



## NUTRITIONAL EVALUATION OF UNCOMMONLY CONSUMED GREEN LEAFY VEGETABLES AND DEVELOPED PRODUCTS

Dr. Varsha S. Zanvar and Pradnya B. Dhutmal

Asst. Prof. Home Science, Shri Yoganand Swami Arts College, Basmat, Dist. Hingoli (M. S.)

### ARTICLE INFO

#### Article History:

Received 13<sup>th</sup> February, 2019  
Received in revised form  
21<sup>st</sup> March, 2019  
Accepted 08<sup>th</sup> April, 2019  
Published online 30<sup>th</sup> May, 2019

#### Key Words:

Vegetables cauliflower,  
Utilizing fresh leaves,  
 $\beta$ -carotene.

### ABSTRACT

A study was conducted on nutritional composition of uncommon green leafy vegetables. Seven commonly grown but uncommonly consumed green leafy vegetables were selected. Fresh and dehydrated form of green leafy vegetables and developed products were also analyzed for proximate composition, minerals and vitamin content. On the basis of high mineral content of cauliflower greens, five products each were developed utilizing fresh and dehydrated cauliflower greens leaves. The result showed the among all selected vegetables cauliflower leaves exhibits highest mineral content in fresh and dehydrated form i.e. iron (37.78 and 234.12 mg/100gm) and calcium (620.62 and 6504.62 mg/100gm). Products like Paratha, Bhajiya, Poori, Kachori and Bakwadi were developed by utilizing fresh leaves. However, Shev, Chakali, Kharapara, Papad and Bundi were developed by utilizing dehydrated leaves. The nutrient content of products were ranged from protein (8.75 to 14.46gm/100gm) and ( 12.12 to 20.95 gm/100gm), fiber (1.61 to 4.59 gm/100gm) and (3.15 to 8.94 gm/100gm), iron (8.82 to 10.43mg/100gm) and (26.63 to 43.57mg/100gm), calcium (125.1 to 193.74mg/100gm) and (708.36 to 780.67 mg/100gm), ascorbic acid (7.46 to 7.99mg/100gm) and (1.88 to 3.16mg/100gm) and  $\beta$ -carotene (393.07 to 481.87ug/100gm) and (297.17 to 401.02ug/100gm) respectively.

Copyright © 2019, Dr. Varsha S. Zanvar and Pradnya B. Dhutmal. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Dr. Varsha S. Zanvar and Pradnya B. Dhutmal. 2019. "Nutritional evaluation of uncommonly consumed green leafy vegetables and developed products", *International Journal of Development Research*, 09, (05), 27665-27668.

### INTRODUCTION

Leafy vegetables play vital and major role in our daily diet to fulfill the nutritional requirement of the Indian population. It is estimated that in India about 800 species are consumed as wild edible plants over the country (Singh and Arora, 1978). These are important source of minerals and vitamin. The importance of vegetables is unlimited because the required element which are essential for our body are obtained from vegetables (Mahbub, *et al*, 2010). Leafy vegetables are appreciated because they not only supply the protective nutrients and variety to a monotonous diet, but also have an alternative taste, pleasing appearance and aroma. Wild edible plants are not only providing food in sufficient quantity but also makes significant contribution to the nutrition of population throughout the year (Grivetti and Ogle Britta *et al.*, 2003). Majority of the Indian population is vegetarian and daily intake of at least 100gm of fresh green leafy vegetable is recommended by ICMR. In addition to all these, large number of minor vegetables are grown in India, similarly leaves of other vegetables like, beetroot, pumkin, radish Bengal gram, drumstic and cauliflower greens etc. are not consumed by

