion

Underutilized vegetable crops hold immense potential for improving nutritional security, enhancing biodiversity, and promoting sustainable agriculture. Their resilience to climate



stress and adaptability to low-input conditions make them highly suitable for future farming systems. Focused efforts in research, policy support, and market development are essential to unlock their full potential and integrate them into mainstream agriculture. Promoting these crops can contribute significantly to food and nutritional security while supporting sustainable and climate-resilient agricultural practices.

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