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A comprehensive review on underutilized minor vegetable crops and their potential

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Abstract

Nowadays, it seems to be highly difficult to provide the undernourished and people with low incomes in developing countries with a source of food that is safe, healthful, and nutritious. Finding a cheap and alternative source of nutritious foods has become necessary due to the shortage, high cost, and inconsistent supply of healthy food in developing and impoverished areas. A study of some of the underutilized vegetable crops revealed that they had great nutritional value. Underutilized vegetable crops, which have a great potential to be used in mainstream agriculture, are also referred to as underdeveloped crops, abandoned crops, orphan crops, traditional crops, vanishing crops, indigenous crops, life support species, subsistence crops, nutrient-rich crops, and new potential crops. The majority of underutilized crops species are good sources of nutrition, and some also have medical qualities, according to a review of the literature. Utilizing underutilized crops aids in the battle against issues related to malnutrition and boosts the health of rural people. Despite their recognized importance, underutilized vegetable crops are occasionally not utilized to their optimum extent because of a lack of materials for planting, ignorance of their medicinal and health benefits, and ignorance of the growing techniques. A programme on the exploration, management, use, and improvement of underutilized vegetable crops with regard to plant genetic resources must be undertaken in order to make sure global security in terms of nutrition and food. Furthermore, it can be concluded that underutilized vegetable crops production will address the lack of per-capita availability, thereby resolving the nutritional issues while simultaneously generating jobs, raising rural people's incomes, and potentially making a contribution to the global economy.

Keywords: Underutilized minor vegetable crops, potential, nutrition

Introduction

It became vital to investigate the use of modern local plant resources due to the rising population and rapid depletion of natural resources. Among the oldest and most important forms of sustainable wealth worldwide today is agriculture. Several vegetable crops are still unexplored and underutilized. As a result, researchers have concentrated their efforts on finding new or underutilized vegetable crops species that can be used for a variety of purposes. Plant species that are present in difficult environments and vulnerable ecosystems as life-support plants are typically underutilized vegetable crops. These plant species possess traits that are essential for both nourishment and production for a number of uses, and they have the genetic tolerance to thrive in such environments. Vegetable crops that are not widely sold or farmed economically on a significant scale are considered underutilized. However, only one-fourth is currently used as a major vegetable crop, with the rest being classified as minor, underutilized, rare vegetables, wild edible veggies, and so on. Underutilized or indigenous vegetables may be unknown outside of a given location or geographical area, and there is a widespread misconception that they are grown mostly in rural places.

Opportunities and Challenges

Various challenges and barriers must be resolved in order to promote the development and advancement of neglected and underutilized vegetable crops. Problems with taste, cooking, and antinutritional traits; lack of interest by researchers, agriculturists, and extension personnel; ignorance of economic advantages and potential markets; lack of technology for processing, value addition, and production; and relatively low yield are a few of these. Other factors include limited germplasm and improved varieties; poor agronomic practices; lack of scientific and technical knowledge - production, consumption, and utilization; problems with

taste, cooking, and antinutritional traits; and problems with taste.

Additionally, these underutilized vegetable crops experience a number of issues related to the creation of improved varieties, including asynchronous maturation, small seed size, lodging, seeds shattering, difficulties in threshing, control of weeds, cross-pollination a lack of systematic breeding, an uncoordinated seeds production system, and a lack of resistance to both biotic and abiotic stresses.

These underutilized vegetable crops are crucial for agricultural diversification because they greatly aid in extending a finite food base, putting high-input agriculture's sustainability at risk, restoring ecosystems, safeguarding against climatic changes and unexpected occurrences, extending agriculture to marginal and degraded lands, addressing modifying food requirements and nutritional deficiencies, strengthening potential for export, and ensuring generations to come.