many people. 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 rich source of vitamins such as beta carotene, ascorbic acid, riboflavin, folic acid as well as minerals like iron, calcium, phosphorus etc. they are also recognized for their color flavor and therapeutic value. (Kagale and Sabale, 2014) in addition to this, a great variety of less familiar green leafy vegetables like Bathua leaves, Rajgeera leaves, drumstick leaves etc. are also used locally in addition. Similarly leaves of large number of plants growing wild in the country side prove to be good source of nutrients. Besides, cool season leafy vegetables like cabbage, kathmath leaves etc. are consumed in India. Nutritive value of commonly consumed green leafy vegetables has been studied extensively, but these is very less information available on nutritive value of uncommon green leafy vegetables. Hence, an attempt was made to analyze nutrient content of uncommon green leafy vegetables. Being rich in nutrients the leaves of the vegetables was utilized for the purpose of enrichment of nutritional products. Many nutritionists in Indian and out of India studied the development of value added product by utilizing green leafy vegetables, but there is need to work on aspects like development of value added products by utilizing

commonly grown and uncommonly consumed green leafy vegetables.

## MATERIALS AND METHODS

The various commonly grown, uncommon consumed low cost indigenous green leafy vegetables were procured from local market of Nanded city. They are listed below.

**Preparation of powder utilizing uncommon green leafy vegetables:** Fresh, green undamaged, non-insect infested, bruised, discolored, decayed and wilted uncommon green leafy vegetables were sorted before washing the leaves. Cleaned vegetables were washed chopped and oven dried at 80 °C for 8 to 10 hours and powder was prepared till it ground to pass through a 40 mesh sieve and stored in airtight containers for further use.

**Nutrient analysis of fresh and dry uncommon green leafy vegetables:** Fresh and dehydrated uncommon green leafy vegetables and Highly acceptable variations of each food product were analyzed for nutrient composition and micro nutrient content was analyzed by different methods. Proximate composition (AOAC,1975), Minerals and vitamin content were analyzed.

Uncommon Green Leafy Vegetable	Botanical Name	Common Name
Drumstick Leaves	<i>Moringa Oleifera</i>	Shevaga pan
Amranthus Spinousus	<i>Amranthus S.</i>	Kathamath
Amranthus Paniculatus	<i>Amranthus P.</i>	Rajgeera Pan
Cauliflower Leaves	<i>Brassica Oleraceabotrytis</i>	Phulgobi Pan
Musterdseed Leaves	<i>Brassica Gulcea</i>	Tikha Pan
Bathua Leaves	<i>Chenopodium album Linn.</i>	Chandan batuha
Beetroot Leaves	<i>Bata Vulgaris</i>	Beetroot Pan

Fresh leaves food products	Dried leaves food products
Paratha	Shev
Bhajiya	Chakli
Poori	Kharapara
Kachori	Papad
Bakrwadi	Bondi

**Development of value added products:** Ten value added products was prepared by incorporating different proportion of fresh and powder vegetable which was selected on the basis of high percent of mineral content. The percent of incorporation was 10, 15, 20, 25 and 30 percent.

## RESULTS AND DISCUSSION

Proximate composition of uncommon green leafy vegetables are reported in Table 1. Moisture content of the analyzed samples of fresh green leafy vegetables ranged between 75.45 to 88.21 gm/100gm, with the highest being in Bathua leaves (88.21gm/100gm) and lowest in Drumstick leaves (75.45gm/100gm). Whereas dehydrated vegetables ranged from 11.77 to 19.80mg/100gm. Highest being in Amaranthus paniculatus and lowest in Cauliflower leaves. Green leafy vegetables are fair source of protein but dehydrated leafy vegetables contained high amount of protein. Dehydrated cauliflower leaves contained high amount of protein (21.87gm/100gm) than the other selected vegetables. Fat content ranged between 0.61 to 1.50gm/100gm in fresh leafy vegetables and in dehydrated leafy vegetables contained 1.72 to 2.78 gm /100gm. Green leafy vegetables are very poor

source of fat. Dehydrated Cauliflower leaves showed the highest crude fiber values (7.59gm/100gm) and lowest was found to be in mustered leaves (3.57 gm/100gm). However, it is also reported that vegetables which has high fiber content. The lower carbohydrate content of 7.36 in fresh Bathua leaves whereas carbohydrate content high in dehydrated Mustured leaves i.e. 58.95gm/100gm. The values of ash content on dry weight basis ranged between 5.60 to 13.52 gm/100gm highest in cauliflower leaves (13.52gm/100gm) and lowest in Mustured leaves (5.60mg/100gm). Table 2. reported the minerals and vitamins content of fresh and dry uncommon green leafy vegetables. Among all selected and analyzed leafy vegetables fresh and dehydrated Cauliflower leaves contained high amount of iron i.e. 37.78 and 234.12 mg/100gm. While Drumstick leaves showed poor source of iron i.e. 1.12mg/100gm in fresh and 26.51 mg/100gm in dehydrated.

