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Qualitative Phytochemical Screening of Some Indigenous Fruits in the Sivasagar district of Assam, India

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ABSTRACT

Indigenous fruits are wild native fruits that are socially and culturally accepted as local fruits within traditional systems. They are well known for their defensive property against pathogens, antioxidant potency and well being for human. This study aimed to analyze the presence of phytochemicals in seven different indigenous fruit species namely *Averrhoa carambola, Dillenia indica, Elaeocarpus serratus, Phyllanthus emblica, Tamarindus indica, Terminalia chebula and Ziziphus mauritiana* in the Sivasagar district of Assam, India. The methanolic extracts of all seven fruits showed the presence of different phytochemicals like flavonoids, terpenoids, tannins, phenols, saponins etc. This preliminary study of this seven fruits indicates their potentiality as a source of medicine and highlights prospective directions for further studies in phytomedicine.

***Key words**: Indigenous fruits, Qualitative screening, Phytochemicals, Medicine*

Introduction

Phytochemicals are non nutritive biologically active chemical compounds produced by plant body. Phytochemicals have been classified into several categories based on their chemical properties and structures. The categories includes carbohydrates, lipids, phenolics, terpenoids, alkaloids and other nitrogenous compounds (Huang *et al*., 2016). They are non nutritive in nature but they provides several benefits for a good health. Fruits, vegetables, nuts, whole grains etc. are the sources of phytochemicals like flavonoids, terpenoids, tannins that are rich in antioxidants which protects the human health from several diseases like cancer, diabetes, heart disease and hypertension etc. (Craig, 1997). Indigenous fruits are important for the richness of phytochemicals in them. Indigenous fruits are being eaten by people of Assam from time immemorial without knowing their beneficial effects. Some people are still unaware about the benefits of these fruits. Borgohain (2017) studied 48 edible fruits of Lakhimpur Assam, and mentioned as *A. carambola* used to cure jaundice, *T. chebula* used as digestive after meal. Aswathy *et al.* (2021), explored bioactive triterpenoids from *D.indica* that showed cytotoxic potency against oral cell carcinoma. Saikia and Bora (2018) performed phytochemical analysis of *P.emblica* and *T. chebula* and tested positive for phenols and anthocyanin that is a class of water soluble flavonoid. Studies showed that amla, carambola has high antioxidant potency among 13 fruits of Assam, studied for their pytochemicals (Saikia *et al*., 2016). Nowadays imported fruits are

getting much importance over our indigenous fruits. It is because the lack of proper knowledge about our rich flora. So it is the time to make people or locals aware about their native fruit species and their useful properties.

Sivasagar is a district of Assam state of North East India with a geographical location of 20°45' to 27°14'N latitude and 94°25' E longitude known for its historical monuments (Nath, 2013). The district is a home for several ethnic tribes like Ahom, Mising etc (Chetia and Das, 2018). The people of Sivasagar district are still maintaining their ethnicity with their own traditions, customs and belief. Most of the populations are dependent on surrounding plant communities for their daily diets and traditional herbal medicines. One of the good sources of their diet is seasonal local fruits. Though people of this region seem to rely on these indigenous fruits, there are very less amount of phytochemical studies done in this regard. Therefore, there is enough scope for the phytochemical analysis of these fruits. Thus, with an objective to evaluate the phytochemical contents i.e alkaloids, flavonoids, phenols, terpenoids, tannis and saponins of 7 different species from different locations of the district are selected. The descriptions of the selected fruit species are provided Table 1.

Materials and Methods

Collection and identification of Fruits

Seven indigenous fruits namely *Averrhoa carambola, Dillenia indica, Elaeocarpus serratus, Phyllanthus emblica , Tamarindus indica, Terminalia chebula and Ziziphus mauritiana* were collected from several regions of Sivasagar district. Taxonomical identification of fruit species were done by consulting the accounts of local, regional floras and monographs.

