

Underutilized Vegetables (Manathakkali): Potential, Importance and Future Prospects

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Vegetables contribute substantially to a healthy diet because they provide vitamins, minerals, dietary fibre, antioxidants and, in several leguminous crops, useful amounts of protein. However, agricultural production and consumption are dominated by a limited number of commercially established vegetables. Numerous edible species continue to be grown mainly in household gardens, local communities and small regional markets. Vegetables that receive comparatively little research, investment, organized seed supply or market attention are commonly described as underutilized, neglected, minor, traditional or orphan crops. Their limited commercial status should not be interpreted as poor quality. In many cases, these crops are well suited to local environments, require relatively few external inputs and possess valuable nutritional or medicinal characteristics. Examples include spine gourd, sword bean, winged bean, drumstick, amaranth and several indigenous leafy vegetables. Their ability to perform under marginal soils or variable climatic conditions can be particularly useful for smallholder farming. Wider cultivation can also reduce dependence on a narrow range of vegetable species and increase the diversity of foods available to rural households. Growing interest in hidden hunger and climate-resilient agriculture has increased attention toward these crops. Their integration into food systems may support both dietary diversification and livelihood development, but this requires stronger scientific evidence, reliable planting material, suitable production practices and better market connections

Concept and Classification of Underutilized Vegetables

Underutilized vegetables are species that are locally important or have a history of cultivation but are not widely produced or traded compared with major commercial vegetables. Their status is influenced largely by economic, institutional and market conditions rather than by botanical relationships. India has a very large diversity of edible plant resources, although only a limited proportion has developed into major commercial vegetable crops. For practical discussion, underutilized vegetables can be grouped according to crop type or the plant part commonly consumed:



Cucurbit vegetables – spine gourd, sweet gourd, snake gourd and teasel gourd.



Leguminous vegetables – sword bean, winged bean, jack bean, velvet bean, yard-long bean and African yam bean.



Leafy vegetables – amaranth, Malabar spinach, water spinach, purslane, spider plant and black nightshade.



Tuber crops – elephant foot yam, yam bean and tassel hyacinth.



Tree and shrub vegetables – drumstick, curry leaf and tree tomato.



Solanaceous vegetables – wild brinjal and pepino.

This classification demonstrates that underutilization is not a separate botanical category. Instead, it describes crops that have remained outside the dominant research, seed, production, processing and marketing systems.

Nutritional and Nutraceutical Potential

Many underutilized vegetables can complement commonly consumed vegetables by supplying important nutrients and phytochemicals. Depending on the species and plant part, they may provide protein, dietary fibre, iron, calcium, zinc and vitamins such as A and C. Some also contain polyphenols, flavonoids, carotenoids and other bioactive compounds that are being investigated for their functional properties. Leafy vegetables such as amaranth and moringa are recognized for their mineral and provitamin content. Legume vegetables such as sword bean and winged bean can contribute useful protein through their pods and seeds. Elephant foot yam and other tuber crops can provide dietary fibre and minerals while producing useful yields in suitable marginal environments. Underutilized vegetables also have cultural and traditional medicinal importance in several regions. Ethnobotanical knowledge has associated different species with traditional uses related to digestive health and other conditions. Such information can provide research directions for food, nutraceutical and pharmaceutical studies, but health-related claims should be supported by appropriate scientific evidence.

Representative Underutilized Vegetables

The following examples illustrate the diversity and potential of underutilized vegetables:

Representative examples

Sword bean (*Canavalia gladiata*) – A legume vegetable whose pods and seeds can provide protein and which can perform in relatively low-fertility conditions.

Spine gourd (*Momordica dioica*) – A cucurbit valued as a vegetable and in traditional food and medicinal practices.

Winged bean (*Psophocarpus tetragonolobus*) – A multipurpose legume in which pods, leaves, flowers, tubers and seeds can be utilized.

Elephant foot yam (*Amorphophallus paeoniifolius*) – A productive tuber crop that can provide dietary fibre and minerals and is often grown in homestead systems.

