

Imperative Role, Nutritive Value, Constraints and Schemes Associated with Underutilized Horticultural Crops in India and Global Scale

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Domesticated plant species with significant nutritional and functional values that are not widely used for a variety of reasons are known as underutilised horticultural crops (Ebert 2014). Pseudocereals and millets, grain legumes, roots and tubers, leafy vegetables, and wild vegetables are the five main categories into which these crops can be grouped. In their local contexts, neglected and underutilised crops are important for food, medicine, trade, or cultural practices. Drumstick, red cabbage, avocado, beetroot, turmeric, passion fruit, jamun, and bael are a few examples of these crops. Because of their diverse genetic backgrounds, these underutilised crops are frequently tolerant of challenging agroclimatic conditions. To assess their potential and incorporate them into agricultural systems, a methodical effort should be made. Moreover, neglected crops are becoming new sources of vital bioactive ingredients and are abundant in naturally occurring pigments with medicinal qualities (Sagar *et al.*, 2018). Neglected horticultural crops have a lot of potential for cultural practices, medical applications, and nutritional security. More resilient and varied food systems may result from their incorporation into agricultural systems.

The significance of neglected horticultural crops

Plant species that have not yet been fully utilised for their potential advantages in economic development, agriculture, and nutrition are referred to as underutilised horticultural crops. These crops frequently have important qualities like high nutritional content, resistance to pests and diseases, climate adaptation, cultural significance, and resistance to diseases. Acknowledging and advocating for the significance of underutilised horticultural crops can yield numerous noteworthy advantages.

Conservation of Biodiversity: Underutilised horticultural crops maintain genetic diversity within agricultural systems, which aids in the conservation of

biodiversity. Numerous of these crops are indigenous to particular areas and offer distinctive genetic resources that could be crucial for upcoming breeding initiatives. Food and Nutrition Security: Underutilised crops can supply vital vitamins, minerals, and other nutrients that are absent from conventional diets. They also frequently have high nutritional value. In areas where malnutrition is a problem, encouraging their production and consumption can help diversify diets and enhance food and nutrition security.

Climate Resilience: Drought, low soil fertility, harsh temperatures—all of these local environmental conditions are well-suited to certain underutilised crops. Farmers can lessen their reliance on conventional crops, which might be more susceptible to environmental stresses, and increase their resilience to climate change by diversifying their agricultural systems with these crops.

Income Generation and Livelihood Improvement: Smallholder farmers and rural communities can benefit economically from the cultivation of underutilised horticultural crops. There may be specialised markets for these crops both locally and abroad, providing greater costs in comparison to common commodities. Furthermore, underutilised crops can be used to create value-added products like jams, juices, and herbal remedies, which can increase income potential even more.

Cultural Preservation: A lot of neglected horticultural crops are important to the local way of life and have a long history of use in food preparation. Encouraging their production and use can aid in the preservation of the traditional knowledge and cultural legacy connected to these crops. Sustainable Agriculture: Compared to conventional crops, underutilised crops frequently require fewer inputs, such as water, fertilizer, and pesticides. Through the reduction of chemical inputs, mitigation of soil erosion, and promotion of agro-ecological principles, their cultivation can support sustainable agricultural

practices. Market Diversification and Innovation: Growing the market for horticulture crops that aren't being used to their full potential can lead to innovative approaches to farming, processing, and marketing (Ebert 2014). This may open doors for investment and entrepreneurship in rural areas, promoting development and economic growth.

Underutilised horticultural crops' nutritional value

High in Micronutrients: Vital vitamins and minerals can be found in abundance in a number of underutilised crops. Moringa leaves, for example, are an excellent supplement to diets in areas where certain nutrients are deficient because of their exceptionally high levels of vitamin C, vitamin A, calcium, potassium, and iron.

Diverse Antioxidants: Underutilised crops frequently have a wide range of antioxidants that lower the risk of chronic illnesses like cancer and heart disease and help fight oxidative stress. For instance, amaranth contains a lot of flavonoids and phenolic compounds, both of which have antioxidant qualities.

Healthy Fats and Oils: Some underutilised crops provide healthy fats and oils that contribute to overall health. Sacha inchi, for instance, is a seed rich in omega-3 fatty acids, which are important for brain function, heart health, and reducing inflammation. High protein content: Plant-based proteins can be found in abundance in a number of neglected crops. For instance, quinoa is a vital component of vegetarian and vegan diets since it is a complete protein that includes all of the essential amino acids.

Dietary fibre: Underutilised crops frequently have high dietary fibre content, which helps prevent diverticulosis and constipation by promoting digestive health. Ethiopian-native teff grain has a high fibre content that promotes gut health and fullness.

Low Glycemic Index: Certain underutilised crops raise blood sugar levels more gradually and steadily because of their low glycemic index. Controlling weight and diabetes may benefit from this. Millet and Fonio are two examples.

Gluten-Free Options: Underutilised crops like teff and fonio provide gluten-free options to traditional grains like wheat, barley, and rye for people with

celiac disease or gluten sensitivity. Adaptability to Adverse Environments: A lot of underutilised crops can withstand adverse environmental factors like drought, poor soil, or extremely high or low temperatures. In areas where conventional crops have difficulty thriving, the cultivation of these crops can increase food security.

Issues related to underutilised crops in horticulture

Plants that have not been fully utilised for their potential benefits are referred to as underutilised horticultural crops. This can be because of a variety of factors, such as a lack of research and development, limited commercial interest, or cultural preferences for other crops. A number of issues are linked to underutilised horticultural crops, including:

Limited Market Demand: One of the main issues is the market's limited appetite for underutilised crops. These crops may be unknown to consumers, or they may prefer more widely accessible options.