Preparation of extract

The fruits were washed with running tap water. Fruit materials were then cut into small pieces, seeds were removed and air dried under shade. After complete drying, the materials were grinded into fine powder with the help of a mixer grinder. Then fruit extracts were prepared by using methanol as an extracting solvent.

Qualitative phytochemical screening

Qualitative chemical tests were performed on each fruit extract following standard procedure (Dutta and Gogoi, 2017) to confirm the presence or absence or various chemical compounds.

Test for alkaloids

Mayer's Test: 1ml of each extract was taken on test tubes and 2ml of 1% HCL was added and gently heated. Then Mayer's reagent was added to each of them. Formation of creamy precipitate confirmed the presence of alkaloids.

Dragendroff's Test: 1ml of each fruit extract was taken on test tubes and 2 ml of dragendroff's reagent was added on each test tube and mixed it well. Presence of alkaloids was confirmed with the formation of orange colored precipitate.

Test for flavonoids

Shinoda Test: 1ml of each fruit extract was taken in test tubes and a few drops of concentrated HCL was added on each of those tubes. Then a few pieces of copper turning was added to the above mixer. Development of pink or magenta red colour indicated the presence of flavonoids.

Alkaline Test: To 1ml of each extract taken in test tubes, 1ml of 2% NaOH solution was added. Presence of flavonoids in the sample was indicated by appearance of intense yellow colour which turned colourless on addition of few drops of dilute acetic acid.

Test for terpenoids

Salkowaski Test: 1ml of each fruit extract was dissolved in 2ml of chloroform and evaporated to dryness. To this, 2ml of H_2SO_4 was added. Presence of terpenoids was well confirmed by formation of reddish brown colour.

Test for tannins

Lead acetate Test: To test the presence of tannins, a few drops of 10% lead acetate solution was added to 1ml of each extract taken on test tubes. Development of precipitation indicated the presence of tannins.

Test for phenols

Ferric chloride Test: To 1ml of each extract few drops of 2% ferric chloride solution was added on test tubes. Apperance of dark green or blue colouration confirmed the presence of phenolic compounds.

Test for saponins

Foam Test: To evaluate the presence of saponins 1ml of each fruit extract was mixed with 5ml of distilled water in test tubes and shaken vigorously then a few drops of olive oil were added. Presence of saponins was confirmed by the development of stable foam.

Results and Discussion

The qualitative screening of fruit extracts showed the presence or absence of phytochemicals in methanoic extracts. Altogether 7 fruit species under 7 families has been brought into light in the investigation that were summarized in the table 2. The presence and absence of a particular phytochemical was denoted by using the '+' and '-' signs respectively. The '+++' sign signified a strong intensity reaction, '++' sign signified a medium intensity reaction, '+' signified a weak intensity reaction and the '-' signified not detected. The study revealed the presence of compounds like flavonoids, tannins, terpenoids, phenols, saponins etc. Alkaloids were not detected in methanoic extracts. *E. serratus* and *Z. mauritiana* showed high intensity reaction for flavonoids, followed by *D. indica*, *P. emblica, T. chebula* showed medium intensity reaction, followed by *A. carambola* and *T. indica* showed weak intensity reaction for flavonoids. Likewise, four species *E.serratus, P. emblica, T. indica, and Z. mauritiana* showed high intensity reaction for terpenoids, followed by *A. carambola and D.indica* showed medium intensity reaction, followed by *T. chebula* showed weak intensity reaction for terpenoids. All the 7 species showed high intensity reaction for tannins. Out of 7 species, 5 species showed high intensity reaction for phenols viz. *D. indica, E. serratus, P. emblica, T. chebula, Z. mauritiana* . The reamaining 2 species i.e *A. carambola* and *T. indica* showed weak intensity reaction for phenols. Only 3 species of fruits showed presence of saponins in their extracts and was weak intensity reactions. The species that showed weak intensity reactions for saponins are *A. carambola*, *E. serratus* and *Z. mauritiana* . No species were tested

