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Research Paper

Nutrient analysis of selected home garden vegetable species

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■ **ABSTRACT :** Thirteen species of vegetable namely, bottle gourd, field bean, french bean, chilli, tomato, brinjal, *Poi*, *Bathua*, mint, *Palak*, *Kalmi*, coriander and lettuce were evaluated for their nutrient contents. Among different leafy vegetables analysed, highest iron, Ca and ascorbic acid was observed in mint, *Poi* and coriander leaves, respectively, whereas, with regards to other vegetables maximum Fe, Ca and vitamin C was recorded in tomato, bottle gourd and french beans as well as chilli, respectively.

■ **KEY WORDS :** Leafy vegetables, Other vegetables, Home garden

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Though the 'green revolution' contributed greatly to the reduction of hunger in India, still over thirty five per cent of Indian population is below poverty line. The country struggles with food insecurity, poverty and a very high incidence of malnutrition. Micronutrient deficiencies commonly referred as 'hidden hunger' affect the lives and health of a large number of people.

Jharkhand, a newly created state of the country is largely inhabited by persons belonging to scheduled tribes and scheduled castes forming about 40 per cent of total population. Above 80 per cent of its population is rural and subsistence farming is their way of life. These tribals are desperately poor, backward, malnourished, generally uneducated and lead a hard and miserable life. As the result of poverty, the intake of various essential constituents of food is inadequate among tribals. Studies has revealed pathetic situation with regard to micronutrient deficiencies among tribal communities (DGHS, 1996;NFHS II, 2002).

Vegetables constitute indispensable part of human diet in India and help combat malnutrition and diversify diets. Dietary diversification balances the diet by enhancing the supply of essential micro-nutrients leading to improved health, enhanced thinking ability and increased efficiency. High intake of vegetables makes an important contribution to prevent chronic non – communicable diseases. Despite the high importance of vegetables, the per capita consumption of vegetables in India is low compared with the recommended 300g/day. The fight against malnutrition continues to be a basic goal of development and a variety of strategies are being applied. Strategies based on nutrient rich foods like vegetables are considered essential (Susane, 1996). 'Home gardening' remains one of the easiest way of ensuring access to a healthy diet that contains adequate vitamins, macro and micro – nutrients by producing diverse kinds of vegetables. Keeping this in view, a home garden model was developed and set up at farmer's field under one collaborative Project which was implemented in Ranchi and Khunti districts of Jharkhand during year 2008- 2009. With a view to contribute to the existing knowledge on nutritional profile of vegetables raised at home garden, an attempt was made to assess the nutrient content of thirteen species of vegetables introduced to selected site of Jharkhand through home garden.

■ RESEARCH METHODS

Collection of samples:

Thirteen species of vegetable namely, were procured randomly three times from home gardens raised at adopted villages. The details of each plant species in respect of their local names, scientific names and cultivars are elaborated in Table 1.

Preparation of samples:

Three samples of each vegetable were dried in hot air oven at 60^0C till constant weight was obtained. They were pooled, ground and kept in air tight container at 5^0C for further chemical analysis.

Chemical analysis :

Samples were analysed for moisture, crude protein, fat, crude fibre and ash by standard methods (AOAC, 1990). The samples were wet digested in a diacid mixture of nitric acid: percloric acid (5:1, v/v). Calcium in the digested sample was determined by the titration method of Vogel (1962). Iron in acid digested sample was determined by the atomic absorption spectrophotometer according to the method of Lindsey and Norwell (1969). Ascorbic acid of fresh sample was determined by 2, 6 diclorophenolinophenol titration method (Ranganna, 1986). All the analysis were done in triplicate.

Statistical analysis :

The data were statistically analysed for analysis of variance to know the significant difference among various treatments (Panse and Suktame 1961).

■ RESEARCH FINDINGS AND DISCUSSION

The chemical composition of leafy and other vegetables are given in Table 2 and Table 3, respectively.

