RESEARCH ARTICLE

Phytochemical assessment of five wild edible fruits

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ABSTRACT

Fruits are important ingredients in the human diets. Due to their high nutritive value, they make significant nutritional contribution to human well-being. The perishable fruits are available as seasonal surpluses during certain parts of the year in different regions and are wasted in large quantities due to unawareness, know-low for proper handling, distribution, marketing and storage. To create awareness regarding nutritive and medicinal values from these fruits, present investigation was carried out. The selected wild edible fruits were (*Ficus racemosa*, *Elaegnus conferta, Antidesma ghasembilla, Grewia tillifolia* and *Scleichera oleosa*) in their mature and ripen stage.. Various parameters were carried out like moisture, dry matter, carotenoids, carbohydrate (reducing sugar, starch, soluble sugar) antioxidant enzymes like catalase, peroxidase, superoxide dismutase. All five wild edible fruits were rich in vitamins, proteins and in antioxidant enzymes. The nutritional and phytochemical composition of fruits indicates that, these neglected wild edible fruits can be a valuable source of nutrients under famine conditions and high levels of some vitamins, antioxidants and can be used to prevent diseases.

Keywords: Antioxidants, Phytochemicals, Wild edible fruits.

INTRODUCTION

"Food is the medicine and medicine is the food" said by Hippocrates nearly 2500 years ago (Proper diet is the medicine and there is no medicine like proper diet). Even good medicines will not cure a patient without an appropriate accompanying diet. In fact, Ayurveda says that a well modulated or regulated diet is the best medicine.

Fruit is one of the major dietary sources of various antioxidant phytocompounds for humans. Our daily diet plays a key role in healthy aging and preventing chronic disease including obesity, diabetes, cardiovascular diseases, cancer, and osteoporosis (Heber, 2009). Edible wild fruits play significant role providing nutrient food supplement and

also by generating side income to the poor people. Fruits collected by local people from natural forests are often seen for sell in the market (Malla *et al.,* 1982, Manandhar, 1991) Many valuable fruits which are familiar to certain areas or to certain communities are unknown to others. Therefore research on wild edible fruits has been carried out.

MATERIALS AND METHODS

Selected wild edible fruits were collected from various localities of kolhapur district,viz. *FicusRacemosa* L., *Elaeagnus conferta* Roxb., *Antidesma ghasembilla* Gaertn., *Grewia tillifolia* Vahl., *Scleichera oleosa* Merr. etc. Efforts made to collect these plants in flowering and fruiting conditions for the correct botanical identification. Healthy and disease free fruits selected and some parameters like moisture, dry matter, antioxidant enzymes like catalase, peroxidase and superoxide dismutase were estimated from fresh fruits. Some fruits were dried under shade so as to prevent the decomposition of chemical compounds present in them. All the dried material powdered in blander for further study.

Dry matter, Moisture, Ash- AOAC (1990), catalase – Sadasivam and Manikam, Reducing sugar and Starch- Nelson (1944), Soluble sugar- Day, 1990 Carotenoids- Kirk and Allen, 1965, Polyphenols - Folin and Denis (1915), Peroxidase - Maehly (1954), phytate-Reddy and Love (1999) and oxalate-Day and Underwood (1986).

RESULTS AND DISCUSSION

I. Proximate analysis: In proximate analysis we have carried out parameters like moisture, dry matter, carotenoid, Carbohydrate i.e. Reducing sugar, starch and total sugar.

i. Moisture:

Moisture content were more in mature fruit of *Ficus racemosa* (71.6%) and ripened fruits of *Antidesma ghasembilla* (85.3%). The nutritional and physico-chemical properties of ripe *Ziziphus* fruit were carried out by Vidrin *et al.* (2008). They obtained 42.25% moisture from this fruit. Desai *et al.* (2010) studied the proximate composition and some physicochemical properties of the two species of *Morinda* fruits. They analyzed parameters like fresh weight, crude protein, crude fibre, total soluble content, total sugar, lipid refractive index, pH titratable acidity etc. The moisture content in *Morinda citrifolia* is (63%) and *Morinda pubescens* is (22%). Our result also somewhat related to results of above mentioned authors.

