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Proximate composition of some underutilized edible wild plants mainly consumed by Munda tribe of Jharkhand

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Abstract-Underutilized edible wild herbaceous plants mainly consumed by Munda tribes of Jharkhand namely *Senna tora*, *Commelina benghalensis*, *Alternanthera paronychioides* were analyzed for their proximate composition. Proximate composition was determined by using standard methods of Association of Official Analytical Chemists (AOAC). The result showed that proximate composition of the selected wild edibles ranged between; moisture (9.56±0.2 - 11.15±0.13%), ash content (9.82±0.12 - 11.56±0.14%), crude protein (6.12±0.11 - 6.52±0.18%), crude fiber (4.78±0.1 - 6.15±0.2%), fat (1.16±0.08 - 1.91±0.11%), carbohydrate (69.33±0.58 - 73.06±0.76%), caloric value (317.1±0.61 - 328.38±1.2 kcal/100g). The varied proportion of nutrient is found in this wild edibles which helps to obtain a scientific data baseline for their wider acceptance as additional, nutritional supplementary source of food.

Key words: Underutilized edible wild, Proximate composition, Munda tribe, Jharkhand

INTRODUCTION

Jharkhand (The land of forest) is primarily known as tribal state with total tribal population of 70,89,068 which is about 28% of state population. There are 32 tribal communities inhabiting here in which Munda, Oraon, Ho, Ashur are in majority. In Jharkhand most of the rural inhabitants depend on wild edible plants to meet their additional food requirements. The wild edible plants have traditionally occupied an important position in the socio-cultural, spiritual and health arena of rural and tribal lives in Jharkhand.

The wild plants from forest provides many essential nutrients which helps to improve both the physical and mental well-being of rural people. In developing countries,

the wild plants have been a main source of food and medicine for tribal people. It is estimated that 80% of the forest dwellers depend on forests for 25-50% of their annual food requirements.¹ They are inexpensive, easy to cook and rich sources of macro and micro nutrients.^{2,3}

Proximate and nutritional analysis of edible fruit and vegetables play a crucial role in assessing their nutritional significance.⁴ Since the selected wild edible herbaceous plants are underutilized, information on their nutritional and medicinal properties are lacking. As there are not many published studies on nutritional and chemical composition of these wild edible varieties, so there is need to initiate the awareness for its wider acceptability among mass urban population. In this research work underutilized edible wild herbaceous plants used by Munda tribe namely *Senna tora*, *Commelina benghalensis* and *Alternanthera*

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paronychioides were analyzed for proximate composition using standard AOAC method.

MATERIALS & METHODS

Sample collection and preparation:

Four underutilized edible wild herbaceous plants used by Munda tribe namely *Senna tora*, *Commelina benghalensis* and *Alternanthera paronychioides* were collected from different localities of Ranchi (Jharkhand).

After collection, the leaves were removed from the branches and were sorted out to get the healthy and disease free edible parts. The leaves were washed properly and dried them under shade at $25 \pm 2^\circ\text{C}$ so as to prevent the decomposition of chemical compounds present in them. The dried plant sample were powdered by just crushing them, sieved through 2 mm mesh sieve and stored in air tight container at room temperature for further investigation.

Methods

Nutritional composition of these dried leafy plant samples were analyzed by using standard method of Indian Standard and Association of Official Analytical Chemists (AOAC)⁵ methods. The moisture content was determined by oven dehydration at 103°C for 6 hours. The ash content of the sample was determined by keeping the sample in silica crucible dish and ignited them in muffle furnace at $525 \pm 25^\circ\text{C}$ until greyish white ash results, then it is cooled in a desiccators and weighed the incinerated residue, according to Association of Official Analytical Chemists (AOAC)⁵ method. The total protein content was estimated by Micro-Kjeldahl method.⁵

Crude fat or oil were extracted by Soxhlet extraction with petroleum ether for 16h.⁵ Crude fibre were determined by acid- base digestion method.⁶ Total carbohydrate content was estimated by difference method as described by James (1995)⁷. Add moisture, fat, protein and ash content and deduct the value from 100 to get carbohydrate content by difference. Caloric value (Kcal/100g) were estimated by using the method described by FAO (2003)⁸ i.e., $\{4 \times (\% \text{ of protein})\} + \{9 \times (\% \text{ of fat})\} + \{4 \times (\% \text{ of carbohydrate})\}$.

