

Original Research Article

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Lindernia dubia (L.) Pennell (Linderniaceae): A new record for the flora of Gujarat State, India

Kishan I. Prajapati^{1*}, Darsh K. Patel¹, Ekta P. Joshi²

¹Vande Vasundhara Research Laboratory, Bhuj, Kachchh, Gujarat – 370 001, India

²R. R. Lalan Collage, Bhuj, Kachchh, Gujarat – 370 001, India

*Corresponding author; e-mail: vandevsundharalab@gmail.com

Article Info

Abstract

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Lindernia dubia (L.) Pennell has been reported first time from two districts (i.e., Sabarkantha and Kheda) of Gujarat State. It was recorded along with the wetland margins from both the localities. Detail morphological description, distribution, flowering and fruiting period, remarks and macro photographs of key characters are also provided for easy identification of species.

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Introduction

Traditionally the genus *Lindernia* Allioni (1762) is classified as a member of the Scrophulariaceae family. The newly outlined Linderniaceae are a monophyletic group that has emerged in the course of the disintegration of the Scrophulariaceae in the past years (Pennell, 1935; Rahmzadeh et al., 2005; Fischer et al., 2013; Schmotzer, 2015). The genus *Lindernia* comprises about 100 species (Fischer, 1999), distributed throughout the old and new world (Lewis, 2000). A total of 28 species of *Lindernia* are reported from Indo-Burma (Mukherjee, 1945) and 31 taxa reported from India, among them 25 are known from South India (Sivarajan and Mathew, 1983; Murugan et al., 2002;

Tandyekkal and Mohanan, 2010; Ratheesh et al., 2012; Prasad and Sunojkumar, 2014).

From Jan. 2019, frequent field trips were conducted to study the aquatic flora of selected wetlands of Gujarat State. During the extensive botanical exploration in Pariej wetland of Kheda District-central part of Gujarat, the first author observed an interesting semi aquatic species growing on wet ditches of lake margin along with grasses, sedges and many wetland plants. The Pariej wetland is one of the eight wetlands of national importance identified in Gujarat state by the Ministry of Environment, Forest and climate change (MoEF & CC) Government of India. After critical observation of morphological features as well as floral characters the

specimen identified as a *Lindernia dubia* (L.) Pennell with the help of different flora and authentic literature (Prasad and Sunojkumar, 2014; Krishnasamy and Arumugam, 2015). Subsequently, the second author also reported the same specimen from Himatnagar taluka, Sabarkantha district. The district Sabarkantha is situated in the North-Eastern part of Gujarat state. The district is very important for rich floristic diversity as well as

ethnobotanical plant species and pre-dominated by the tribal areas (i.e., Khedbrahma, Vijaynagar forest etc). In addition, a brief description, phenology, remarks, and photographs provided for easy field identification. The present localities of the *Lindernia dubia* (L.) Pennell. in Gujarat are shown in Fig. 1. The herbarium specimens were deposited at Vande Vasundhara Research Laboratory, Bhuj-Kachchh.

