

Underutilized Leafy Vegetables: A Boon for Malnutrition and Farmer Crisis

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Abstract

The promotion over the years of only a small number of crops had systematically replaced many indigenous traditional plants consumed by local subsistence farmers, from over 7,000 species of edible plants only about 30 crops are used in households around the world. Abandoning them has also led to the loss of some genetic pool. Utilization of underutilized vegetables and fruits is moreover the need of the hour to meet the hunger of the growing world population. They are also cost-efficient, making it available to all income groups. Especially in a country like India, with the world's largest population where half of the country falls below the poverty line. These crops are high in nutrition like protein, Vitamin C, iron, etc. benefiting the vegans. Other properties like anti-inflammatory, anti-microbial, etc. pull off the crops in great medicinal purposes. If we promote and consume these vegetables by bringing upon the light of awareness, using such vegetables will be beneficial to all, with nutrition, health, and variety in the plate of satiety.

Keywords: Underutilized; Crops; Nutrition; Hunger; Medicine

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Introduction

The word underutilized vegetable is termed as those vegetable crops which are neither grown commercially nor traded widely. Even with 7,000 species of edible crops, only about 30 crops provide 95% of the household. With the modernization of agricultural practices, many species of crops have been so neglected that genetic erosion of their gene pools is now regarded as lost crops [1].

For any non-vegetarian, it is almost impossible to have a balanced diet without vegetables. In a study done by Takataet Y et al. [1] showed that the prevalence of smoking men in China is 21.3% higher than in other North American and European countries. However, the prevalence of lung cancer in China is 45.9 per 100,000 people and a rate of 71.2 per 100,000 people in the United States, according to the survey of 2008. This is due to the traditional plant-based food in China [2].

India's climate permits the growth of a variety of range improved crop production that will give, great national security with many essential nutrients. Although India is one of the most populous countries with about one-fifth of the world's population out of which 70% are farming households [3]. With the increasing population with 1.8% per annum, the demand for food is increased by about 3%. In order to support such strategies, there needs to

be an improvement in every aspect, mostly at the availability of food for every household. The farming sector of India needs an awakening to provide food with proper nutrition as much as for the availability of hunger. Malnutrition is a widespread problem faced worldwide. Although the growth of crops has increased the need to focus on providing a balanced meal. However, underutilized vegetables have not yet drawn much attention [4].

A wide range of vegetable crops is grown in the southern Asian subcontinent, which includes *solanaceous* vegetables, cucurbitaceous, okra, various kinds of beans, tubers and roots crops, spices, cole crops as well as some species of leafy vegetables. The occurrence of their wild relatives is also a subject of potential exploitation towards crop improvement. These cheap and readily available crops, contribute 3.14% of the total geographical area of the region. With being blessed with one of the richest reservoirs of genetic diversity.

In order to get a better look at this scenario, 5 such underutilized have been discussed further mentioning their benefits.

Methods

Amaranth Leaves

Amaranth/Huatli/Rajgiri, "*Amaranthus spp*". The sweet and savory flavor gives an amazing taste to the dishes. A high source

of-excellent quality protein, especially beneficial to the vegan population. Other edible portions are tender stem, leaves, and seeds. It contains lysine, a rare amino acid found in grains that aids in growth, the formation of enzymes and antibodies, and promotes energy and protein synthesis [5].

The adaptive nature of amaranth crop is that; it can grow in various climate ranges according to its adaptability permits. It ranges from a high north elevation from the humid south condition [6].

Boiled Amaranth leaves are four times richer in calcium and Vitamin C in their raw form. They are a source of folic acid, which is essential to the formation of red blood cells and genetic material, both of which aid fertility. Amaranth contains between five and eight percent of healthy fats, including squalene, a type of fat that acts as a precursor for "good" cholesterol. The magnesium contained in amaranth relaxes arteries and veins, reducing the potential for hypertension and cardiac arrhythmia. It also helps to maintain glucose levels in the blood. The high content of starch cholesterol molecules obtained from one's diet [7]. Amaranth is an important component of a varied diet and contains valuable nutrients for child development as well as for expected and breastfeeding mothers. Amaranth helps keep infants healthy and prevents anemia in mothers [8].

Moringa Leaves

Moringa leaves/*Moringa oleifera*, it is known for its remedy for malnutrition. With its abundance in nutrition with a variety of phytochemicals. Recently there has been a lot of awareness about moringa leaves. The by-products and the leaves are exported from India to Europe in dried powder form. It is marked as the 'superfood' of the European markets. The term 'superfood' is a marketing term given to a product with high levels of nutritional benefits [9]. However, it is not yet legal to be used in medicine, in Europe. More African traders are also making their way for this crop. The consumption of Moringa leaves fresh or cooked has been in around a century [10].

