



PROXIMATE AND ESSENTIAL NUTRIENTS EVALUATION IN
Eugenia uniflora(L.) LEAVES.

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ABSTRACT

In the last few years there has been an exponential growth in the field of herbal medicine and these drugs are gaining popularity both in developing and developed countries because of their natural origin and less side effects. The current study focuses on quantitative estimation of minerals, minerals in ash, vitamins and various proximate composition in Eugenia uniflora leaves. Minerals like iron, calcium, phosphorus and magnesium were estimated in aqueous hot extract of Eugenia uniflora and minerals like iron, calcium and phosphorus were estimated in ash. Vitamins such vitamin A, vitamin B, vitamin C and β -carotene were estimated according to standard methods. Proximate analysis of ash, moisture, crude fibre and crude fat were estimated in powdered leaves of Eugenia uniflora. The finding of this study suggests that this plant leaves and aqueous hot extract could be a potential source of natural antioxidant that could have great importance as therapeutic agents in preventing various diseases. The results are very much encouraging but scientific validation is necessary before being put into practice.

KEY WORDS: *Eugenia uniflora*, Minerals, Vitamins, Proximate composition.

I. INTRODUCTION

Nature has bestowed upon us a very rich botanical wealth and a large number of diverse type of plants. In India, the use of different parts of several medicinal plants to cure specific ailments has been vogue from ancient times. Plants are the rich source of all the elements essential for human beings. There is a relationship between the element content of the plant and its nutritional status. Some elements are essential for growth, for structure formation, reproduction or as components of biologically active molecules while others have some other beneficial affect [1]. Medicinal plants have been used as traditional treatments for numerous human diseases for thousands of years.

Medicinal plants continue to be an important therapeutic aid for the ailments of humankind. The search for eternal health and longevity and for remedies to relieve pain and discomfort drove early man to explore his immediate natural surroundings and led to the use of many plants, animal product and minerals, etc. and the development of variety of therapeutic agents. Today there is a renewed interest in traditional medicine and an increasing demand for more drugs from plant sources. This revival interest in plant derived drugs because of the belief that green medicine is safe and more dependable than the costly synthetic drugs, many of which have adverse side effects.

All human beings require a number of complex organic/inorganic compounds in diet to meet the need for their activities. The important constituents of diet are carbohydrates, fats, proteins, vitamins, minerals and water [2]. Every constituent plays an important role and deficiency of any one constituent may lead to abnormal developments in the body. Plants are the main source of food. They are rich in nutrients. They are also rich in compounds which have pain relieving and healing abilities. From earliest times itself, plants were used for treatment of disease without knowledge about the compounds present

and their mode of action. Over the centuries societies around the world have developed their own tradition to make sense of medicinal plants and their uses.

Quantitative determination of mineral elements present in plants is important because the concentration and type of minerals present must often be stipulated on the label of a food. The quality of many foods depends on the concentration and type of minerals what they contains. And also play a very significant role against a variety of degenerative diseases and processes, they may also prevent and reduce injury from environmental pollutants and enhance the ability to work and learn, some minerals are essential to a healthy diet (e.g. Calcium, Phosphorus, Potassium and Sodium) where as some can be toxic (e.g. Lead, Mercury, Cadmium and Aluminium). Bioactive chemical compounds found naturally in plants work with nutrients and dietary fibre to protect against diseases [3,4].

Vitamins are organic substances necessary for metabolism. Deficiency of vitamins can cause serious human health diseases and sometimes, small concentrations are required for maintenance of good human health [5]. Vitamins are organic compounds required as vital nutrients in tiny amounts by an organism. Vitamins serve as biocatalysts in many chemical reactions as well as precursors to various body factors. They also required for a variety of biological processes such as mental alertness eg; niacin; resistance to infections e.g. vitamin C. Vitamin A is necessary in vision , gene transcription [6,7], immunity, dermatology [8], growth and development [9] and so on. Thiamine derivatives and thiamine dependent enzymes are present in all cells of the body, thus a thiamine deficiency would seem to adversely affect all of the organ systems. However, the nervous system and the heart are particularly sensitive to thiamine deficiency because of their high oxidative metabolism [10].

