

Review Article

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Commercial Prospects of under Exploited Leafy Vegetables in India

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ABSTRACT

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Leafy vegetables play a major role in our daily dietary food chart. These nourish us with several nutrients like vitamins and minerals which help in combating against various diseases. Nearly one thousand species of plants with edible leaves are known. Out of which many of them are either grown locally or in rural-tribal areas. On the other hand many are unaware about their existence as well as importance. This paper has been focused on some of them which are widely distributed in various parts of our country India which are categorised as under-exploited. They are *Sesbania grandiflora*, *Talinum triangulare*, *Ipomea aquatic*, *Chenopodium album*, *Moringa oleifera*, *Cucurbita moschata*, *Marselia quadrifolia*, *Alternanthera sessilis*. These have been found in the Southern and eastern regions of India. These crops need to be expanded quickly for proper nutritional security and prevention against harmful diseases.

Introduction

India is the country which is blessed with the natural origin of various types of fruits and vegetables which play a major role in our nutrition. And also according to ICMR, a person should consume an average of 300gm of vegetables and 100gm of fruits per day. And among vegetables, 50 gm of leafy vegetables, 200 gm of other vegetables and 50 gm of root and tuber crops are needed (Sachdeva *et al.*, 2013). The growth and consumption of leafy vegetables like Amaranthus, Palak Spinach are quite familiar

among all as therefore they are categorised into major groups. Their cultivation is widely distributed in our country. But still other leafy vegetable crops are there whose utility and consumption is very rare in our country though they are rich source of several nutrients.

And these crops are categorised into underexploited leafy vegetables. Their commercialisation is needed to give a good impact on the food security. Such crops like *Sesbania grandiflora*, *Talinum triangulare*, *Ipomea aquatic*, *Chenopodium album*,

Moringa oleifera, *Cucurbita moschata*,
Marselia quadrifolia, *Alternanthera sessilis*.

Importance of leafy vegetables

The photosynthesis process i.e. preparation of food by utilising water and carbondioxide takes place in leaves. Somehow we are consuming the edible parts like fruits in most cases but also leaves and flowers are also being consumed. The plants whose edible part is leaf is considered as leafy vegetable. However, leafy vegetables are rich source of minerals vitamins, moisture (Arasaretnam *et al.*, 2018). If we focus on its cultivation, these are basically short duration crops and requires less maintenance for their growth.

Also they are not heavy feeder of nutrients. Leafy vegetables are regarded as low volume high value crops. Green leafy vegetables have been playing important role in our diet and nutrient and most readily available sources of carbohydrate, fats, proteins, vitamins, minerals, amino acids, fibers. Green leafy vegetables can be processed and stored for future use.

Why underexploited crops?

Many leafy vegetables exist but very few of them are being commercially grown.

Many are grown and consumed in rural and tribal villages of India.

Furthermore we are unaware about the nutritional, medicinal/therapeutic properties of the crops.

As, very lack of research have been conducted son we are unavailing with the desired seeds or planting material for its cultivation.

Potential role of some underexploited leafy vegetables

Sesbania grandiflora

It is commonly called as Agathi belongs to Leguminoseae family and it is widely distributed in the areas of Maharashtra, Tamil Nadu, Uttar Pradesh, Assam (Indian Biodiversity Portal). Leaves are alternate compound and pinnate. It is suitable to grow at a temperature of 22-30⁰ C and can be grown in wide range of soils. Both leaves and flowers are valued and have nutritional property (Priyanka *et al.*, 2019). Leaves chewed to disinfect mouth and throat. They are excellent source of Vit C, Ca, Fe also (Gowri *et al.*, 2010). 100 gm of agathi leaves contain 93 Kcal energy, 73 gm moisture, 8 g protein, 1g fat, 3g mineral, 2g fibre, 12 g carbohydrate, 1130 mg Ca, 80 mg phosphorus and 4 mg Fe. Also some amount of iodine and pectin is also present in leaves. Used as aperients, diuretic an also to bruises. Leaf juice has antiurolithiatic activity (Ojha and Diwedi, 1996). Also, regarded as bone strengthener. As it is a leguminous crop, it helps in contributing nitrogen to soil and improves soil fertility.

Talinum triangulare

It belongs to family Purslane (Portulacaceae). Also known as water leaf or Ceylon spinach. It is widely distributed in regions of Assam, Andhra Pradesh, Karnataka, Tamil Nadu, some parts of Odisha (Indian Biodiversity Portal). It is a succulent plant and known for its growing herbage yield and the chemical composition. It is characterised as tolerant to various soil types, temperature and moisture levels and grow well under shade (Swarna *et al.*, 2015). The leaves of shade loving plant possess great therapeutic value in the traditional system of medicinal but have not been fully exploited. (Swarna *et al.*, 2013).

It is a perennial herb with fleshy green leaves. Popularly known as water leaf because of its high moisture content of almost 90.8 g/100gm of edible leaf. It is characterised by the presence of minerals like Ca, K, Mg and vitamins like C and β -carotene. Extract of leaves used to cure Asthma. It consists of several phytochemicals (Anthocyanin, carotenoids, lutein, lycopene, phenolics. The flavonoids like quercetin, haempferol, apigenin which helps against cardiovascular diseases. (Ikewuchi *et al.*, 2017) Water leaf has anti-inflammatory, anti-fungal and anti-bacterial functions (Adie *et al.*, 2018).