Moringa leaves provides vitamin C 7 times more than that of oranges, Vitamin A 10 times more than carrot, calcium 17 times more than milk, protein 9 times more than yogurt, potassium 15 times bananas and Iron 25 times more than spinach. It is cultivated throughout the tropical and subtropical areas of the world, known by various names. However, it is a native of the sub-Himalayan northern part of India. Other commonly found names in the literature are, malunggay, horseradish tree, and drumstick tree [10,11]. Known for its excellent level of antioxidants, that provides the body energy and also fights against the free radicals leading to several diseases. It was also found that moringa leaves can also be added as preservatives for meat to increase its shelf life [12].

Colocasia Leaves (Taro Leaves)

Originating from south-eastern Asia and the Indian subcontinent, the *colocasia* leaves, also known as the taro leaves/*Colocasia Araceae*, comes from the genus of flowering plants and *Araceae* in the family. These leaves are commonly referred to as 'elephant

ears' with the large structure of the leaves. It has a shape similar to an elephant's ear or a shield. In the length of the leaves vary from, 20 cm to about 150 cm (7.9-59.1 in ch) long.

However, this family of plants possesses clusters of two to five fragrant inflorescences in the leaf axils [13]. Consumption of these causes an intense discomfort to the lips, mouth, and throat. This occurs due to the chemical structure of the leaves, having microscopic needle-like raphides of calcium oxalate monohydrate and in part by protease. It is very important that the processed leaves are cooked, soaked, or fermented can be done along with an acid (lime or tamarind) before the consumption [14].

The *colocasia* leaves help in the inhibition of cancerous cells and their proliferation [13]. It reduces the risk of colon cancer [15]. It also showed effective measures in reducing breast cancer cells. The high levels of vitamin C act as a water-soluble antioxidant [14]. They are a rich source of vitamin A, Carotenes, which help in maintaining good vision also prevent several eye problems like cataracts and muscular degradation as well as age-related vision loss. Vitamin A deficiency marks India at the fourth most common problem found [16]. It helps in preventing diabetes and strengthening the body's immune system. It also helps in reducing inflammation and improves digestion [17].

Radish Leaves

"*Raphanus raphanistrum subsp. sativus*". Belonging to the salad family, radish is consumed worldwide. If we quit stopping at the roots, the radish leaves have an abundance of high levels of vitamins and minerals. It is a very good detoxifier. It increases immunity and reduces fatigue. It is naturally diuretic with antiscorbutic properties.

Radish leaves have antibacterial properties that help in painful conditions like piles and some digestive problems. Powdered dry radish leaves mixed with an equal amount of sugar and a little bit of water can form a paste. This paste can either be consumed or applied topically on the inflammation. It is said that consuming half a liter of radish leaves juice for 10 days daily helps in curing hyperbilirubinemia. There are no noted allergies or side effects from the consumption of radish leaves.

Pumpkin Leaves

"*Cucurbita cucurbitaceae*". It seems almost impossible to think pumpkin leaves as dinner. It is another lesser-known and less utilized highly beneficial for consumption. It's a North American native, one of the oldest plants being cooked from as early as 7,500 to 5,000 B.C.

Pumpkin leaves help in treating anemia, certain cancer increases fertility and reduces blood serum cholesterol levels. High levels of antioxidants as well as vitamins and minerals boost immunity and many other benefits. Huge amounts of benefits following pumpkin leaves, some of them include, healthier skin making it a great anti-aging food. High levels of calcium help in maintain bone strength and prevent the diseases following calcium deficiency. It has properties of antimicrobial helping in fighting infections. For young mothers, it helps in promoting lactation. It also helps in curing any testicular damage and helps to regain fertility in males.

Table 1: Nutrition content per 100 gram of the leaves (dry weight).

Nutrient per 100 N of leaves (dry)					
Nutrients	Amaranth	Moringa leaves	Colocasia leaves	Radish leaves	Pumpkin leaves
Energy (Kcal)	43	92	77	28	57
Moisture (g)	85	75.9	78.8	90.8	81.9
Protein (g)	3	6.7	6.8	3.8	1.6
Fat (g)	0.3	1.7	2	0.4	0.8
Crude fibre (g)	1.1	0.9	1.8	1	2.1
Carbohydrate (g)	7	12.5	8.1	2.4	7.9
Calcium (mg)	800	440	460	258	392
Phosphorus (mg)	50	70	125	59	112
Iron(mg)	22.9	0.85	0.98	0.09	-
Carotene (µg)	3564	6780	12000	5295	-
Vitamin C (mg)	33	220	63	81	-
Magnesium (mg)	122	42	32	22	-

(Table 1).

