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Survey of Underutilised Leafy Vegetables in South Karnataka of India to Attain Nutritional Security

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Abstract

Plants are gifts of God for mankind. In India most rural inhabitants depend on wild edible plants to meet their additional food requirements and to attain household food security. India, being blessed with diverse climatic conditions, has a wide array of edible green leafy vegetables (GLV) some of which are locally grown and utilized from ancient periods as source of food as they contain many nutrients and minerals which can nourish the ever growing human population and helps to attain nutrient security. Many of these greens are growing as weeds in the crop fields which are resilient, adaptive and tolerant to adverse climatic conditions and need less investment and don't require much investment, hence it is described as 'poor man's vegetables'. Although, they can be raised at lower management costs even on poor marginal lands, they have remained underutilized due to lack of awareness and popularization of technologies for utilization. It is essential that the locally available GLV, which are inexpensive and easy to cook, be used in the diets to eradicate micronutrient malnutrition and also to prevent the degenerative diseases. Therefore, the present study was undertaken with the objective of exploring potentialities of the lesser known underutilized green leafy vegetables in different districts viz., Kolar, Chickballapura, Mysore, Davanagere, Shimoga of Karnataka state, South India to create awareness among the public and for encouraging further research by scientific community. During the present study, 45 species of green leafy vegetables such as *Amaranthus sp., Cleome sp., Solanum sp.* were documented and tabulated as per botanical name, family, common name, and local name and also mentioned their mode of consumption.

Keywords: Underutilized; Leafy vegetable; Nutrition security

Introduction

Plants are gifts of God for mankind. India is a country with rich in biodiversity. There are 45,000 species of wild plants [1], out of which 9,500 species are ethno-botanically important species [2]. Of these 7,500 species are in medicinal use for indigenous health practices. About 3,900 plant species are used by tribal people as food (out of which 145 species comprise of root and tubers, 521 species of leafy vegetables). India is blessed with a vast resource of greeneries and wide array of Green Leafy Vegetables. Green leafy vegetables are used since ancient periods as source of food as they contain many nutrients and minerals which are helpful in maintaining human health. Leafy vegetables are naturally available important constituent of Nutraceuticals and are also called as pot herbs, greens, vegetable greens, leafy greens or salad greens. The leafy vegetables are said to tone up the energy and vigour in human being. Though leafy vegetables are low in calories and fat but high in dietary fibre, iron, Phosphorous calcium and magnesium content and very high in photochemical such as vitamin (A, B, C and K), carotenoids, lutein, folate, magnesium. It has been found that the person who consumes less amount of vegetables suffer from malnutrition, which in turn hampers the immune system.

The World Health Organization (WHO) recommends a daily intake of more than 400g of vegetables per person to protect against diet related chronic diseases. India secured second position in the world next to china in vegetable production. Although, 175 major and minor vegetable crops are grown in India including 82 leafy vegetables, there is a challenge to achieve the target of 160 million tons of vegetables to fulfil the recommended requirement by 2020'. Green leafy vegetables are the cheapest of all the vegetables within the reach of poor man, being richest in their nutritional value. Green Leafy Vegetables are sources of nutrients and micronutrients [3] such as iron and vitamin C, which are lacking from staple foods and are primary sources of

lutein and zeaxanthine, which have been identified as important eye protective agents. Also contains natural antioxidants such as tocopherols, vitamin C and polyphenols which are necessary in neutralizing free radicals which are known human chemical hazards. These green unexposed foods are fond to possess ample amount of vitamins and minerals Sheela et al. [4]. They owe the potential to nourish the ever increasing human population. Many of these plant species are found resilient, adaptive and tolerant to adverse climatic conditions, although they can be raised at lower management costs even on poor marginal lands. Besides other crops, cultivation of these vegetables will not only increase food production but also provide balanced nutrition, food security, health security and poverty alleviation to the deprived section. So, these leafy vegetables have the potential to become an important alternative to usual agricultural crops.

Material and Methods

Study area

The study was conducted in different villages of districts viz., Kolar, Chickballapura, Mysore, Davanagere, Shimoga of Karnataka state, South India.

Aim of the survey

The main aim of the survey was to gather information about the different leafy vegetables plant species which are used by the local people.

Data collection

The data was collected regarding different green leafy vegetables used by the farmers and information was obtained by local farmers through a combination of methods like personal contact, observation and group discussions [5]. Simple questionnaire schedule was developed to elicit the information regarding the various aspects of underutilized greens used in the culinary purpose by these rural people. Frequent field visits were taken up for a period of one month. Collected data was confirmed and finalized by repeated visits to the same locality and also to different localities. Local people accompanied author/s during field visits. The specimens were identified using fresh as well as herbarium materials with taxonomic keys.