Importance

Underutilized vegetable crops are being used increasingly frequently and successfully to combat hunger, impoverishment, and economic development. They are crucial biological resources for poor rural communities and can help millions of tribal people live more comfortably. Unused veggies are a great source of vitamins, minerals, and other nutrients that are good for you, such high antioxidant activity. They have a significant impact on diet diversification, which results in better-balanced nutritious sources of micronutrients. Additionally, underutilized vegetables are resilient to a variety of biotic and abiotic stresses, and their yields can help nourish hungry people by supplying the nutritional requirements of vulnerable populations. Unused veggies are occasionally used as comfort meals by low-income urban residents and provide nutrition to the diets. They can help maintain the health of agro ecosystems since they are adapted to vulnerable conditions, especially in semi-arid and arid plains, hills, steppes, and tropical forests. They provide a wide range of crops to increase output, ensure the world's food supply, and fulfill new market demands.

Underutilized Vegetables' may have Potential Role

- Better nutrition and food security
- Increased income for the poor communities in remote areas
- The sustainability of the environment
- Maintain Cultural biodiversity

Ways for Developing Underutilized Vegetables Crops

To prevent overexploitation of natural resources, domestication of prospective indigenous species through homestead farming should be encouraged. Aids are needed for planting distribution of material and multiplication in addition to opening up markets for perishable foods through marketing networks. Vegetables that are underutilized crops are rich in nutrients and ideally suited to low-input vegetable gardening. More advancement and research actions in these areas will boost human health in the areas of nutritional and food security considerably. A greater effort is needed to collect and document indigenous knowledge, such as ethnobotanical studies. A focus on value adds will be possible if more native diversity is used for several purposes.

Particularly at the national and regional levels, strategies must be developed to create and make available potential selections/varieties while overcoming challenges with the production of high-quality seed material, planting material, *in-vitro*/tissue culture material, etc. This would increase output, satisfy local demand, encourage domestic markets, and ultimately improve the small agricultural communities' ability to generate revenue. It is necessary to carry out systematic localized crop scheduling according to the region's agro-climatic appropriateness.

Underutilized Vegetables Crops have a low production and low quality, which reduces productivity. Therefore, there is a need to establish certain standards for the commercialization of underutilized vegetable crops. High productivity, consumer interest, lack of major pests and diseases, simple postharvest management, good nutritional value, and availability of production are possible requirements. Making farmers aware of the health benefits of underutilized vegetable crops, such as fruits, vegetables, and medicinal plants, is essential from the beginning Sharma (2003) [25]. Extension professionals can do this by planning unique training camps, initiatives, exhibitions, etc., at the micro as well as the macro levels to spread the message of underutilized horticulture crops. Similar to this, using printed media like magazines, newspapers, radio stations, and TV to raise understanding among farmers can be very effective. The development of processing facilities in this region should receive priority in order to maximize the use of underutilized vegetable crops and improve economic returns. Additionally, it would offer rural residents work options. In underutilized vegetables, genetic degradation is an extremely important issue. And if these cannot be saved soon, several landraces will go extinct. Malnutrition among the people of these rural areas will be greatly reduced due to the abundance of underutilized vegetable crops.

National Programme on Underutilized Crops

India is the sole emerging nation with a well-structured national programme on underutilized crops. With its headquarters at NBPGR and 29 crops included, the All India Coordinated Research Project (AICRP) on Underutilized and Underexploited Plants was started in 1982. The number of crops was lowered to 18 after it was decided that prioritization was necessary.

The initiative was switched to network form in 2002 and became the All India Coordinated Research Network on Underutilised Crops (AICRN) with 18 crops. The title of the network later was renamed to AICRN on Potential Crops in 2014 to include the major highest priority crops, including winged bean (*Psophocarpus tetragonolobus*) amaranth (*Amaranthus* Spp.), faba bean (*Vicia faba*), chenopod (*Chenopodium* spp.), adzuki bean (*Vigna angularis*), rice bean (*Vigna umbellata*), perilla (*Perilla frutescens*), kankoda (*Momordica dioica*), *Moringa oleifera*; kalingada (*Citrullus lanatus*), *Vigna trilobata*, *Vigna glabrescens*; tumba (*Citrullus colocynthus*), *Vigna marina*. These species have been identified as a high priority for active research and crop improvement.

The AICRN Project has achieved a lot of progress over the years in terms of data collection, identification, assessment, conservation efforts, and utilization.