Ipomea aquatica

It is commonly known as water spinach belongs to family Convolvulaceae. It is found in the areas of Bihar, Madhya Pradesh, Odisha, Rajasthan, Uttar Pradesh, Assam. It is a semi-aquatic tropical plant. It is a quick vigorous plant. This is considered as food with medicinal effects. Used in treatment of various nervous disorders, Gastric and intestinal disorders (Austin, 2007). It contains proteins, carbohydrates, crude fibre, vitamins like A, B, C, E and U and minerals like Mg, Mn, K, Fe (Umar *et al.*, 2007). It has been noted that some amount of phenolic compounds, flavonoids, saponins, β -carotene and ascorbic acid have been found (Dua *et al.*, 2015). Traditionally, it is used in treatment of disorders like diabetes, liver, malfunction, constipation (Chopra *et al.*, 1956).

Chenopodium album

It is known as bathua belongs to family Amaranthaceae. It is found in the areas of Kashmir, Bihar, Assam, Manipur. It is a fast growing annual plant. Plant is used for local use as a food and medicine. It is reported that bathua contains phenols, tannins, saponin, flavonoids, proteins and trace elements. Also, it has anti-inflammatory, anticancer,

antioxidant, antimicrobial, anthelmintic properties (Ali, 2015). Leaves contain minerals like Na, K, Ca, Mg, Fe, Zn, P, Cu, Mn, N (Adedapo, 2011). Traditionally, used as blood purifier, diuretic, sedative, hepalo-protective, antiscorbutic, laxative, anthelmintic against round and hookworms, ulcer and burns (Amrita *et al.*, 2015 and Agrawal *et al.*, 2014). It provides minerals, fibre, vitamins and essential fatty acids (Amrita *et al.*, 2015). Rich in protein, Vit A, Vit C, Ca, P, Fe, K (Agrawal *et al.*, 2014).

Moringa oleifera

It is known as drumstick or moringa belongs to family Moringaceae. This is widely known for its fruit in Southern parts of India in preparation of various dishes. Widely distributed in the regions of Maharashtra, Karnataka, Odisha, Bihar, Uttar Pradesh. Varying percentage of nutrients are found in leaves (Bamishanye *et al.*, 2011). Pods and leaves contain high amount of Ca, Mg, K, Mn, P, Zn, Na, Cu and Fe (Aslam *et al.*, 2005). Protein has also been found in leaves (Asante *et al.*). Traditionally leaves are used in treatment of diabetes (Dieye *et al.*, 2014). Leaves contain bioactive components like vitamins, phenolic acids, flavonoids, isothiocyanates, tannins and saponin which help against chronic diseases (Jimenez *et al.*, 2017). Leaves have antioxidant and anti-inflammatory properties (Mbikey, 2012). Somehow leaves are also processed and preserved for future use (Mishra *et al.*, 2012).

Cucurbita moschata

It is widely known vegetable for its fruit commonly famous as Pumpkin. In many parts of India and other countries other parts of the plant like leaves are consumed as a cooked vegetable or in the form of soups (Rahman *et al.*, 2019). Leaves are widely consumed in the tract of Odisha, Jharkhand region.

Traditionally, other parts of pumpkin plant except the fruit was also used for medicinal purpose (Yadav *et al.*, 2010). Pumpkin leaves contain protein (Ghaly *et al.*, 2010). Besides the consumption of leaves of *Cucurbita moschata*, leaves of *Cucurbita maxima* and *Cucurbita pepo* are also edible.

Marselia quadrifolia

(Water Clover/ Sunsunia) is a rarely found leafy vegetable in the Odisha, Jharkhand regions of India. It is an aquatic fern belongs to family Marsileaceae that grows from creeping rhizomes. It grows best in the muddy regions of ponds and lakes. It is used as a locally vegetable and also has medicinal properties. It is a good source of protein but low in mineral content like Sodium, potassium (Dewanji *et al.*, 1993). The leaves used to cure migraine, hypertension, headache (Soni and Singh, 2012). It also contains phytochemical compounds which helps in curing against several diseases like tannins, saponins, flavonoids, phenolic compounds, carbohydrates (Gopalakrishnan *et al.*, 2017).

Alternanthera sessilis

It belongs to family Amaranthaceae. Commonly known as joyweed or Madranga. This is an annual or perennial prostrate herb. Young shoots and leaves are eaten mostly on eastern parts of India mostly Odisha, Assam, Manipur. Leaves are high in antioxidant property and they protect us from various chronic diseases (Murugan *et al.*, 2013). Leaves are source of moisture, protein, total sugar, some amount of vitamin C (Misra and Misra, 2014). They are locally used for treatment against fever, ophthalmia, gonorrhoea (Behera *et al.*, 2008). It is also a good source for reducing blood sugar level (Hossain *et al.*, 2014). It contains phytochemicals like saponin (Walter *et al.*, 2014 and Rao 2018).

Poverty is a major problem in our country for which many are unable to get required amount of nutrient in their daily diet. However, this can be rectified by the various underexploited leafy vegetables such as available locally in rural-tribal areas of India. India is blessed with many such type of leafy vegetable which need to be exploited commercially. These underexploited crops such as *Sesbania grandiflora*, *Talinum triangulare*, *Ipomea aquatic*, *Chenopodium album*, *Moringa oleifera*, *Cucurbita moschata*, *Marselia quadrifolia*, *Alternanthera sessilis* are rich source of minerals like P, K, Ca, Fe, Mg, Mn, Zn; vitamins like A, B, C; moisture and some amount of proteins. The growth habits of most of these crops are of short duration which hardly requires 3-4 months to obtain the herbage yield. Also these are good source of various phytochemicals such as phenolic acids, flavonoids, tannins, saponins which help in building antioxidant properties in our body to fight against several diseases like chronic diseases, diabetes, etc. Many can be processed and stored for future use. So, focus need to be concerned towards their commercial cultivation and improvement for nutritional security.

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