Result and Discussion

Nutrition is basic human need and a prerequisite for healthy life. A proper diet is essential from very early age of life for growth, development and active life. So that consumers are looking for variety in their diets, and are aware of the health benefits of fresh fruits and vegetables of special interest are food sources rich in antioxidant vitamins, Calcium (Ca), Magnesium (Mg), and Potassium. On the other hand, with few exceptions, fruits and leafy vegetables are believed to occupy a mode rest place as a source of trace elements due to their high water content. Green Leafy Vegetables (GLVs) occupy an important place among the food crops as these provide adequate amounts of vitamins and minerals for humans. Leafy Vegetables are herbaceous, shrub, or tree origin where leaf is the edible part [6]. It is well known that the dark green coloured leafy vegetables are richer in nutrients content than lighter coloured vegetables. It is observed that knowledge of wild leafy vegetables may be lost in the near future, unless efforts are made to educate younger generations about their importance [7]. They could be used as an important source of nutrients during the pre-cropping season, before traditional crops are available for human consumption. It is recommended that agronomic investigations into cultivation of wild leafy vegetables that are adapted to rural areas where underutilized leafy vegetables are not widely available needs to be undertaken. Those studies could contribute significantly in government policies to improve food security in rural areas, and in the improvement of wild vegetable status, whose potential as sources of nutrition is currently undervalued.

The study provides empirical evidence about diversity of Green leafy vegetables (Figure 1). The study area is floristically rich and includes various useful wild leafy vegetable species. The present survey encompasses 45 leafy vegetable species (Table 1) belonging to 21 family tabulated with botanical name, family, common name local name and mode of consumption. A maximum of 14 plants from Amaranthaceae, two each from *Brassicaceae, Fabaceae, Apiaceae, Chenopodiaceae, Cleomaceae, Asteraceae, Portulaceae, Euphorpiaceae*, Solanaceae, one each from Basellaceae, Nyctaginaceae, Sapindaceae, Commelinaceae, Papilionaceae, Convolvulaceae, Moringaceae, Oxalidaceae, Caesalpinaceae, Menispermaceae, Aizoaceae.

Table 1: List of Green Leafy Vegetables of different districts of Karnataka.

S. No	Botanical name	Family	Common name	Local name	Mode of consumption
1.	*Achyranthes aspera* L.	Amaranthaceae	Prickly chaff flower	Uttarani	Young leaves and shoots are collected, roasted then eaten.
2.	*Allium cepa* L.	Amaryllidaceae	Onion leaves	Eerulli soppu	Young leaves are mixed with flour of Ragi or rice to prepare rotti.
3.	*Allmania nodiflora* (L.) R. Br.	Amaranthaceae	Node flower	Hasiru budde soppu	Leaves are cooked as vegetable

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4.	*Alternanthera sessilis* (L.) R. Br.	Amaranthaceae	Sessile joy weed	Honagone soppu	Leaves and young shoots is used to prepare curry and leaves are also used to prepare palyam
5.	*Amaranthus blitum* L.	Amaranthaceae	Purple amaranth	Chilakarive	Leaves and young shoots is used to prepare curry and leaves are also used to prepare palyam
6.	*Amaranthus caudatus* L.	Amaranthaceae	Foxtail amaranth	Chilike soppu	Leaves and young shoots is used to prepare curry and leaves are also used to prepare palyam
7.	*Amaranthus cruentus* L.	Amaranthaceae	Red amaranth	Rajagiri	Leaves and young shoots is used to prepare curry and leaves are also used to prepare palyam
8.	*Amaranthus dubius* L.	Amaranthaceae	-	Mulladantu	Leaves and young shoots is used to prepare curry and leaves are also used to prepare palyam
9.	*Amaranthus gangeticus* L.	Amaranthaceae	Amaranth	Dantu soppu	Leaves and young shoots is used to prepare curry and leaves are also used to prepare palyam
10.	*Amaranthus polygonoides* L.	Amaranthaceae	Amaranth	Chikkire soppu	Leaves and young shoots is used to prepare curry and leaves are also used to prepare palyam
11.	*Amaranthus roxburghianus* L.	Amaranthaceae	Amaranth	-	Leaves and young shoots is used to prepare curry and leaves are also used to prepare palyam
12.	*Amaranthus spinosus* L.	Amaranthaceae	Amaranth	Mullu harave soppu	Leaves and young shoots are cut into small pieces, cooked with salt and chilly and then eaten.
13.	*Amaranthus tricolor* L.	Amaranthaceae	Jacob's coat	Dantina soppu	Leaves and young shoots is used to prepare curry and leaves are also used to prepare palyam
14.	*Amaranthus viridis* L.	Amaranthaceae	Green amaranth	Nayi harive soppu	Leaves and young shoots is used to prepare curry and leaves are also used to prepare palyam
15.	*Basella alba* L.	Basellaceae	Indian spinach	Basale soppu	Stem and leaves are used to prepare curry.
16.	*Beta vulgaris var. Bengalensis* L.	Chenopodiaceae	Palak	Palak soppu	Young leaves are boiled in water and mixed with flour of Ragi to prepare rotti.
17.	*Boerhavia diffusa* L.	Nyctaginaceae	Horse purslane	Odakalu soppu	Tender leaves and young shoots are collected, fried/ roasted then eaten.
18.	*Brassica juncea (L) Czern. & Coss.*	Brassicaceae	Indian mustard.	Sasive soppu	Yung leaves are used to prepare curry
19.	*Cardiospermum helicacabum* L.	Sapindaceae	Baloon vine	Agniballi	Cooked as vegetable
20.	*Cassia fistula*	Fabaceae	Golden shower tree	Kakke soppu	Cooked as vegetable
21.	*Celosia argentea* L.	Portulaceae	Red spinach	Anne soppu	Young leaves and shoots are collected, roasted then eaten.
22.	*Centella asiatica* (L.) Urban	Apiaceae	Indian pennywort	Ondelga soppu	Leaves and young shoots are collected, roasted then eaten.
23.	*Chenopodium album* L.	Chenopodiaceae	Chenopod	Sakothina soppu	Cooked as vegetable
24.	*Cleome gynandra* L.	Cleomaceae	African cabbage	Kadu sasive	Leaves and young shoots are collected, roasted then eaten.

