

Alocasia indica (Lour.) Spach: A potential nutraceutical wetland flora

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Abstract: *Alocasia indica* is one of the wetland plant species distributed widely in Manipur, India. Although it is widely consumed as a vegetable, it has various health benefits too, therefore, this species is widely cultivated in home gardens. However, the species has been often confused with *Alocasia macrorrhizos* (L.) G.Don, and so the distribution in other parts of India is not clearly defined, and the ethnobotanical uses reported from Northeast India have often been misidentified, as the above confusion stated. Therefore, an attempt has been made to document the ethnobotanical uses of *A. indica* by the Meitei community of Manipur with proper photographs and descriptions of the plant species for easy identification. The therapeutic uses reported earlier have been also incorporated. As a result, such nutritional and highly beneficial therapeutic plants should be marked as nutraceutical plants and to create an awareness among the people all over the country about its nutraceutical values, so that the growing population of the country could face food insecurity issues, hunger, malnutrition, etc. through cultivation and value addition of this species of *Alocasia*.

Keywords: Ethnobotanical uses, medicinal, species confused, highly nutritive, food insecurity

Introduction: Manipur possesses one of the richest plant diversities in India due to the diverse hill and valley landscapes and as a part of the Purvanchal Mountains or the Eastern Mountains of the Himalayan Range bending sharply towards the south and spreading along the eastern boundary of India (Nandy et al., 2000). Most of the area are hills and the central area occupies the valley region. The valley lies in an elevation of about 790 m and most of the valley areas were initially wetlands but due to the rapid urbanization, many wetlands' areas are slowly disappearing. Among the various wetland plants, *Alocasia* and *Colocasia* are some of the genera of family Araceae that prefer wetland habitat (Devi et al., 2022). *Alocasia indica* is one among the most common plants

consumed as vegetable by maximum people of the state. This is because, the plant is considered highly nutritional and often cultivated in most home gardens. This species is native to Indian subcontinent and Indo-China ([IPNI 2023](#)) which is often misidentified as *Alocasia macrorrhizos* as a result many researchers are confused leading to the misinterpretation of the research works and distributional data. Thus, such misidentification of *Alocasia* species needs to be cleared for the future research works. This species of *Alocasia* needs to be of more concern as the people of Manipur especially the Meitei community considered it as a highly nutritional vegetable. As India is the second highest populated country in the world with a very high inequality of wealth distribution. International Labor Organization 2020 reported that many informal sector workers earn very less with minimum employment stability as compared to the official sector due to many factors like caste system, landownership patterns, colonial exploitation, economic policies, privatization, etc ([Sharma et al., 2023](#)). This led to the lower income groups to find difficulty to consume the healthy nutrition or in other words, they face the truth of food insecurity issues ([FAO 2023](#)). Considering the highly nutritional and therapeutic values of *A. indica*, along with the confusion in the identification of the species, an attempt has been made to find the ethnobotanical uses of *A. indica*, and to clear the confusion in identification of the species with photographs and illustrations to prove it as highly potential nutraceutical plant which could be consumed, marketed and cultivation in various parts of the similar habitat. So that, the people with lower income could get the nutrition accompanying its therapeutic values of *A. indica* with very less price.

Methodology: The ethnobotanical data has been collected on the food and therapeutic uses of *A. indica* from the Meitei community of Manipur using standard method ([Kumar et al. 2021](#)) Previous reports of the food and therapeutic uses of the species have also been incorporated. The confusion in misidentification of the species has also been cleared by the comparative account of the morphological characters and photographs procured from authenticated sources using the International Plant Name Index and Plants of the World Online, Royal Botanical Garden, Kew. The food and therapeutic values leading to a potential nutraceutical plant are also described hereunder.

Results and discussion: *Alocasia indica* is a highly nutritional plant species of the Araceae family of Manipur, India. It has high therapeutic values because of which, people

cultivate it in most of the home gardens. However, as mentioned earlier to carry out the research activities, people are confused in identification of the species. In the present study, proper description for identification with photographs is given along with the comparative morphology of the most misidentified species i.e., *Alocasia macrorrhizos* is given hereunder. The ethnobotany of the species collected from the Meitei community of Manipur is also presented here.

***Alocasia indica* (Lour.) Spach**

Habit: Moist areas or near waterbody like near drains, streams, wetlands, etc.