Lack of Research and Development: Compared to major crops, underutilised crops frequently lack thorough research and development. This covers post-harvest handling methods, agronomic techniques, pest and disease management plans, and breeding programmes for improved varieties.

Poor Infrastructure and Distribution Networks: Inadequate infrastructure, such as storage facilities, transportation networks, and market linkages, can hinder the efficient distribution of underutilised crops from production areas to consumers.

Limited Access to Inputs and Technology: Farmers growing underutilised crops may have limited access to quality seeds, fertilisers, pesticides, and other agricultural inputs. Additionally, they may lack knowledge about modern farming technologies and practices that could improve crop productivity.

Risk of Genetic Erosion: Underutilised crops often possess valuable genetic diversity that could be lost over time due to neglect. This genetic erosion reduces the resilience of agricultural systems to environmental stresses such as climate change and pest outbreaks.

Marginalisation of Indigenous Knowledge: Traditional knowledge related to underutilised crops may be marginalised or lost as communities transition

to more commercially viable crops. This can lead to a loss of cultural heritage and ecological wisdom associated with these crops.

Food Security and Nutrition: Neglecting underutilised crops limits dietary diversity and resilience to food insecurity. Many of these crops are rich in essential nutrients and have the potential to contribute to improved nutrition and food security, especially in marginalised communities.

Policy and Regulatory Constraints: In some cases, regulatory barriers, such as certification requirements or trade restrictions, may impede the production and marketing of underutilised crops, limiting their economic viability.

Underutilised horticultural crops in India

Here are some examples of underutilised horticultural crops from various regions around the world:

1. Moringa: Known for its high nutritional value, moringa is grown in many tropical and subtropical regions but is still underutilised in many places (Bennett et al., 2013).
2. Jicama: also known as Mexican turnip or yam bean, is a root vegetable native to Mexico and Central America. It has a crunchy texture and a slightly sweet flavour.
3. Okra: Commonly grown in tropical and subtropical regions, okra is a nutritious and versatile vegetable that is underutilised in some parts of the world.
4. Chayote: Chayote, also known as vegetable pear or mirliton, is a squash-like fruit native to Mesoamerica. It is grown in many tropical and subtropical regions but is often underutilised.
5. Amaranth: Amaranth is a highly nutritious pseudocereal that is grown in many parts of the world but is considered underutilised compared to other grains such as wheat and rice.
6. Bamboo shoots: Bamboo shoots are edible young shoots of bamboo plants and are commonly used in Asian cuisine. They are underutilised in many parts of the world outside of Asia (Rana et al., 2022).

7. Winged bean: A tropical legume indigenous to Papua New Guinea, winged bean is also referred to as goa bean or asparagus pea. It yields edible flowers, leaves, pods, and tuberculate roots.
8. Celeriac: A root vegetable closely related to celery, celeriac is also referred to as celery root. Compared to other root vegetables, it is underutilised and has a distinct flavour.
9. Taro: Grown extensively in tropical regions, taro is a starchy root vegetable. Even though it is a staple food in many parts of the world, some areas still don't use it enough.
10. Yacon: A native of South America's Andes, yacon is a tuberous root vegetable. It is becoming more and more popular as a low-calorie sweetener because of its crunchy texture and sweet flavour.

Plans, laws, and regulations from the government for underutilised horticultural crops

Around the world, a number of governments have put plans, laws, and regulations into place to encourage the growth and use of underutilised horticultural crops. These programmes frequently target nutritional issues, biodiversity conservation, increased farmer incomes, and food security. Here are a few instances:

India's National Horticulture Mission (NHM) is a government-sponsored initiative designed to encourage the comprehensive development of the horticultural industry. It encompasses programmes for the advancement of neglected crops in addition to common horticultural crops.

United States Specialty Crop Block Grant Programme: Underutilised horticultural crops and other specialty crops are among the projects that this programme funds state departments of agriculture to support in order to increase their competitiveness. It seeks to address problems with these crops, including marketing, research, and education.

The Canadian government funds research, development, and adoption of innovative agricultural practices, such as the production and use of

underutilised horticultural crops, through the Agri-Innovation Programme.

National Horticulture Policy, Kenya: Kenya has developed a National Horticulture Policy that aims to promote the production, marketing, and consumption of diverse horticultural crops, including those that are underutilized. The policy provides a framework for supporting smallholder farmers and improving access to markets.

The European Union launched the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI) to encourage innovation in agriculture. It consists of initiatives to encourage the production and use of underutilised crops, with an emphasis on resource efficiency and sustainability.

CGIAR ie Conservation and Sustainable Use of Crop Genetic Resources in Developing Countries. It is an international collaboration that funds agricultural development research. Programmes aimed at conserving and utilising crop genetic resources, particularly underutilised horticultural crops, are included.

Initiatives supported by the United Nations Food and Agriculture Organisation (FAO): As part of its efforts to improve food security and nutrition globally, FAO supports a number of initiatives aimed at promoting underutilised crops, including horticultural crops. This covers policy advocacy, research support, and capacity building.

Conclusion

Acknowledging the value of underutilised horticultural crops and promoting their production, application, and commercialization can help with a

number of sustainability-related issues, such as food security, climate resilience, biodiversity preservation, and economic growth. Through policy support, research and development, capacity building, and market linkages, governments, research institutions, non-governmental organisations, and the private sector can all play significant roles in encouraging the adoption of these crops.

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