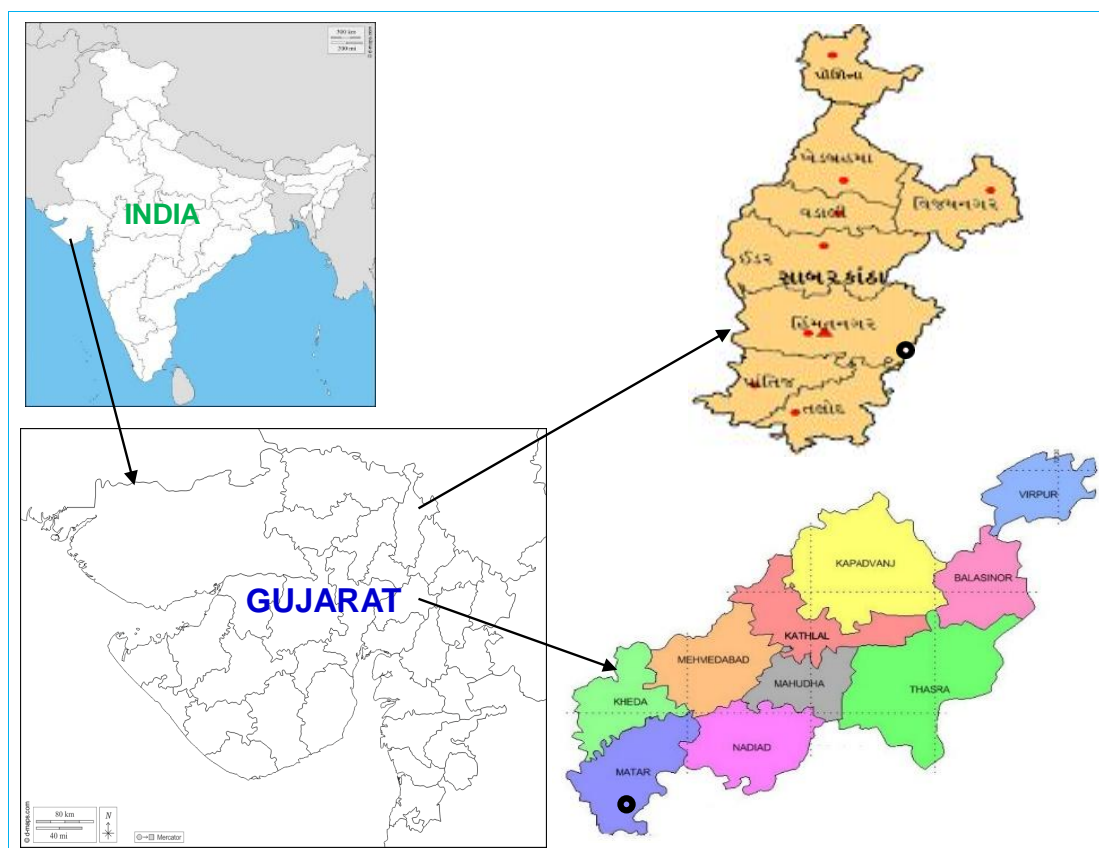


Fig. 1: Location of *Lindernia dubia* (L.) Pennell. in Gujarat.

Materials and methods

Study area

Kheda district: Pariej wetland (22°33'00" N, 72°38'00" E) is situated in Matar taluka of Kheda district. The district is famous for high quality of tobacco production. Pariej wetland is considered as an Important Bird and Biodiversity Area (IBA) of India and also a Rank-1 (i.e., top ranking) wetland from biodiversity point of view as per the national wetland prioritization by Salim Ali Centre for Ornithology and Natural History (Vijayan, 2004; Suthar, et al., 2019; Joshi, 2018). Pariej wetland is covering 445 ha area and one of the largest

man-made freshwater wetland in Gujarat. This perennial wetland linked with the canal and supplies drinking water to 52 surrounding villages around Pariej through pipelines. The wetland is covered by full of aquatic vegetation. *Typha angustata* Bory & Chaub. constitutes the most dominant hydrophytic on fringes.

Sabarkantha district: The study area (23°39'34.4" N, 73°10'00.6" E) is situated in Himatnagar taluka of Sabarkantha district. During the extensive botanical exploration for study the aquatic plants diversity of Himatnagar taluka, the authors visited an interesting unexplored wetland area located on the way of Gambhoi-Bhiloda highway near Gopalkunj village. So

far, this unrecorded annual wetland explored recently by authors and documented a good number of aquatic plants; among them one interesting not common species *Hemidelfhus polyspermus* (Roxb.) Ness is also recorded as strongly associated with *Lindernia dubia* (L.) Pennell. The district Sabarkantha is famous for rich floristic diversity which was explored by various plant taxonomists (Sexton and Sedegwick, 1918; Yogi, 1970; Bhatt and Sabnis, 1987; Punjani, 1997; Patel, 2003; Panday, 2011; Parmar, 2012). After literature review of mentioned literatures, we concluded that the species was not recorded from Sabarkantha and Kheda district.