Proximate analysis in plants gives valuable information and help to access the quality of the sample. It provide information on moisture content, ash content, volatile matter content, ash, fixed carbon etc. Total ash may vary with in wide limits for specimen of genuine drugs due to variable natural or physiological ash. Ashes give us an idea of the mineral matter contained in a plant. Dietary fibre is a complex of non-digestible carbohydrates and lignin that are intrinsic and intact in plants and are resistant to digestion and absorption in the small intestine. Dietary fibre promotes beneficial physiological effects such as laxation, reduction in blood cholesterol and postprandial blood glucose modulation.

*Eugenia uniflora*L., commonly known as “pitangueira” or Brazilian cherry tree, is a species belonging to the family Myrtaceae, which is native to South America and common in regions with tropical and subtropical climate [11]. *Eugenia uniflora* is considered to be effective in treating many diseases and are popularly used in the Brazilian medicine. A leaf infusion of pitanga is used in Brazil for stomach pain, and as an astringent. In Surinam, the leaf decoction is taken as a cold remedy and, in combination with lemongrass, as a febrifuge. In Java, fruits are used to reduce blood pressure [12, 13]. Extract from pitanga leaves are considered to be effective against many diseases and are therefore used in popular Brazilian medicines.

Considering the potential pharmacological benefits of *E. uniflora*, the aim of this study was to investigate the presence minerals in aqueous hot extract of *Eugenia uniflora* leaves, minerals in ash, and vitamins in aqueous hot extract of *Eugenia uniflora* leaves and proximate composition in powdered leaves of *Eugenia uniflora*.

II. MATERIALS AND METHODS

Plant material

Fresh leaves of *Eugenia uniflora*(Linn), Family- Myrtaceae, were collected from Wayanad district, Kerala during the month of February 2014. Taxonomic authentication was done by Dr. V. SRamachandran, Taxonomist, Department of Botany, Bharathiar University, Coimbatore, Tamilnadu, India.

Sample Processing

The leaves were washed, shade dried at room temperature and powered in a mixer grinder.

Hot Water Decoction: 10g of the powdered sample was dissolved in 100ml of distilled water which was boiled for one and half hours and filtered. The decoction was stored at 4°C for further usage.

NUTRIENT ANALYSIS IN *Eugenia uniflora* LEAVES

1. Quantitative estimation of minerals

Minerals are the nutrients that exists in the body and as essential as our need for Oxygen to sustain life. They are most important factors in maintaining all physiological processes, constituents of the teeth, bone, tissues, blood muscle and nerve cells. Various minerals like calcium, magnesium, iron and phosphorus were quantitatively estimated in aqueous hot extract of *Eugenia uniflora* leaves and in ash using standard procedures.

Table 1: Quantitative estimation of Minerals

Parameters	References
Calcium	Raghuramula et al.,1983[14]
Magnesium	Neil and Neely, 1956 [15]
Iron	Sadasivam and Manickam, 1996 [16]
Phosphorus	Fiske and Subarrow, 1925 [17]

2. Quantitative estimation of minerals in ash

Ash is the inorganic residue remaining after water and organic matter have been removed by heating, which provides a measure of total amount of minerals within the drug. Minerals are not destroyed by heating and they have a low volatility as compared to other food components.

Sample extraction for Ash

Extraction procedure was conducted according to the standard procedure given by [18].10 g of sample is transferred into preheated (600°C) porcelain crucible. Place the crucible in clay pipe triangle (heated first over low flame till charred completely) followed by heating in muffle furnace at 600°C for 3-5 hours. Cool the crucible in desiccator and weighed. Place and heated crucible again in muffle furnace for 1 hour, cooled and weighed. Repeat the procedure till two consecutive weights are same. Ash becomes white/greyish colour. Moisture ash is dissolved in small amount of distilled water. Add 5 ml of HCl, evaporate mixture to dryness on boiling water bath. Repeat the procedure thrice. Filter into 50 ml volumetric flask using whatmann No.40 filter paper. Cool and make up the volume to 50 ml and use aliquots for estimation of Iron, Phosphorus and Calcium.

Table 2: Quantitative estimation of minerals in ash

Minerals	References
Magnesium	Neil and Neely, 1956 [15]
Iron	Sadasivam and Manickam, 1996 [16]
Phosphorus	Fiske and Subarrow, 1925 [17]

3. Quantitative estimation of Vitamins

Vitamins are essential organic nutrients required in very small amounts for normal metabolism, growth and physical wellbeing most vitamins are not made in the body or only in insufficient amounts, and are mainly obtained through food. Vitamins like vitamin A, vitamin C, vitamin E and β -carotene are estimated in aqueous hot extract of *Eugenia uniflora* using standard procedures.