The other selected leafy vegetables contained appreciable amount of iron. Further it was showed from the table calcium content of analyzed fresh and dry vegetables Amaranthus spinosus (780.82 and 7852.02mg/100gm), Cauliflower leaves (620.62 and 6504.62mg/100gm), Amaranthus paniculatus (523.87 and 6610.82 mg/100gm), Drumstick leaves (426.57 and 5620.62 mg/100gm) and Beetroot leaves (370.70 and 3731.12 mg/100gm) had a high. Further table showed that vitamin- C content of selected vegetables ranged from 30.35 to 200.14 highest amount Drumstick leaves shows ascorbic acid i.e. 200.14 mg/100gm followed by Amaranthus paniculatus (78.25mg/100gm) and Amaranthus spinosus i.e. 30.35 mg/100gm. Whereas other vegetables showed ascorbic acid content Beetroot leaves (68.34), Cauliflower leaves (45.12), Mustured leaves (35.21) and Bathua leaves (34.34).

The values for ascorbic acid in dehydrated leafy vegetables very low than the fresh leaves ranged from 08.34mg/100gm (Bathua leaves) to 18.21mg/100gm (Drumstick leaves). The  $\beta$ -carotene content of analyzed greens shows that highest content was recorded for Amaranthua paniculatus (13458.24) followed by Drumstick leaves, Beetroot leaves and Amaranthus spinosus (6240.21, 5984.10 and 3650.45). However other vegetables show ranged between (1780.21 to 2684.24). Further the levels of  $\beta$ -carotene in the dehydrated leafy vegetables ranged between 2454.23ug/100gm. (Bathua leaves) to 16485.66ug/100gm (Amranthus Spinousus).

In nutshell the table concluded that selected uncommon green leafy vegetables are good source of macro and micro nutrients. They are good source of iron, calcium, ascorbic acid,  $\beta$ -carotene. It can be recommended from the table that regular consumption of these uncommon green leafy vegetables can nutritional requirement to overcome the micro nutrient malnutrition at household's level with minimum cost. Nutrient composition of developed value added products with incorporation of cauliflower leaves in various traditional products in Table 3. The result shows that the protein content high in Bhajiya 14.46 gm/100gm than other prepared products. iron content high in Paratha and Bhajiya i.e. 10.43 and 10.05 mg/100gm. Calcium ontent high in Bakarwadi 193.74mg/100gm and low in Poori 125.1mg/100gm and  $\beta$ -carotene content high in Kachori 552.76 ug/100gm. Nutrient composition of developed products with incorporation of dries cauliflower leaves in various traditional products indicated in Table 4.

**Table 1. Proximate composition of uncommon green leafy vegetables as is basis**

Leafy vegetables	Moisture (gm/100gm)		Protein (g/100 g)		Fat (g/100 g)		Fiber (g/100 g)		CHO (g/100g)		Ash (gm/100gm)	
	Fresh L.	Dry L.	Fresh L.	Dry L.	Fresh L.	Dry L.	Fresh L.	Dry L.	Fresh L.	Dry L.	Fresh L.	Dry L.
Drumstick Leaves ( <i>Moringo Oleifira</i> )	75.45	13.78	4.04	16.55	1.50	2.41	1.01	4.40	15.73	50.4	2.28	9.52
Amranthus Spinousus ( <i>Amranthus S..</i> )	83.59	12.91	3.62	13.94	0.61	2.43	1.21	5.68	13.46	48.67	2.56	10.44
Amranthus Paniculatus ( <i>Amranthus P.</i> )	78.72	14.79	4.93	16.77	1.20	2.78	2.10	6.21	12.46	42.44	3.59	12.16
Cauliflower Leaves ( <i>Brassica Oleraceabotrytis</i> )	79.49	13.37	5.36	21.87	1.42	2.12	2.23	7.59	9.74	42.04	3.61	13.52
Musteredseed Leaves ( <i>Brassica Gulcea</i> )	88.19	12.48	3.55	12.40	0.82	2.02	0.10	3.57	18.83	58.95	1.63	5.60
Bathua Leaves ( <i>Chenopodium album Linn</i> )	88.21	11.77	4.11	17.40	0.83	1.91	0.91	4.89	7.36	51.58	2.63	10.46
Beetroot Leaves ( <i>Bata Vulgaris</i> )	85.56	12.80	2.95	12.43	0.92	1.72	0.71	4.54	11.68	54.04	2.21	10.47

