The Planta RBS: Vol.-1 Issue-1 (October) 2020: 191 - 197
(Research Book Series – www.pgrindias.in)

18

POTENTIAL ROLE OF UNDEREXPLOITED LEAFY VEGETABLES FOR FOOD SECURITY AND BETTER NUTRITION

[1]Shashi Bala, [2]Kamlesh Kumar Gautam and [3]Mamta Sahu

Abstract

India has great reservoir for large number of non -traditional and underutilized minor vegetable crops. It has a rich biodiversity of cultivated and wild vegetables due to different agro-ecological/ phyto- geographical regions but the development of standard varieties were limited. These crops are also rich in nutrition along with various medicinal properties. Most of the minor vegetables are enriched with nutritional and medicinal value, and can be grown even in wastelands without much care. Therefore, it is worthwhile to look into the organized cultivation and improvement of minor group of crops like chayote, ivy gourd, purslane, sorrel, agathi etc. so that their production can be maximized. Wasteland such as marshy, ravines, acidic, marginal and sandy that are unfit for the cultivation of commercial and high input demanding crops. Such land can be exploited for growing local low input demanding leafy vegetable crops in order to diversify the present agricultural system, fulfill demand of local people and reducing the depletion of natural resources. Identification and conservation of the rare vegetable should be requiring as they have great potential for improving the socio economic status of the people. Hence, more focus on research related to nutritional and medicinal benefits should be given along with better crop improvement technology.

Keywords: purslane, under exploited vegetable, leafy vegetable, agathi etc.

[#]General Article

[1&2]Department of Horticulture, U.P. College, Varanasi
[3]Directorate of Research, C.S. Azad University of Agriculture &Technology, U.P.
Email- shashicsa@gmail.com

Introduction

Vegetables are the rich source of nutrient, vitamins & minerals and play an important role in human balance diet. It contributed 58.75% in total horticulture production of India but the high production does not fulfill the nutritional adequacy. The production contributed by the development of improved varieties, hybrids and their protection measures of some vegetables. India is a diverse land of wide ecosystem and has different ago climatic conditions which allow to grow a various wild horticultural crops beside the commercial cultivated crops (Janardhanan K, 2003). The underexploited vegetables are not known economically but they have great potential for nutrition, medicinal values and a source of income generation. They also known as wild edible vegetable, rare vegetables, minor vegetables etc. some common underutilized vegetables are *Oxalis corniculata, Portulaca oleracea, Polygonum plabium, Dioscorea bulbifera* (Aerial yam, Air potato), *Vigna umbelata* (Rice bean), *Vigna angularis* (Adzuki bean), *Psophocarpus tetragonolobus* (Winged bean) , *Parkia roxburghii* (Tree Bean) , *Mucuna pruriens* (Velvet bean), *Sechium edule* (Chow-Chow), *Sauropus androgynus* (Chekurmanis), *Sesbania grandiflora* pers (Agathi), *Portulaca oleracea* (Common Purslane), ivy gourd, *Alternanthera sessilis* (Ponnanganni Greens, Gudrisag) etc.

Leafy Vegetables

Cultivation of leafy vegetables or herbs is an old as human civilization. These are the excellent component of daily diet in various countries. These are naturally wildely growing plants and a good sources of proteins, vitamins, minerals (including micronutrients), phytonutrients such as antioxidants, bioflavonoids etc (Jana , 2007). These vegetables are very rich in nutrient as compared to the commercially cultivated vegetables. They not only supply the nutrient but add a variety to monotonous diet. Moreover, some of the plants are reported to have anticancerous antimicrobial, haepatoprotective anti-inflamatory properties and more. Due to their medicinal values, they are used as natural healers by the tribes and nomadic peoples. They have alternative taste, pleasing aroma and used to cure the problem of Fe deficiency or anemia and has various health benefit. In most cases, sowing seeds or planting once provides repeated harvest for long duration. Somewhere just maintenance in its natural habitat is also sufficient for collection in a huge amount (Gurumoorthi, 2003). Thus, cultivation of these plants in their locality is helpful for upliftment of socio economic status of small and marginal farmers. The high nutritional qualities indicate that the cultivation and consumption of these crops may be helpful in overcoming the nutritional deficiencies predominant in many rural areas of the country. Few are discussed below:

