



Perennial Vegetables - Key to Alleviate Malnutrition

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Conflict of interests: The author has declared that no conflict of interest exists.

How to cite this article?

Kavitha *et al.*, 2023. Perennial Vegetables - Key to Alleviate Malnutrition. *Biotica Research Today* 5(7), 480-482.

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Abstract

Perennial vegetables meant for low maintenance and rich rewards besides key source of pharmaceutical principles, which gives structure to both garden and soil as they are not removed annually. Moreover, these are amenable for cultivation in the place where cultivation of annual vegetables is difficult as these are potential source to address the challenges like biodiversity of crops, environment variation and nutrient scarcities. Due to woody nature, these species act as a carbon sequester and notified as potential tool to compensate the losses due to crop biodiversity. Only few commonly cultivated vegetables are also able to address nutrient deficiencies as like perennial ones. These species are rich sources of multi-nutrients and have the inherent capability to overcome diet deficits. Hence, necessary steps to be taken to increase the vegetable production to threefold to offer healthy foods to the growing world population. In this context, necessary steps to be undertaken to incorporate the perennial vegetable in the new production areas to achieve the aforementioned goal.

Keywords: Climate change mitigation, Crop biodiversity, Multi-nutrient species, Pharmaceutical properties

Introduction

Perennial vegetables are hardy species which need less attention and yields edible parts like leaves, flowers, fruits tuber, *etc.* for a quite long period which are used as vegetable. These are classified as neglected and underutilized crops and have the huge potential to address the 21st century challenges. About 33-56% of perennial vegetables occupy total cultivated vegetable species and 6% of world cultivable land is occupied by the same. These are potential sources of key elements necessary to address nutrient scarcities as compared to commonly grown vegetables (Kreitzman *et al.*, 2020). Though, they play distinctive role in mitigation of climate change and nutritional security, their attention in the scientific literature is very scanty. Perennial plants are more productive, can produce staple foods with numerous ecological welfares for long period without replanting. However their agronomic and nutritional properties have not been recognized as compared to annual vegetables.

Perennial Vegetables for Overcoming Malnutrition

As per the report of world committee on food security, hunger, micronutrient deficiencies, overweight and obesity is considered as malnutrition in developing and developed

countries. It is estimated that globally 795 million people are undernourished and 155 million people face the problem of stunted growth and 52 million people falls under wasted categories. About two billion peoples globally suffer from chronic micronutrient deficiencies (Chadha and Patel, 2007).

Perennial vegetables are considered one of the most important sources for addressing malnutrition problem in developing countries. Many indigenous vegetables, especially the leafy vegetables are rich source of vitamin A, vitamin C, essential amino acids and minerals like iron, calcium, phosphorous, potassium, *etc.* The fruits of perennial vegetables like *Artocarpus altilis*, *A. heterophyllus*, *A. lakoocha*, *Bassia latifolia*, *Capparis decidua*, *Carissa carandas*, *Cordia myxa*, *Dillenia indica*, *Embllica officinalis*, *Garcinia indica*, *Musa* spp. were used as vegetables and in *Bambusa* spp., *Moringa oleifera*, *Murraya koenigii*, *Sauropus androgynous* and *Sesbania grandiflora*, plant parts are also primarily used for same (Chadha and Patel, 2007).

Moringa is a monogenic perennial soft wood tree of sub-Himalayan origin, is consumed profusely among the rural tribal masses. It has an immense potential and grown across the globe due to its potent nutrient profile. All the plant

Article History

RECEIVED on 18th June 2023

RECEIVED in revised form 13th July 2023

ACCEPTED in final form 14th July 2023

parts of moringa trees are edible. For acute malnutrition treatment, moringa leaf powder is mixed with soyabean and groundnut or peanut paste and it is considered as ready to use food (RUF) besides energy rich food supplement. In addition to these perennial vegetables which are having high nutrient density are further grouped in different botanical families like perennial legume vegetables, perennial solanaceous vegetables, perennial cucurbits, perennial edible greens, perennial aquatic vegetables like *Ipomea aquatica*, *Trapa bispinosa*, *Nelumbo nucifera*, etc.

Medicinal Importance of Perennial Vegetables

Nearly 6000 plants are currently being used by the herbal industry in some form or other. Most of this demand is met from the wild populations without any assessment of their actual availability on a sustainable basis. A number of perennial leafy vegetables of Indian origin are rich source of folic acid, which is crucial in foetal development in early stage of pregnancy and also helpful to reduce the risk of cardiovascular diseases. It is abundantly found in perennial source of leafy vegetables like poi, drumstick, etc. Carotenoid (precursor of Vitamin A) is the daily requirement of everyone. Now it is realized that not only Beta carotene but also carotenoids including lycopene may have important role in protection against major disorders like cancer and heart diseases. Perennial brinjal species like *Solanum khasianum* and *Solanum ammosum* are cultivated for solasodine alkaloid.

