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Meyna spinosa Roxb. ex Link, an unexplored nutraceutical leafy vegetable

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Abstract

Traditional and folk foods have been known to humans since ancient times. It has become a contemporary source of medicine. The COVID-19 pandemic is a wake-up call to the vulnerability of our food systems and an insight into the ongoing threat posed by the climate crisis to nutritional security and our health. For a sustainable and healthy life, humans started focusing on nutraceutical plants, which can provide both food and medicine. Meyna spinosa is one of the species that is used as traditional food and medicines by the tribal communities of India. Therefore, keeping the importance of M. spinosa, an attempt has been made to gather the food & medicinal values from literature and field survey in selected areas (Odisha & Jharkhand). The results revealed that the powder of dried leaves is used for food and medicinal purposes having economic values. The chapter highlights the importance of traditional nutraceutical and bring attention to do value addition for sustainable development.

Keywords: Future Food, Nutraceutical, Medicinal plant, Leafy Vegetables

1. Introduction

The year 2020 started off on a very high note in regards to health and wellness initiatives. Nowadays, there is a high demand for sustainable, organic ingredients and plant-based meals. Due to the scarcity of fresh food during pandemic, people are forced to rely on packaged food, leading to numerous health issues. Later, people started cooking at home to stay healthy and opted for healthier options. Food industries have invested in the production of sustainable food, which is preferable for both the environment and human beings (Gralak et al. 2020; Meike et al. 2021). COVID-19 had helped us focus on ourselves and a healthy lifestyle (Manjula et al. 2023).

Traditional and folk foods obtained from plants can lead the way to the world's future food (Kumar et al. 2021). The traditional foods have a large amount of nutritional and medicinal value and are still unexplored (Kumar et al. 2012). Tribal people collect the plants from wild habitats and consume them either raw or cooked (Kumar and Jena 2017; Sharma et al. 2022; Manjula et al. 2022). A study has found that, as compared to urban people, rural people have more immunity due to a natural and healthy diet (Aman and Masood 2020). Green leafy vegetables have excellent nutritional value, which can be utilised for medicinal benefits (Kumar et al. 2011).

These fresh and young leafy vegetables are edible and have a rich number of antioxidants, dietary fibres, minerals, fatty acids, amino acids, and vitamins, along with the presence of bioactive compounds (Carlos and Imai 2017; Hemmige et al. 2017). Keeping the importance of unexplored food & traditional nutraceutical, an attempt has been made to document the food, medicinal & economic values of *M. spinosa* through literature and field survey. The chapter highlights the importance of traditional nutraceutical in contemporary situations.

2. Methodology

The field survey was carried out during 2021-2023 in Odisha & Jharkhand under several ongoing projects of Ambika Prasad Research Foundation, Odisha, India (Nayak and Kumar 2023). The review was also carried out through literature analysis. The important data in the context of *M. spinosa* were recorded, and particulars were framed and presented through our study. The documentation of the species was retrieved from web sources such as Google Scholar, Google Archives, Google Books, PubMed, NCBI, Scopus, Shodhganga, Web of Science, and UGC Care journals. Also, research articles with good findings and scope were included. The review has been categorised into seven sections: taxonomy, food values, economic values, nutritional values, pharmacognosy, ethnomedicinal values, and future aspects. To have a better outlook, the habit of the species and its vegetative and fruiting features have been shown through photographs (Figures 1 and 2).

3. Morphology and distribution

It is an unexplored leafy vegetable belonging to the tribe Vanguerieae of the family Rubiaceaceae The species was earlier identified as *Vangueria spinosa* Roxb., and a few specimens (K001125420 and K001125421) can be found in KEW herbaria. It is a large shrub or small tree that favourably grows in wet tropical climates. The height can reach up to 8 metres. The stem is covered with long spines; branches are bushy; leaves are membranous, ovate, with short petioles; flowers are pale white, crowded into fascicles having shorter pedicels; fruits are berries, greenish-yellow sub-globose drupes, smooth with persistent calyx lobes. Flowering occurs between March and June, and the fruits get ripe in the cold season. The species is distributed throughout India (except Himachal Pradesh, Jammu and Kashmir, and Uttarakhand). It is also distributed in Bangladesh, Cambodia, the East Himalaya, Laos, Myanmar, Thailand, and Vietnam. According to the Flora of Orissa, it is common in Odisha,

Tripura, Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, West Bengal, Andhra Pradesh, Karnataka, and Tamil Nadu (Saxena and Brahman 1995).

Figure 1: Leaves of Meyna spinosa in wild

Figure 1: Habit and vegetative features of M. spinosa, a) Leaves, b) Fruits

4. Food values

Local communities of Odisha and Jharkhand use young and fresh leaves as leafy vegetables and chutney. It is locally known as Sarla or Sarli Saag in Odisha. The leaves are also used in

the form of powder. In the present study, we have found that the tribal people collect the leaves and dry them; further, they make powder of it and avail it through curry or chutney (Present study). It is also used as fodder plant (Koireng et al. 2015). Seeds are roasted or fried with salt before consumption (Misra and Misra 2016). The dried fruits are consumed as food by the Thadou-Kuki tribe of the Indo-Myanmar region of Manipur, India (Haokip and Panmei 2022). The leaves are also used for the preparation of pickles and spicy salad (singju) (Singh et al. 2022).