**Table 2. Mineral and vitamin content of uncommon green leafy vegetables as is basis**

Leafy vegetables	Calcium (mg/100 g)		Iron (mg/100gm)		Ascorbic Acid (mg/100g)		β-Carotene (mg/100 g)	
	Fresh L.	Dry L.	Fresh L.	Dry L.	Fresh L.	Dry L.	Fresh L.	Dry L.
Drumstick Leaves ( <i>Moringo Oleifira</i> )	426.57	5620.62	1.12	26.51	200.14	18.21	6240.21	6868.66
Amranthus Spinousus ( <i>Amranthus S..</i> )	780.82	7852.02	21.16	196.53	30.35	12.24	3650.45	3966.66
Amranthus Paniculatus ( <i>Amranthus P.</i> )	523.87	6610.82	18.33	102.11	78.25	15.24	13458.24	16485.66
Cauliflower Leaves ( <i>Brassica Oleraceabotrytis</i> )	620.62	6504.62	37.78	234.12	45.12	12.54	2425.24	2737.33
Musteredseed Leaves ( <i>Brassica Gulcea</i> )	150.62	1372.18	16.99	88.27	35.21	08.61	2684.24	2831.66
Bathua Leaves ( <i>Chenopodium album Linn</i> )	151.82	1145.22	5.54	99.21	34.34	08.34	1780.21	2454.23
Beetroot Leaves ( <i>Bata Vulgaris</i> )	370.70	3731.12	17.10	101.37	68.34	16.31	5984.10	7866.66

**Table 3. Nutritional composition of traditional food products with incorporation of fresh Cauliflower leaves**

Nutrient	Paratha	Bhajiya	Poori	Kachori	Bakarwadi
Moisture (g/100 g)	15.21	34.94	16.93	16.65	17.01
Protein (g/100 g)	11.92	14.46	8.75	13.94	10.72
Fat (g/100 g)	7.61	14.11	10.34	11.49	7.76
Fibre (g/100 g)	2.63	2.31	2.76	1.61	4.59
Carbohydrate (g/100g)	60.37	31.16	58.99	56.31	60.4
Ash (g/100gm)	2.26	2.57	2.23	1.65	1.34
Iron (mg/100 g)	10.43	10.05	9.18	8.92	8.82
Calcium (mg/100 g)	142.42	166.25	125.1	159.75	193.74
Ascorbic Acid (mg/100g)	7.99	8.79	7.56	7.49	7.8
β-Carotene (mg/100 g)	423.00	457.31	393.07	552.76	481.87

**Table 4. Nutritional composition of traditional food products with incorporation of dry Cauliflower leaves**

Nutrient	Shev	Chakali	Kaharapara	Papad	Boondi
Moisture (g/100 g)	10.32	12.19	5.16	8.35	10.07
Protein (g/100 g)	20.95	12.52	12.12	14.23	20.42
Fat (g/100 g)	8.42	8.21	11.24	13.45	8.29
Fibre (g/100 g)	4.96	4.34	3.15	4.09	8.94
Carbohydrate (g/100g)	51.43	59.91	66.59	56.76	48.36
Ash (g/100gm)	3.92	2.83	1.74	3.12	3.92
Iron (mg/100 g)	28.87	28.36	43.57	26.63	28.87
Calcium (mg/100 g)	724.36	708.36	720.10	780.67	724.36
Ascorbic Acid (mg/100g)	3.16	1.88	1.98	2.01	3.16
$\beta$ -Carotene (mg/100 g)	401.02	317.68	297.17	323.93	401.02

The result showed that the protein content ranged from 12.12 to 20.95 gm/100gm, iron, calcium, ascorbic acid and  $\beta$ -carotene ranged from 26.63 to 43.57 mg/100gm, 708.36 to 780.67mg/100gm, 1.88 to 3.16mg/100gm and 297.17 to 401.02 ug/100gm respectively.