Suitability of Perennial Vegetables for Production in Unfavourable Conditions

It is also known as indigenous vegetables which are basic food of marginal and semi-arid areas where food shortages and famines are more prevalent. Most of the nutritional deficits of these people could be alleviated by incorporation of perennial vegetables in their diet. These are tolerant to harsh climate changes and poor soil fertility where the commercial vegetable species are unable to thrive. In these areas, cultivation of perennial species adapted to marginal environments and the economic yield were obtained for many years with minimum inputs. Few perennial species are exotic origin and have been cultivated for centuries without major pest or disease incidence. Most of the perennial vegetables are hardy in nature and they can be placed in marginal land, shade condition and other disadvantage location. Moringa may be planted as fence crops, similarly other hardy perennial vegetables may be grown in multi-storey conditions (Pandey, 2019).

Perennial Vegetables - Boon for Ecosystem

The important uses of cultivation of perennial vegetables are safeguarding and improving soil health to ensure the food safety and security for future. According to the FAO report (2011), entitled "The State of the World's Land and Water Resources for Food and Agriculture", about 25% of world's agriculture lands are degraded highly and one-third crop land of Earth is under risk. Moreover, loss of productive agriculture land is more in Himalayan and Andean regions, Africa, India, Southeast Asia where industrialised farming is intensive. In this context, it will be appropriate to mention

that perennial vegetables possess a long chain of diverse group of plants embedded with nutritional and medicinal attributes; any little effort may play substantial dividends to the growers as well as consumers. High retention of nitrogen and other essential nutrients in native ecosystems attributed for the predominance of perennial vegetation which retains nutrients in two ways: (i) re-translocation of nutrients within the plant parts before tissue senescence and (ii) maintenance of extensive root systems which capture nutrients in broad areas over the long period.

Perennial Vegetables - Suitability for Organic Farming

Organic farming is a production system which avoids or largely excludes the use of synthetically compounded fertilizers, growth regulators and livestock feed additives (Lampkin, 1990). Feasibility of organic farming systems rely on the techniques like crop rotations, application of crop waste, decomposed animal waste, legumes, green manures, organic wastes available at off farms and plant protection by biological means helps to maintain soil health and productivity. Perennial vegetables possess considerable resistance or tolerance to a number of diseases and pests and avoid the application of hazardous chemicals for their production. Than in organic production of vegetables, perennial vegetables offer a good scope for consumers in local markets and for sale in export.

Perennial Vegetables for Grafting

In recent days, vegetable grafting is extremely popular in many developing countries to improve the biotic stress tolerance particularly where intensive agro-systems are practiced. This technique also used to enhance vegetable tolerance to abiotic stresses, where the plant shows various disorders which limits the economic yield and quality of produce. Half of the population of *Solanaceae* family exhibits wide genotypic and phenotypic variation (Toensmeier et al., 2020). *S. aethiopicum* is cultivated in sub-Saharan Africa mainly for its fruits and leaves and it is found in various parts of the world. *Solanum torvum* is another promising wild *Solanum* rootstock found to be resistant to root knot nematodes, mycoplasma, *Fusarium* wilt and other soil borne diseases. The grafting affinity between globe artichoke and cardoon species has motivated to use wild cardoon species as rootstocks (Kreitzman et al., 2020). Cultivated cardoons help to get increased yield and reduce the Verticillium wilt incidence when it is used as rootstocks (Chadha and Patel, 2007). Thus wild plants which are mostly perennial in nature offers good scope to be utilized as a promising rootstocks to desired cultivars to thrive under difficult abiotic and biotic conditions.

Conclusion

Perennial vegetables are an excellent source of minerals, vitamins, antioxidants and other health-promoting phytochemicals, as well as adding variety, flavour and nutritional quality to diets. Furthermore, these perennial wild plants are not only important for nourishment but also a good source of revenue. These vegetables are also more resistant to most pests and diseases than annual vegetables. With a few exceptions, the most frequently grown and

marketed vegetables are not the greatest at addressing nutrient shortages. Because global vegetable output must be tripled in order to ensure healthy foods for all, initiatives should be taken to include these veggies into new regions. The identification of new species with high level of nutrients opens up the possibility of highlighting these perennial species for alleviating malnutrition in developing countries. Regional programmes should identify the perennial species which are highly adaptive to climate change and satisfy the precise nutrient requirements of targeted populations. Additionally, perennial vegetables, which are usually found in the wild, play an important role in lowering production stress caused by varying climatic circumstances.

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