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Bioactive compounds and biological activities of *Elaeagnus latifolia* L.: An underutilized fruit of North-East Himalaya, India

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ABSTRACT

Growing health concerns have led to a substantial increase in the demand for edible plants that provide health benefits over and above basic nutrition. As the demand for food with promising health benefits increases, search for wild edible plants having medicinal and nutritional properties also increases. In view of this, in the present study, *Elaeagnus latifolia* L., an underutilized wild edible fruit of Sikkim Himalaya, India, has been investigated for minerals, bioactive compounds, and biological activities. The outcomes of the study revealed that potassium (610.13 mg/100 g) is the most abundant mineral found in *E. latifolia*, followed by phosphorus (228.99 mg/100 g), calcium (46.67 mg/100 g), magnesium (42.82 mg/100 g), and sodium (5.58 mg/100 g) with traces of iron (17.27 mg/100 g), zinc (0.25 mg/100 g), copper (2.59 mg/100 g) and manganese (5.84 mg/100 g). Ascorbic acid, lycopene, and β -carotene were also present in adequate amount. The IC₅₀ values in 2, 2-diphenyl-1-picrylhydrazyl (DPPH) and 2, 2-azinobis-3-ethylbenzothiazoline-6 sulfonic acid (ABTS) assays were recorded as 2394.06 μ g ml⁻¹ and 58.41 μ g ml⁻¹, respectively, indicating the good antioxidant potential of this wild edible fruit. Further, fruit extract showed very good antimicrobial activity against gram-positive and gram-negative bacterial pathogen and fungal phytopathogen with Minimum Inhibitory Concentration (MIC) values of 170–410 μ g ml⁻¹ for bacteria and 30–410 μ g ml⁻¹ for fungal pathogens. Three organic acids namely, tartaric, pyruvic, and oxalic acid and four polyphenols gallic, p-coumaric, ferulic, and catechin were quantified using HPLC-PDA analysis. As the fruit extract exhibited good antioxidant activity, antimicrobial activity, and contains bioactive compounds and minerals, it can be widely used by pharmaceutical and nutraceutical industries for functional product development.

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1. Introduction

The Indian Himalayan Region (IHR), amongst 35 global biodiversity hotspots, is highly enriched with its vegetation including wild edible fruits due to its varied eco-geographical and eco-climatic conditions. Local inhabitants of the IHR, particularly those residing in remote locations and at the fringes of the protected areas, depend substantially on wild edible fruits to meet their food needs. In addition to providing variety in the diet, wild edible fruits are an important natural resource that can ensure food, nutritional and health security of the IHR populace, particularly at the time of famine, natural disaster, and pandemics. Wild edible fruits are frequently consumed to treat and cure various

ailments and are considered by the IHR communities as a necessity rather than as a supplement (Maikhuri et al., 2004; Sundriyal and Sundriyal, 2004). WEFs of the region are vital, lucrative, and inexpensive sources of protein, carbohydrates, fats, vitamins, and minerals (Sundriyal and Sundriyal, 2004). Nutritional value coupled with the medicinal properties of some of the wild fruits can be harnessed for promoting their use as health food supplements to deal looming climate change issues.

As the demand for fruits with promising health benefits increases, the search for edible fruits having nutraceutical properties also increases. Keeping this in view, the present study aimed to investigate *Elaeagnus latifolia* Linn. (family Elaeagnaceae), a popular wild edible fruit of Sikkim, India, for antimicrobial, antioxidant activities and bioactive compounds. *E. latifolia*, commonly known as Musleri in Sikkim and Sohshang in Meghalaya, India, is a deciduous shrub, distributed in the subalpine and temperate zone of the Eastern Himalaya. *E. latifolia* fruits are frequently eaten either in the form of raw or processed food (such as pickle and chutney) by the local inhabitants of Sikkim. In the local markets of Sikkim, the fruit costs are 50–70 Rs./Kg. Appraisal of

Abbreviations: Abs, absorbance; ABTS, 2, 2-azinobis-3-ethylbenzothiazoline-6 sulfonic acid; BHT, Butylated hydroxytoluene; DPPH, 2, 2-diphenyl-1-picrylhydrazyl; FC, Foliniocalteu; GAE, Gallic acid equivalent; ICP-MS, Inductively Coupled Plasma Mass Spectrophotometry; TPC, Total Phenolic content; TFC, Total flavonoid content; QE, Quercetin equivalent

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