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Nuritional and Elemental Composition Analysis of Leaves, Bark and Fruits of Ficusauriculatafrom Two Different Regions of Uttarakhand

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ABSTRACT: The present study is mainly focused on estimation of nutritional profiling in Ficusauriculata fruits, leaves and bark collected from two different regions of Uttarakhandi.e, Almora and Haldwani. **Method-:** Proximate composition analysis leaves, bark and fruits were determined and Mineral contents of 10 elements were analyzed by using Atomic Absorption Spectrometer. **Results-:**The proximate analysis and mineral analysis of leaves, bark and fruits of Ficusauriculata were investigated and it showed the sample have a variable quantities of proximate and mineral composition. Results revealed that ash% was found in the range of (7 to 23.4%), moisture %(7.3 to12.3%), protein % range were found (2.30 to 8.74%) and mineral constituent composition range variable for different element e.g. Mg (18.14to28.12 mg/100g), Ca (10.43to25.3 mg/100g) and K (42.5to132.1 mg/100g) were found maximum. It indicates that plants are the good source of nutritional value.

Keywords: Ficusauriculata, Minerals, Proximate analysis, Nutritional value

I. INTRODUCTION

[1] According to WHO 80% of world populations depends on medicinal plants because of their therapeutic properties and the rest of population health depends on commercial. About 21,000 species of plants are very useful due their medicinal properties. Ethnobotany accept a complex relationship between plants, people and way of life. This relationship between flora and human cultures is no longer confined to the use of vegetation for meals, clothing and shelters, but also includes their use for spiritual ceremonies, ornamentation and fitness care.

[2]Ficus is a genus that consists of 750 species of medicinal plants primarily occurring in tropical and subtropical regions throughout the world.There is a large variation in the habitat of this species. Ficus genus belongs to the mulberry family (Moraceae**)**. Fig species are rich in nutrient, vitamins, mineral elements, water, and fats. Figs are rich source of calcium and fiber. [3]According to USDA data for the Mission variety, dried figs are rich in fiber, vitamin K, copper, magnesium, manganese, calcium, potassium**.** [4]The genus can be gently reviewed by the very distinguishing syconium and lactory latex and are collectively known as “figs”. Ficusplants are used by humans in different ways throughout the tropical and sub-tropical regions. Plants are origin of medication and nutrition and are used as decorative trees, devotional plants, lac hosts, fuel, fodder hedges or enclosures.

[5]**Taxonomic classification**
Kingdom : Plantae (Plants)
Superdivision :Spermatophyta (Seed plants)
Division: Magnoliophyta (Flowering plants)
Class :Magnoliopsida (Dicotyledons)
Order: Urticales
Family :Moraceae (Mulberry family)
Genus :Ficus L. (Fig)
Species :F. auriculataLour.
Synonyms :F. roxburghii Wall
Common indian names:
Gular, Timbal, Timal, Timla, Tirmal, Tremal, Trimmal

Itconsists of over 800 species and is one of about 40 genera of the mulberry family. The plants are mainly distributed in temperate, tropical and subtropical regions of about 1800 – 2600 m altitude. It is native to Asia, especially in India, China, Nepal, Bhutan, Pakistan, Myanmar, Thailand, Vietnam, Malaysia etc.F.auriculata is also known as Elephant earfig tree because of its

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large leaves, The tree is a very large and evergreen, 4-10 m tall, with huge spreading limbs supported by aerial roots which later form accessory trunks extending to a large area. The bark is greyish brown with rough texture. Leaves are simple, broad, oval, ovate or orbicular-ovate to riped or mature fruit is dark red in colour.