Table 1. Details of species tested for presence of phytochemicals

Sl. No.	Scientific name	Local name	Family	Flowering and fruiting time	Collected Place
1.	*Averrhoa carambola*	Kordoi	Oxalidaceae	July-August and October-January	Namti, Sivasagar
2.	*Dillenia indica*	Ou-tenga	Dilleniaceae	May-August and September-February	Nemuguri, Sivasagar
3.	*Elaeocarpus serratus*	Jolfai	Elaeocarpaceae	March-June and July-October	Charing, Sivasagar
4.	*Phyllanthus emblica*	Amlakhi	Phyllanthaceae	February-June and December-January	Nemuguri, Sivasagar
5.	*Tamarindus indica*	Teteli	Fabaceae	April-August and September-January	Namti, Sivasagar
6.	*Terminalia chebula*	Hilikha	Combretaceae	May-June and November-March	Nemuguri, Sivasagar
7.	*Ziziphus mauritiana*	Bogori	Rhamnaceae	July-October and February-March	Nimaijan, Sivasagar

Table 2. Phytochemical constituents of seven indigenous fruits

Sl no.	Plant name	Alkaloid	Flavonoid	Terpenoid	Tannin	Phenol	Saponin
1.	*Averrhoa carambola*	-	+	++	+++	+	+
2.	*Dillenia indica*	-	++	++	+++	+++	-
3.	*Elaeocarpus serratus*	-	+++	+++	+++	+++	+
4.	*Phyllanthus emblica*	-	++	+++	+++	+++	-
5.	*Tamarindus indica*	-	+	+++	+++	+	-
6.	*Terminalia chebula*	-	++	+	+++	+++	-
7.	*Ziziphus mauritiana*	-	+++	+++	+++	+++	+

(+++) indicates high intensity reaction. (++) indicates medium intensity reaction, (+) indicates weak intensity reaction and (-) indicates not detected

positive for alkaloids in methanolic extract.

From the qualitative screening it has been found that most of the fruits are rich in phytochemicals like flavonoids, terpenoids, tannins, phenols and more or less saponins. These constituents are enriched with medicinal values and are known for their physiological properties. Sharma *et al.* (2011) detected phytochemicals in *T.chebula* i.e carbohydrates, glycosides, triterpenoids, saponins, tannins, polyphenols, proteins, amino acids and flavonoids in hydroalcoholic extract which contributes antiulcerogenic activity of *T.chebula* fruit. Flavonoids are the biologically occurring plant secondary metabolite with antiviral properties against influenza and human coronavirus (Shahrajabian *et al.*, 2022). Flavonoids also show significant activities like anti-inflammatory, antioxidant, cardio-protective along with neuro-protective effects (Ullah *et al.*, (2020), Duru and Cayan (2015) stated that terpenoids has potentials like antibacterial, anticholinesterase, anti-inflammatory, antitumour and many more. Tannins are a class of compounds that are popular for their activities like bactericidal, anti-inflammatory and anticancer activities (Pizzi, 2021). Phenols are potent for their antioxidant effects that are significant to prevent various oxidative damages associated to human diseases (Nisar, 2022). Balandrin (1996) said that saponins are widely used for their hypocholesterolemic, anti-inflammatory and immune stimulating effects. Therefore, the detected compounds can be used to treat several diseases and potent drugs can also be discovered from the each of these compounds in near future.

Conclusion

India is rich in floral diversity. It has several biodiversity hotspots with numerous endemic plants. All the plants of India, specially the flora of North East India are still not explored. Assam is a home for many indigenous species of fruits that are still not tested for their chemical properties. So there are ample scopes to identify those plants and reveal their phytochemicals through laboratory tests or screenings. In this modern era, it seems that the local fruits and vegetables do not get much attention in terms of health benefits. This is just because unawareness of people about the benefits of our indigenous fruits. Therefore, it is the need of hour to disclose those species and their properties. Along with this, additional work is encouraged to clarify the action of the tested extracts of indigenous fruits.

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Conflict of interest: The authors declare that there is no conflict of interest.

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