Portulaca oleracea (Common Purslane)

It is a common annual herb found up to an altitude of 1500m in Himalayan region as a weed. Traditionally the local people of that particular area where it is found utilize it as a vegetable. It is also known as Purslane, Kurfa or hog weed belongs to the family Portulaceae (Shazia Syed et al., 2016). It is rich in Vitamin C (26.6mg), beta- carotene (1.9mg), folic acid , essential fatty acids along with antioxidant property. From the medicinal point of view, it is astringent and diuretic in nature and can be useful in thirst

relief, headaches, crushing of bladder stones, stoppage of bleeding, and reduction of coughing and irritation of urethra, bladder and used as a health food for patients with cardiovascular diseases (Fasuyi AO,2005).

***Sauropus androgynus* (Chekurmanis)**

It is popularly known as "Multi vitamin Green" due to its high nutritive value as it is a rich source of carbohydrate, vitamin and minerals. Chekurmanis is a perennial shrub grown widely in S-E Asia belongs to the family Euphorbiaceae It is mainly propagated by semi hard wood stem cutting. It juice is used against the eye diseases as the leaves of this plant is rich source of protein, and Vitamin A, B and C[8]. It is a popular tropical leafy vegetable originated from the Indo Burma region. Its high nutritive value yet not recognized in commercial scale by the people. It was introduced in India in 1953 and cultivated in Malabar region of North Kerala. It was then used for research purpose in Agricultural Research Station, Tamil Nadu. It is a rich source of carbohydrate (11.6g), fat (3.2g), Vit A (9510 IU) and Vit C (200mg) per 100g of edible portion.

Curry Leaf (*Morraya Koinigii*)

Curry leaf (*Morraya Koinigii*) is an important leafy vegetable used in cooking for flavouring the foodstuff. Leaves have pungency, bitterness and acidic nature even after drying. It is native to India, Sri lanka, Andaman Island and Bangaldesh. It is found in forest and wasteland of Indian subcontinent belongs to the family Rutaceae. It normally attain a height of 2.5 m, leaves are bipinnately compound, 20-25 leaflet, reticulate vination. Pinene, sabinene, caryophyllene, cardinal are the major constituent responsible for aroma and flavour. It is rich source of Ca, Fe, Vit A, Vit B, Vit C, Vitamin B_{12} and antioxident properties, It used as a effective medicine in treating nausea, morning sickness, skin burn, kidney pain etc.

Agathi (*Sesbania grandiflora*)

Agathi or Sesbania grandiflora L. belongs to the family Leguminaceae is a well known legume plant having small, loosely branching, tree that grows up to 8- 15 m tall and 25-30 cm in diameter. It is a cultivated in Tropical Asia such as Malaysia, Myanmar, Indonesia, Philippines including India. It is resembles to *Sesbania formosa*, an Australian species. Agathi is not a very well known crop it is cultivated for its leaf and flowers that are not sold like other vegetables in the market. Agethi is able to produce ripe pods 9 months after planting and the large-flowered hermaphroditic species appears to be pollinated by birds. The tree has a life span of about 20 years and mainly propagated by seed. Its leaves, flower and fruit are rich in vitamin A and minerals beside the medicinal properties i.e., why it valued as a vegetable or mixed with curries in many recipies (Funk VA *et al.*,, 2005). Bakery products like biscuits and cookies are high in carbohydrate, fat, calories, but low in fiber content. Therefore, addition of bakery products with potentially nutritive ones likes Agathi leaves, wheat flour and palm jaggery would be beneficial to improve the nutritional quality of baked product. Due to the lack of a seed coat, if viability is to be maintained, the species should be stored in sealed containers at a temperature of 4 deg. C or less and mc of less than 10%. Viability can also maintain for 2 years in open storage at room temperature. Seed weight is 17 000-30 000 seeds/kg.

