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Nutritional Assessment of Leaves of Wild Edible Plant *Urtica ardence*

Jayanti, Kshitij Agarwal* and Prem Saini

Dev Bhoomi Institute of Pharmacy and Research, Dehradun (U.K)

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Abstract

Considering the growing need to identify alternative bio-nutritional sources, wild edible leaves consumed in forest zone of Uttarakhand, India were evaluated for their nutritive value in order to prioritize edible wild plant suitable for domestication. The result showed significance of wild plant species as important source of nutrient for rural poor people. The nutritional value of leaves of wild plant *Urtica ardence* were evaluated in terms of protein, carbohydrate, fat, fiber content, vitamin content, reducing sugars and minerals. *Urtica ardence* had a significant level of above nutrients and therefore was identified as promising specie for promotion as backyard planting especially farming systems suffering from crop loss, food shortage and chronic malnutrition.

Keywords: *Urtica ardence*; Medicinal Plant; Tropical.

1. Introduction

In many tropical countries, rural people traditionally harvest wide range of leafy vegetables, roots, tubers, fruits from wild because of its taste, cultural uses, as food supplements or to tide over food shortage. Labeled as famine or hunger food, wild plants have been recognized to have potential to meet household food and income security. Many wild fruits notably, Amla, Harida, Bel, Elephant apple have been exploited from wild for centuries across Indian subcontinent on account of its food and medicinal properties. Even today in Mediterranean Europe, gathering of wild fruits is a common practice; so is picking of wild mushroom in northern Europe [1, 7]. Non cereal plant foods from forests contribute significantly to the diets of local residents in Africa. In rural countryside of many developing nations, wild fruits are often the only fruits consumed as people cannot afford cultivated commercial fruits as apple, grapes, pomegranate or orange. In India, the indigenous fruits collected from wild play significant role in the food and nutrient security of rural poor and tribal. Some wild fruits have been identified to have better nutritional value than cultivated fruits [2, 8]. As a result, in recent years, a growing interest has emerged to evaluate various wild edible plants for their nutritional features Inventory of wild food resources, ethno-botanical information on its adaptability coupled with nutritional evaluation can only establish the non cultivated variety as real substitute for domesticated or cultivated species. Scrutiny of plants of various tropical forest areas through constituent analysis may lead to selection of valuable wild species that can be taken through crop improvement and hybridization process to establish it as cultivated variety. Of the estimated 700 species of vascular plants of Uttarakhand state (India), about 150 wild edible fruit species occurring in different parts of eastern India's deciduous forests

***Corresponding Author: Kshitij Agarwal, Dev Bhoomi Institute of Pharmacy and Research, Dehradun (U.K), India. E-Mail Id: tanupharma@gmail.com;**

are consumed in various quantities by rural communities. The wild edible species are gathered mostly for home consumption and mainly by forest dwellers, tribal and marginalized rural communities. Most fruits in India are collected from wild in small quantity for consumption or at time during the festivals. But information on their nutritional and anti nutritional properties are lacking. Since none of the indigenous fruit plants has been brought under farm cultivation yet, detail on their nutritional utility storage ability etc., are not known except its consumption value and taste. Besides, there are many wild fruit relatives in forests that are underexploited, and their economic potential is yet to be tapped. In general information on edibility and therapeutic properties of wild fruits is scanty and data on their nutritional composition is negligible. A wide array of wild plants was collected by forest dwellers; particularly tribal communities in eastern Indian state of Uttarakhand to supplement their food which necessitates scientific investigation of wild fruit plants nutritional and anti-nutritive properties [3,6]. The present study explores the nutritional status of leaves of wild edible plant *Urtica ardence* by profiling their biochemical attributes i.e., protein, carbohydrate, sugars, vitamin, fat and micronutrient.

Material and Methods

Collection of Plant Material

The selected wild edible plant was collected from Forest research institute Dehradun in February 2013. The healthy and disease free edible plant was selected which have fully matured leaves.

Procedure

Estimation of Fat

2gm of moisture free sample was extracted with Petroleum ether (60-80◦C) in Soxhlet apparatus about 6 hour. The residual Petroleum ether was filtered using Whatman filter paper No-40 and filter evaporated in rotavapour [5].

