ELEMENT CONTENT ANALYSIS OF *FICUS PALMATA* FORRSK. GROWN IN AZAD JAMMU AND KASHMIR

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ABSTRACT: *Ficus palmata is a very potent medicinal and multipurpose plant which has gained global significance due to medicinal and multipurpose utility. It bear deep violet to black berries which are known to human being from centuries for their effects on health .The plant is wildly distributed throughout Azad Jammu and Kashmir It has attracted considerable attraction in the world mainly for its nutritional and medicinal value. Keeping in view the global importance of Ficus palmata and its presence in Azad Kashmir as wild forests in abundance this research was conducted to study the medicinally important minerals in 25 selected Fig ecotypes from variable locations in Azad Jammu and Kashmir. Calcium, Magnesium, Phosphorus and Iron were estimated by instrumental method. The results of the present study provide justification for the usage of these fruits in daily diet for nutrition as well as for medicinal usage and medicinal plants in the treatment of different diseases. The metal contents in the samples were found at level such as Calcium , Magnesium , iron and Phosphorus (1.54 , 0.92 ,1.58 and 1.88 mg/gm) respectively which play a vital role in cure of diseases. These results can give the importance about the wild edible fruits and used to set new standards for prescribing the dosage of the herbal drugs prepared from these plant materials in herbal remedies and in pharmaceutical companies*

INTRODUCTION

The history of medicine and surgery dates back perhaps to the origin of the human race. Use of plants as a source of medicine has been inherited and is an important component of the health care system indifferent countries of the world. Traditional Unani medicine is a part of Pakistan culture. Pakistan is included in those countries where traditional Unani medicine is popularly practiced among the large segment of populations, the Unani medicine system originated in Greece was found by old ancient Greek philosophers [1]. The flora of Azad Jammu and Kashmir due to its diverse climatic conditions and many ecological regions is rich in medicinal plants. Azad Kashmir have been honored with colossal assorted greenery of enormous quality, which is inexhaustible as well as rich in hereditary differences and biochemical constituents of restorative significance[2].

The figs (Ficus species, Moraceae) are among the biggest genera of angiosperms with more or less 750 types of trees, epiphytes and bushes in tropical and subtropical areas around the world. Frodin [3] positioned them as the twenty-first biggest class of seed plants.

Ficus palmata is utilized as fuel wood and generally utilized for the successful treatment of numerous ailments, viz skin illnesses, ringworm, wound diseases and haemorrhoid [4, 5].The fig organic product *(Ficus palmata*) is extremely feeding sustenance and utilized as a part of mechanical item under different structures, ie crisp, dried and canned, loaded down with nuts, secured with chocolate or aromatized in diverse ways [6, 7].*Ficus* cordata Thunb (Moraceae) is a savana tree of around ten meters stature found in Senegal, Angola, South Africa and Cameroon [8]. The leaves of this plant are utilized against hyperesthesia, ataxia, muscle tremor and cushioning movements and can slaughter calves 48h after ingestion [9].Extra ethnopharmacological examinations demonstrated that the stem bark of this plant is utilized by some western Cameroonian customary healers for the treatment of jaundice; who can be a side effect of a few related liver maladies [10].In the present study, an elemental assay was done by *Ficus palmata* which is very useful for man's consumption both as food and medicine.

MATERIAL AND METHODS

Ficus palmata grows extensively in Azad Kashmir. Different populations of *Ficus palmata* were selected and collected from different localities of Azad Kashmir areas in the 1st week of June when they were fully matured. These ecotypes were compared for different characters. These fruits were kept in plastic pots and transported to University of Azad jammu and Kashmir and were subjected to deep freezer at $-80^{o}C$.

Ficus palmata fruit was used for mineral determination. Food and food products were first digested with acids to release the minerals. The acid digest was then diluted and used for mineral determination by instrumental method [11].

Preparation of acid digest

The powdered sample (1gm) of each *Ficus palmata* organic product was taken and it was exchanged to a digestion tubes. Concentrated HNO_3 (5 ml) of was included and kept in treater digester for 60 minutes at 70ºC. The temperature was raised to 140ºC, so that Nitrous acid fumes come out. The tubes were chilled off and 3 ml of HNO_3: $HClO_4$ (1:1) blends were included into it. The tube was warmed to 200ºC so the white thick vapor of perchloric acid ($HClO_4$) vanished. The tubes were cooled and the substance were exchanged to a 50ml volumetric flask.. Volume was made upto the marked with refined water. The digest was put away in a refrigerator and was utilized for mineral determination [12].