RESULT & DISCUSSION

Some selected species of underutilized edible wild plant showed variant proportions of proximate composition as mentioned in the Table 1.

Moisture Content

Moisture in vegetables is a good source of water and is necessary as it is considered that around 20% of the total water consumption must come from food moisture.⁹ On dry basis the moisture content of the underutilized edible wild species *Senna tora*, *Commelina benghalensis* and *Alternanthera paronychioides* were 9.56 %, 10.29 % and 11.18 % respectively. The value of moisture content was comparable to other commonly cultivated species such as *Spinacia oleracea*, *Coriandrum sativum* and *Brassica oleraceae* were 14.51 %, 10.49 % and 24.00 % respectively.¹⁰

Ash Content

From the biochemical point of view, ash content plays an important role as it contains important nutritional elements mainly minerals which is helpful in the physiological function of the body. The ash content of the underutilized edible wild herbaceous species *Senna tora*, *Commelina benghalensis* and *Alternanthera paronychioides* were 8.82%, 13.85% and 16.84 % respectively. The ash value were more or less same, compared with the commonly cultivated species such as *Spinacia oleracea*, *Coriandrum sativum* and *Brassica oleraceae* were 22.50 %, 20.07% & 8.21% respectively.¹⁰

Crude Fat Content

Fats are a type of lipids which is stored in the adipose tissue and under the skin of animals. It is mainly used as an energy storage molecule in the body as 1 gram fat gives 9 Kcal energy. The fat content of the selected edible wild species *Senna tora*, *Commelina benghalensis* and *Alternanthera paronychioides* were 1.18%, 1.93% and 1.18% respectively. The crude fat content of the selected wild species were lower as compared to 7.12% in *Spinacia oleraceae*¹¹ and are same when compared with other wild edibles like *Ipomoea aquatica* (1.2%), *Lippia alba* (1.39%), *Cayratia trifolia* (1.61%)¹². Due to the general low level of crude fat in vegetable leaves and its high level of total unsaturated fatty acid, their consumption in large amount would be beneficial to individual suffering from overweight or obesity and this would constitute a good dietary habits.

Crude Fibre Content

Fibre is the indigestible part of plant food which is important for our digestive health. It can improve cholesterol and blood sugar level and helps in preventing

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some diseases such as diabetes, heart diseases and colorectal cancer. Crude fibre content of the underutilized edible wild herbaceous species *Senna tora*, *Commelina benghalensis* and *Alternanthera paronychioides* were 4.78%, 5.71% and 6.18% respectively. Fiber content was lower compared to *Spinacia oleracea*, *Coriandrum sativum* and *Brassica oleraceae* which were 22.50 %, 20.07%, and 8.21% respectively.¹⁰

Crude Protein Content

Crude protein content of the selected underutilized edible wild species *Senna tora*, *Commelina benghalensis* and *Alternanthera paronychioides* were 6.38 %, 6.57 % and 6.12 % respectively. The value obtained was lower than the value of the commonly cultivated species such as *Spinacia oleracea*, *Coriandrum sativum* and *Brassica oleraceae* were 17.29 %, 18.36 % & 9.59 % respectively.¹⁰ However, the protein content of these edible wild species was higher compared to other wild edibles like, 2.11 % in *Amaranthus viridus*, 2.98 % in *Chenopodium murale* leaves and 2.76 % in *Nasturtium officinale*.¹³

