CHAPTER-29

PHYTOCHEMICAL ANALYSIS OF SELECTED WILD FRUITS FROM AKOLA REGION (MS) INDIA

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Summary

Wild fruits are a rich source of bioactive compounds that contribute to their medicinal and nutritional properties. The present study investigates the phytochemical composition of selected wild fruits from the Akola region to evaluate their potential health benefits. Selected fruits were collected from different locations, and preliminary qualitative phytochemical screening was conducted to detect the presence of alkaloids, flavonoids, tannins, saponins, terpenoids, and phenolic compounds. The results revealed a significant presence of secondary metabolites, particularly flavonoids and phenolics, which are known for their antioxidant properties. The findings suggest that these wild fruits could be valuable sources of natural antioxidants and have potential applications in the pharmaceutical and food industries

Keyword: Wild fruits, Antioxidants, Alkaloids, Saponins, Terpenoids, Phenolics, etc.

Introduction

The consumption of a wide range of fruits yields substantial health benefits, as they serve as a valuable source of phytochemicals that aid in disease prevention. Numerous epidemiological studies have demonstrated a positive relationship between the dietary intake of fruits and vegetables and a lower risk of cardiovascular diseases (Hu, 2003; Ikram et al., 2009), certain cancers (Ikram et al., 2009; Riboli and Norat, 2003), immune system problems, arthritis, inflammation and brain dysfunction (Leong and Shui, 2002). A diverse array of antioxidant compounds, including flavonoids, phenolics, carotenoids, and vitamins, is found in fruits. These substances are acknowledged for their health benefits, particularly in reducing the likelihood of degenerative diseases through

E-Book ISBN: 978-81-981814-9-7, DOI: https://doi.org/10.34256/adbor.25.29.229

the alleviation of oxidative stress and the inhibition of macromolecular oxidation (Heber, 2004; Prior et al., 2003; Rangkadilok et al., 2007).

Indigenous fruits contain various phytochemicals, such as phenolic substances, flavonoids, carotenoids, phytosterols, and vitamins C and E, which have drawn considerable attention for their biological properties, particularly their antioxidant, anticancer, and antidiabetic capabilities. (Tshikalange *et al.*, 2017; Sirichai *et al.*, 2022). These phytochemicals counteract reactive oxygen species by providing an electron to an unpaired molecule, thereby neutralizing free radicals. Additionally, phytochemicals have the potential to diminish the risk of cancer, as well as cardiometabolic and endocrine disorders (de Carvalho and Conte-Junior, 2021).

Materials and Methods

Collection of plant material

The fruits selected for the study are Aegle marmelos (L.) Correa., Limnonia acidissima L., Tamarindus indica L., Terminalia bellirica (Gaertn.) Roxb., Ziziphus mauritiana L., Buchnania lanzan Spreng., Citrullus colocynthis (L.) Schrad, Ficus racemosa L., Lantana camara L. and Morinda citrifolia L., were collected during month of September - December from various forest localities of Akola district (MS). The plant material and specimens were identified by using standard floras like Naik 1989, Yadav and Sardesai, 2002. The voucher specimens were preserved in the institute herbarium library. The collected plant material fruits were washed with tap water and then distilled water. Then the material was grinded well to obtain homogenous fine grade powder. The 5gm powdered material soaked in each 50 ml of Acetone, Distilled water and alcohol for 1 hour. The solvent was filtered, and the preliminary tests were carried out.

Qualitative Phytochemical Analysis

For the phytochemical analysis of following Phytochemicals, prepared from the three types of solution that is leaves extracts with Acetone, distilled water and Ethanol of above-mentioned plants. The preliminary phytochemical studies are done for detection of various constituents i.e. alkaloids, glycosides, carbohydrates etc. present in plant extract, which is responsible for the pharmacological activity. Chemical tests were carried out on the successive extracts separately using standard procedures to identify the constituents as described by (Harborne, 1973; Sofowora, 2000 and Krishnaiah et al, 2009).

Quantitative Estimation of Total Phenols

1gm of sample was grinded with the help of mortar and pestle in 10-times volume of 80% ethanol. The homogenate was centrifuged at 10,000 rpm for 20 minutes. Supernatant was kept and the residue was re-extracted with 5 times volume of 80% ethanol, centrifuged and pooled. Then the supernatant was evaporated to dryness in a water bath. Then the residue was dissolved in the known volume (5 ml) of distilled water.1 ml of the aliquot was pipette out in a test tube, and volume make up to 3 ml with distilled water. To it 0.5 ml of Folin - Ciocalteu reagent was added. After 3 minutes, 2 ml of 20% Na_2CO_3 solution was added, then mixed thoroughly and the test tube was kept in boiling water

bath for exactly one minute, then allowed to cool and absorbance was measured at 650nm against a reagent blank. Standard curve was prepared using different concentrations (0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8 and 2.0 ml) of catechol. (Thimmaiah, 2009)

Observation and Results

Qualitative Phytochemical Analysis

In all 10 fruits were selected for the study viz, Aegle marmelos (L.) Correa., Limnonia acidissima L., Tamarindus indica L., Terminalia bellirica (Gaertn.) Roxb., Ziziphus mauritiana L., Buchnania lanzan Spreng., Citrullus colocynthis (L.) Schrad, Ficus racemosa L., Lantana camara L. and Morinda citrifolia L. The powdered sample of plant material (fruits) were subjected for preliminary phytochemical analysis using three solvents i.e. Acetone, Distilled water and Ethanol. Quantitative estimation for total phenols was performed by spectrophotometric method. The various observations done and results obtained are enumerated in Table 1.

