



# On The Trail of Underutilised Ambemohar-pat (*Pandanus amaryllifolius* Roxb., Pandanaceae)

<sup>1</sup>Patil, C. R. and <sup>2</sup>D. A. Patil

<sup>1</sup>Department of Botany, Rani Laxmibai Mahaidyalaya, Parola 425 111 District Jalgaon (M. S.), India

<sup>2</sup>Post-Graduate Department of Botany, S. S. V. P. Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule - 424005 (M.S.)  
India (Former Professor & Principal)

## Abstract:

*Pandanus amaryllifolius* Roxb. (Pandanaceae) is a true cultigen thriving only through vegetative propagation in Asian countries. It is being cultivated mainly in home gardens and used solely for its aromatic leaves. This scenario enticed the present author to take stock of situation on various scientific grounds. It has been widely used traditionally and also being employed in modern medicine and integrated with some food-stuffs. The species is a source of therapeutic values, apart from nutritional one. It has fair industrial scope to fetch more income for the farmers in tribal and rural areas.

**Keywords:** *Pandanus amaryllifolius*, Ethnobotany, Conservation, Modern utilities.

## 1. Introduction:

Vartak (1981) for the first time mentioned its occurrence and traditional use-report of leaves to flavor rice in the state of Maharashtra (India). There is very scant literature. Cooke (1958) and even recent publication viz., 'Flora of Maharashtra State: Monocotyledons' (Sharma *et al.*, 1996) made no mention about its occurrence in the state. Almeida (2009), however, described in phytographically excepting reproductive parts. It is also not included in 'Dictionary of Indian Folk Medicine And Ethnobotany' (*cf.* Jain, 1991), Wealth of India (Anonymous, 1948-1976) and A Dictionary of Economic Products of India (Watt, 1889-1893). This literary scenario enticed me to have a fuller information of this much underutilized species. Its all-pervasive examination appeared necessary, which forms the subject of this communication.

## 2. Methodology Adapted:

A literary survey was conducted on various scientific grounds. The worldwide traditional knowledge was borrowed from published literature. Experimental studies extended are also included to have a better understanding of the problem. The traditional use-reports as well as classic or modern applications are provided in the Tables I to IV. Experimental investigations are briefly narrated following these tables. The subject-matter is then dilated under results and conclusions to arrive at concrete conclusions.

### 3. Systematic Enumeration:

**Table-I: Ethnomedicinal Uses:**

Sr. No. (1)	People & Country (2)	Local Name (3)	Part/s Used (4)	Recipe (5)	Disease Treated & Reference (6)
1.	Kedah, Malaysia	Pandan	Leaves	Bath water	To rid body of odour, for spiritual cleaning for hygienic purposes, to ward off 'makhluk halus' (Mystical forces) during post-partum bath (confinement period) (Razak <i>et al.</i> , 2018).
2.	Philippines	Pandan	Leaves	Decoction	Urinary tract infection, hypertension, abdominal pain and kidney problems (Balinado & Chan, 2017).
3.	Philippines	Pandan	Leaves	Decoction	To treat hypertension (Fiscal & Chavez, 2016).
4.	Thailand	Toei	Leaves	--	Medicinal use (Pholhiamhan <i>et al.</i> , 2018).
5.	Malaysia	--	Leaves	--	Used as medicine for women after childbirth (Samy <i>et al.</i> , 2005).
6.	Philippines	--	Leaves	Lotion	To treat measles, as purgative, in leprosy, sore throat and as diuretic (Samy <i>et al.</i> , 2005).

**Table-II: Culinary Uses:**

Sr. No. (1)	People & Country (2)	Local Name (3)	Part/s Used (4)	Recipe (5)	Preparation & Reference (6)
1.	Maharashtra, India	Ambemohar pat	--	Cooking rice	Rice cooking (Vartak, 1981).
2.	South & South-East Asia	Pandan	Leaves	Cooking Asian Dishes	Enhancing sweet flavor (Yahya <i>et al.</i> , 2010)
3.	Philippines	--	Leaves	Cooking rice	To flavor rice (Jorge <i>et al.</i> , 2020)
4.	Northern Vietnam	Dura-Tham	Leaves	Colouring food	Colouring material dotained used to make cake, jelly (food) (Ludam <i>et al.</i> , 2016).
5.	Java, Indonesia	Pandan-Wangi	Leaves	Food preparation	To impart aroma to food stuffs (Wardhan, 2009)
6.	Java	Pandan-Wangi	Leaves	Food preparation	Used for fragrant and colourant food (Heyne, 1927).
7.	Bali	Pandan-arum	Leaves	Food preparation	Used as green colourant for food (Putri <i>et al.</i> , 2014).
8.	Thailand	Toei	Leaves	Food preparation	Recipe Not mentioned (Pholhiamhan <i>et al.</i> , 2018).