Total Carbohydrate Content

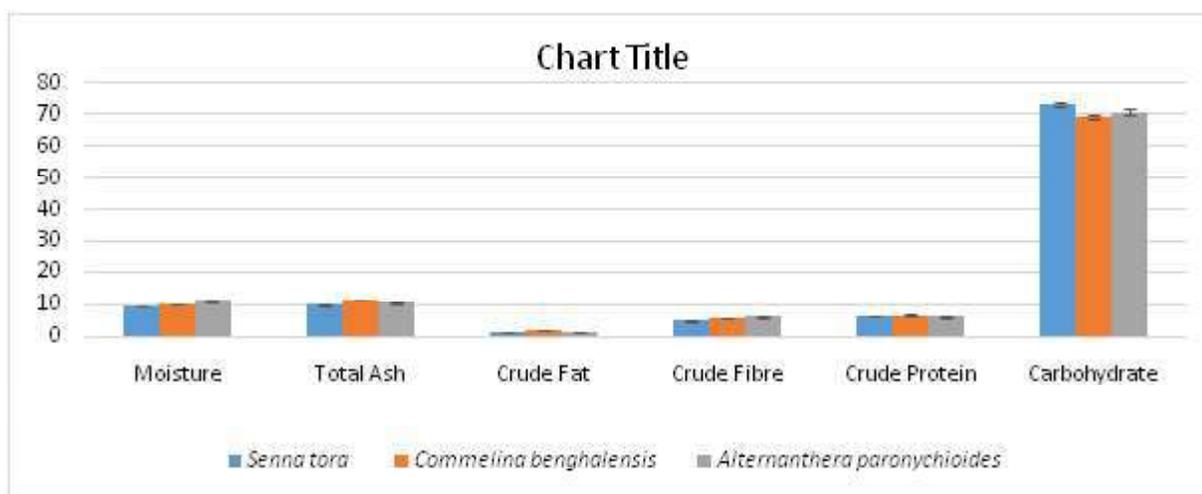
Carbohydrate is the primary source of energy in the body. The 1 g of carbohydrates yield 4 kcal energy. The carbohydrate content of the selected underutilized edible wild species *Senna tora*, *Commelina benghalensis* and *Alternanthera paronychioides* were 74.06 %, 67.37 % and 64.68 % respectively. It was higher compared to other commonly cultivated species such as *Spinacia oleracea* (44.56 %), 49.64 % in *Coriandrum sativum* and 56.18 % in *Brassica oleraceae*.¹⁰

Energy (Caloric Value) kcal/100g

The overall calculated energy values of the selected edible wild species *Senna tora*, *Commelina benghalensis* and *Alternanthera paronychioides* were 332.38 kcal/100g, 313.09 kcal/100g and 293.82 kcal/ 100g respectively. These energy values are similar to *Brassica oleracea* i.e. 319.80 kcal/100g¹⁴ and to *Spinacia oleracea* i.e. 306.35 kcal/100g¹¹.

Table 1- Proximate composition of some underutilized edible wild herbaceous plants used by Munda tribe (on dry weight basis)

Sample name	Moisture (%)	Total Ash (%)	Crude fat (%)	Crude fibre (%)	Crude Protein (%)	Carbohydrate (%)	Caloric value (kcal/100g)
<i>Senna tora</i>	9.56±0.2	9.82±0.12	1.18±0.06	4.78±0.1	6.38±0.13	73.06±0.76	328.38±1.2
<i>Commelina benghalensis</i>	10.1±0.19	11.56±0.14	1.91±0.11	5.7±0.18	6.52±0.18	69.33±0.58	320.59±1.4
<i>Alternanthera paronychioides</i>	11.15±0.13	10.84±0.14	1.16±0.08	6.15±0.2	6.12± 0.11	70.61±0.43	317.1±0.61



Graph 1- Graphical representation of proximate composition of some underutilized edible wild herbaceous plants used by Munda tribe (on dry weight basis)

CONCLUSION

These underutilized wild edibles possess significant amount of carbohydrate, protein, dietary fiber and calories and may be recommended as nourishment to people suffering from malnutrition. Therefore, the maintenance of good health, vitality and longevity by the rural tribal may be due to consumption of these nutritious wild edibles.

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