[6]Nutraceutical properties is associated with mineral, nutrient and phytochemicals present in plants and well known for its therapeutic potential for human health and play a major role in nutritional security for rural tribes**.** [7]The fruit of the Ficusauriculata is a good source of essential nutrients including minerals, , proteins, carbohydrates and lipids**.** [8]Wild edible plants are very important not only as sources of supplemental of food, balanced diets, medicines, fuel and fodder, but also for their commercial purpose of generating economy potential**.** Plant species consist of heavy metals which are categories in two parts i.e. essential and toxic heavy metals. [9]The essential heavy metals like Cu, Fe, Zn, Mn, Cr, Co and Ni . They are required in very trace amounts and important for the biological functions and physiological in human body and the excess of minerals or deficiency of minerals are both harmful for human health. It may lead to metabolic disorders**.**

II. EXPERIMENTAL

1. Collection of plant materials and identification

We took three parts of plant fruits, leaves and bark of Ficusauriculata from two different altitudes of Uttarakhand. Places near to the Almora and Haldwani were selected for the collection of fruits, leaves and barks (FLB) of Ficusauriculata during their seasonal time which were identified in Department of Biological Sciences, G.B.P.U.A & T Pantnagar. Washed off the sample to remove dust. After washed off cut the fruits, leaves and bark in to small pieces. They were kept in shade drying for the two weeks till then moisture content has been removed and then start the extraction process for the further progress.

2. Determination of proximate composition:-

Determination of ash content

[10] The ash content in F. auriculata's fruits, leaves and bark. Firstly the crucible and lid weighed at three decimal places and then 3g of sample were weighed in crucible. Placed the crucible and lid on muffle furnace at 550^{o}C for 3 hours to burn all the impurities present in fruits, bark and leaves. Now crucible cooled in dessicator. The sample was heated at 550^{o}C for 3 hours without lid until complete ashcontent formed. Lid was placed after completion of heating. After cooling ash was weighed.

Determination of moisture content-:

[11] All samples i.e. fruits, leaves and bark of F.auriculata of Haldwani (Nainital) and Almora were weighed by microbalance about 2g of each sample and dried at 103 ℃ for 4 h in Electric heating air blower constant temperature for drying. After drying, sample were cooled in a desiccator for one hour and then again weighed. So, the reduction in weight of each sample was taken to be the moisture content of leaves, bark and fruits present in it.

Estimation of total protein

[12] The estimation of total protein in fruits, leaves and bark of F. auriculatawas estimated.

Reagents -:

1. 0.1 N of NaOH solution
2. 2% of Na_2CO_3 in 0.1 N of NaOH solution(A)
3. 0.5% of $CuSO_4.5H_2O$ in 1% of sodium potassium tartarate(B)
4. Mix the A and B reagent(50:1)(C)
5. FCR reagent(folin-ciocalteu reagent) and distilled water(1:1)(D)

Powdered sample 0.1g were put in 25 ml 0.1N of NaOH solution in homogenized manner in ice. And keeping them for whole night in refrigerator for complete protein extraction. Next day this solution were centrifuged at 5000 rpm and supernatant was collected for estimation of total protein content.

Take 50µl of sample filtrate to it add 2.5ml of reagent (C). Mixture was allowed to stand for 10 minutes in room temperature for reaction. Addition of 0.25 ml of (D) reagent was added and reaction mixture was kept for incubation about 30 minutes at room temperature. Absorbance was read at 520nm against reagent blank. The amount of protein was calculated by plotting standard curve of standard BSA(bovine serum albumin) of different concentration dissolved in 0.1 NaOH solution (30-150mg/ml).

3. Elemental analysis-:

[13] **AAS analysis:-**Mineral analysis method – The minerals are present in sample was determined by the atomic absorption spectrophotometric method**.** First digestion of powdered sample with nitric acid appearance of

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reddish brown fumes and then treated with perchloric acid and 5 minutes heat required to this solution and transfer it to flask.and left for overnight , again heated and colourless solution appeared. Heated the solution till then solution reduced to 3 ml- 5ml. Cooled the solution and kept it for whole night and filtered the solution by whatmann no.1. Filtrate solution used to analysis for mineral element Zn , Cu , Mn , Fe ,K , Na., Ca, Cd, Pb, As, P. with the help of Atomic absorption spectrophotometer with standard curve of their standards.