Determination of Phosphorus by (Colorimetric Method)

In food material phosphorus was usually determined and expressed as phosphoric acid (P_2O_5). This may be done by colorimetry. In general, the food sample was digested (wet ashing). An aliquot was then used for the colorimetric determination of phosphorus.Five (5) ml aliquot was taken from the acid digest and same procedure was followed as used in the standardsolution. Noted the absorbency reading and determined the amount of phosphate from the standard curve. The phosphate was calculated content as mg / 100g sample.

Determination of Calcium using Murexide as an Indicator

The determination of Ca in the sample was based upon the principle of titration. The indicator Murexide and buffer formed the red color of the solution. The solution is then titrated against 0.01M solution of EDTA until the red color of the soln. changed to bluish-violet.One mole of 0.01M. EDTA= 0.4008 mg of Ca^{++}.

Determination of Magnesium

The determination of Magnesium in the sample was based upon the principle of titration. The Eriochrome black T. indicator (EBT) and buffer were added to the sample, which formed the red color. The sample is then titrated against 0.1M EDTA until the color changed from red to blue. 1 ml. of 0.1M EDTA =2.43 mgs Mg^{2+}

Determination of Iron (Fe)

Iron content was determined for nutritional reasons and to measure iron contamination of food. Iron in the sample reacts with certain reagent and produce color. Iron estimation was carried out spectrophotometrically by reacting iron with potassium thiocyanate. A red color complex of the iron forms, which was estimated in spectrophotometer at 447 nm. The iron was calculated as mg / 100 g of the sample.

Results and Discussion

Ficus palmata ecotypes were compared on the bases of Phosphorus, Calcium, Magnesium and Iron contents .Mean values and ANOVA were shown in the Table 1.All the mineral elements show significant results. Results were also presented by graphs.

ANOVA				
Degree of Freedom	24	24	24	24
Sum of Squares	9342.467	39223.787	7015.965	23.447
Mean Squares	389.269	1634.324	292.332	0.977
F value	104.2879	11.1684	143.0347	80.8878
LSD @0.05	3.256	20.39	2.409	0.1846

Table 1: Mean values and Anova of mineral elements in Fruits of *Ficus palmata*

Phosphorus was estimated in ecotypes of *Ficus palmata* grown in AJK (Figure1). Value of Phosphorus ranged from 64.2 to 99.76 mg/100g. Highest value was shown by ecotype E1 and lowest value was shown by ecotype E8. Most ecotypes show same results.

The highest value of Calcium was shown by E4 which was 250.7 mg/ 100g (Figure2). Mean values of calcium ranged from 175 to 250 mg /100g. Lowest value of calcium was seen in ecotype E10 of *Ficus palmata* grown in AJK which is 175 mg/100g. Ecotypes E14, E24 and E25 also show highest values of approximately more than 200mg/100g .No specific difference was seen between ecotypes of *Ficus palmata* in response to the Calcium contents.

Highest value of Magnesium was observed in ecotype E18 which is 102.7 mg/100g and lowest value was observed in ecotype E13 which is 76.4 mg/100g (Figure3). Values of magnesium ranged from 62.4mg/100g to 102.7mg/100g which means that all ecotypes of *Ficus palmata* does not high diversity in Magnesium contents.

Ficus palmata ecotypes collected from diverse locations of AJK show significant difference in Iron contents (Figure4). Values of Iron ranged from 1.4 to 3.53 mg/100g. The highest value was shown by ecotype E23 and lowest value was shown by ecotype E15. All ecotypes showed diversity in Iron contents.