9.	India	Ambemohar	Leaves	Food preparation	To flavor ordinary rice as a substitute for the expensive aromatic Basmati rice (Gopalkrishnan <i>et al.</i> , 2015; Watke <i>et al.</i> , 2009).
10.	Philippines, Thailand & Indonesia	Pandan	Leaves	Food diversity	To flavor food (Salim <i>et al.</i> , 2004).
11.	India	Ambemohar	Leaves	Cooking rice	To impart a resemblance of the Basmati aroma to the cooked rice and to flavor meat and vegetable products (Ooi <i>et al.</i> , 2004).
12.	South-East Asia	--	Leaves	--	--

**Table-III: Miscellaneous Uses:**

Sr. No. (1)	People & Country (2)	Local Name (3)	Parts/Used (4)	Use/s & Reference (5)
1.	Bali	Pandan-arum	Leaves	Used for ritual (Putri <i>et al.</i> , 2014)
2.	India	Ambemohar	Leaves	To repel cockroaches (Watke <i>et al.</i> , 2009)
3.	Malaysia	--	Leaves	Leaves and other scented flowers used to make 'Potapourri' used during traditional ceremonies (Setyowati & Siemonsma, 1999)
4.	Malaysia	--	Leaves	Used for hair wash (Samy <i>et al.</i> , 2005).

**Table-IV: Industrial / Classic Uses:**

Sr. No. (1)	People & Country (2)	Local Name (3)	Parts/Used (4)	Use/s & Reference (5)
1.	India & Malaysia	--	Dried Leaves	Powder in ice-cream, yogurt, soup, cake, tea, coconut-jam (Call 'Kayal') (Bhattacharjee <i>et al.</i> , 2005 Che Man <i>et al.</i> , 1999).
2.	South-East Asia	Pandan	Leaves	To flavor bakery products and sweets (Jiang, 1999).
3.	Java, Indonesia	Pandan-Wangi	Leaves	In food industries e.g., bread, biscuits, dye materials, soya beverage and coconut milk (Wardah, 2009).
4.	South-East Asia	Pandan-Wangi	Leaves	Used for green food colour (Wongpornchai, 2006).

**Experimental Investigations:**

**(I) Conservation:** *Pandanus amaryllifolius* Roxb. is exotic and thought originated in the Moluccas Islands (Stone, 1978). In India, it is being cultivated in homestead gardens particularly costal states *viz.*, Gujarat,

Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Orissa (Odisha) and West Bengal (Wakte *et al.*, 2009). Outside India, it is distributed, under cultivation, in different tropical Peninsular countries *viz.*, Sri Lanka, Thailand, Malaysia, Indonesia, Singapore, Vietnam, New Guinea, Taiwan and Philippines (Wakte *et al.*, 2009; Stone, 1978; Ravindran and Balachandran, 2005). It is interesting that it is found only as a true cultigen since ancient times and has adapted well in different tropical countries or islands. It is the only species of *Pandanus* bearing aromatic leaves. Because of this feature, it has been favoured by mankind and now finds place in various useful commodities. It is thus prevented from its extinction, although it perenates exclusively through vegetative propagation. Being a useful species (cultigen), it should be maintained in gardens of universities, colleges, institutional gardens, apart from homestead gardens. It is obviously a cultigen that can fetch better income for farmers and even tribal people.

**(II) Micropropagation *vis-à-vis* Biotechnology:** Gangapadhyay *et al.* (2004) obtained meristems with sheathing leaf bases from newly emerging tillers and used as explants. A protocol for clonal propagation of *P. amaryllifolius* Roxb. was established which is a rich source an aromatic compound 2-acetyl-1-pyrroline (2 A.P.). They analysed the 2 AP content of *in vitro* plantlets by gas chromatography at the backdrop of the mother plant. They also subjected the plantlets thus raised to isozyme and RAPD analysis to ascertain their genetic fidelity. They advocated micropropagation as a viable biotechnological tool for *ex situ* conservation of the cultigen.