ii. Dry matter:

Dry matter was more in mature fruit of *Elaegnus conferta* (51%) and ripened fruits of *Ficus racemosa* (28.3 %). Effiong *et al.* (2009) carried out the nutritive and energy values of wild fruit in southern Nigerian. The dry matter present in fruits of *Xylopia aethiopica* was 26.94 ± 0.09%; *Tetrapluera tetraplera* 69.46 ± 0.48%; *Piper guineense* 16.66 ± 0.74%. The antioxidant capacity and phytochemical properties of wild and cultivated red raspberries (*Rubus idaeus* L.) were carried out by Cekin and Ozgen (2010). The dry matter of the raspberries accessions were 0.03% (PC1); 0.36% (PC2) and 0.16% (PC3).

iii. Carotenoid:

Carotenoid content from five wild edible fruits showed more amount in mature fruits than ripened fruits. Mature fruits of *Elaegnus conferta* (8.4mg/100gFW) and ripened fruits of *Schleichera oleosa* (3.4mg/100gFW) showed highest carotenoid content.

Table 1: Phytochemical assessment of five wild edible fruits

Name of the plants	Moisture		Dry matter		Carotenoid		Reducing sugar		Starch		Total sugar	
	M	R	M	R	M	R	M	R	M	R	M	R
Grewia tiliifolia	67 ±0.001	72.66 ±0.025	33 ±0.05	17.33 ±0.01	5.06 ±0.0	2.95 ±0.09	1.6 ±0.51	2.18 ±0.03	15.15 ±0.032	11.3 ±0.072	4.1 ±0.02	5.17 ±0.1
Ficus racemosa	71.66 ±0.081	75.6 ±0.031	24.4 ±0.01	28.1 ±0.02	4.7 ±0.04	2.5 ±0.01	3.17 ±0.03	13.07 ±0.01	9.7 ±0.01	9.4 ±0.012	18.08 ±0.04	29.43 ±0.02
Elaegnus conferta	46 ±0.012	77.33 ±0.09	54 ±0.03	22.6 ±0.06	8.4 ±0.003	2.14 ±0.001	4.9 ±0.01	10.63 ±0.02	15.5 ±0.023	6.7 ±0.012	10.17 ±0.04	22.32 ±0.041
Antidesma ghasembilla	60 ±0.02	71.5 ±0.03	40 ±0.03	29.5 ±0.02	1.5 ±0.01	1.4 ±0.01	7.2 ±0.03	11.8 ±0.012	17.7 ±0.05	10.6 ±0.043	16.15 ±0.02	25.7 ±0.023
Schleichera oleosa	52±0.04	77.4 ±0.05	48 ±0.051	22.6 ±0.01	3.5 ±0.023	3.1 ±0.05	8.4 ±0.001	11.7 ±0.003	11.3 ±0.008	9.2 ±0.6	2.64 ±0.1	7.23 ±0.2

Table 1: Continued...

Name of the plants	Phytic acid		oxalate		Catalase		peroxidase		Superoxide dismutase	
	M	R	M	R	M	R	M	R	M	R
Grewia tiliifolia	0.82 ±0.07	0.62 ±0.09	1.22 ±0.3	1.1 ±0.25	0.0086 ±0.005	0.005 0.0002	0.0037± 0.0002	0.0046± 0.0002	0.001467± 0.00013	0.0011 ±0.0001
Ficus racemosa	0.93 ±0.05	0.7 ±0.2	1.4 ±0.15	1.1 ±0.15	0.02± 0.0002	0.0044± 0.0002	0.003733± 0.000153	0.008533± 0.0002	0.004667± 0.0005	0.002 ± 0
Elaegnus conferta	0.51 ±0.09	0.31 ±0.02	1.23 ±0.10	0.93 ±0.11	0.0037± 0.00015	0.000667 ±0.0002	0.0025± 0.0002	0.0055± 0.004	0.003567± 0.00028	0.00262± 0.327
Antidesma ghasembilla	0.75 ±0.07	0.67 ±0.04	0.87 ±0.04	0.73 ±0.05	0.0045± 0.0002	0.003533± 0.0003	0.000467± 0.000208	0.000633± 0.0003	0.0008 ± 0.0001	0.0006 ± 0.0001
Schleichera oleosa	0.7 ±0.079	0.46 ±0.04	1.36 ±0.30	1.1 ±0.1	0.0053± 0.0003	0.0045± 0.0056	0.001167± 0.000115	0.001433 0.00011	0.0012 ± 0.0002	0.000833± 0.0001