Estimation of Crude Fiber

Extract 2gm of ground material with ether or petroleum ether to remove the fat (initial temp. 35- 38◦c and final 52◦c). After extraction with ether boil 2gm of dried material with 200ml of sulphuric acid for 30 min. with bumping chips. Filter through muslin cloth and wash with boiling water until washing are no longer acidic. Boil with 200ml of sodium hydroxide solution for 30 min. Filter through muslin cloth again and wash with 25ml of boiling 1.25% H2So4, 50ml portion of water and 25ml of alcohol. Remove the residue and transfer to pre weighed dish (W1) .Dry the residue for 2 hrs. at 130± 2◦c, cool the dish in the desicator and weight (W2). Ignite for 30 min. at600± 15◦c. Cool in a desicator and reweigh (W3).[9]

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Total Carbohydrates

Carbohydrates are first hydrolyzed in to simple sugar using dilute hydrochloric acid .in hot acidic medium glucose is dehydrated to Hydroxymethy furfural .This compound forms green color product with Anthrone reagent at 630nm. Weight 100mg of the sample into a boiling tube. Hydrolyzed by keeping it in boiling water bath for 3 hours with 5ml of 2-5N Hcl and cool it at room temperature It was neutralize with solid Na_2CO_3 until the effervescent produced. Make up the volume to100ml passing through sodium sulphate anhydrous into a 200 ml of volumetric and centrifuge. Collect the supernatant and take 0.5 And 1ml of the working standard. Make up the volume to 1ml in all the tube including sample tube by adding distilled water then add 4ml of Anthrone reagent. Heat for eight minute in a boiling water bath. Cool rapidly and read the green to dark green color at 630nm. Draw a standard graph by plotting concentration of the standard on the X axis vs. absorbance on the Y axis. From the graph calculated the amount of carbohydrates present in the sample tube [11].

Reducing Sugar

3ml DNS reagent (Di nitro salicylic acid) in a tightly closed test tube with 3ml of sample mixed it and heated at 90◦C for 5- 15 min. when the mixture attained the red brown color add 1ml of ROCHELL;S salt for stabilize the color .After cooling in cold water bath absorbance was recorded at 575nm [12].

Total sugar

The TS was estimated using Anthrone's reagent (Rangana, 1979). 1 ml of alcoholic extract was taken in a test tube and chilled. After a while 4 ml of Anthrone's reagent was carefully run down the walls of the test tube. The test tubes were thereafter immersed in ice water. The tubes were brought to ambient temperature and boiled in water bath for 10 min. After proper cooling, the absorbance was measured at 625 nm.

Vitamins

Estimation of vitamin A

3gm of sample was taken add 5ml of 50% potassium hydroxide solution and 50ml of ethyl alcohol it was refluxed in water condenser for one hr. add 50 ml of hexane and shaken vigorously for 5 min. resulting in formation of two separate layer . The organic layer was

flask while the aqueous layer was shaken 3times by taking 3o ml hexane each

time. All the organic layer were pooled together and diluted to 200ml with required amount of hexane. The absorbance in UV spectrophotometer at 325nm was recorded contents was calculated [13].

A (IU/100gm of sample= Sample absorbance ×200×1830 ÷ wt.of sample×100

Estimation of Thiamine (Vitamin B) 1

Preparation of Buffer Solution: To 6.8 g of potassium dihydrogen Phosphate, 8 ml of 1 M sodium hydroxide Solution was added and diluted with 1000 ml with water.

Preparation of Dye Solution: To prepare it, 0.06 g Bromothymol blue was dissolved in 100 ml of chloroform.

Preparation of Standard Solution: For this purpose Thiamine hydrochloride RS (100 mg) was dissolved in 100 ml of water.

Working Standard Solution: One ml of stock was diluted with 100 ml of sample buffer for preparation of sample solution. To 10 g of sample powder, 100 ml of buffer was added and filtered through Whatman filter paper.

Procedure: 10 ml of sample solution and working standard solution were taken in two different dry separating funnels. 10 ml of chloroform and 10 ml of dye solution were added to both of the solutions and shaked for 2 minutes continuously. Then, these were allowed to stand for 5 minutes with occasional shaking. The chloroform layer was collected by passing it through Sodium sulphate anhydrous. The readings were taken at 420 nm using Shimadzu UV 118 spectrophotometer (Chloroform was used as blank).

$$\text{Thiamine HCl (mg)/ 100 g of sample} = \frac{SAA \times STW \times 1 \times 10 \times 10 \times 1 \times STP}{STA \times 100 \times 100 \times 1 \times SAW \times 10 \times 10} \times 100 \times 1000$$

SAA- sample absorbance

STA- standard absorbance; SAW- sample weight

STP- standard purity; STW- Standard weight.

