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Proximate and mineral analysis of fruit of *Zanthoxylum rhetsa* DC. and *Glycosmis pentaphylla.*(Retz)DC: Most useful ethnomedicinal plants in Kolhapur district

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ABSTRACT

In the present investigation, an attempt has been made to appraise proximate and mineral composition of *Zanthoxylum rhetsa* DC. And *Glycosmis pentaphylla.* (Retz)DC. The fruits are used by rural people of Kolhapur district as their in food and medicine. Hence in present investigation unripened and ripened fruits are selected for determining the nutritional potential and ethnomedicinal importance. In present study higher amount of Moisture (60.0 ±1.42%), Crude protein (3.5 ±0.5%), Reducing sugar (2.7 ±0.40%), Total sugar (4.1±0.70%), Starch (5.8 ±0.37%) and Energy (273±34.74KJ/100g.) in ripened fruit of *Glycosmis pentaphylla.* Highest amount of Dry content (53.2 ±0.32%), Ash (4.0 ±0.10 %) and Crude fibre (6.5±0.51%) and crude fat (5.5 ±1.56%) found within unripened fruit of *Zanthoxylum rhetsa.* Among the various macronutrients and micronutrients estimated in the fruits Magnesium (1150±0.03mg) was present in highest quantity, followed by sulphur (920±0.14mg) and calcium (890±0.08mg) in ripened fruit of *Glycosmis pentaphylla*. Only zinc was (2.0.±0.04) higher reported in ripened fruits of *Zanthoxylum rhetsa.* Unripened fruit of *Glycosmis pentaphylla. s*hows Maximum concentration of Magnesium (1050±0.15) followed by calcium (1010±0.026). While only sodium (820±0.10) was maximum reported in unripened fruit of *Zanthoxylum rhetsa*. On the basis of above investigation fruit of both the plants play a very significant role in food supplement of rural people and also beneficial for health care.

Keywords: Bromatological analysis, Mineral contents, Ethnomedicine, *Zanthoxylum rhetsa* DC and *Glycosmis pentaphylla*. (Retz) DC.

INTRODUCTION

Wild edible fruits play a vital role in supplementing diet to rural people. The dependence on these fruits has steadily diminishing due to more exotic fruits have been introduced. But many rural people still use them as a supplement of their basic need as food. Potentially they have many advantages as compare to their traditional use. (Deshmukh *et al*, 2011).

The family Rutaceae has economic importance for its edible fruits and also great value in indigenous system of medicine. Today most of the wild plants were commonly used as vegetables and for curing diseases. Wild edible plants play a significant role in the sustenance of tribal people residing in forested areas**.** (Deshpande *et al*, 2015).

Zanthoxylum rhetsa. is medium-sized, deciduous, aromatic and medicinal tree commonly known as **Tirphal** belonging to family Rutaceae. It is distributed in Konkan, Deccan, Mysore, Malabar, Annamalais and Travancore at low elevation. It is also found in Assam and Meghalaya and in Eastern and Western Ghats of peninsular India (Kirtikar and Basu, 1993). The fruit shows medicinal properties such as stimulants, astringent, aromatic and digestive (Abraham *et al*, 1972). Essential Oils from fruit showed significant local anesthetic activity (Abraham *et al*, 1972, Agshikar *et al*, 1969). The fruit and stem bark are aromatic, stimulant, astringent, stomachic and digestive; prescribed in urinary diseases, dyspepsia, and diarrhea and with honey in rheumatism (Rastogi *et al*, 1990). The bromatological and mineral analysis of edible plants plays an important role in evaluataning their nutritional significance. Nutritional status is depending upon presence of different element in their plants.

Glycosmis pentaphylla is a small shrub having bitter stems and leaves (Ghani, 2003). The plant is indigenous to south-eastern Asia and north eastern Australia. It is found in various states of India including Assam, Arunachal, Meghalaya, Nagaland and Mizoram (Islam, M. 1996). This plant is well known as indigenous medicine for the treatment of cough, jaundice, inflammation, rheumatism, anemia and helminthic infestations (Kirtikar *et al*, 1993). *Glycosmis pentaphylla*. has also been established to possess antioxidant, galactagogue, immune stimulant, larvicidal activity, and antipyretic and hepatoprotective activities (Jaya, et al 2010). In folk medicine, the bark of *Glycosmis pentaphylla*. is useful for the management of diabetes and gonorrhea (Gupta *et al*, 2011). Paste of leaves is used externally in eczema and other skin affections. Root is beneficial in fever and fruits used in dysentery (Ghani, 2003). Whole plant of *Glycosmis pentaphylla* was subjected to numerous pharmacological investigations to determine antioxi-dant, analgesic and antimicrobial activities upon literature survey and on the basis of traditional uses. The fruits of *Zanthoxylum rhetsa* DC, and *Glycosmis pentaphylla.* (Retz) DC were subjected to proximate and mineral analysis. The present study investigate Moisture, Dry Matter, Ash, Protein, Fat, Fiber, Carbohydrate and Energy were analyzed while essential nutrients analysis likes N, K, Na, P, Ca, Mg, Cu, Fe, Mn and Zn were scrutinized.