Leafy vegetables :

Moisture content of leafy vegetables analysed ranged

Table 1 : Details of selected vegetable species

Sr.No.	Name of the vegetables	Local name	Scientific name	Name of the variety
1.	*Poi*	Mayalu	*Basella rubra*	RCSA line
2.	*Bathua*	Bathua	*Chehopodium album*	HARP line
3.	Mint	Pudina	*Mentha spicata*	local
4.	Spinach	Palak	*Spinacia oleracea*	All green
5.	Ipomoea	Kalmi	*Ipomoea reptans*	RCSA line
6.	Coriander	Dhania	*Coriandrum sativum*	Super midori
7.	Lettuce	Salad	*Lactuca sativa*	RCSA line
8.	Bottle gourd	Kaddu	*Lagenaria vulgeris*	Arka bahar
9.	Field beans	Sem	*Dolichos lablab*	Royal doli
10	French beans	Frasbean	*phaselus vulgaris*	Arka anamika
11.	Chill	Mirch	*Capsicum annuum*	Pusa Jwala
12.	Tomato	Tamatar	*Lycopersicon esculentum*	Swarn lalima
13.	Brinjal(round)	Bangen	*Solanum melongena*	Swarna shyamali
	Brinjal (oblong)	do	do	Swarna prathibha

Table 2: Chemical composition of leafy vegetables (on dry weight basis)

Sr. No.	Nome of the vegetable	Moisture (%)*	Protein (%)	Fat (%)	Fibre (%)	Ash (%)	Iron (mg/100g)	Calcium (mg/100g)	Ascorbic acid (mg/100g)*
1.	*Poi*	87. 36 ± 0.55	26.33±0.441	4.63 ± 0.12	.33 ± 0.66	16.06 ± 0.06	80.000 ± 1.15	2471.00 ±66.99	84.667 ± 2.6
2.	*Bathua*	84.38 ± 0.11	38.00 ± 0.2	5.06 ± 0.24	8.66 ± 0.33	25.20 ± 0.20	25.30 ± 1.10	2003.93±57.79	26.667 ± 0.333
3.	Mint	82.46 ± 0.06	35.91 ± 0.21	4.76 ± 0.03	10.56 ± 0.34	15.60 ± 0.1	86.633 ± 1.17	801.60 ± 0.00	25.667 ± 0.33
4.	Spinach	90.40 ± 0.058	28.56 ± 0.29	5.53 ±0.06	08.00 ± 0.00	25.46 ± 0.37	20.600 ± 0.61	1469.60± 33.40	32.000 ± 1.15
5.	*Kalmi*	80.76 ± 0.28	22.47± 0.370	5.06 ± 0.14	08.33 ± 0.33	10.20 ± 0.11	38.757 ± 0.48	1402.53 ±57.85	30.667 ± 0.66
6.	Coriander	85.16 ± 0.14	28.19 ± 0.24	5.63 ± 0.03	7.66 ± 0. 33	13.86 ± 0.35	13.337 ±1.37	1035.40 ± 33.4	165.000 ± 0.57
7.	Lettuce	92.06 ± 0.28	29.917±0.22	2.96 ± 0.12	13.50 ± 0.26	17.50 ± 0.20	55.600 ± 0.45	668.00 ± 33.40	41.333 ± 0.6
	C.D.	0.829	0.93	0.47	1.13	0.71	2.98	139.49	3.64

*On fresh weight basis

Table 3 : Chemical composition of other vegetables (on dry weight basis)

Sr. No.	Name of the vegetable	Moisture (%) *	Protein (%)	Fat (%)	Fibre (%)	Ash (%)	Iron (mg/100g)	Calcium (mg/100g)	Ascorbic acid (mg/100g)*
1.	Bottle gourd	94.60 ± 0.05	19.54 ± 0.34	3.93 ± 0.18	15.00 ± 0.28	6.66 ± 0.67	12.18± 0.26	734.80± 33.40	nil
2.	Field bean	85.25 ± 0.08	32.84 ± 0.04	3.26 ± 0.08	12.16 ± 0.08	5.86 ± 0.17	12.28± 0.19	601.00 ± 0.00	7.33± 0.33
3.	French bean	87.18 ± 0.01	30.79 ± 0.51	3.46 ± 0.03	11.66 ± 0.33	9.66 ± 0.06	13.90± 1.95	701.00 ± 0.00	22.00± 0.00
4.	Chilli	84.45 ± 0.22	23.25 ± 0.34	4.53 ± 0.12	18.66 ± 0.33	6.26 ± 0.13	15.07± 0.11	200.40 ± 0.00	100.66±1.76
5.	Tomato	94.70 ± 0.33	22.64 ± 0.03	5.76 ± 0.06	09.33 ± 0.33	9.66 ± 0.29	19.73± 0.53	334.00±33.40	18.66± 0.66
6.	Brinjal(swarnshyamli)	93.06 ± 0.08	20.96 ± 0.18	3.23 ± 0.08	12.50 ± 0.28	8.03 ± 0.08	9.18 ± 0.21	404.20± 33.40	8.68± 0.28
7.	Brinjal (Swarn pratibha)	92.28 ± 0.11	19.75 ± 0.39	2.16 ± 0.20	12.00 ± 0.57	7.46±0.17	8.60 ± 0.23	300.60±0.048	8.21 ± 0.18
	C.D.	0.38	0.96	0.38	1.06	0.49	2.41	66.96	2.25