III. RESULTS AND DISCUSSION

Moisture content

[14] Moisture content is the water content retained in a plants, soil and other materials**.** Maximum moisture content was found in powder sample of HRFE (18.69%) followed by ARFE (17.12%). It was observed that AUFE (11.5%) and HUFE (12.3%) were contain comparably less moisture with respect to riped fruits. Least moisture content were found in ABE (7.3%)and are presented in **Table 1** and **Fig.1**. [15] reported that moisture content in fruits was 19.93%. [16] reported that moisture content in fresh fruit was found 87.9%. [7] reported in fresh fruits moisture content was found 46.64 ± 0.15%.

Ash content

[15]Ash is the inorganic material that is left after the water and [17] organic matter have been completely removed by heating in the presence of oxidizing agents, total ash content is a measure of the total amount of minerals within a food. Ash content of FLB of F.auriculata presented in **Table 1** and **Fig. 1.** Ash content were found maximum in HBE (23.4%) followed by ABE (18.76%). Lowest percent of ash content was observed in AUFE (7%). [7] reported the ash content in fruits was found 3.7 ± 0.08 %.

4.5.5 Total protein

[18] Protein percent based on nitrogen contentin the samples. Ficus species are found to be more nutritious Being wild, it is easily available and cheaper source of nutrition. Total protein were estimated in FLB of F.auriculata presented in **Table 1** and **Fig. 1**. The range of protein content varied from (3.7 ± 0.039 to 13.7 ± 0.131 %). The maximum protein content was found in ARFE followed by HRFE (12.1±0.116%) and least was observed in ABE. AUFE (7.9%) and HUFE (7.6%) comparably have less protein percent as compared with riped fruits of Almora and Haldwani. The results of investigation were showed that plants are rich source of protein, fat, fibre.

Table 1-: Percent of moisture, ash and total protein content in FLB of F.auriculata

S.no.	Sample	Moisture %	Ash %	Total protein %
1	**HUFE**	12.3	7.74	7.6
2	**HRFE**	18.69	8.82	8.14
3	**HBE**	7.8	23.4	2.3
4	**HLE**	9.1	13.16	2.6
5	**AUFE**	11.5	7	7.9
6	**ARFE**	17.12	8.84	8.74
7	**ABE**	7.3	18.76	2.43
8	**ALE**	8.6	14.8	2.78

FLB-Fruits, Leaves and Bark, HUFE-HaldwaniUnriped Fruits Extract, HRFE-HaldwaniRiped Fruits Extract, HBE-Haldwani Bark Extract, HLE-Haldwani Leaves Extract, AUFE-AlmoraUnriped Fruits Extract, ARFE-AlmoraRipedFruits Extract, ABE-Almora Bark Extract and ALE-AlmoraLeaves Extract

