

Original Research Article

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Nutritional Analysis of Few Selected Wild Edible Leafy Vegetables of Tribal of Jharkhand, India

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ABSTRACT

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The nutritional potential of nine edible plants of tribal of Jharkhand was evaluated by determining proximate composition and micronutrient content. The result showed significance of wild leafy vegetable species as important source of nutrient for rural tribal. Protein content of different wild species ranged from 19.03 ± 0.26 to 31.16 ± 0.20 percent. The crude fiber content was found highest in *Polygonum plebijum*, while highest ash content was observed in *Portulaca oleracea*. Among micronutrient content, iron content ranged between $11.88 \pm$ to 397.66 mg/100g with highest content in *Trianthema monogyna*. The calcium content ranged between 441.62 ± 12.70 to 4200 ± 5.77 mg/100g, with highest content was observed in *Sesbania grandiflora* followed by *cassia tora*. The nutritional value of many wild species compared well with selected cultivated species namely amaranthus, spinach and fenugreek leaves in terms of protein, carbohydrate and fat and found superior in terms of crude fiber, mineral, calcium, iron and vitamin c content.

Introduction

Jharkhand is one of the eastern states, where bulk of tribal lives constituting about 28% of the tribal population. Majority of tribal population of the state lives in forest ecosystem and has its own socio-cultural pattern, traditions and typical food practices. They subsist on limited agriculture and local products of plant and animal origin. Vegetables eaten are mainly of leafy variety, which grow as wild weeds¹. It has become their habit and till date, these edible plants are integral part of their diet. These are consumed more routinely as dominant source of leafy vegetables particularly in rainy and summer

season, when the vegetables are in short supply; people collect various species of wild edible plants from their agricultural and non agricultural fields to supplement their staple food¹. The range of these types of foods used by the tribal varies from locality to locality depending on the availability of resources. These edible wild foods play a significant role in the food and nutritional security of rural poor and tribal^{2,3}. Nutritional value of these unconventional greens is precisely not known and need to be investigated to grade them according to their importance for wider use as they have remained confined due to lack of scientific knowledge and awareness. Nutritive value of commonly consumed leafy

vegetables has been studied extensively but there is very loss information available on nutritive value of these unconventional leafy vegetables of regional importance^{4, 5}. Keeping this in view, an investigation was carried out to assess the nutrient composition of few selected species of wild leafy vegetables of tribal.

Materials and Methods

Collection of samples: Nine species of unconventional green leafy vegetables that are consumed widely in rural areas of Jharkhand were selected and collected from local market in a bulk. A general account of the selected vegetables is presented in table 1. The samples of three popular cultivated vegetables namely *Amaranthus gangeticus*, fenugreek leaves (*Trigonella foenum-graecum*) and spinach (*Spinacia oleracea*) were also collected from local market for analysis and comparison.

Preparation of sample: leaves were sorted to remove foreign substances as well as thoroughly washed in water 2-3 times to remove the adhering dust and impurities and were dried in hot air oven at 60⁰C till constant weight was obtained. They were ground and kept in air tight container at 5⁰C for further chemical analysis.

Chemical analysis

Samples were analysed for moisture, crude protein, fat, crude fibre, and ash by standard methods⁶. Carbohydrate content was determined by subtracting total sum of ash, crude fiber, crude fat and protein from 100. The samples were wet digested in a diacid mixture of nitric acid and perchloric acid (5:1, V/V). Calcium and iron in the digested sample was determined by the atomic absorption spectrophotometer⁷. Ascorbic acid of fresh sample was determined by 2,6 dichlorophenolinophenol titration

method⁸. All the analysis was done in triplicate.

Statistical analysis

The data were statistically analysed for analysis of variance to know the significant difference among various species⁹.

Results and Discussion

The macro and micronutrient content of selected vegetables are given in table 2 and table 3, respectively. An attempt was made to compare the nutritional content of wild species with three most popular commonly consumed leafy vegetables. Moisture content of wild leafy vegetables analysed ranged from 73.10±0.20 to 92.43±0.27 percent, while that of cultivated species ranged from 86.2±0.06 to 92.1±0.20 percent. Crude protein of selected nine wild species of leafy vegetables ranged from 19.03±0.26 to 31.16±0.20 percent. Crude protein content of *Amaranthus gangeticus*, Fenugreek leaves and spinach was recorded as 25.33±0.08, 28±0.17 and 22.56±0.17 percent, respectively. While analysing the fat content of selected nine wild leafy vegetables, the result showed that *Marsilea minuta* (5.53±0.22%) had highest fat content followed by *Sesbania grandiflora* (5.23±0.14%), *Polygonum plebijum* (4.42±0.14%), *Trianthema monogyna* (4.13±0.18%) while least fat content was observed in *Cassia tora* (0.91±0.05) followed by *Celosia argentea* (1.21±0.072%), *Alternanthera sessilis* (1.89±0.067%) and *Bauhinia purpurea* (1.90±0.032%). Fat content of selected cultivated counterparts ranged from 2.26±0.145 to 7.66±0.16 percent. Ash content of selected nine wild species ranged from 7.59 to 31.82 percent. Crude fibre content was found to be maximum (12.56±0.23 %) in *Polygonum plebijum* followed by *Celosia argentea* (10.08±0.09%), *Portulaca oleracea* (9.46 ±0.15%),