### Conclusion

A study was conducted on nutritional composition of uncommon green leafy vegetables. Study showed the among all selected vegetables cauliflower leaves exhibit highest mineral content in fresh and dehydrated form i.e. iron (37.78 and 234.12 mg/100gm) and calcium (620.62 and 6504.62 mg/100gm). Paratha, Bhajiyaa, Poori, Kachori and Bakr wadi were developed by utilizing fresh leaves. However, Shev, Chakali, Kharapara, Papad and Bundi were developed by utilizing dehydrated leaves. The nutrient content of fresh and dehydrated green leafy vegetables products were ranged for protein (8.75 to 14.46gm/100gm) and ( 12.12 to 20.95 gm/100gm), fiber (1.61 to 4.59 gm/100gm) and (3.15 to 8.94 gm/100gm), iron (8.82 to 10.43 mg/100gm) and (26.63 to 43.57 mg/100gm), calcium (125.1 to 193.74 mg/100gm) and (708.36 to 780.67 mg/100gm), ascorbic acid (7.46 to 7.99mg/100gm) and (1.88 to 3.16mg/100gm) and  $\beta$ -carotene (393.07 to 481.87ug/100gm) and (297.17 to 401.02ug/100gm) respectively. From the findings of present investigation, it may be concluded that selected uncommon green leafy vegetables are good source of macro and micro nutrients. They are good source of iron, calcium, ascorbic acid,  $\beta$ -carotene. It can be recommended that regular consumption of these uncommon green leafy vegetables can be helpful for nutritional requirement to overcome the micro nutrient malnutrition at household's level with minimum cost. Cauliflower leaves which are normally wasted can be used as a valuable source of micronutrient like, iron, calcium. The result of the study shows that micronutrient deficiency can be prevented if Cauliflower leaves are used in dietaries.

### REFERENCES

- A.O.A.C. 1975. Official methods of analysis. Association of Official analytical chemist., 14<sup>th</sup> Edn. Washington, DC. 95, pp.61 - 133.
- Awogbemi, Omojola and Ogunleye, I. Olusola 2001. Effects of drying on the qualities of some selected vegetables," IACSIT International Journal of Engineering and Technology Vol.1, No.5, ISSN: 1793-8236.
- Griventti, L. E. and Ogle Britta, M. 2000. Value of traditional foods in meeting macro and micronutrient needs: the wild plant connection. Natl. Res. Rev. 13:31-46.
- Kagale, L. and Sable, A. 2014. Nutritional composition and antioxidant potential of coastal, wild leafy vegetables from Ratnagiri District of Maharashtra. World Journal of Pharmacy and pharmaceutical Sciences. 3(10):890-897.
- Mahbub, A., N. Jahan, T. Muslim and M. A. Rahman, 2010. Investigation of some constituents of two plants (*Alternanthera philoxeroides* and *Alternanthera sessilis*) of Amaranthaceae family. Dhaka University J. Sci. 58 (2), 327-328.
- Ogle B., M., Ho T. T., Hoang N. D. and Nguyen N. X. 2003. Food, feed or medicine: The multiple functions of edible wild plants in Vietnam, Econ. Bot. 571:103-117.
- Oguntona, T. and Oguntona, C. R. B. 1985. Proximate Composition of three leafy vegetables Commonly in North-eastern Nigeria, M.Sc (Biochemistry) Thesis, University of Ibadan, Nigeria. 1985 (Unpublished).
- Singh, H. B. and Arora, R. K. 1978. Wild edible plants of India 1<sup>st</sup> ed. ICMR publication, New Delhi.88.

\*\*\*\*\*