Determination of Thiamine

Thiamine (mg) /100 g of sample = Thiamine HCl (mg) / 100 mg of sample =Molecular wt. of thiamine (300.77) ÷ Molecular weight of thiamin Hcl (337.2)[10]

Estimation of Riboflavin (Vitamin B_2)

Procedure

To 5 g of sample powder, 150 ml of water and 5 ml of glacial acetic acid were added. The solution was boiled for 5 minutes and then cooled. After that, 30 ml of 1.0 M sodium hydroxide solution was added and diluted to 550 ml with water. The solution was filtered and absorbance was measured at 444 nm in Shimadzu UV-1201spectrophotometer (water was used as blank).

Vitamin C

Preparation of Metaphosphoric Acetic Acid Solution

(MPAA): To 15 g of metaphosphoric acid, 40 ml of glacial acetic acid was added and diluted with 100 ml of water.

Preparation of 2, 6-Dichlorophenol Indophenol Solution: 2, 6-dichlorophenol indophenols salt (0.05 g)

was diluted With 100 ml of water and the solution was filtered.

Preparation of Standard Solution Stock Solution: To 0.05 g of L-ascorbic acid standard, 20 ml of MPAA solution was added and diluted with 250 ml water.

Preparation of Sample Solution: To 10 g of sample powder, 20 ml of MPAA solution was added and then it was diluted with 500 ml water. Subsequently the solution was filtered through filter paper.

Procedure: To 10 ml of standard stock solution, 5 ml of MPAA solution was added and titrated against 2, 6-Dichloro-phenole indophenol solution till the appearance and persistence of pink color for 10 seconds. The titration was completed within 2 minutes. The titer value was noted. Sample solution (100 ml) was taken and same procedure was repeated.

$$\text{Ascorbic acid (mg)/ 100g of sample} = \frac{\text{SAV x STV x 10 x 500 x 1x STP}}{\text{STV x 250 x 1 x SAW x 100 x 100}} \times 100$$

Where SAV refers to sample titre value; STV refers to standard titre value; STW refers to standard weight;SAW refers to sample weight and STP refers to standard purity.

Plant Minerals

Some 0.5 g of fine dried powdered sample of plant material was digested following wet digestion procedures using conc. HNO3 and 30% H2O2. The digested samples were used for elemental analysis. Iron(Fe), Copper u), Manganese (Mn) and Zinc (Zn) was determined using Atomic Absorption spectrophotometer and Sodium (Na), Potassium (K), Calcium (Ca) using Flame Photometer [8,9].

Result and Discussion

Table No. 1 Different Nutritional Content of *Urtica ardence*

S.No.	Fat	Crude Fiber	Carbohydrate	Reducing sugar	Total Sugar
1	0.05±0.01	0.92±0.02	4.75 ±0.65	1.2±.02	2.5±0.05

Table No. 2 Total Vitamin content of *Urtica ardence*

Plant	**Vitamin A**	**Vitamin B1**	**Vitamin B2**	**Vitamin C**
Urtica ardence	0.16±0.01	0.80±0.04	0.80±0.04	0.18±0.01

Table No. 3 Total Minerals of *Urtica ardence*

Plant	Fe(mg)	Cu(mg)	Mn (mg)	Zn(mg)	K(mg)	Ca(mg)	Na(mg)
Urtica ardence	0.18±0.01	0.15+0.02	0.58 ±0.04	0.83 ±0.03	171.0 ±10.2	19.2 + 2.5	171.0 ±10.2

Different result showed that wild edible plant *Urtica ardence* had a significant concentration of Fat, Crude fiber, Carbohydrate, Reducing sugar, Total sugar, Vitamins(A, B1, B2 & C) and Total minerals.(Table 1,2,3). Above results revealed that Urtica qualify as high nutrient and mineral content comparable to popular cultivated counterparts. The carbohydrate content was found to be (4.75). Similarly, sugar content which characterizes the taste of a fruit was found abundant in Urtica (2.5gm). The study shows that all the wild edible plant under investigation are good sources of ascorbic acid or vitamin C. Calcium, Magnesium and Potassium are essential for making good of worn out cells, building of red blood cells and maintaining body mechanisms. Their absence in diet might result in weak, stunted growth and poor bone development.

Summary and Conclusion

Wild edible plant and their traditional knowledge is a good illustration of poor communities living in the remote areas, they are the best source of various nutrients they are directly used for consumption purpose and have no toxic effects. The vitamins investigation of the plant found that they are rich in vitamins, A, B, C; Vitamin A is one of the major constituents of nettle leaves. It is very imperative that the nutrient found in wild plant is responsible for the well documented health benefits. Based on the nutritive evaluation study of the wild edible plant it can be summarized that the pant have good source of vitamins, fibers, minerals, proteins, fat, carbohydrates. With the increasing interest in the wild edible plant revolution, we need to focus on more research work on nutritional determination of wild edible plant ,by this the lay public should aware by the nutritional value of the wild plant.

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