Trianthema monogyna (9.13±0.18 %), *Bauhinia purpurea* (8.73±0.16%), *Sesbania grandiflora* (8.19±0.11%), *Marsilea minuta* (7.33±0.24%), *Cassia toria* (7.25±0.32%), and *Alternanthera sessilis* (6.99±0.25%). Carbohydrate content of selected wild vegetables were found in the range of 31.53±0.29 (*Portulaca oleracea*) to 58.5±0.28 percent (*Cassia tora*).

Micro-nutrient content of analysed vegetable species are given in table 3. Calcium content was in the range of 441.62±12.7 to 4200±5.77 mg/100g; highest being in *Sesbania grandiflora* and lowest being in *Bauhinia purpurea*. Iron content were in the range of 15.16±0.44 to 397.66±9.38 mg/100g. The Vitamin C content in edible parts of the vegetables is shown in table 3. High concentrations of Vitamin C were present ranging from 25.16±400 (*Sesbania grandiflora*) to 691.6±10.40 mg /100g (*Polygonum plebijum*). The Vitamin C content of selected cultivated species were recorded between 28.50±28 to 99±0.57 mg/100.

Moisture content of each species were different from each other and it was highest in *Portulaca oleracea* followed by *Trianthema monogyna* and *Celosia argentea*, which were also comparable to selected commonly consumed cultivated species while others had comparatively lesser content. The values obtained for *Sesbania grandiflora*, *Polygonum plebijum*, *Bauhinia purpurea* and *Trianthema monogyna* are in close agreement with those reported by earlier investigator¹⁰.

Sesbania grandiflora followed by *Bauhinia purpurea* showed highest protein content among all nine species as well as the selected cultivated counterparts. *Polygonum plebijum*, *Cassia tora* and *Trianthema monogyna* exhibited relatively lesser protein content where as *Marsilea minuta*, *Portulaca oleracea* *Celosia argentea* and *Alternanthera sessilis* exhibited comparable protein content as compared to spinach. Except *Marsilea minuta*, *Sesbania grandiflora*, *Polygonum plebijum*, *Trianthema monogyna*, other wild species were found to have lower fat content as compared to selected cultivated species.

Table.1 General account of wild edible leafy vegetables selected for nutrient analysis

Sl.no.	Species	Local Name	Habit	Season of availability
1.	<i>Sesbania grandiflora</i> Pers.	Agasti	Tree	Summer
2.	<i>Cassia tora</i> Linn.	Chakor	Shurb	Rainy
3.	<i>Polygonum plebijum</i> R.Br.	Chimati sag	Herb	Winter
4.	<i>Bauhinia purpurea</i> Linn.	Koinar	Treo	Summer
5.	<i>Marsilea minuta</i> Linn.	Sunsunia	Herb	Rainy
6.	<i>Portulaca oleracea</i> Linn.	Golgala	Herb	Rainy
7.	<i>Celosia argentea</i> Linn.	Lahenga	Herb	Rainy
8.	<i>Trianthema monogyna</i> , Linn.	Khapra	Herb	Rainy
9.	<i>Alternanthera sessilis</i> Br.	Saronchi	Herb	Rainy

Table.2 Proximate composition of few selected wild leafy vegetables (g/100g, on dry wt. basis)

Sl.no	Name	Moisture	Protein	Fat	Ash	Fibre	Carbohydrate
1.	<i>Sesbania grandiflora</i>	73.10±0.20	31.16±0.20	5.23±0.14	11.50±0.173	8.19±0.11	43.50±0.28
2.	<i>Cassia tora</i>	77.62±0.47	20.25±0.29	0.91±0.05	13.44±0.03	7.25±0.32	58.5±0.28
3.	<i>Polygonum plebijum</i>	83.23±0.14	19.03±0.26	4.42±0.14	23.33±0.45	12.56±0.23	44.30±0.35
4.	<i>Bauhinia purpurea</i>	77.08±0.01	29.40±0.05	1.90±0.032	7.59±0.043	8.73±0.162	47.43±0.29
5.	<i>Marsilea minuta</i>	83.4±0.27	24.90±0.88	5.53±0.225	10.43±0.13	7.33±0.24	57.50±0.28
6.	<i>Portulaca oleracea</i>	92.43 ±0.27	23.83±0.27	3.05±0.130	31.82±0.13	9.46±0.154	31.53±0.29
7.	<i>Celosia argentea</i>	90.11±0.05	22.67±0.52	1.21±0.072	20.82±0.17	10.08±0.091	45.50±0.25
8.	<i>Trianthema monogyna</i>	91.20±0.20	21.06±0.18	4.133±0.186	22.167±0.167	9.13±0.186	56.4±0.27
9.	<i>Alternanthera sessilis</i>	80.06±0.14	27.11±0.032	1.89±0.067	21.140±0.193	6.99±0.253	42.63±0.27
10.	<i>Amaranthus gangeticus</i>	86.2 ±0.06	25.33±0.088	2.26±0.145	16.90±0.208	6.26±0.14	49.41±0.30
11.	<i>Trigonella foenum-graecum</i>	86.36 ±0.08	28.76±0.17	5.60±0.20	9.10±0.55	7.30±0.11	49.30±0.35
12.	<i>Spinach oleracea</i>	92.1±0.208	22.56±0.176	7.66±0.16	19.23±0.14	6.56±0.14	43.70±0.15
CD		0.61	1.01	0.42	0.69	0.56	0.54