Morphological description: It is an herbaceous perennial, glabrous, tall herb. Leaves are broad, light green in colour, slightly cordate or heart shaped, margin entire and wavy, two ovoid lobes at the base, apex rounded and slightly acute, midrib primary and secondary veins marked with slightly whitish colour (not distinct), petiole long, fleshy, porous, overlap with one another, produce watery sap, sheathing at the lower part; inflorescence spadix, spadix surrounded by spathe and shorter than spathe, pale yellow; fruit fleshy berry, globose when mature ([Figure 1](#)).

Confusion with other species: *Alocasia indica* (Lour.) Spach was first reported in 1846 at the Naturelle des Vegetaux. Phanerogams in the volume 12 and issue 47 of the publication and *Alocasia macrorrhizos* (L.) G.Don was first reported in Sweet's Hortus Britannicus or a catalogue of cultivated plants in the gardens of Great Britain, third edition in 1839 ([IPNI 2023](#)). The two species are different species but often confused with its identification or wrongly treated as synonyms. *A. macrorrhizos* commonly known as Gaint Taro differentiates from *A. indica* with the dark green colour, ovato-sagittate, bluntly triangular in outline lamina, apex pointed upwards and more importantly its coriaceous or glossy green leathery surface with prominently distinct primary veined on the abaxial surface and glands in the axils of primary veins (Boyce 2008). This is supported by the photographs of *A. macrorrhizos* given in Kew Science Photographs (<https://powo.science.kew.org>; [Joshi et al., 2015](#); [Muller et al., 2023](#); [Nakhuru et al., 2021](#)). Many times, research activities have been published with *A. macrorrhizos* and wrongly identified as *A. indica* and vice versa. For example, antioxidant and hepatoprotective activity has been carried out of *A. indica* but the photographs illustrated shows the *A. macrorrhizos* ([Pal et al., 2014](#)). Sometimes, *A. macrorrhizos* has been wrongly

revealed as synonym of *A. indica* (Islam et al., 2013). In manipur, majority of the people locally refer *A. indica* as yendem and *A. macrorrhizos* as Hongoo. However, the confusion created due to misidentification has led to the wrong interpretation of the local names of the two species (Singh and Sharma 2018; Singh 2010; Sharma et al., 2015; Patil et al., 2012; Islam et al., 2013) The above quoted publication showed the misidentification. Some published documents like Srivastava et al., 2009; Singh 2010; Joshi et al., 2015; Sharma et al., 2015; Singh et al., 2018; Nakhuru et al., 2021 showed the right identification. This confusion needs to be cleared for the best possible outcome of the research activities.

Ethnobotany of *A. indica*: The present study shows that the leaf, petiole and corm are edible which are consumed in various ways of delicacies. The petiole along with the leaf is commonly cooked and consumed whereas the corm is commonly consumed as fresh in spicy salad known as Singju which can also be consumed as cooked vegetables. It is considered that this species is rich in iron content and so the cooked petiole is given during post-delivery of child birth which helps in the faster recovery. The leaf lamina is slightly roasted on fire directly and applied externally to reduce boils and swellings. Out of the various ways of consumption, the preparation of salad out of the corm of *A. indica* is illustrated in Figure 2. Reports have shown that the petiole is having blood purifying and good astringent properties and so it is used to cure cuts and wounds. The petiole tonic and the petiole paste is applied to forehead to reduce dizziness. The petiole is prescribed by the local healers to treat arthritis and rheumatic pains. The ash of the burnt petiole is mix with honey to treat dry cough. The corm is consumed to treat piles and constipation (Srivastav et al., 2009; Singh and Sharma 2018; Sharma et al., 2015). In other words, the whole plant is highly nutritional with good therapeutic properties. Other reports revealed that the high content of Vitamin C in this species recommended to consumed as it could help prevention of many diseases (Nakhuru et al., 2021). Although reports have shown the tuber or corm, leaves and roots possess antioxidant properties, tuber to have antibacterial, antidiabetic and antihyperlipidemic activity, the misidentification of species have created confusion and proper identification needs to be carried out before further research activities proceed (Ongpoy 2017; Mulla et al., 2009; Patil et al., 2012). There is a rich diversity of Araceae family flora in the state of Manipur but the local name Yendem refers to only one species *A. indica* and people of Manipur are well aware of this species as it is a very common vegetable and are cultivated in most home gardens. This indicates

that ethnobotany of Yendem given by Manipuri researchers is most likely that of *A. indica* even if it is misidentified as *A. macrorrhizos*.