Table 3: Quantitative estimation of Vitamins

Vitamins	References
Vitamin A	Nedd and Pearson, 1963 [19]
β carotene	Nedd and Pearson, 1963 [19]
Vitamin B ₁	Sadasivam and Manickam, 1996 [16]
Vitamin C	Omaye et al., 1979 [20]

PROXIMATE ANALYSIS IN *Eugenia uniflora* LEAVES

The proximate analysis of plant parts reveals the presence of fat, crude fibre and moisture in them [21]. This study seeks to carry out some proximate analysis (% moisture, fat, crude fiber and ash) in sample of *Eugenia uniflora* leaves using standard methods.

Table 4: Proximate analysis in *Eugenia uniflora* leaves

Proximate composition	References
Ash	Raghuramalu, et al., 2003 [22]
Moisture	
Fat	
Crude	

Statistical Analysis

All the analyses were performed in triplicate and the results were statistically analyzed and expressed as mean (n=3) \pm standard deviation (SD).

III. RESULTS

Medicinal plants are of great importance to health of individual and communities. The medicinal values of a plant lie in some chemical substances that produce a definite physiological action on the human body. The result of proximate analysis shows variant concentration/proportions of biochemical and other contents. The result obtained from present study is shown in Table 5, Table 6, Table 7 and Table 8.

Table 5: Quantitative estimation of Minerals

Minerals	Amount (mg/g)
Calcium	2.29 \pm 0.02
Magnesium	1.89 \pm 0.06

Iron	3.17 ± 0.04
Phosphorus	1.96 ± 0.06

Values are expressed by mean ± SD of 3 Samples

Table 6: Quantitative estimation of minerals in ash

Minerals	Amount (mg/g)
Iron	3.98 ± 0.07
Phosphorus	1.56 ± 0.05
Calcium	2.67 ± 0.03

Values are expressed by mean ± SD of 3 Samples

Table 7: Quantitative estimation of Vitamins

Vitamins	Amount (mg/g)
Vitamin A	0.59 ± 0.03
Vitamin C	0.64 ± 0.05
Vitamin E	0.26 ± 0.04
β-carotene	0.20 ± 0.03

Values are expressed by mean ± SD of 3 Samples

Table 8: Proximate analysis in *Eugenia uniflora* leaves

Proximate composition	Observations for powdered leaves of <i>Eugenia uniflora</i> , Percentage (%)
Moisture	6.98 ± 0.08
Crude Fibre	2.98 ± 0.02
Ash	9.87 ± 0.01
Fat	1.93 ± 0.03

Values are expressed by mean ± SD of 3 Samples

IV. DISCUSSION

From Table 5, aqueous hot extract of *Eugenia uniflora* contains an excellent range of minerals, among which iron was found to be maximum (3.17 ± 0.04 mg/g) followed by calcium (2.29 ± 0.02 mg/g), phosphorus (1.96 ± 0.06 mg/g) and magnesium (1.89 ± 0.06 mg/g).

Iron is essential to all cells. Functions of iron includes involvement of energy metabolism, gene regulation, cell growth and differentiation, oxygen binding and transport muscle oxygen

use and storage, enzymereaction, neurotransmitter synthesis and protein synthesis. Iron deficiency is most prevalent nutritional deficiency [23,24,25].

Calcium is important for pregnant or lactating women, young children have more risk of calcium deficiency, rickets and postmenopausal women in whom there might be concern about osteoporosis and fracture's. Ca is the main component of bones and teeth. This element functions on cell membranes and on muscles, by regulating endo- exoenzymes and blood pressure [26].

Phosphorus works with calcium to develop and maintain strong bones, teeth and enhances use of other nutrients. It plays a key role in cell membrane, integrity, intracellular communication and for proper energy processing in body.

70 % of the total magnesium content of the body is combined with calcium and phosphorus in the complex salts of bone. The remainder is in the soft tissues and body fluids. It is the principal cation of the soft tissue [27].