MATERIAL AND METHOD

Collection of Plant Material

Both plants materials were collected in flowering and fruiting stages during frequent visits in the month of June–February from adjoining areas of Kolhapur district. The local floristic keys were used for determining the species. The collected material was placed in a polythene bag to prevent loss of moisture during transportation to the laboratory.

Sample Preparation

The plants were washed thoroughly until no extraneous material remained. They were blotted till the excess moisture absorbed, air dried and weighted to obtain fresh weight. The sample used for mineral analysis was washed using double deionised water. Then the plant materials cut into small pieces and placed in paper envelop and dried in the oven at 40^0C until constant weight was obtained. After complete drying the sample was ground to a fine powder by using an electric grinder. The sample was packed into airtight sample bottles and used for the nutrient analysis. All analyses were conducted in duplicate by using analytical grade reagents.

Proximate analysis

The moisture content, ash, crude fat, crude protein and crude fiber were determined in accordance with the standard methods of the AOAC (1990). Crude fat was determined by exhaustively extracting samples in a soxhlet apparatus using petroleum ether as the solvent. Crude protein determination involved the use of routine Kjeldahl nitrogen assay (N x 6.25). Crude fiber estimates were obtained from the loss in weight on ignition of dried residue following the digestion of fat free sample with 1.25% each of sulphuric acid and sodium hydroxide solution under specified condition. Reducing sugar, total Sugar and starch were estimated according to the method described by Nelson (1944). Carbohydrate content was determined by summation of total sugar and starch. Energy was calculated by using the general Atwater factor of 4 kilocalorie (kcal) per 'g' protein, 9 kcal per 'g' fat and 4 kcal per 'g' carbohydrate. These conversion factors were multiplied by 4.186 in

order to obtain energy values in kilojoules (kJ) WHO (1985).

Mineral analysis such as K, Na, P, Mg, Ca, Fe, Mn, Cu and Zn were determined by the atomic absorption spectrophotometric method. The samples, which were digested in acid solution of HNO_3 and perchloric acid (Toth *et al*, 1948), were passed through atomic absorption spectrophotometry (AAS) using different lamps and caliberated or different micronutrients. Potassium and sodium was determined through flame photometer after acid digestion. Phosphorus was determined spectrophotometrically using the vendates solution (Sekine *et al*, 1965, Yoshida *et al*, (1972).

A] Images of *Zanthoxylum rhetsa*.

Plate-1Habit

Plate-2Flower

Plate-3 Fruits

Plate-4 Collection of fruit

B] Images of *Glycosmis pentaphylla.*

Plate-1 Habit

Plate-2 Flowers

Plate-3 Friuts

Plate-4 collection of fruit

RESULTS AND DISCUSION

Proximate analysis

The results of proximate composition of wild edible fruits of *Zanthoxylum rhetsa* and *Glycosmis pentaphylla*. are depicted in Table 1.

The results obtained from bromatological analysis of two wild edible unripened fruits establishes that Dry content, Ash, Crude fibre and Crude protein was maximum recorded in unripened fruit of *Zanthoxylum rhetsa.* While these parameters are least recorded in unripened fruit *Glycosmis pentaphylla.* Maximum amount of Moisture, Crude fat, Reducing sugar, and Total sugar, Starch, Carbohydrate and Energy Content were found in unripened fruit of *Glycosmis pentaphylla.* And minimum concentration was found in unripened fruit of *Zanthoxylum rhetsa. (*Mahadkar *et al,* 2016) carried out Bromatological Analysis from Medicinally Relevant Wild Edible Plant Parts. They analyzed similar kinds of parameters. They mentioned fruit of *Zanthoxylum rhetsa* contain (20.67 ±0.01) Energy Content, **(**1.25±0.009) Carbohydrate, (1.0± 0.0057) Starch, (0.23±0.0061) Total sugar. In present investigation these values is reported to be higher

Maximum concentration of Dry content, Ash, Crude fibre and Crude fat was found in Ripened fruit of *Zanthoxylum rhetsa* while remaining parameters were highly recorded in ripened fruit of *Glycosmis pentaphylla.* (Verma and Khosa 2009) carried out pharmacognostical studies on *Zanthoxylum armatum* leaves. They analyzed parameters like total ash, acid soluble ash, water soluble ash, moisture content, water content, foreign organic matter, water soluble extractive, alcohol soluble extractive, chloroform soluble extractive, petroleum ether soluble extractive etc. Moisture content in leaves of *Z. armatum* is 8.97%.

In present study moisture content (46.8 ±0.32 to 49.2±0.35%) in unripened and ripened fruits of *Z. rhetsa* is reported to be higher. Earlier authors used as bark and leaves for their study. In present work fruits had been taken. Similar work was done by Mahapatra *et al*, (2012) on Nutrient Analysis of Some Selected Wild Edible Fruits of Deciduous Forests of India; and Explorative Study towards Non. They determined proximate value, mineral contents and antioxidant activity of some wild edible plants from Deciduous Forests of India *Glycosmis pentaphylla* is one of them.