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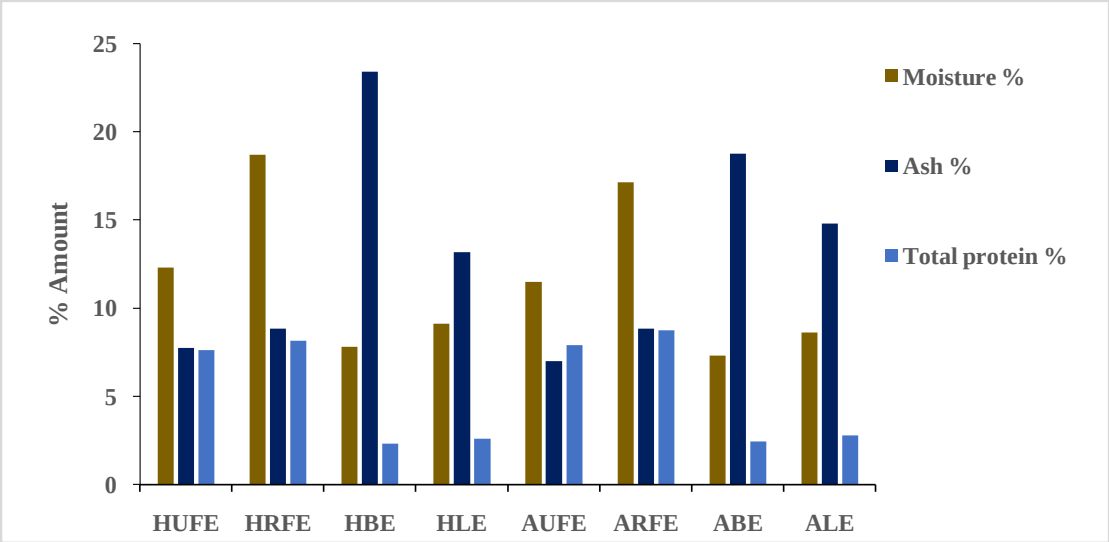

Fig. 1-: Percent of moisture, ash and total protein content in FLB of F.auriculata

Elemental analysis

Elemental analysis of fruits, leaves and bark of F.auriculata were estimated with the help of AAS(atomic absorption spectroscopy). 10 elements (sodium, potassium, calcium,nickel, chromium, cobalt, zinc, copper , iron and manganese) were estimated.

The amount of iron was found maximum in ARFE (3.64mg/100g) and lowest in HBE (1.27mg/100g). The amount of copper concentration was found maximum in HRFE(1.21mg.100g) and lowest in ALE(0.11mg/100g). The maximum amount of nickel was found in RAFE (2.63mg/100g) and lowest were found in HBE(0.29mg/100g). The amount of manganese was found maximum in HRFE (1.18mg/100g) and lowest were found in ABE(0.07mg/100g). The amount of chromium was found maximum in ARFE (0.821mg/100g) and lowest were found in ALE (0.027mg/100g). Cobalt amount was found maximum in HRFE (0.218 /100g) and lowest were found in ABE(0.04mg/100g). Maximum amount of magnesium was found in HRF(28.12mg/100g) and lowest were found in ABE(18.14mg/100g).Sodium concentration was found maximum in ARFE (1.98mg/100g) and lowest were found in ALE(1.227mg/100g). The amount of calcium was found maximum in HRFE (20.8mg/100g) and lowest were found in ABE(10.43mg/100g). The amount of potassium was found maximum in ARFE (132.1mg/100g) and lowest were found in ALE(42.5mg/100g). The decreasing order of amount of elements followed as-: K>Mg>Ca >Fe>Ni>Na>Cu>Mn>Cr>Co. Results are presented in **Table 2** and **Fig 2.**

[8] reported the mineral composition in unriped and riped fruits, their range vary for calcium and iron (34.53 and 35.17mg/100g) and (2.95 and 3.04 mg/100g) respectively. In mature leaves of F.auriculata showed mineral content and their range of calcium (51.65-157.90mg/100g), magnesium (20.10-25.50mg/100g)iron (0.34-0.54mg/100g), potassium (211.30-436.00mg/100g), sodium content (0.01-1.38mg/100g) [19] . According to [7] in fruits elements were found to be (1.35, 0.90 and 2.11 mg/100gm) respectively for calcium, magnesium, potassium.

Trace element is an element in a sample that has an average concentration >100ppm. Trace elements have different role in human body. The excess levels of the trace elements can be toxic for the health and may lead to cause many fatal diseases, such as cancers. Hemoglobin in body contains Fe, Oxygen from the lungs to the tissues is transferred by erythrocyte protein.