***Basella alba* L**

Basela alba is native to south Asia and commonly found in tropical region of the world, belongs to the family Basellaceae. It is synonymous to *cordifolia* Linn., *Basella lucida* linn., Malabar spinach, Indian spinach, cylon spinach, poi saga and vine spinach etc. It is fast growing perennial stemmed plant can attain 10m length. Both succulent stem and tender leaf can be used as a vegetable. It is rich in flavonoids, caroteniods, saponin, amino acids and organic acids besides ca, fe, vit A and C. It has ethano medicinal properties and used to cure irritation, anemia, bleeding piles, digestive disorder, skin disease, wooping cough, leprosy etc.

The leaves contain a high level of calcium and are rich in vitamins like A, C, thaimine, riboflavin, niacin, and betacyanin, oxalic acid, flavonoid like acacetin, 4,7-dihydroxy kempferol and 4'-methoxyisovitexin and also phenolic acids like vanilla, syringic and ferulic acid.Dried leaves (per 100 gm) contains, protein 20%, fat 3.5%, carbohydrate 54%, fibre 9%, and ash 19%.. The fruit contains betacyanins and gomphrenin. The juice of the plant is used as a dye for official seals, as a rouge on the facial skin and food colouring

Lettuce (*Lactuca sativa L.)*

Lettuce is a member of compositeae family that are thought to be the largest known family of the plant and originated from Mediterranian region from the wild species (Argyris *et. al.*, 2005). Formally, cultivated lettuce is grouped into seven different types:

Cos (or. Romaine) - This type having oblong upright rigid leaves and a midrib having dark green leaves

Cutting (or. Leaf) - The Cutting group forms no firm heads but instead produces a dense mass of leaves in the center of the plant

Stalk (or Asparagus) - both the leaves and stem may be eaten, and this group does not form heads and has prominent thickened fleshy stems and upright ovate leaves.

Butter head - this group is widely used in Europe and was second in commercial importance in the early twentieth century in the US

Crisp head (. Iceberg or Cabbage) - The leaf is crispy and the veins are prominent , this group forms tight, dense heads which are comprised of spherical leaves folded upon each other. Leaf color varies from deep green to light green, with some genotypes containing anthocyanin Crisp head lettuce is the most popular lettuce type in the US, although the market share of Cos and Cutting types have markedly increased in recent years.

Lettuce type - leaves of the Latin group are thick, have entire margins, and are green, It forms a poorly organized rosette that is similar in appearance to the Butter head group. The lettuce type is cultivated in the Mediterranean region including North Africa and in South America

Oilseed -The Oilseed group is typified by a multi stemmed upright growth habit with green leaves

Red-pigmented lettuce contains higher phenolic compounds than green lettuce. Baby green romaine was especially high in vitamin C. Lettuce has a high water and low fat content, which makes it ideal for dietary plans (Caldwell,2003). It is valued for its organoleptic properties and is considered an important source for health-promoting

metabolites (carotenoids, chlorophylls, macro and trace elements, phenolics, and vitamins), which are crucial in human nutrition. Scientists recommend that people should consume fruits and vegetables daily, because they satisfy 11%, 35%, 7%, and 24% of the daily intake of P, K, Ca, and Mg, respectively (Shazia Syed et al.,2016). These macronutrients help against certain diseases, such as blood pressure imbalances, hypertension (K), and osteoporosis (P, Ca, and Mg) . For lettuce, several authors reported potassium content between 48-72 mg g −1, phosphorus 4-6 mg g −1, magnesium 1.4-2.8. Compounds such as phenols, carotenoids, flavonoids and vitamin C, represent the defensive power both in plants and humans, because they have the ability to block free radicals, which are harmful to proteins, lipids and DNA in the cells. They have been shown to be beneficial for treating a variety of diseases and illnesses such as diabetes, inflammation and some types of cancer.