Hegazy *et al* [13] reported that the Calcium, Magnesium, Iron and Phosphorus in *Ficus palmata* is 65, 37.67, 3.13,and 32.67 mg/100g respectively .Our result show higher values of these mineral elements than the Hegazy report. Chandra and Saklani [14] reported that the level of nutrients such as Calcium , Magnesium , Potassium andPhosphorus (1.54 , 0.92 ,1.58 and 1.88 mg/gm) respectively . Our results also ranged between these values.The present study also agreed with [15] research which showed that mineral elements like Calcium Magnesium Iron and Phosphorus were found to be 0.071, 0.076, 0.004 and 0.034 respectively in *Ficus palmata*

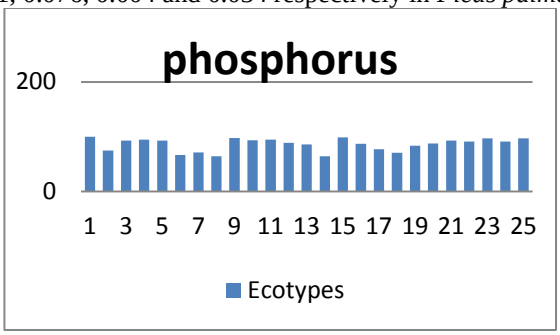

Fig. 1: comparison of phosphorus contents among 25 ecotypes of *Ficus palmata*

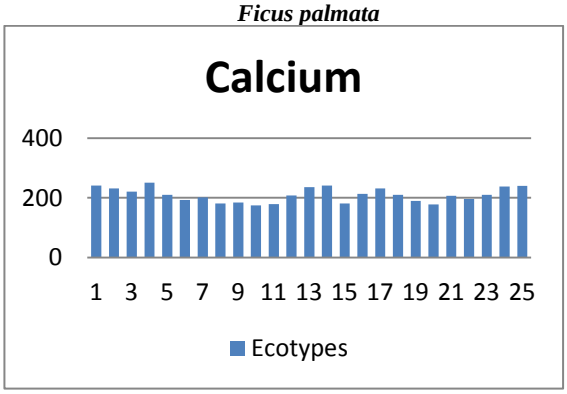

Fig. 2: Comparison of Calcium contents among 25 ecotypes of *Ficus palmata*

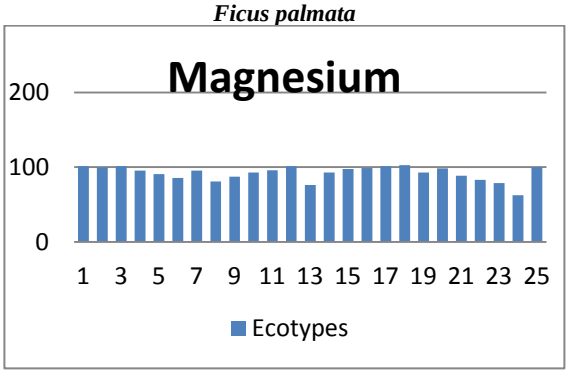

Fig. 3: Comparison of Magnesium contents among 25 ecotypes of *Ficuspalmata*

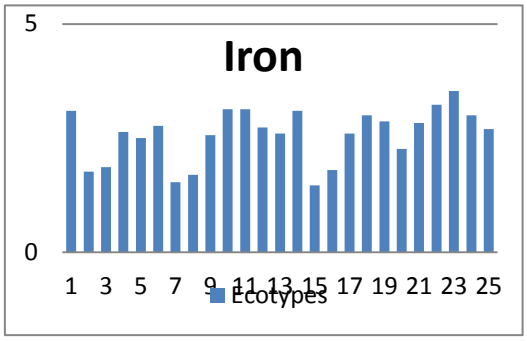

Fig. 4: Comparison of Iron contents among 25 ecotypes of *Ficus palmata*

Principle Component Analysis of mineral nutrients

Principal Component Analysis of mineral nutrients showed that all studied ecotypes of *Ficus palmata* grown in AJK can be divided in to four groups (Figure5**).**The group1 consist of ecotypes E3, E1, E24, E25, E12,E5and E13 while ecotypes E15, E9, E10, E11, E20 and E22 gathered in the second group. Similarly, the third group comprises of only four ecotypes namely,E2, E13, E14 and E18 while the fourth group consist of E6,E8,E17, E15and E19. It was observed that there is a close relationship between the ecotypes of the same group while diversity was found among ecotypes of dissimilar group in estimation of mineral nutrients.