Quantitative Estimation of Total Phenols

The selected fruit extracts showed varied absorbance at 650 nm wavelength and the concentration of total phenols was calculated (mg/g) by plotting the absorbance of the respective fruit extract on the standard graph represented in graphical manner.

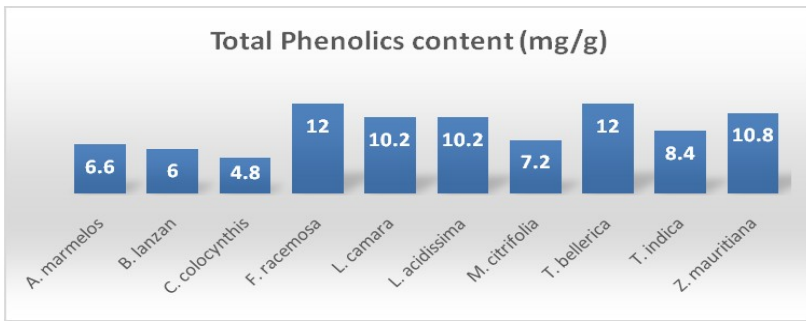

Figure 1: Quantitative analysis of Total Phenolics content (mg/g) of selected Wild Fruits from Akola region

Discussion

Wild fruits have been an essential part of human nutrition and traditional medicine for centuries. Unlike cultivated fruits, wild fruits grow naturally in forests and uncultivated lands, often thriving in diverse climatic conditions. Rybicka *et al.* (2021) reported the nutritional value of 12 commercially available dried fruits. They found dried fruits to be nutritious and have potential applications in wider various food formulations. Investigation of the nutritional

Table 1: Preliminary Phytochemical Analysis of selected Wild Fruits from Akola region

S. N.	Phytochemical	*Am*			*Bl*			*Cc*			*Fr*			*La*			*Lc*			*Mc*			*Tb*			*Ti*			*Zm*		
		A c.	D W	E t.	A c.	D W	E t.	A c.	D W	E t.	A c.	D W	E t.	A c.	D W	E t.	A c.	D W	E t.	A c.	D W	E t.	A c.	D W	E t.	A c.	D W	E t.	A c.	D W	E t.
1	Carbohydrate	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	Protein	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+
3	Reducing Sugar	-	-	+	-	+	+	-	+	+	-	+	+	-	-	-	-	+	+	-	+	+	+	-	+	-	-	-	-	+	-
4	Cardiac glycosides	+	+	-	+	+	+	+	-	-	+	+	+	+	-	-	+	+	+	-	-	+	+	+	+	+	+	-	+	-	+
5	Steroids	-	+	-	-	-	-	+	-	+	+	-	-	-	-	-	+	-	-	+	-	-	-	+	+	+	-	-	-	-	-
6	Alkaloids	-	-	-	-	+	+	-	-	-	-	+	+	-	-	-	-	+	+	-	+	-	+	+	+	+	-	-	+	+	+
7	Flavonoids	+	+	+	+	-	-	+	+	+	-	-	-	+	-	+	+	+	+	-	-	+	+	+	+	-	+	+	-	+	-
8	Tannins	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	+	+	-	-	-
9	Phenolics	+	+	+	-	+	+	+	+	+	+	+	+	+	-	+	-	-	-	-	+	+	-	+	+	+	+	+	+	+	-
10	Saponin	-	-	-	+	+	+	-	-	-	-	+	+	-	+	-	+	+	+	-	+	+	+	+	+	+	-	+	-	+	+
11	Terpenoids	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	+	-	-	-	+	-	+	-	-
12	Quinone	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	+	-	-	+	+	+	+	-	-	-	+	-
13	Fats and Oils	-	+	+	+	+	+	-	+	-	-	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	-	+	-	-	+

*Am – *Aegle marmelos*; Bl – *Buchnania lanzan*; Cc – *Citrullus colocynthis*; Fr - *Ficus racemosa;* La – *Lantana camara*; Lc – *Limonia acidissima*; Mc – *Morinda citrifolia*; Tb – *Terminalia bellerica*; Ti – *Tamarindus indica*; Zm – *Ziziphus mauritiana;* Ac – Acetone; DW – Distilled water; Et. – Ethanol

compositions, phytochemicals and biological activity of dried wild fruits will promote and increase their utilization as a sustainable food source, thereby improving nutrition security for populations in some countries (Kubola et al., 2011). The consumption of wild fruits has been shown to protect against chronic diseases, including cancer and cardiovascular conditions, due to their significant antioxidant capacity (Hydamaka et al., 2008). Understanding the effects of domestic cooking methods on these fruits can further influence their health benefits, as appropriate cooking techniques can enhance the bioavailability of these vital nutrients (Cao et al., 2019). phytochemical screening of various edible fruits has revealed the presence of significant amounts of phenols, saponins, and terpenoids, which are linked to various health-promoting effects, including anticancer and anti-mutagenic activity, as noted in recent research (Anand et al., 2017). Furthermore, the preservation of these phytochemicals during food preparation is essential, as cooking methods can influence their bioavailability and antioxidant capacity (Cao et al., 2019).

Conclusion

Phytochemical analysis of wild fruits is essential for unlocking their health benefits and commercial potential. By understanding their bioactive compounds, we can harness their medicinal properties, promote sustainable utilization, and integrate them into modern food and health industries. Further research and conservation efforts are necessary to ensure these valuable natural resources are preserved for future generations.

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