Values are mean ± SE

Table.3 Micronutrient content of few selected wild leafy vegetables (on dry weight basis)

Sl.no	Name	Calcium (mg/100g)	Iron (mg/100g)	Vitamin C* (mg/100g)
1.	<i>Sesbania grandiflora</i>	4200 ± 5.77	15.167 ± 0.441	25.16 ± 4.00
2.	Cassia tora	3590.5 ± 66.89	45.83 ± 0.381	76.54 ± 2.57
3.	<i>Polygonum plebijum</i>	1153.33 ± 14.33	0.00 ± 0.0	259.33 ± 1.86
4.	<i>Bauhinia purpurea</i>	441.62 ± 12.707	59.127 ± 0.33	181.9 ± 1.47
5.	<i>Marsilea minuta</i>	501.0 ± 0.06	57.52 ± 0.571	69.06 ± 0.009
6.	<i>Portulaca oleracea</i>	1135.6 ± 33.40	115.87 ± 2.996	35.78 ± 1.037
7.	Celosia argenta	23.03.06	155.71 ± 2.996	48.20 ± 2.57
8.	<i>Trianthema monogyna</i>	1030 ± 1.54	397.667 ± 9.383	70.16 ± 0.16
9.	<i>Alternanthera sessilis</i>	20.16.03 ± 19.45	151.72 ± 9.383	691.6 ± 10.400
10.	<i>Amaranthus gangeticus</i>	2493.33 ± 6.66	21.76 ± 0.145	99.00 ± 0.57
11.	<i>Trigonella foenum-graecum</i>	3550.0 ± 5.77	12.63 S± 0.081	52.13 ± 0.24
12.	<i>Spinach oleracea</i>	836.66 ± 3.33	13.00 ± 0.15	28.50 ± 0.289
	CD	73.06	9.61	9.66

Values are mean ± SE

* Values are on fresh weight basis

Though *Marsilea minuta*, *Sesbania grandiflora*, *Polygonum plebijum* and *Trianthema monogyna* exhibited higher fat content yet it was lower than Spinach. Among all selected twelve species highest fibre content was observed in *Polygonum plebijum* followed by *Celosia argentea*, *Portulaca oleracea* and *Trianthema monogyna*. As compared to selected cultivated species *Portulaca oleracea* followed by *Polygonum plebijum*, *Trianthema monogyna* and *Alternanthera sessilis*, *Celosia argentea* were found superior with respect to ash content while others except *Bahuhinia purpurea* were found comparable. Wild species were found superior in terms of crude fibre content as compared to selected cultivated counterparts. As compared to cultivated species, higher carbohydrate content was found in *Cassia tora*, *Marsilea minuta* and *Trianthema monogyna* while *Polygonum pleijum*, *Bauhinia purpurea*, *Celosia argentea* were found superior as compared to spinach.

Sesbania grandiflora exhibited highest calcium content among all twelve species. Among cultivated species highest calcium content was observed in Fenugreek leaves and cassia tora recorded similar calcium content, while *Polygonum plebijum*, *Portulaca oleracea*, *Celosia argentea*, *Trianthema monogyna*, *Alternanthera sessilis* were found superior over spinach. Highest iron content was recorded in *Trianthema monogyna* followed by *Celosia argentea*, *Alternanthera sessilis* and *Portulaca oleracea*. All wild species were found superior in terms of iron content. Similar trend in the micronutrient composition of some uncommon greens has been reported by earlier workers^{11,5}. Except *Sesbania grandiflora*, all selected unconventional leafy vegetables exhibited higher content of Vitamin C while Vitamin C content of *Sesbania grandiflora* was comparable to spinach. The finding of this

study is close agreement with earlier worker¹², who also reported that nutritional value and mineral content of wild edible plants were richer than that of commercial vegetables.

In conclusion, the result highlighted significance of wild vegetable species as cheap sources of nutrient for rural tribal. The food value of many wild vegetables compared well with dominate popular leafy vegetables namely Amranthus, fenugreek leaves and spinach in terms of protein, Carbohydrate and fat. All wild species were found superior in respect of fibre. Mineral content was also found in much higher amount in five species where as rest species were found superior over fenugreek leaves. The comparison also revealed that majority of wild species was better in terms of calcium, iron and Vitamin C content.

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