Ashes give us an idea of the mineral matter contained in a plant. Measuring it is important, because mineral matter may be the cause of a pharmacological effect [28]. From table 6, aqueous hot extract of *Eugenia uniflora* leaves contains an excellent quantity of minerals in ash among which iron was found to be maximum (3.98 ± 0.07 mg/g) followed by calcium (2.67 ± 0.03 mg/g) and phosphorus (1.56 ± 0.05 mg/g).

Vitamins are the necessary food factors or essential compounds which are organic in nature, occurring in natural foods. It is required in minute amounts for normal growth, reproduction etc. Quantitative estimation of vitamins in aqueous hot extract of *Eugenia uniflora* (Table 7) shows that vitamin C was more (0.64 ± 0.05 mg/g) followed by vitamin A (0.59 ± 0.03 mg/g), vitamin E (0.26 ± 0.04 mg/g) and β -carotene (0.20 ± 0.03 mg/g).

Vitamin C and vitamin E plays an important role in numerous biological conditions and the major beneficial actions of these vitamins are due to their antioxidant properties that scavenge reactive oxygen species in biological fluid [29] and membrane [30]. The interaction between the two vitamins occur at the membrane cytosol interface and vitamin C functions as a reducing agent of the membrane bound oxidized vitamin E.

Vitamin A plays a major role in vision. It helps in maintaining the integrity of epithelial tissues as epithelial layers of skin, respiratory mucosa, oesophagus and genitourinary tract. It helps in preservation of the structural integrity and the normal permeability of the cell membrane as well as cell organelles.

β -carotene is a pigment found in plants that gives them their color. In the body β -carotene is changed into Vitamin A. β -carotene is an antioxidant. It protects the body from damaging molecules called free radicals.

Proximate composition of a substance constitutes the different classes of nutrients present in the samples. Proximate and nutrient analysis of edible plant and vegetables play a crucial role in assessing their nutritional significance. As various medicinal plant species are also used as food along with their medicinal benefits, evaluating their nutritional significance can help to understand the worth of these plant species. [31]

Moisture is one of the major factors responsible for the deterioration of the drugs and formulations. Low moisture content is always desirable for higher stability of drugs. The moisture content of the crude drug was found to be low ($6.98\% \pm 0.08$). This result indicated low shelf life of the fresh plant hence long storage would lead to spoilage due to its susceptibility to microbial attack. This supports the practice of storage in dry form by users. Moisture content is among the most vital and mostly used measurement in the processing, preservation and storage of food [32].

Crude fibre is the fraction of carbohydrate that remains with acid and alkali. The crude fibre content of the leaves was found to be $2.98\% \pm 0.02$.

Ash is the inorganic residue remaining after water and organic matter have been removed by heating, which provides a measure of total amount of minerals within the drug. Ash value is useful in determining authenticity and purity of sample. The total ash value in *Eugenia uniflora* leaves was $9.87\% \pm 0.01$. This percentage clearly indicates that the leaves are best for drug action and effects.

The crude lipid content obtained was $1.93\% \pm 0.03$. Lipids provide very good sources of energy and aids in transport of fat soluble vitamins, insulates and protects internal tissues and contributes to important cell processes [33,34]

V. CONCLUSION

Plant-derived substances have recently of great interest owing to their versatile applications. Medicinal plants are the richest bio-resource of drugs of traditional systems of medicine, modern medicines, nutraceuticals, food supplements, folk medicines, pharmaceutical intermediates and chemical entities for synthetic drugs.

Some traditional medicines are highly equipped with more qualities in therapeutical basis, majority of the people in developing countries have resorted to the use of medicinal plants as an alternative treatment. Herbal medicines are rich in the active ingredients and are safe with the body chemistry of man [35]. Also the presence of the active ingredients lends credence to the claims of the use of plants for the treatment of diseases by traditional medical doctors. However, plants have forever been a catalyst for our healing. In order to halt the trend of increased emerging and resistant infectious disease, it will require a multipronged approach that includes the development of new drugs. Using plants as the inspiration for new drugs provides an infusion of novel compounds or substances for healing disease.

The results obtained in the present study indicate *Eugenia uniflora* leaves have the potential to act as a source of useful drugs because of presence of various minerals, vitamins and proximate compositions. The results are very much encouraging but scientific validation is necessary before being put into practice.

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