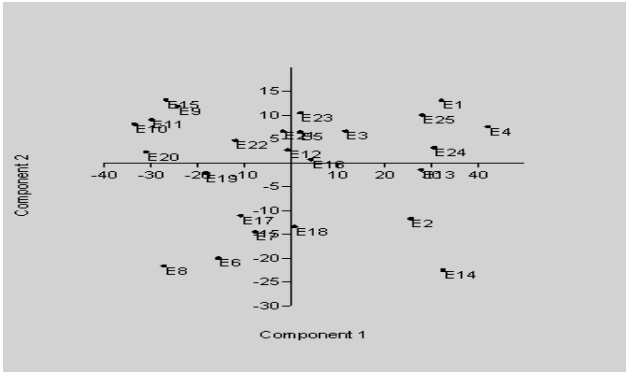

Fig.5:PCA of mineral nutrients.

Cluster analysis of mineral nutrients

Dendrogram obtained using average linkage distance for mineral nutrients showed that all twenty five *Ficus palmata* ecotypes can be divided in to two main clusters.Cluster1 and Cluster2. (Figure6).

Cluster 1

It consists of only seven ecotypes namely, E24, E13, E14, E2, E1, E25, and E4 in which E24 and E13 showed similarity to each other and form a group. The ecotype E14 and E2 from group 2 and showed 100%similarity to each other. Another group consist of E25 and E1while E4 form a sister cluster with this group. It can be analyzed that the ecotypes within group showed similarities to each other while the ecotypes out of groups showed dissimilarity to each other.

Cluster 2

Cluster 2 can be divided into two sub clusters and sub clusters also divided into six groups. In sub cluster 1 two groups were formed in which ecotypes E22 and E19 were located in the same group while the ecotypes E10 and E11showed 100%similarity to each other and were placed in the same group. In sub cluster 2 four groups were formed in which ecotypes E21 and E5 showed similarity to each other and placed in the group 1and ecotype E23 form sister cluster with this group. Second group consist of E16 and E12 and E3 form sister cluster with second group. Similarly, the third group consists of ecotypeE17 and E7 while E18 form sister cluster with this group. The ecotypes E8 and E9 form the fourth group. The ecotypes grouped in different clusters clearly indicated that on the basis of mineral nutrients, the diversity among them is not on geographic distance. The environmental factors including atmosphere and pollution, season of collection sample, age of plant and soil conditions in which plant grows effect the concentration of elements. As it varies from plant to plant and region to region. The elemental results of wild *Ficus palmata* fruits shows that many of these fruit contain elements of vital importance in man's metabolism and that are needed for growth, developments, prevention and treatment of many diseases. It is evident that they are important sources of essential mineral elements in reasonable concentrations which have required in treatment of many diseases. The similarity on the base of morphological performance does not necessarily mean that populations will exhibit similar behavior in their biochemical.Many factors are involved in the synthesis of metabolites in addition to environmental and soil conditions.

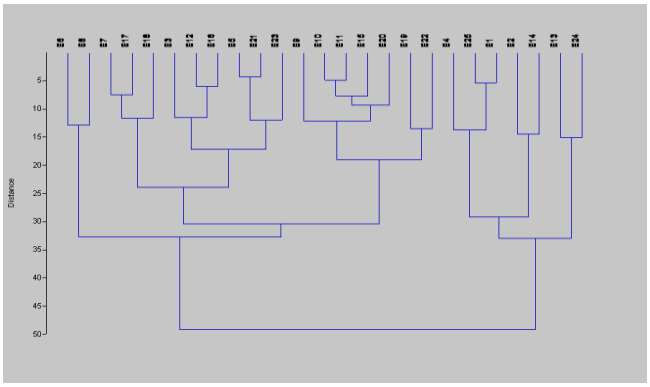

Fig.6: Dendrogram based on average linkage distance for mineral nutrients

CONCLUSION

In this study four elements were determined in different ecotypes of*Ficus palmata* plant and wild edible fruits of *Ficus*.Among the various elements detected in different medicinal plants of same genus used in the treatment of various diseases. The data obtained in present study will be helpful in the synthesis of new modern drugs with various combinations of plants which can be used in the cure of many diseases ethnomedicinally. However, moredetailed analysis of chemical composition of the following medicinal plants is required.The elemental results of wild edible fruits shows that many of these fruit contain elements of vital importance in man's metabolism and that are needed for growth,developments, prevention and treatment of many

diseases. It is evident that they are important sources of essential mineral elements in reasonable concentrations which have required in the treatment of many diseases.

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