* On fresh weight basis

from 80.76 ± 0.28 to 92.06 ± 0.28 per cent (Table 1) which is in agreement with those reported by Gopalan *et al*. (2000). Moisture content of each species was different and it was highest in lettuce followed by spinach and *poi*, while others had comparatively lesser composition (Table 2). The values obtained for spinach and *bathua* leaves are in close agreement to the results obtained by Hussain *et al*. (2009), who also reported 90.62 and 84.33 per cent moisture in spinach and *bathua* leaves, respectively. Crude protein was found maximum in *Bathua* leaves and minimum in '*Kalmi*'. However, lower protein content in *bathua* leaves and spinach was reported by Hussain *et al.* (2009), which might be due to differences in agro-climatic and agronomic practices. In addition, a varietal differences may have accounted for the different result. While analyzing the fat content of selected seven leafy vegetable species, the result showed that fat content ranged from 2.96 ± 0.12 to 5.63 ± 0.03 per cent. The crude fibre content of different leafy vegetables analyzed was found maximum in lettuce (13.50 per cent) and minimum in *Poi* (6.33 per cent), where as *Bathua*, spinach, ipomoea leaves and coriander had almost similar crude fibre content. Ash content varied from 10.20 to 25.46 per cent. *Bathua* and spinach had similar ash content, whereas significant difference was observed among other leafy vegetables. Significantly higher iron content was observed in mint followed by *Poi*, lettuce and ipomoea leaves and lowest content was observed in coriander leaves. Calcium content was in the range of 668.00 ± 33.40 to 2471.00 ± 66.99 mg/100g, highest being in *Poi* and lowest being in lettuce. Maximum ascorbic acid was recorded in coriander and minimum was observed in *Bathua* and mint, where as spinach and ipomoea leaves had almost similar ascorbic acid content. The result of present study shows variation as compared to standard values reported by Gopalan *et al*. (2002). The possible governing reasons for disagreement of the present data on different nutrient contents with literature could be the differences in cultivars selected for evaluation, agro-climatic conditions and techniques chosen for analysis.

Other vegetables :

Table 3 summarizes the nutrient content of seven types of other vegetable grown in home gardens developed under project. Moisture content varied from 84.45 ± 0.22 to 94.70 ± 0.33 per cent, being highest in gourd and tomato and lowest in chilli. Crude protein content was found in the range of 19.54 ± 0.34 to 32.84 ± 0.04 per cent. Excepting bottle gourd and brinjal, other vegetables differed significantly from each other in protein content. Fat content of other vegetables analysed was recorded minimum (2.16 per cent) in Swarna prathitha cultivar of brinjal and maximum (5.76 per cent) in tomato. Fibre content ranged from 9.33 (tomato) to 18.66 per cent (chilli) whereas, field bean, French bean and both cultivars of brinjal had almost similar content of fibre. Maximum ash content was observed in tomato and French bean, whereas, minimum was observed in field bean. Highest iron content was observed in tomato (19.73mg/100g) followed by chilli(15.07mg/100g), where as bottle gourd, field bean and French bean had almost similar content of iron. Calcium content varied from 200.40 ± 0.00(chilli) to 334.80 ±33.40/100 g (bottle gourd). Highest vitamin C was observed in chilli followed by French beans and tomato. Nil vit C was observed in bottle gourd which was in line with those of Gopalan *et al*. (2002). The vitamin C content of both cultivars of brinjal analysed was between 8.21 to 8.68 mg/100g against the standard value of 12 mg/100g as reported by Gopalan *et al*.(2002) which might be due to difference in variety and agro-climate condition. Dietary guidence aimed at increasing consumption of vegetables has had limited success and Indian continues to fall short of daily goals for total vegetable intake as well as for the majority of vegetable subgroup recommendations. A new approach may be needed to help improve vegetable intake. The present analysis compares the nutrient content of commonly consumed 13 spices of vegetables in India to identify the vegetables among those that provide the most key nutrients in the greatest amounts. This study will enable the individuals to choose the vegetables that provide the most nutrients and will be particularly useful for those who find it difficult to increase their vegetable intake, subsequently nutrient rich vegetables for those with fewer nutrients.

Conclusion :

It may be concluded that all selected vegetables contained appreciable amounts of nutrients and being high in fibre, calcium, iron and vitamin C has potential to alleviate micronutrient malnutrition through dietary diversification and value addition to products of specific dietary importance.

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