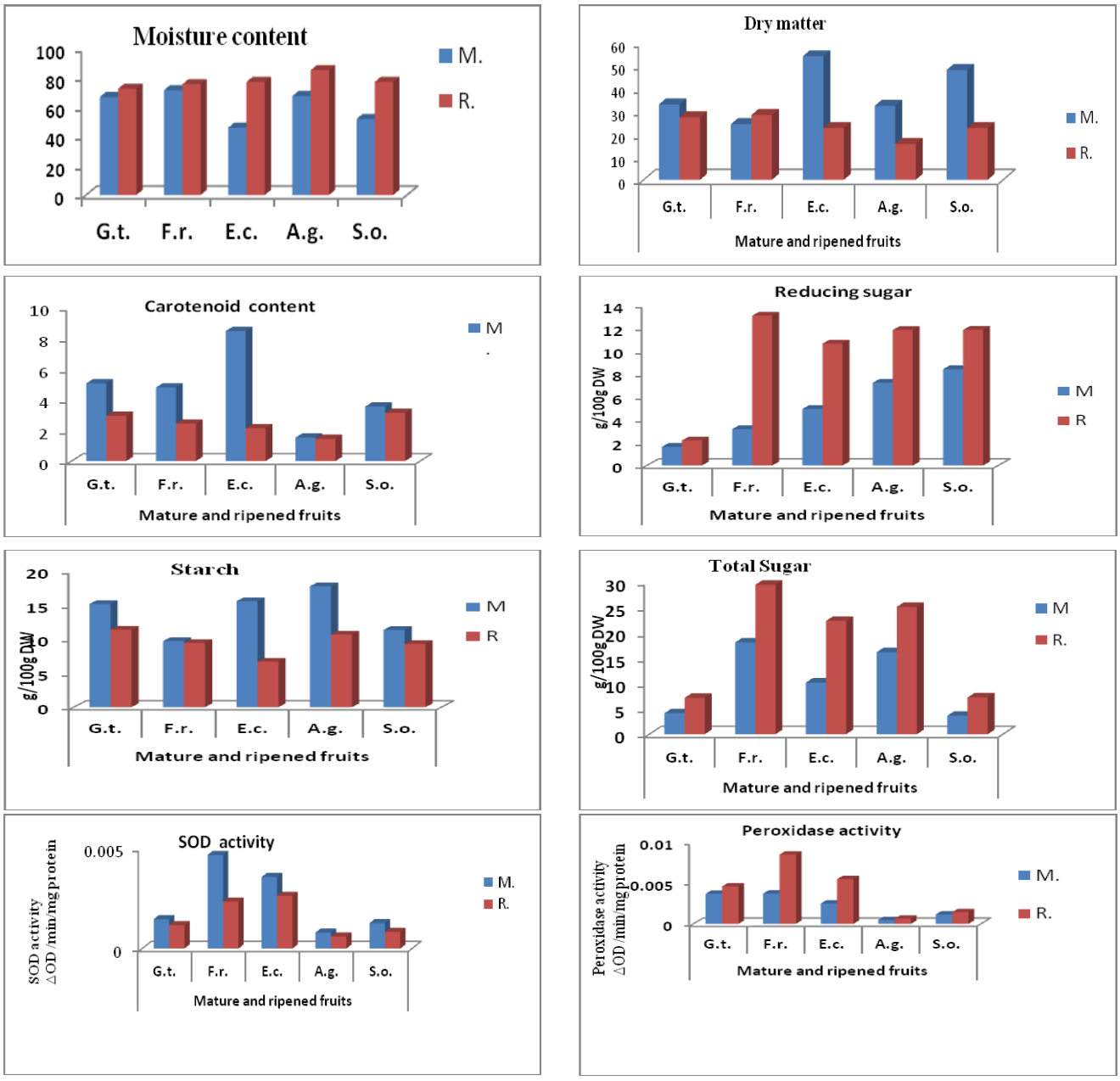

Fig. 1: Phytochemical assessment of five wild edible fruits

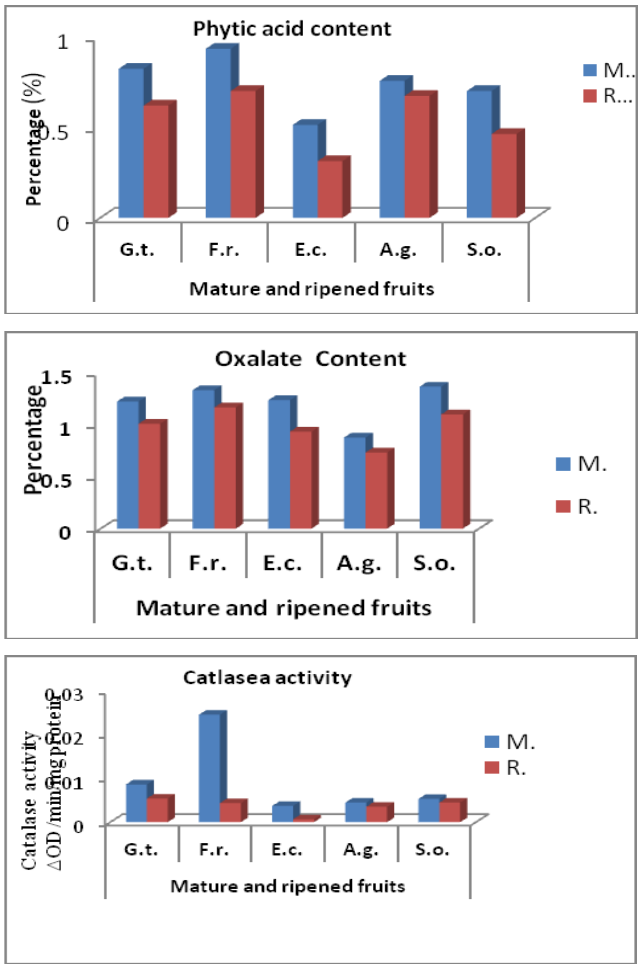

Fig. 1: Phytochemical assessment of five wild edible fruits

Gouado *et al*., (2007) studied carotenoid content of some locally consumed fruits and observed that mango fruits are the richest source of provitamin A carotenoids (2854 ug/100 g FW) followed by red pumpkin (1204 ug/100 g FW) and the lowest in guava (29.84 ug/100 g FW). As we compared these values with present study carotenoid content is lower in present study.

Carbohydrates:

Reducing sugar and total sugar is higher in ripened fruits and starch content s higher in mature fruits. From five edible fruits, reducing sugar (10.07) and total sugar (29.43g/100gDW) is higher in *Ficus racemosa* fruits. Starch content is higher in mature fruits of *Antidesma ghasembilla* (17.7g/100gDW).

The increase in reducing sugars in the pulp and peel of Guava fruits up to the climacteric peak and subsequently decreases have been reported by Hind *et al*., (2003). Subramanyam and Acharya (1957) also found that reducing sugars increased during guava fruit ripening and then decreased. Similar results were also reported in mango fruits (Abu-Goukh and Abu-Sarra, 1993 and Subramanyam *et al*., 1976). The starch content in *Artocarpus heterophyllus* was approximately 330 g/kg DW (Rahman *et al.* 1995) and *Cordia dichotoma* have 5.86 g/100g DW (Aberoumand, 2009). The amount of total soluble sugars changes with fruit maturity showing amaximum score at ripening (Cho *et al.,*1993). Sugar content varies with plant nutrition, climate, soil and storage conditions (Whiting, 1970).