Results and discussion

In order to check the identity, through the florals and published articles literature of Gujarat, there are 12 species of *Lindernia* those have been reported from Gujarat state (Cooke, 1958; Shah, 1978; Raghvan et al., 1981; Bole and Pathak 1988; GEC, 1996; Pandey and Singh, 1999; Singh and Parabia, 2003; Meena, 2004, Patel et al., 2021). It is concluded that the species was unrecorded so far from Gujarat state. Hence, *Lindernia dubia* (L.) Pennell. as a new addition record to the flora of Gujarat.

Taxonomy

Lindernia dubia (L.) Pennell, in Acad. Nat. Sci. Phil. Monogr. 1: 141. 1935. *Gratiola dubia* L. Sp. Pl. 17. 1735.

Herb, annual, erect, 5-20 cm long; Rooting at the lower node; Stem herbaceous, light green, 4-angled, glabrous, much branched near the base; Leaves sessile, basal ones larger, smaller towards the apex, 0.5-2 × 0.1-1.5 cm, ovate or ovate-elliptic, upper lanceolate, 3 nerved from base, nerves mainly distinct on lower larger leaves, base usually rounded or cuneate-attenuate, apex acute, margin entire; Flowers solitary, axillary, pedicel cylindrical, glandular hairy, equalling or longer than the leaves, 5-10 mm long. Calyx deeply 5-lobed, 3-4 mm long, linear or lanceolate, apex acute, sparsely glandular, sepals basally connate. Corolla 6-10 mm long, white, tube 4.5-5 mm long, the upper lip slightly emarginate at the apex, lower lip 3-lobed, lobes rounded. Androecium 4, the anterior 2 staminodes and posterior 2 perfect, anthers 2-lobed, posterior stamens coherent below the upper lip when staminodes covered with yellowish glands throughout, free at apex. Ovary 1.1-1.4 mm long, ellipsoid, style 2.5-3 mm long, stigma

2-lamellate. Capsule 2-5 mm, ellipsoid or obliquely ellipsoid, obtuse to acute at apex, glabrous, matured capsules yellow, persistent calyx present, seed numerous (Fig. 2).

Flowering and fruiting: July to December (recorded during field survey in the April month).

Distribution: Kerala, Andhra Pradesh, Madhya Pradesh, Tamil Nadu, recently in Gujarat.

Specimen examined: India. Gujarat: Kheda district, Matar taluka, Pariej wetland, Kishan Prajapati, 11 April 2021, VVRL-005; Sabarkantha district, Himatnagar taluka, near to Gopalkunj village, Darsh Patel, 22 May 2021, KD-VVRL-006.

Remarks and habitat

This plant species recorded in wet ditches and margins of the wetlands. Our scientific observation concluded that the specimen was strongly associated with four major families like Cyperaceae, Poaceae, Acanthaceae and Scrophulariaceae. In first locality Pariej: We have noticed that the sedges are dominant in habitat like *Bulbostylis* sp. and *Cyperus* sp. Pteridophyte species *Marsilea minuta* is also recorded as a strongly associated with *L. dubia*. In second locality Gopalkunj: It has been observed that *Peplidium maritimum* (L.) Wetsst., *Fimbristylis* sp., *Cyperus compressus* L., *Cyperus laevigatus* L., *Bergia ammannioides* Roxb. and *Paspalum* sp. is strongly associated with *L. dubia*. In addition, the rich population of three not common aquatic plant species named *Utricularia gibba* L. var. *exolate* (R. Br) Tylor, *Ludwigia adscendens* (L.) Hara. and *Nymphoides cristatum* (Roxb.) O. Ktze. has been noticed.

Conclusions

The numbers of the individuals are different from the both localities i.e., 4 individuals were recorded from Pariej wetlands and up to 30 individuals were recorded from Gopalkunj wetland. The area of Gopalkunj wetland and surrounding localities are being used by pastoralist communities for grazing their domestic animals, and overgrazing pressure may lead pressure on development of seeds of this species. So, we proposed to create awareness campaign among the surrounding villages on this plant species rarity and conservation significance.