References

- Takatae Y (2013) Intakes of fruits, vegetables, and related vitamins and lung cancer risk: results from the shanghai men's health study (2002-2009). *Nutr Cancer* 65: 51-61.
- Lobell DB, Schlenker W, Roberts CJ (2011) Climate trends and global crop production since 1980. *Science of Nature* 333: 616-620.
- Muñoz N, Liu A, Kan L, Li MW (2017) Potential uses of wild germplasm of grain legumes for crop improvement. *Inter J Molecular Sci* 8: 18-328.
- Wozny D, Kramer K, Finkemeier I, Acosta IF (2018) Genes for seed longevity in barley identified by genomic analysis on near isogenic lines. *Plant Cell Environ* 41: 1895-1911.
- Thalhammer A, Hundertmark M, Seckler R, Hincha DD (2010) Interaction of two intrinsically disorder plant stress proteins (COR15a and COR15b) with lipid membranes in the dry state. *Biochim Biophys Acta* 1798: 1812-1820.
- Shah M, Soares EL, Carvalho PC, Soares AA (2015) Campos FAP Proteomic analysis of the endosperm ontogeny of *Jatropha curcas* L. seeds. *J Proteome Res* 14: 2556-2568.
- Muntz K, Belozersky MA, Dunaevsky YE, Schlereth A (2001) Stored proteinases and the initiation of storage protein mobilization in seeds during germination and seedling growth. *J Exp Bot* 52: 1741-1752.
- Davies MJ (2005) The oxidative environment and protein damage. *Biochim Biophys Acta* 9: 93-109 .
- Iqbal S, Bhangar MI (2006) Effect of season and production location on antioxidant activity of *Moringaoleifera* leaves grown in Pakistan. *J Food Compost Anal* 19: 544-51.
- Lalas S, Gortzi O, Athanasiadis V (2012) Determination of antimicrobial activity and resistance to oxidation of *Moringaperegrina* seed oil. *Molecules* 17: 2330-2336.
- Gopalan C, Sastri BV, Balasubramanian SC (1989) Nutritive value of Indian foods. *Indian Council of Medical Research* 9: 180-190.
- Shah MA, Donbosco JS, Ahmad S (2015) Effect of *Moringaoleifera* leaf extract on the physicochemical properties of modified atmosphere packaged raw beef. *Food Pack Shelf Life* 3: 31-38.
- Prajapati R, Kalariya M, Umbarkar R (2011) *Colocasiaesculenta*: A potent indigenous plant. *Inter J Nutri Pharma Neuro Diseases* 1: 90-100.
- Pereira PR, Silva JT, Vericimo MA (2015) Crude extract from taro (*Colocasiaesculenta*) as a natural source of bioactive proteins able to stimulate haematopoietic cells in two murine models. *J Funct Foods* 18: 333-343.
- Kundu N, Campbell P (2012) Antimetastatic activity isolated from *Colocasiaesculenta* (taro). *Anti-cancer drugs* 23: 200-211.
- Agyare C, Boakye, Y (2015) antimicrobial and anti-inflammatory properties of *anchomanesdifformis* (Bl.) Engl. and *colocasia esculenta* (L.) schott. *Biochem Pharm* 5: 120-140.
- Patel DK, Kumar R, Laloo D (2012) Diabetes mellitus: an overview on its pharmacological aspects and reported medicinal plants having antidiabetic activity. *Asian Paci J Trop Bio* 2: 411-20.

Conclusion

In a country like India, a majority of the population suffers from several chronic illnesses as well as many deficiency diseases. It is the need of the hour to provide the citizens of the country with good quality food as well as increase the rising food demands for the growing populations. A plant-based diet is highly beneficial with its abundance in antioxidants and other essential nutrients necessary for a major population facing deficiency like vitamin A. These plants are mostly Indian origin and thus can be available in abundance.

Plants like moringa leaves have succeeded in achieving trades and processing chains. While other plants like *colocasia* have not yet been much researched upon. Vegetables like radish and pumpkin even after being consumed on a larger just stay to the roots and the leaves get discarded off instead to be consumed. This shows the lack of information in the individuals.

If these plants and many more are brought more light upon and make to the processing. Using by-products of such vegetables will be beneficial to all with health and availability to variety.