Enzymatic Antioxidants:

Enzymatic activities of catalase (CAT) and superoxide dismutase (SOD) were higher in mature fruits while peroxidase higher in ripened fruits. *Ficus racemosa* mature fruits showed higher catalase (0.0247 ΔOD /min/mg protein) and SOD (0.0046ΔOD/min/mg protein) while ripened fruits showed higher POX activity (0.0085 ΔOD /min/mg protein).

Huang, *et al.,* (2007) studied the activity of enzyme catalase in orange pulp during fruit ripening and maturation of three cultivars ('Red Flesh' navel orange, 'Newhall' navel orange and 'Sanguine' orange,) and noticed the progressive decrease in catalase activity with ripening and the most substantial decrease in catalase occurred between young fruit stage and green fruit stage. Niranjana, *et al.* (2009) studied the effect of pre cooling and heat treatment on antioxidant enzymes profile of Mango and Banana. The highest activity of SOD in mango (T5) was 119.4 units / min/g FW. and least in (T4) was 86 units / min/g FW. Incase of banana (T6) highest SOD activity was (2.84 units / min/g FW) and least in T4 (0.4 units / min/g FW). In present study, all enzymatic antioxidants were lower than studied by these authors.

Antinutritional factors:

Although the wild fruits are delicious and nutritious, more consumption of such fruits are hazards to our body, so before eating it must be checked weather it contain proper amount of antinutritional factors. The antinutritional factors such as phytic acid and oxalic acid, have adverse effect on health through inhibition of protein digestion, growth, iron and zinc absorption (Liener et al 1980, Larsson et al 1996.). Therefore we analyzed following two antinutritional factors.

Phytic acid: Among five fruits, *Ficus racemosa* showed higher phytate content (0.7±0.2%) while *Elaegnus conferta* (0.31±0.03%) showed less.

Aberoumand and Deokule (2009) carried out the nutritional values of some wild edible plants from Iran and India. The *Cordia myxa* Roxb is one of them. They analysed nutrients such as carbohydrates (free sugars and starch), oil, proteins, minerals, ascorbic acid and antioxidant phenols and phytic acid. They obtained 2.5 mg/100g phytic acid in this fruit.

Oxalate: Oxalate content is higher in mature fruit of *Schleichera oleosa* (1.49+0.03%) and lower in ripened fruits of *Ficus racemosa* (1.13+0.02%).

The seeds of the fruits of some wild plants, *Cassipourea congoensis* (Tunti), *Nuclea latifolia* (Luzzi), *Deterium microcarpum* (Tallow), *Balanites aegytiaca* (Betu), and *Gemlin arborea* (Melina) were analysed to establish their proximate compositions and the physico chemical characteristics of the oils by Nkafamiya *et al.* (2007). The oxalate content in these seeds were 10.21 $\pm$ 1.11% in *Cassipourea congoensis*; 9.5 $\pm$ 0.16% in *Deterium microcarpum*; 10.15 $\pm$ 0.13 *Nuclea latifolia*; 10.01 $\pm$ 0.12% in *Balanites aegyptiaca,* 9.16 $\pm$ 0.13% in *Gemlina arborea.*

CONCLUSION:

All Five wild fruit plants are rich in carbohydrates and in antioxidant enzymes. Out of them, *Ficus racemosa* were rich in antioxidant enzymes; *Grewia tiliifolia, Elaeagnus conferta, Ficus racemosa* and *Schleichera oleosa* are rich in all non enzymatic antioxidants. The nutritional and phytochemical composition of five wild edible fruits indicates that, these neglected fruits can be a valuable source of phytochemical and nutrients under famine conditions and can be used to prevent diseases.

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