Table 1: proximate analysis.

Sr. No.	Parameters	*Zanthoxylum rhetsa*		*Glycosmis pentaphylla*	
		Unripened fruit	Ripened fruit	Unripened fruit	Ripened fruit
1	Moisture (%)	46.8 ±0.32	49.2±0.35	57.5±0.55	60.0±1.42
2	Dry content (%)	53.2 ±0.32	50.8±0.35	42.5±0.55	40.0±1.42
3	Ash (%)	4.0 ±0.10	3.5±0.36	3.5±0.51	3.2±0.20
4	Crude fibre (%)	6.5 ±0.51	4.8±0.30	5.5±0.65	3.9±0.15
5	Crude fat (%)	3.5±0.4	4.0±0.50	5.5±1.56	2.5±0.65
6	Crude protein (%)	3.6±0.97	1.0±0.45	2.06±0.31	3.5±0.5
7	Reducing sugar (g)	0.15±0.07	0.23±0.04	2.1±0.28	2.7 ±0.40
8	Total sugar (g)	0.25±0.06	0.3±0.2	3.2 ±0.1	4.1±0.70
9	Starch (g)	1.5±0.25	1.02±0.05	4.4±0.55	5.8 ±0.37
10	Carbohydrate(g)	1.75 ±0.07	1.32±0.04	7.6±0.11	9.9±0.28
11	Energy Content KJ/100g.	158.9±13.31	172.4±22.68	215.5±16.95	273±34.74

Values are means of three determinations ±S.D. (n=3), 2. Carbohydrate calculated by difference 3. Energy calculated by using Atwater factor.

Table 2. - Mineral analysis

Sr. No	Name of the elements (mg/100g)	*Zanthoxylum rhetsa*		*Glycosmis pentaphylla*	
		Unripened fruit	Ripened fruit	Unripened fruit	Ripened fruit
1	Nitrogen	220 ±0.02	160±0.02	330±0.05	560±0.04
2	Phosphorus	50±0.03	100±0.02	500±10.04	180±0.10
3	Potassium	310±0.01	330±0.01	1020±0.04	640±0.10
4	Calcium	430±0.05	1000±0.11	1010±0.026	890±0.08
5	Magnesium	950±0.04	1001±0.05	1050±0.15	1150±0.03
6	Sulphur	250±0.03	100±0.02	690±0.36	920±0.14
7	Sodium	820±0.10	860±0.02	680±0.07	880±0.24
8	Zinc	1.99±0.19	2.0.±0.04	6.4±0.07	1.69±0.12
9	Ferrous	2.14±0.11	2.2±0.06	6.9±0.13	4.3±0.23
10	Copper	0.86±0.33	1.2±0.2	2.9±0.14	1.8±0.12
11	Manganese	2.9 ±0.23	3.1±0.3	9.7±0.13	6.1±0.17

They mentioned fruit of *Glycosmis pentaphylla* contain (61.7±0.34) Moisture, (0.8±0.13) Crude protein, (0.58±0.08) Reducing sugar, (1.35±0.07) total sugar and (4.3±2.1) carbohydrate. In present investigation maximum values were reported because it is due to edaphic factor.

Mineral Analysis :

The results of mineral composition of wild edible fruits of *Zanthoxylum rhetsa* and *Glycosmis pentaphylla*. are depicted in Table 2.

The edible fruits of both the plants contain minerals like Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Sulphur, Sodium, Zinc, Ferrous, Copper and Manganese are analyzed. Among Macronutrients and micronutrients Unripened fruit of *Glycosmis pentaphylla* show maximum values. While least amount of both the nutrients were found in unripened fruit *Zanthoxylum rhetsa*. Similar work was done by (Mahadkar *et al*, 2016). They have mentioned fruit of *Zanthoxylum rhetsa* contain (720±3.00) Nitrogen, (240±10.53) Phosphorus, (340±12.52) Potassium, (731.2±5.16) Calcium, (316±4.92) Magnesium, (350±6.08) Sodium, (1.06±0.13) Zinc, (9.52±0.33) Ferrous, (4±0.14) Copper and (0.70±0.06) Manganese. In present investigation Magnesium and manganese was highly recorded than previous author.

Ripened fruit of *Glycosmis pentaphylla* shows higher amount of macro as well as micronutrients only calcium and zinc was highly reported in ripened fruit

Zanthoxylum rhetsa. (13) (Mahapatra *et al*, 2012) worked on Nutrient Analysis of Some Selected Wild Edible Fruits of Deciduous Forests of India; and Explorative Study towards Non. *Glycosmis pentaphylla* is one of them. They have mentioned (675.78) Potassium, (88.87) Calcium, (31.03) Sodium, (2.95) Zinc (1.87) Copper and (4.04) Manganese. In present study all these parameters are higher than previous author due to the different environmental conditions.

CONLUSION

The study shows that the wild edible fruits collected from adjoining area of Kolhapur district are rich in proteins, available carbohydrates, total dietary fibre, energy content and sufficient amount of minerals. We believe that these fruits can be used for the well-being of mankind due to its nutrition potential.

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