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Table 2-: Elemental analysis in FLB ofF. auriculata

S.no.	Sample	Concentration mg/100g									
		Fe	Cu	Ni	Mn	Cr	Co	Mg	Na	Ca	K
1	HUFE	2.13	0.764	0.648	0.617	0.115	0.058	23.06	1.419	15.1	90
2	HRFE	2.89	1.21	1.82	1.18	0.623	0.218	28.12	1.819	20.8	110
3	HBE	1.27	0.282	0.29	0.096	0.067	0.068	18.3	1.358	10.56	50.8
4	HLE	1.735	0.159	0.395	0.164	0.056	0.075	20.8	1.295	11.2	70.8
5	AUFE	3.14	0.68	0.821	0.214	0.126	0.064	24.12	1.496	16.34	120.1
6	ARFE	3.64	1.082	2.63	0.823	0.821	0.51	26.32	1.98	25.3	132.1
7	ABE	1.454	0.423	0.323	0.07	0.056	0.04	18.14	1.324	10.43	60.2
8	ALE	1.462	0.11	0.415	0.146	0.027	0.05	20.32	1.227	12.31	42.5

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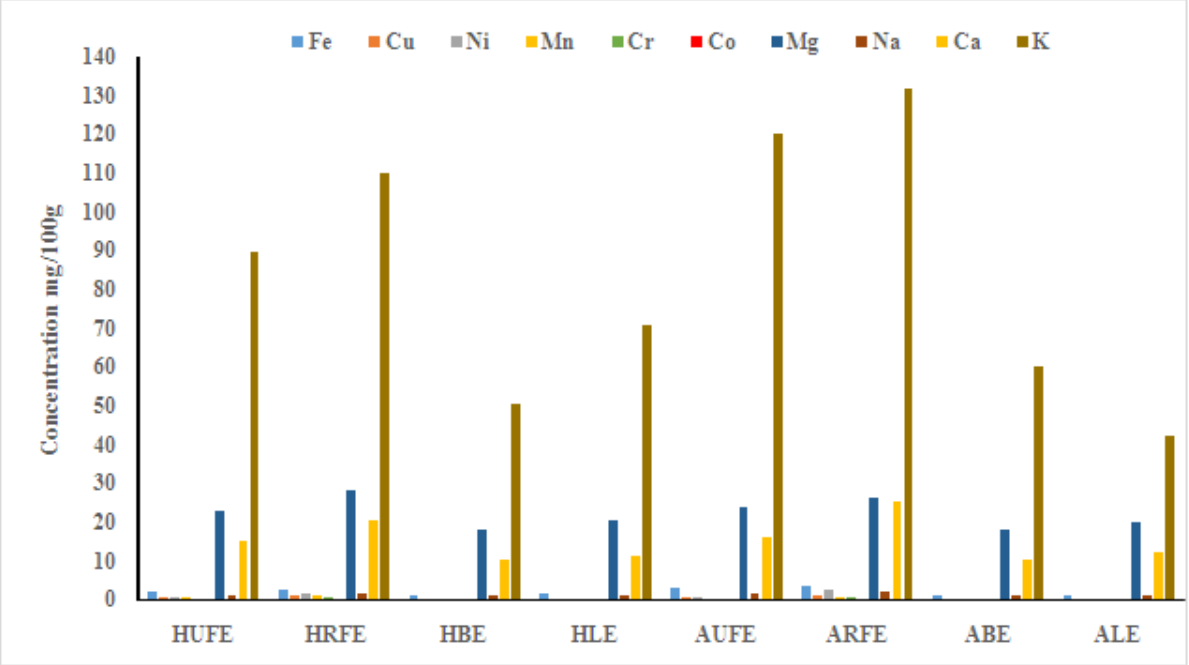

Fig . 2-: Elemental analysis of FLB of F. auriculata

IV. CONCLUSION

The investigation revealed the variable quantity of proximate composition and mineral value of fruits, leaves and bark. Hence, plants could be the good source of nutritional value and overcome the human deficiency causing problems and malnutrition. It could developed to formulate drug for prevention and treatment of diseases.

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