

NUTRITIVE VALUE OF EUGENIA JAMBOSA FRUIT

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SUMMARY: The present study deals with measurement of minerals, vitamins, free sugars and amino acids of Eugenia jambosa fruit. Minerals were determined in edible pulp of the Eugenia jambosa fruit dried in an oven to constant weight. The ash content was determined by incineration of known weight of the sample and trace elements were determined by atomic absorption. Sodium and potassium was measured by flame photometry and phosphorus was measured by colorimetry. Sufficient amount of sodium (391.5 mg), potassium (278.4 mg), calcium (116.0 mg), iron (0.58 mg), zinc (0.29 mg) and manganese (0.58 mg) were found to be present in Eugenia jambosa fruit. The chromatographic analysis showed that fruit contains glucose, mannose, sucrose, alanine, arginine, asparagine, tyrosine, glutamine and cysteine.

Key Words: Sodium, potassium, trace minerals, Eugenia jambosa fruit.

INTRODUCTION

Eugenia jambosa or *Eugenia jambolana* belongs to Myrtaceae family and consists of about 90 genera and 2800 species. It is locally known as Jamun or Jambun. *Eugenia jambosa* is a large ever-green tree of approximately 3.6 m girth and 30 m high. Generally two main varieties of *Eugenia jambosa* are distinguished based on the type of fruit. The raa Jamun fruit has sweet flesh with a central cavity containing small seeds. While desi Jamun fruit has relatively large seeds and acidic flesh. *Eugenia jambosa* is widely distributed in warm countries such as Pakistan, India, Sri Lanka, Malaya, Australia, and tropical America (14). Generally this tree is cultivated on the main boundaries of fruit gardens. The annual production of this fruit in Pakistan is about 5772

tones. The fruit of *Eugenia jambosa* is variable in size upto 2.5 mm large.

Different parts such as barks, fruits and seeds of *Eugenia jambosa* possess various medical and therapeutic values (14). Present study on *Eugenia jambosa* (desi Jamun) fruit deals with minerals, vitamins as well as the identification of free sugars and amino acids. During literature survey, it was observed that little attention has been focused on the analysis of nutritive value of common vegetables and fruits produced in this country where a tremendous potential exists to explore the nutritive value of commonly cultivated or wild type vegetables and fruits. Few laboratories have carried out work of various aspects on these vegetables and fruits (4,10,12,13,18,19).

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MATERIALS AND METHODS

Eugenia jambosa (desi Jamun) fruit was purchased from local market and the procedures were carried out on the same

day. All the reagents used in this study were of analytical grade.

Analysis of sample

The edible pulp of *Eugenia jambosa* fruit was dried to a constant weight in an oven at 105°C. The ash content was determined by incineration of known weight of the sample in a furnace at 700°C. The elementary composition was determined to the procedure of Ecrement and Bruelli (8) by atomic absorption spectrophotometry. Sodium and potassium was determined by flame photometric method and phosphorus was measured by colorimetric method as reported by Chen *et. al.* (2).

Vitamin B complex content from *Eugenia jambosa* fruit was determined according to the method of Schiaffino *et. al.* (20) and vitamin C was determined Bajaj and Kaur method (1).

Isolation of water soluble components

20.0 grams of defatted *Eugenia jambosa* fruit pulp was ground with 30 ml cooled distilled water using pestle and mortar. The suspension was centrifuged to 6000 rpm for 15 minutes and supernatant was transferred to 100 ml volumetric flask. This procedure was repeated twice and volume was made upto the mark with distilled water.

The pH of the extract was measured by pH meter (WPA). Protein content was measured according to the method of Lowry *et. al.* (16) using serum albumin as standard. Total carbohydrate was measured by the method of Dubios *et. al.* (7) and the reducing sugars were estimated by the method of Miller (17).

Table 1: Mineral composition of *Eugenia jambosa* (mg/total ash weight).

Ash	5-80 % on dry weight
Sodium	391.50
Potassium	278.40
Calcium	116.00
Phosphorus	6.38
Copper	-
Cobalt	-
Iron	0.58
Zinc	0.29
Manganese	0.57

(-) absent

Table 2: Composition of water soluble vitamins of *Eugenia jambosa* fruit (per 100 g of sample).

Thiamine	0.120 mg
Niacin	0.272 mg
Ascorbic acid	30.00 mg

The composition of each sugar from aqueous extract was measured spectrophotometrically as reported by Leopold (15). Identification of free sugars from water extract of *Eugenia jambosa* fruit pulp was carried out by one dimensional thin layer chromatography using butanol - ethyl acetate - propanol - acetic acid - water (7:20:12:7:6 v/v) solvent as suggested by Takahashi *et. al.* (21). After drying, the spots were visualized by spraying with aniline phtalate and drying for 5 minutes at 80°C.

