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Importance and future utilization of unexploited vegetables

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Introduction

India ranks first among the most populous countries in the world, accounting for about 17.8% of the global population, with more than 60% of households engaged in farming. The country's population is growing at an annual rate of about 1.87%, while the demand for food is projected to increase by 3% or more every year (Statista, 2024). Vegetables play an important role in the human diet, supplying essential vitamins and minerals. They are excellent sources of nutrients such as carotene, ascorbic acid, riboflavin, folic acid, and minerals such as calcium, iron, and phosphorus. However, the average daily intake of vegetables in India is well below the recommended 400 g per day (Deepti et al., 2023). Nature provides many underutilized vegetables with high nutritional potential that can help support a growing population. About 60 of these are widely grown, and only about 30 are familiar to most farmers. Focusing on underutilized vegetable crops is important to help meet the recommended daily vegetable intake and enhance nutritional security.

Unexploited Vegetables

Underutilized crop species are those whose potential economic value has not been fully realized due to limited attention to their cultivation, consumption, and use (Aboagye et al., 2007). The term usually refers to both wild and cultivated plant species whose benefits have not yet been fully explored. These crops are often grown by local farmers in the areas where these species originated. Their continued cultivation in these areas suggests that they have some benefits; otherwise, they would have been replaced by more prominent crops. Since they are not widely cultivated or commercially in demand, they are considered underutilized crops. Traditionally, these crops have served as a source of food, fodder, or medicine. Despite their limited use, many of these species hold immense potential for improving food security, nutrition, health, livelihoods, and ecological sustainability (Jena et al., 2018). Some notable underutilized vegetable crops include asparagus, amaranthus, basil, moringa, ivy gourd, globe artichoke, kale, and broad bean.

Causes of being Unexploited

- Minimal or inadequate research has been done on these crops.
- There is a scarcity of quality seeds and planting materials.
- Modern on-farm agricultural techniques are rarely applied.
- Knowledge of proper post-harvest handling and management is lacking.
- These underutilized crops are often overlooked in horticultural development programs.
- Marketing support and infrastructure for transport, storage, and processing are limited and inadequate.
- Farmers have little awareness of the nutritional and medicinal benefits of these lesser-known horticultural crops.

- Innovative technologies, such as biotechnology and plasticulture, are rarely used to boost productivity.
- Institutional support is weak, and financial institutions play a minimal role in establishing agro-industrial and horticulture-based enterprises.

Importance of Unexploited Vegetable Crops

- These crops are excellent sources of essential nutrients, including vitamins, minerals, proteins, carbohydrates, and fats.
- Compared to widely cultivated commercial vegetables, they often offer superior nutritional value (Keatinge et al., 2011).
- They are generally hardy and easier to cultivate.
- Their cultivation can help create employment opportunities in rural communities.
- Many of these vegetables can thrive in challenging climatic and soil conditions.
- They are affordable and easily accessible to local populations.
- Promoting their cultivation can significantly boost farmers' incomes.
- They can play a vital role in helping the population meet the recommended daily intake of vegetables nationwide.
- Many of these crops possess valuable medicinal properties.
- Utilizing these lesser-known crops can help reduce dependence on a limited number of major crops, thereby increasing resilience (Sood et al., 2021).
- They offer a diverse array of options to enhance agricultural productivity, ensure food security, and respond to market needs.
- Their adoption can help raise the per capita food availability.
- These crops support sustainable livelihoods and household food security by broadening dietary diversity and food choices.

Future utilization of Unexploited Vegetable Crops

A variety of wastelands such as sand dunes, ravines, acidic soils, marshy areas and marginal lands exist in different regions of the country, which are generally unsuitable for cultivating high-input crops. However, these lands can be effectively used to grow low-input crops, providing an opportunity to diversify current agricultural practices. This change is necessary due to increasing population pressure, rapid depletion of natural resources and changing human needs.

Currently, the productivity of horticultural crops is only about half the national average. Cultivation of cereals has not been economically sustainable, especially in hilly and uneven areas where there is no irrigation facility. Despite government efforts to provide support to such areas, a large part of their potential remains untapped. This potential can be realised by promoting region-specific horticulture and expanding the area under cultivation of horticultural crops. Scientific methods can also help increase the production of underutilised horticultural crops. Apart from their nutritional benefits, these crops are also often valued for their medicinal uses, especially in Ayurvedic medicine, and many people are already familiar with the curative properties of locally grown varieties.

Encouraging domestic cultivation of promising wild species can help prevent their overharvesting from the wild. Support systems are needed to improve the multiplication and distribution of planting material and market access for these perishable crops. Underutilized vegetables are suitable for low-cost farming systems and are rich in nutrients. Promoting research and development in this area can contribute significantly to food and nutrition security. National programmes should prioritize a select group of these crops for intensive research, focusing on both subsistence crops and crops with commercial potential (Barooah et al., 2023).

These crops are mostly grown by various ethnic groups through traditional agricultural systems. To better understand and utilize their full range of uses, it is important to document indigenous knowledge, such as through ethnobotanical research. National and regional strategies should focus on developing and distributing improved varieties and addressing challenges related to

availability of quality seeds, planting material, and in-vitro propagation.

Such efforts will increase local production, strengthen domestic markets, and improve income opportunities for small farmers. Crop planning should be tailored to the agro-climatic suitability of specific regions. Expansion of infrastructure, especially in marketing, transport and communication, is essential. Currently, low yield and poor quality of many underutilized crops limit their productivity. Therefore, criteria for their commercial viability should focus on attributes such as high yield, marketability, resistance to pests and diseases, easy post-harvest care, nutritional value and sustained production.

Raising awareness among farmers about the nutritional value of underutilized crops including fruits, vegetables and medicinal plants is an important first step (Sharma, 2003). Extension workers can facilitate this at the grassroots and wider levels through awareness campaigns, exhibitions and educational initiatives. Mass media such as radio, television, newspapers and printed material can also be effective in disseminating this knowledge.

To fully leverage the potential and economic benefits of these crops, it is important to set up processing units, as this will not only increase profits but also generate rural employment. However, genetic erosion poses a serious threat to underutilized vegetables, and many traditional varieties are at risk of extinction if not conserved promptly. Further, development of efficient production technologies and post-harvest practices is essential to make commercial cultivation of non-traditional horticultural crops viable. Increasing the availability and use of these crops can play a vital role in reducing malnutrition in the rural population (Sinha et al., 2022).

Conclusion

Unexploited vegetable crops are a hidden treasure for improving nutrition, promoting climate-resilient agriculture, enhancing rural livelihoods, and preserving cultural food heritage. Policy support, research investments, public awareness and integration into diets and value chains are needed to unleash their potential.

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