Amaranthus Spp.

Amaranthus belongs to family amaranthaceae is very rich nutrient pseudo cereal consumed since ancient times. The name 'Amaranthus' derived from the greek word 'Amaranthus' which means eternal flower and considered as super food.

Amaranthus is the leafy vegetable of Africa and Asia, it's mostly species have edible leaf and used as a pot herbs. They have several edible species, which have edible leaves, spinach like flavour and high yielding such as *Amaranthus. blitum* L.; sin. *Amaranthus. lividus* L., *Amaranthus. viridis* L.; sin. *Amaranthus. gracilis* Desf. and *Amaranthus tricolor* L.; sin. *Amaranthus gangeticus* L.)

Its seed has high nutraceutical values such as unsaturated oil (omega 3 and omega 6), dietry fibre, phenolic compound, flavonoid vitamin and minerals (a, Mg, Mn, etc.) (Cui X, Xu, 2005). Its consumption is good for a person having glutin intolerance i.e. celiac disease and helps to avoid disease caused by inflammation. Seed contain more Ca than other cereals, which prevent the bones from osteoporosis, its oil reduces the bad cholestrol and affect cholesterol metabolism. It also regulates the sugar level and prevents diabetes(Kumar , 2002).

Chenopodium album

The *Chenopodium album* Linn. (*Chenopodiaceae*) a originated from Western Asia, also falls in under the explored category and its multipurpose use for humankind generated interest worldwide. The genus Chenopodium has a worldwide distribution and contains about 250 species. In India, it is represented by about 21 species, of which some are cultivated for vegetable and a few for the seed (Cooper DA, 2004). *C. album* have also been reported to grow naturally as weed in the fields of mustard, gram, wheat, barley and other crops. The weed is slow growing while the cultivated plants are tall and leafy. The whole young plant has to be reported as food and herbal medicine. *C. album* is known by various synonymous names, viz. *Parupukkirai* (Tamil), *Pappukura* (Telgu) and *Katu, Bathua sag* (Hindi), *Chandan betu* (Bengali).

Bathua is an excellent source of protein, sugar, vitamin and minerals, it consumed as a cereals that remove the food scarcity. It has inadequate scientific knowledge regarding their nutritional and medicinal properties .The plant is used as blood purifier, sedative, diuretic and have hepatoprotective properties.

Conclusion

Most of the minor vegetables are enriched with nutritional and medicinal value, and can be grown even in wastelands without much care. The potentiality of processed products from some minor fruits and vegetables in the country is still unfocussed. Therefore, it is worthwhile to look into the organized cultivation and improvement of minor group of crops like chayote, ivy gourd, purslane, sorrel, agathi etc. so that their production can be maximized. There is always demand from consumers for new, delicious, nutritious and attractive food products. To satisfy this demand, there is a constant effort to develop products from diverse sources. Identification and conservation of the rare vegetable should be requiring as they have great potential for improving the socio economic status of the people. Hence, more focus on research related to nutritional and medicinal benefits should be given along with better crop improvement technology. However, efforts have been made by various researchers for the development of value added products from underutilized fruits and vegetables Identification and quantification of the species which having the anti nutritional factors is also required. Government should include cultivation of underutilized leafy vegetables in different community development programmes at village level. All these will certainly have positive effect on the different socio-economic aspect, especially on the large malnourished population in different ethnic communities.

It reflects the feasibility for the development of some diversified value added products from some of the minor horticultural crops grown in India in order to minimize the wastage, to promote these products as export items and to uplift the nutritional and socio-economic status of the vulnerable communities of country.

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