Table 1: Different underutilized vegetable crops

S. No.	Common Name	Scientific Name
1.	Amarnathus	<i>Amarnathus spp.</i>
2.	Asparagus	<i>Asparagus officinalis</i>
3.	Lettuce	<i>Lactuca sativa</i>
4.	Shallot	<i>Allium cepa</i> (Aggregatum group)
5.	Celery	<i>Apium graveolens</i>
6.	Orach	<i>Atriplex hortensis</i>
7.	Leek	<i>Allium porrum</i>
8.	Jerusalem artichoke	<i>Helianthus tuberosus</i> L.
9.	Globe Artichoke	<i>Cynara scolymus</i>
10.	Elephant Foot Yam	<i>Amorphophallus campanulatus</i>
11.	New Zealand spinach	<i>Tetragonia tetragonioides</i> L
12.	Brusselssprout	<i>Brassica oleracea</i> var <i>gemmifera</i>
13.	Kale	<i>Brassica oleracea</i> var <i>acephala</i>
14.	Chinese cabbage	<i>Brassica campestris</i> Spp.
15.	Winged bean	<i>Psophocarpus tetragonolobus</i>
16.	Jack bean	<i>Canavalia ensiformis</i>
17.	Pointed gourd	<i>Trichosanthes dioica</i>
18.	Parsnip	<i>Pastinaca sativa</i>
19.	Rhubarb	<i>Rheum rhubarbarum</i>
20.	Kakrol	<i>Momordica cochinchinensis</i>
21.	kartoli	<i>M. dioica</i>
22.	Broad Bean	<i>Vicia faba</i>
23.	Tree Bean	<i>Parkia roxburghii</i>
24.	Kundru	<i>Coccinia grandis</i>

Events around the world that promoted underutilized crops

- An independent, nonprofit centre for scientific study and training is known as the International Centre for Underutilized Crops (ICUC). It was founded in 1988.
- Underutilized crops were highlighted in the FAO Global Plan of Action for Plant Genetic Resources for Food and Agriculture in 1996.
- 1999 - The Consultative Group of International Agricultural Research (CGIAR) acknowledged the importance of neglected and underutilized species to nutrition, rural prosperity, and the fight against poverty during an international workshop organized in Chennai, India.
- The Global Facilitation Unit of Underutilized Species (GFU), which was based inside Bioversity International in Rome, Italy, was established in 2002 as part of the Global Forum on Agricultural Research (GFAR).
- In 2008, Crops for the Future (CFF), a Malaysian company formed by the merger of ICUC and GFU, was established.
- In 2011, Malaysia's Crops for the Future Research Centre (CFFRC) was established.
- 2012 - The international Crops for the 21st Century seminar, held from December 10–13 in Cordoba, Spain, focused on highlighting the importance of underutilized and neglected species in addressing future food and agricultural concerns.
- The International Year of Quinoa (IYQ-2013) was formally introduced in 2013, with the goal of raising public awareness of the benefits of quinoa for food security.
- The third international conference on neglected and underutilized species will take place in Accra, Ghana in 2013-In order to ensure that research on neglected and underutilized species (NUS) is demand-oriented and that discoveries are properly communicated and deployed,

there has to be more collaboration between researchers, extension workers, the private sector, and farmers in sub-Saharan Africa.

The following are common constraints

- There is a scarcity of germplasm sources;
- An absence of scientific knowledge;
- Absence of national strategy;
- A lack of curiosity on the behalf of scholars, agriculturists, and extension employees
- There is a lack of producer awareness.

Conclusions

It is clear from the above discussion that underutilized vegetables have an abundant amount of nutritional potential, therapeutic qualities, and resilience to harsh environmental circumstances. Due to incomplete information on their performance and input needs, an absence of planting materials, a lack of information on how they can fit into production processes, and the difficulty of producing vegetables locally like the major cultivated species, these underutilized vegetables are still neglected.

To ensure future security of nutrition and food, it is vital to start an initiative on genetic resource exploration, management, utilization, and enhancement of these underutilized vegetable crops. Additionally, the production of underutilized veggies will address the lack of per capita consumption availability, addressing the nutritional gap, while also creating jobs, raising rural residents' incomes, and possibly even boosting the country's economy.

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