Two dimensional thin layer chromatography was also carried out for the identification of free amino acids in the above aqueous extract sample using butanol - acetic acid - water (4:1:1 v/v) and phenol - water (4:1 v/v). After drying the chromatogram was sprayed with ninhydrin and dried in oven for 5 minutes at 80°C.

RESULTS AND DISCUSSION

Table 1 demonstrates the results of mineral content of *Eugenia jambosa* fruit ash sample. It is clearly seen that fruit is very rich in minerals such as sodium 319.5 mg, potassium 278.0 mg, calcium 116.0 mg. The results concerning the other minerals were as follows: phosphorus 6.38 mg, iron 0.58 mg, manganese 0.58 mg and zinc 0.29 mg/per total ash weight. These observations are consistent with the results of other workers for commonly cultivated fruits (6).

Table 3: Analysis of 20% water extract of *Eugenia jambosa* fruit.

pH	3.85
Total protein	0.85 mg/ml
Total sugar	9.40 mg/ml
Reducing sugar	1.05 mg/ml
Non-reducing sugar	8.35 mg/ml

Table 4: Quantitative analysis of free sugars from *Eugenia jambosa* fruit water extract.

Sugars	mg/ gram sample	Relative %
Fructose	57.50	12.23
Galactose	52.50	11.17
Glucose	20.00	4.25
Maltose	210.00	44.68
Mannose	35.00	7.44
Sucrose	95.00	20.12

The water soluble extract of *Eugenia jambosa* fruit was examined for the content and of water soluble vitamins, the results are presented in Table 2. Fruit extract contains ascorbic acid (30.7 mg), thiamine (0.12 mg) and niacin (0.27 mg). Thiamine, niacin and ascorbic acid content of *Eugenia jambosa* fruit is favourably comparable with the content of *Salvadora oleides* (0.23 mg, 0.26 mg and 35.0 mg respectively) (3). *Cucumis melo* (0.04 mg, 0.60 mg and 33.0 mg), *Ribes grossularia* (0.15 mg, 0.30 mg and 25 mg) and *Citrus nobillis* (0.07 mg, 0.02 mg and 31.0 mg) (6).

The value of pH (3.85) of aqueous extract of *Eugenia jambosa* fruit pulp (Table 3) is highly acidic and is responsible for astringency in taste. The pH value of *Eugenia jambosa* fruit pulp is higher than *Carisa carindas* 2.9 (11) but it is in agreement with *Punica granatum* fruit extract pH 3.83 (9) and *Capparis decidua* pH 3.82 (5). It is reported that lower pH of sample is favourable for higher shelf life (11). A significant amount of soluble protein 0.85 mg/ml, total sugar

Table 5: Identification of free sugars by TLC from *Eugenia jambosa* fruit water extract.

Sugars	Standard Rf value	Sample Rf value
Sucrose	0.245	0.235
Glucose	0.364	0.354
Mannose	0.460	0.451

Table 6: Identification of free amino acids by TLC from *Eugenia jambosa* fruit water extract.

Alumino acid	Standard Rf value	Sample Rf value
Alanine	0.304	0.305
Unknown	-	0.341
Unknown	-	0.349
Asparagine	0.363	0.357
Unknown	-	0.374
Tyrosine	0.400	0.392
Glutamine	0.426	0.424
Cysteine	0.466	0.456

9.40 mg/ml and reducing sugar 1.05 mg/ml is present in the aqueous extract of *Eugenia jambosa* fruit pulp.

Table 4 shows the composition of free sugars isolated in aqueous extract which were determined quantitatively by spectrophotometric method. The concentration of maltose 44.68% was found higher in comparison to sucrose 20.12%, fructose 12.23%, galactose 11.17%, mannose 7.44% and glucose 4.25%. In a previous study, it was noted that the concentration of fructose was higher in comparison to other sugars in case of *Capparis decidua* fruit pulp extract (5).

The presence of glucose, mannose and sucrose were also identified by one dimensional thin layer chromatography and results are shown in Table 5. Free amino acids of *Eugenia jambosa* fruit pulp extract were separated and identified by two dimensional thin layer chromatography and results are compiled in Table 6. Out of eight, five spots were identified as alanine, asparagine, tyrosine, glutamine and cysteine. Generally the content of free amino acids changed during ripening and senescence of fruit. It is concluded that *Eugenia jambosa* fruit contain fair amount of minerals, vitamins, free sugars and amino acids and possess good nutritional value. This fruit has a high potential for commercialization in fruit juice and other food industries.

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