Alocasia as nutraceutical plant: Each part of the plant *A. indica* is edible and has high nutritional value. The different parts of the species have its own importance in terms of food value and therapeutic values (Figure 3). The people of Manipur especially the Meitei community are aware of the importance of this species. Apart from the high content of Iron and Vitamin C, the corm is rich in carbohydrates too. The high nutritional and therapeutic values of the species makes the species *A. indica* as a highly potential nutraceutical plant. Keeping this point, the species could be marketed fresh or dried or cultivated in similar habitat i.e., moist terrestrial habitat or in flower pots to be consumed as vegetable. This could help to reduce the inability of the growing population in India to purchase high price nutritional diets or to find a solution towards food insecurity issues.



Figure 1: *Alocasia indica* and its different plant parts: a) Whole plant in its habitat b) Watery sap from petiole c) Leaf lamina d) Corm e) Adventitious roots on corm f) Leaf petiole



Figure 2: Preparation of the spicy salad (Singju) out of the corm of *A. indica*

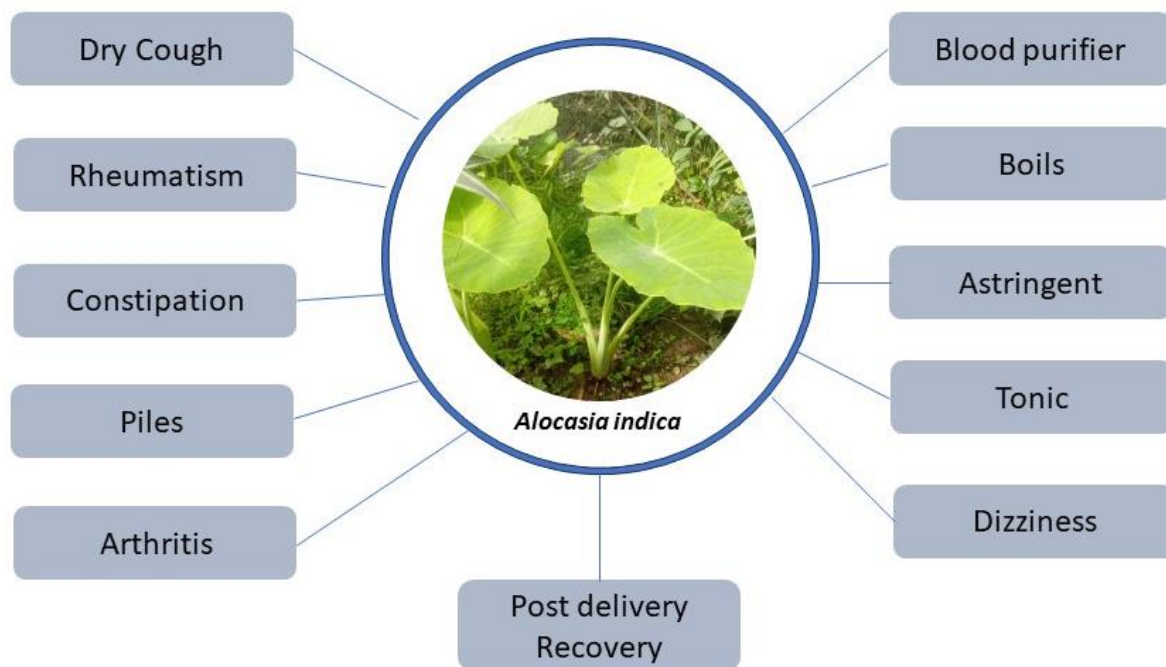


Figure 3: Ethnobotanical uses (therapeutic) of *A. indica* by the Meitei community of Manipur

Conclusion: As discussed above, *A. indica* is a highly nutritional plant, which also and possess a high therapeutic value. Each part of the plant has specific food and therapeutic uses which makes the species highly potential nutraceutical plant. Further, more research needs to be carried out to find out the nutritional components and to analyse the phytochemical compounds responsible for its therapeutic values after proper identification of the plant species.

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