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25.	*Cleome viscosa* L.	Cleomaceae	Yellow spider flower	Nayibela	Leaves and young shoots are collected, fried/ roasted then eaten.
26.	*Commelina communis* L.	Commelinaceae	Asiatic day flower	Kanne soppu	Cooked as vegetable
27.	*Digera muricata* (L.) Mart.	Amaranthaceae	False amaranth	Chenchali soppu	Cooked as vegetable
28.	*Eclipta alba* L.	Asteraceae	Bhringaraj	Garuga Soppu	Cooked as vegetable
29.	*Emilia sonchifolia* L.	Asteraceae	Lilac tassel flower	Elikivi soppu	Cooked as vegetable
30.	*Lathyrus sativus* L.	Papilionaceae	Lathyrus	Kesari	Cooked as vegetable
31.	*Merremia emarginata (Burm. f) Hallier f*	Convolvulaceae	Kidney Leaf Morning Glory	-	Cooked as vegetable
32.	*Moringa oleifera* L.	Moringaceae	Drumstick	Nugge soppu	Leaves are eaten after frying or roasting.
33.	*Oxalis corniculata* L.	Oxalidaceae	Indian Sorrel	Huli soppu	Leaves are plucked, and Eaten as raw.
34.	*Phyllanthus amarus* L.	Euphorpiaceae	Carry Me Seed	Nela nelli	Eaten as raw
35.	*Portulaca oleracea* L.	Portulaceae	Purslane	Nelabasale soppu	Cooked as vegetable
36.	*Portulaca quadrifida* L.	Portulaceae	Chicken weed,	Goni soppu	Tender leaves and shoots are collected, roasted then eaten.
37.	*Raphanus sativus* L.	Brassicaceae	Radish	Mulangi soppu	Cooked as vegetable
38.	*Sesbania grandiflora* (L.) Pers.	Fabaceae,	West Indian Pea	Agase soppu	Cooked as vegetable
39.	*Solanum nigrum* L.	Solanaceae	Black nightshade	Kachi soppu	Cooked as vegetable
40.	*Solanum trilobatum* L.	Solanaceae	Purple fruited pea eggplant	Ambusondeballi	Cooked as vegetable
41.	*Sauropus andragynus* (L.) Merr.	Euphorbiaceae	Tropical asparagus	Chakramuni	Cooked as vegetable
42.	*Tamarindus indica* L.	Caesalpinaceae	Tamarind	Hunise soppu	Cooked as vegetable
43.	*Tinospora cordifolia*	Menispermaceae	Heartleaf moonseed	Amrutaballi	Cooked as vegetable
44.	*Trianthema portucastrum* L.	Aizoaceae	Desert horse purslane	Sambar soppu	Cooked as vegetable
45.	*Trigonella foenum-graecum* L.	Apaiaceae	Methi	Menthya soppu	Fresh leaves used for pulav preparations

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Figure 1: Green Leafy Vegetables of different districts of Karnataka.

Consumption of herbs is as old as human race itself. Green leafy vegetables represent an excellent component of the habitual diet in the tropical and temperate countries. Green leafy Vegetables in our country are known to be the most inexpensive source of several vital nutrients. Leafy vegetables are appreciated because they not only supply the protective nutrients and add variety to a monotonous diet, but also have an alternative taste, pleasing appearance and aroma. In nature, there are many underutilized

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greens of promising nutritive value, which can nourish the ever increasing human population. Many of them are resilient, adoptive and tolerant to adverse climatic conditions. Although, they can be raised comparatively at lower management cost even on poor marginal lands, they have remained underutilized due to lack of awareness and popularization of technologies for utilization. Now-a-days, underutilized foods are gaining importance as a means to increase the per capita availability of foods.

Conclusion

Green leafy vegetables found in South India, used as a source of food have many health benefits like protection from eye problems, iron deficiency and oxidative damage. Green leafy vegetables are of great medical importance due to the health benefits produced. Thus, an attempt has been made to identify and analyze various underutilized green leafy vegetables for their nutrient content from selected regions of South Karnataka. The study throws light on encashment of these crops by preserving them as germplasm collections in different ICAR Centres of India for evaluation and multiplication before they become extinct and probable due focus needs to be concentrated by AICRP on Underutilized Crops of India on these crops.

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