5. Ethnomedicinal values

The plants and their parts are natural sources of medicine. Many species with medicinal properties are left unexplored, and *M. spinosa* is one of them. The mature fruits are used to relieve cracked heels, gastritis, and haemorrhoids, and the leaves are used as shampoos (Buragohain and Konwar 2008). The Polia tribe of West Bengal uses *M. spinosa* along with garlic (*Allium sativa*) and asafoetida; the ingredients are transformed into a paste and taken to induce abortion up to two months into pregnancy. The bark of the plant is used to treat headaches. Fruits and leaves are beneficial for diabetes, jaundice, and other gastro-intestinal disorders. Ripe fruits are used for the cure of piles, cracked heels, and gastric, hepatic, and biliary congestions. Different groups in India use plants for the treatment of dysentery, indigestion, intestinal worms, and painful urination. Santal prescribes root paste against painful urination. Dried leaf powder of the plant with turmeric and rhizome is made into paste and used in the removal of intestinal worms by Oraons (Chhetri 2006; Sen et al. 2013a). It has medicinal effects for diabetes, dysentery, headaches, indigestion, liver disorders, skin infections, and stomach worms (Sen and Chakraborty 2017). In present study, authors also observed that leaf powder is used to treat stomach problems in Jamtara, Jharkhand and Sundargarh, Odisha by local tribal communities. The tribes in Tripura use leaf extract to cure peptic ulceration and hepatic disorders. Plant shoots are used for the treatment of jaundice in Assam. The leaves are

helpful in the treatment of dyspepsia and indigestion (Nadkarni 2005). The plant has abortifacient activity, and so the fruits and leaves are used by the ethnic community of Tinsukia district (Assam) to induce abortion (Buragohain 2008a). The ripe fruits, seeds, and leaves are effective in curing pimples and skin infections (Sen et al. 2011). Also, the fruits are used by tribal people in Tripura to cure liver disorders (Sen et al. 2013a; Sen 2014).

6. Pharmacological potential

The food and ethnomedicinal values indicate that plant parts of *M. spinosa* should have pharmacological values. The methanol extract has shown antifungal activity in the species (Goswami 2006). The fruits are rich in antimicrobial compounds that have been found to be effective against *B. subtilis, K. pneuminiae, E. coli, S. aureus,* and *C. albicans* (Buragohain 2008b). The species is efficacious as an antidiabetic and hypolipedemic plant (Sen et al. 2013a). A triterpene named 19-hydroxyursane-type is found in the leaves of *M. spinosa* (Rudrapaul et al. 2014). According to an investigation conducted on type II diabetic rats, the species has potential reducing power, antioxidant activity, inhibit lipid peroxidation, and oxidative hemolysis methanol extract (Sen et al. 2013b). Seven endophytic fungi have been isolated from the roots, stems, and leaves of *M. spinosa* (Bhattacharya et al. 2017).

The plant has shown genotoxic effects (cytotoxic and non-cytotoxic), which are very high in nature and lead to carcinogenicity (Singh et al. 2017). The plant's leaf methanol extracts have kaempferol, quercetin, swietenine, and 3,4,5-trihydroxystilbene, which act as potent antioxidant and antimicrobial (against *Staphylococcus aureus*) compounds (Kadirvelu et al. 2021). is a source of secondary metabolites like fatty alcohol, flavonoids, hydroxy acids, phytosterols, triterpenes, etc. (Singh et al. 2022).

7. Economic values

The tribal people used to collect the tender leaves from the forest during the rainy season and sell them in local markets. The market value of this leafy vegetable is 10 rupees per bundle in Odisha state (Present study; Figure 2). Tribal people also used to sell the dried leaf powder, and the market value for the powder is about Rs. 80–100 per kilo (Present study). This traditional leafy vegetable is very important for regional food security and getting financial support. The species is often grown in the home gardens of Barak Valley, Assam, since it serves the purpose of fuel wood and medicine (Das and Das 2005). The seed oil of *M. spinosa* is an important source of biodiesel production and has better performance in comparison to conventional diesel fuel (Kakati and Gogoi 2016). The *M. spinosa* fruits are dried and sold in markets by the Thadou-Kuki tribe of the Indo-Myanmar region of Manipur, India (Haokip and Panmei 2022).

Figure 2: M. spinosa trade of leaf powder in local market

8. Conclusion

There are several health problems created due to unhealthy food, a metallic lifestyle, and anthropogenic activities. Traditional foods and medicines are much better than modern ones.

The present study highlights the importance of traditional nutraceuticals such as *M. spinosa* and suggests their sustainable use.

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