Drumstick (*Moringa oleifera*) – A tree vegetable whose leaves and pods are valued for nutrients including provitamin A, calcium, iron and protein.

Spiny amaranth (*Amaranthus spinosus*) – A rapidly growing leafy vegetable containing minerals and antioxidant phytochemicals and capable of repeated harvesting.

Water spinach (*Ipomoea aquatica*) – A leafy vegetable adapted to wet environments and useful as a source of vitamins, minerals and fibre.

Yam bean (*Pachyrhizus erosus*) – A tuber-forming legume producing an edible, water-rich tuber and capable of biological nitrogen fixation.

Socio-economic and Ecological Significance

Food and nutrition security

Many underutilized vegetables are adapted to local environments and can produce food with comparatively modest external inputs. Their performance under drought, poor soil fertility or irregular rainfall can provide an additional food resource when sensitive commercial crops are affected. They therefore have potential value for household food security, especially among small and subsistence farming communities.

Income and livelihood diversification

Demand for locally distinctive vegetables can create niche markets, particularly where consumers value traditional foods, nutritional attributes or novelty. Smallholders may use these crops to diversify farm income and reduce dependence on a single commercial crop. Development of grading, processing, packaging and reliable market channels could increase their economic value.

Agrobiodiversity and environmental resilience

Maintaining diverse vegetable species in cultivation helps conserve plant genetic resources. Leguminous vegetables can also contribute to soil fertility through biological nitrogen fixation. In addition, crops that are adapted to local conditions may require fewer external inputs, supporting more resource-efficient production systems.

Constraints Limiting Utilization

Despite their potential, several factors restrict the wider adoption of underutilized vegetables.

- **Research gaps:** breeding, crop management, pest and disease studies, post-harvest handling and quality improvement are less developed than for major vegetables.
- **Limited planting material:** quality seed, seedlings and other propagules are often difficult to obtain through formal supply chains.
- **Weak market systems:** irregular production, limited storage, processing facilities and distribution networks can restrict sales to local markets.
- **Low consumer awareness:** urban consumers may have limited knowledge of the taste, preparation methods and nutritional value of unfamiliar vegetables.
- **Anti-nutritional compounds:** some species contain substances that require appropriate processing before consumption.
- **Limited policy attention:** agricultural research, extension and development programmes have traditionally focused on major staples and commercial vegetable crops.

Strategies and Future Prospects

A coordinated approach is needed to move promising underutilized vegetables toward wider cultivation and use.

- Genetic resource conservation and characterization should be strengthened to protect diversity and identify useful accessions.
- Breeding and agronomic research should focus on yield, quality, uniformity, adaptation, consumer preference and reduction of undesirable compounds where necessary.
- Nutrition-oriented crop improvement, including suitable biofortification approaches, can increase the value of already nutrient-rich vegetables.
- Simple processing and value-addition technologies such as drying, flour production and ready-to-cook products can improve shelf life and market opportunities.
- Consumer education, recipe demonstrations and nutrition campaigns can improve familiarity and demand.

- Stronger seed systems, extension services, farmer groups, market linkages and institutional support are required to connect research with production and commercialization.

The experience of crops that have moved from limited use to broader cultivation indicates that sustained research, market development and institutional support can change the status of neglected crops.

Conclusion

Underutilized vegetables represent an important reserve of crop diversity with nutritional, economic and ecological value. Their ability to provide nutrients, adapt to diverse environments and support traditional food systems makes them relevant to dietary diversification and resilient agriculture. Their limited use is mainly associated with gaps in research, planting material, markets, processing facilities, consumer awareness and policy support rather than a lack of potential. Future efforts should therefore combine conservation of genetic resources with crop improvement, production research, value addition, market development and nutrition education. Greater integration of these vegetables into farming and food systems can provide additional food choices, strengthen livelihood opportunities and contribute to sustainable food and nutrition security.

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