**(V) Biochemistry:** Zakaria *et al.* (2020) studied chemical composition of essential oils from leaf extract of Pandan (*P. amaryllifolius* Roxb.) obtained from three different locations in Paninsular Malaysia. A total of 57 chemical compounds were identified comprising fatty acids, steroids, aromatic compounds and non-polar components. Stigmasterol was detected in samples of two locations *viz.*, Kedah and Johor. Their findings are additional information for potential use in pharmaceutical or nutraceutical applications in the production of functional food. They thus developed further use of essential oils beyond food flavouring, traditional medicines and limited food industries. *Pandanus amaryllifolius* is widely known for its aromatic/flavouring compound known as 2-acetyl-1-1-pyrroline (Wongpornchai *et al.*, 2003).

**(III) Pharmacognosy:** Gopalkrishnan *et al.* (2015) extended pharmacognostic investigation of leaves of *P. amaryllifolius* Roxb. They dealt with quantitative and qualitative microscopic evaluation of leaves in Maharashtra (India). The principal anatomical characteristics relating to scherenchyma, parenchymatous, mesophyll cells and bundle sheath cells are revealed. Their phytochemical screening pointed out the presence of alkaloids, glucosides, terpenoids, flavonoids, saponinis, anthraquinone and cardiac glycoside. Their attempt will help bring the plant in the main stream of crude drugs and food industry.

**(IV) Biological Activities:** Bhuyan and Sonowal (2021) reviewed existing literary sources on biological activities based on leaves of *P. amaryllifolius* Roxb. They critically discussed activities such as (i) antidiabetic, (ii) antioxidant, (iii) anticancer, (iv) antiviral, (v) antibacterial, (vi) antitubercular, (vii) dental and (viii) as food preservative. Antibacterial activities are also studied by Faras *et al.* (2014) to avoid food poisoning. These studies will benefit for the development of better medicinal products.

#### 4. Results and Discussion:

Emphasis on indigenous knowledge, uses and management of biological resources particularly by native communities is more viable option to improve the understanding and alternative management to conserve at regional or local levels. The dynamic relations between social and cultural systems and biodiversity can be understood by ethnobotanical research of underutilized species. The present communication is, therefore, an all-pervasive examination of a species of *Pandanus* which has thrived till date from ancient time just being cultivated in homestead gardens. *Pandanus amaryllifolius* Roxb. is thus a true cultigen.

The traditional medicinal systems employed in many Asian countries are tabulated in Table-I. In each case leaves are being used exclusively to combat different human afflictions. These are being extended since ancient time. Khare (2004) recorded *Pandanus amaryllifolius* Roxb. also, as a source of some modern medicine. Many of these traditional applications still need to be authenticated on modern scientific grounds. It is also interesting that the leaves are being traditionally used to flavor, as colourant or to impart aroma to various food preparations in various Asian countries and communities (cf. Table-II). These traditional culinary use-reports are also ancient in origin. It appears that based on these applications relating food-stuffs, *Pandanus amaryllifolius* is being used for some modern food articles e.g., ice-cream, yogurt, coconut-jam, sweets, bread, biscuits, soya beverage, food colouring, coconut-milk, etc. The said species is also find places in various miscellaneous traditional uses in certain rituals, ceremonies, and hair wash and repellent for cockroaches, etc. This resume indicates that there is hardly any compartment of human life in which the species finds no place that too based on a single plant part (leaf).

The present author also seeks attention to modern technologies and revelations extended. To aid in *ex situ* conservation, protocol has been also developed for clonal propagation (cf. Gangopadhyay *et al.*, 2004). A detailed report on biochemical considerations of *P. amaryllifolius* is also established providing a sound scientific ground before embarking upon any other its applications (cf. Zakaria *et al.*, 2020; Wongpornchai *et al.*, 2003). It is to be further noted that pharmacognostic studies are completed to authenticate crude drugs (cf. Gopalkrishnan *et al.*, 2015). It has been also verified based on various biological activities (cf. Bhuyan and Sonowal, 2021).

The species *viz.*, *P. amaryllifolius* is fairly investigated on various scientific grounds. It is already being propagated vegetatively in homestead gardens in many Asian countries. The scientific revelations are now available for extension activities to increase income of the stakeholders. It should be projected for more industrial products as the scientific database is developed for its users. Only we have to add value to it. The said species, at the beginning my study, *prima facie* appeared an underutilized one in India. The literary worldwide survey suggests that it is fairly investigated. The scattered information is now collated to have a better understanding of the potentialities and possibilities for human welfare. Still there is fair scope for fetching more income. It is already being cultivated and thereby conserved in Asian countries. More options to conserve in gardens maintained by universities, colleges, educational institutions or even corporate bodies are possible in future. It is notable that the said species (*P. amaryllifolius* Roxb.) has survival just because of traditional human efforts growing it in home gardens as it lacks sexual method of propagation in nature.

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