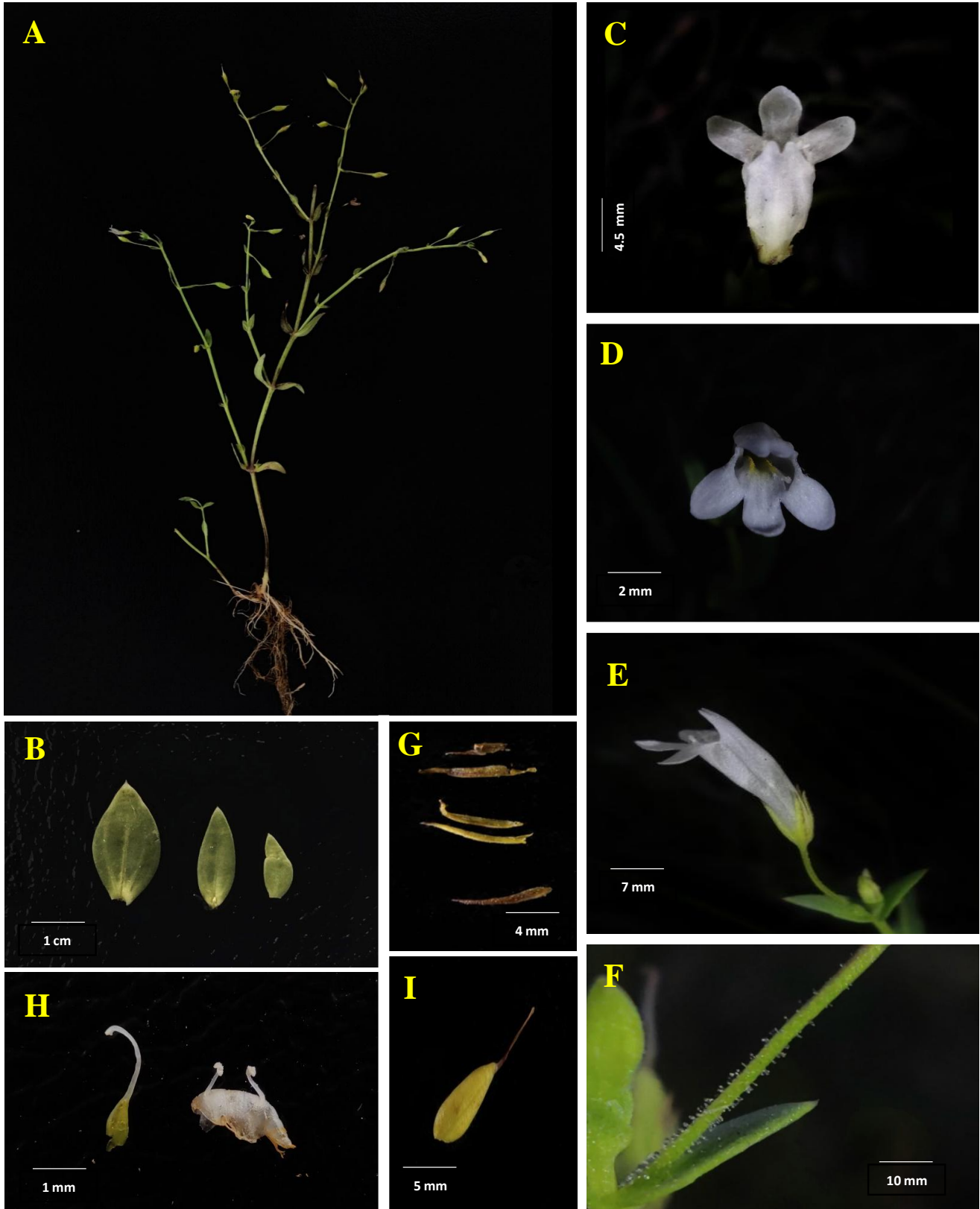


Fig. 2: *Lindernia dubia* (L.) Pennell: A. Habit; B. Leaf; C, D and E. Different views of flowers (*viz.*, top view, front view and side view); F. Glandular pedicel; G. Calyx; H. Androecium and gynoecium; I. Capsule.

Conflict of interest statement

Authors declare that they have no conflict of interest.

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