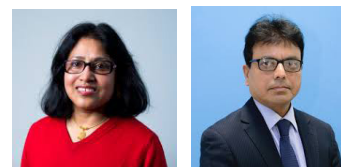




Guest Editorial

'Helencha' (*Enhydra fluctuans* Lour.): A brief overviewLUTFUN NAHAR¹,✉*, AND SATYAJIT D. SARKER²,✉*¹Laboratory of Growth Regulators, Institute of Experimental Botany ASCR & Palacký University, Šlechtitelů 27, 78371 Olomouc, Czech Republic²Centre for Natural Products Discovery (CNPD), School of Pharmacy and Biomolecular Sciences, Liverpool John Moores University, James Parsons Building, Byrom Street, Liverpool L3 3AF, United Kingdom

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'Helencha' (*Enhydra fluctuans* Lour.) (Fig. 1), a well-known but underused leafy vegetable with medicinal properties, belongs to the family Asteraceae (*alt.* Compositae). This aquatic or semi-aquatic herb is also known by several other common names such as 'buffalo spinach', 'English marsh herb', 'godobos', 'harkuch', 'hilmochikah', 'hinche', 'jalabrahmi', 'phak bung ruem' and 'zhao ju' (Kamal et al., 2019; Barua et al., 2021; Lopa et al., 2021). *Enhydra fluctuans* is synonymous with *Coreopsis anagallis*, *Enhydra anagallis*, *E. linifolia*, *E. longifolia*, *E. paludosa*, *E. wollsii*, *Tetraotis longifolia*, *T. paludosa* and *Meyera fluctuans*. This plant is indigenous to Bangladesh and India, but also native to other South-East Asian countries like Burma, Indonesia, Malaysia, Sri Lanka, Thailand and Vietnam, and introduced in various other countries, e.g., China, the Philippines, Senegal and Zaire.

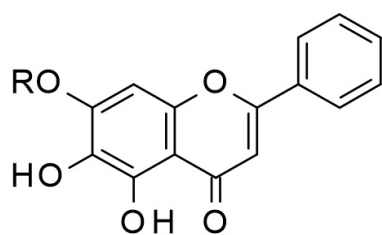


Fig. 1. 'Helencha' plant.

Enhydra fluctuans young leaves may be used as a salad as it is used in Malaysia, but most often, especially in Bangladesh and India, the leaves are steamed before consumption as a leafy vegetable, and also cooked properly to make several traditional dishes (Kamal et al., 2019; Lopa et al., 2021). This plant has long been used in traditional medicines, particularly in Bangladesh and India, for the treatment of bile disorders, convulsions, epilepsy, gonorrhoea, high blood pressure, inflammation, liver diseases, nervous disorders, paralysis and skin diseases (Barua et al., 2021; Lopa et al., 2021). Most of these uses of this plant have been indicated in the Ayurveda. It is also known to possess soothing, demulcent, laxative, purgative, tonic and wound healing properties. In the Malay tradition, the leaves of this plant are used as a laxative, while in Bangladesh and India, fresh juice of the leaves is used as a tonic to treat nervous disorders and various skin conditions. Previous phytochemical studies on *E. fluctuans* have revealed the presence of at least 35 different compounds mainly from the phytochemical classes of flavonoids, isoflavonoids, steroids and terpenoids (mostly mono and sesquiterpenes) (Barua et al., 2021). Some of these compounds, especially the flavonoids and isoflavonoids, are well-known bioactive compounds, and might be responsible for at least some of the bioactivities of this plant. For example, baicalein and its glycosides possess (Fig. 2) various pharmacological properties including a high level of antioxidant potential (Sannigrahi et al., 2011; Verma et al., 2021; Vrabec et al., 2022). Pharmacological studies performed on *E. fluctuans* to date have provided some scientific evidence, albeit of preliminary nature, in support of its uses in the traditional medicine for the treatment of certain

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human diseases (Barua et al., 2021; Raj et al., 2021).



Baicalein R = H
Baicalein 7-O-glucoside R = Glucosyl
Baicalein 7-O-diglucosides R = Diglucosyl
Fig. 2. Structure of baicalein and its glycosides.

Several bioactivity studies on this plant, mostly *in vitro* and/or *in vivo* experiments involving animals, have revealed its analgesic, antidiabetic, antidiarrhoeal, anti-inflammatory, antimicrobial, antioxidant, cytoprotective and hepatoprotective efficacy (Hasan et al., 2019; Barua et al., 2021; Lopa et al., 2021; Raj et al., 2021). However, the claim for anticancer efficacy of this plant, based on a single animal study is rather weak. Similarly, its effect on the central nervous system (CNS), and anthelmintic, neuroprotective and thrombolytic activities are not adequately substantiated. Furthermore, not much evidence is available in the literature depicting possible mechanisms of action associated with its bioactivities. However, attempts have been made to link activities with the presence of certain secondary metabolites in this plant. In a recent study (Omidifar et al., 2021), it has been shown that the extract of *E. fluctuans* could offer protective effect against heavy metal toxicity, especially against cadmium (Cd) toxicity, because of various antioxidant compounds (Lopa et al., 2021; Raj et al., 2021), e.g., flavonoids, β -carotene and phenolics produced by this species. Lopa et al. (2021) have attempted to demonstrate potential therapeutic applications of *E. fluctuans* in the treatment of Alzheimer's disease based on their findings on its significant cholinesterase inhibitory and antioxidant activities. It is a pity that here is no information available to date on any well-designed, randomised and double-blinded clinical studies with this plant. Even though this plant may be used as one of the ingredients in some commercially available Ayurvedic or traditional medicinal formulations, there is clearly a need for extensive clinical studies to promote this plant or its components as a modern and reliable drug formulation.

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