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### Research Paper

## A TAXONOMIC REVISION OF THE GENUS *BOERHAVIA* L. (NYCTAGINACEAE) IN INDIA

Dutta Pramanick Debasmita<sup>1</sup>, G. G. Maiti<sup>2</sup> and M. S. Mondal<sup>3</sup>

<sup>1</sup>Botanical Survey of India,  
Northern Regional Centre, Dehradun-248 195, India;

<sup>2</sup> Department of Botany,  
Kalyani University, Kalyani-741 235, India;

<sup>3</sup> Ex-Addl. Director,  
Central National Herbarium,  
Botanical Survey of India, Howrah-711 103, India.

### Abstract

The genus *Boerhavia* L. is a pantropical taxon, distributed in tropical and subtropical regions of both Old and New World. In the present paper, taxonomic revision of the genus in India has been undertaken by the authors to provide detailed taxonomic accounts of infra-generic taxa. A key has been provided for easy identification of the species.

Key words: *Boerhavia* L., Nyctaginaceae, Revision, Taxonomy, India.

### INTRODUCTION

The genus *Boerhavia* L. (Nyctaginaceae) is represented by *ca.* 50 species [1], mostly distributed in tropical and subtropical regions of both the hemispheres, few are of warm and temperate distribution. In India, the genus is represented by 4 species *viz.*, *B. crispa* Heyne *ex* Hook. *f.*, *B. diffusa* L., *B. erecta* L. and *B. rubicunda* Steud. In 'Flora of British India', Hook. *f.* treated the genus *Boerhavia* L. with 6 species and 2 Varieties *viz.*, *B. repens* L. ( *var. procumbens* and *var. diffusa*), *B. Crispa* Heyne, *B. repanda* Willd., *B. verticillata* Poir., *B. fruticosa* Dalz. and *B. elegans* Chois.[2]. Afterwards the genus has been treated variously time to time [3-17]. Due to extreme polymorphic nature of some species of the genus, many authors have indicated that the distinctiveness at the species level, especially among pantropical *B. diffusa* L. and *B. repens* L. is rather difficult [18-22].

### MATERIALS AND METHODS

The present revisionary work is primarily based on study of live collections, thorough scrutiny of herbarium specimens deposited in Central National Herbarium (CAL), Industrial Section, Indian Museum, Botanical Survey of India, Kolkata (BSIS), Northern Regional Centre, Botanical Survey of India, Dehradun (BSD), Forest Research Institute and College, Dehradun (DD), Southern Regional Centre, Botanical Survey of India, Coimbatore (MH), Eastern Regional Centre, Botanical Survey of India, Shillong (ASSAM), Andaman & Nicobar Circle, Botanical Survey of India, Port Blair (PBL), National

Botanical Research Institute, Lucknow (LWG), Tropical Botanic Garden and Research Institute Herbarium, Pachapalode (TBGT), The Rapinat Herbarium and Centre for Molecular Systematics, Tiruchirapalli (RHT) and Department of Botany, University of Kalyani, Nadia (KLN), study of loan specimens from all the renowned national herbarium and consultation of relevant literature. The present article comprises of detailed taxonomic treatment of all the four species of the genus *Boerhavia* L. including a key to the species, correct nomenclature, synonyms, type, vernacular name (if any), taxonomic description, phenology, distribution, ecology, taxonomic note, uses and exsiccate. Photograph and line drawing of the habit, along with detailed floral parts has been provided.

## RESULT AND DISCUSSIONS

### OBSERVATIONS (Taxonomic Treatment)

*Boerhavia* L. Sp. Pl. ed. 1: 3. 1753.

**Type Species:** *Boerhavia diffusa* L. ( Sp. Pl. ed. 1: 3. 1753 ).

Annual or perennial, erect or diffuse herbs often with red tinge along the stems. Leaves opposite, subequal to unequal in each pair, sometimes thick and fleshy. Inflorescence axillary or terminal cymes, paniculate or umbellate, pedunculate, bracteate. Flowers white or pink to lavender coloured with corolliform perianth. Stamens 1-5, didymous. Ovary 1-chambered with solitary ovule in basal placentation. Fruits indehiscent nut, utricle or achene enclosed within accrescent perianth base forming a specialized structure, "anthocarp".

### Key to the studied Species of *Boerhavia* L.:

- 1a. Plant erect; anthocarps obconic, truncate at top, glabrous, eglandular, with 5-longitudinal plicate ribs.....**3. *B. erecta***
- 1b. Plant diffuse; prostrate or straggling; anthocarps otherwise.....(2)
- 2a. Leaf-blades lanceolate, or linear, or elliptic; pedicels 2-4 cm long.....**4. *B. rubicunda***
- 2b. Leaf-blades ovate, or orbicular, or oblong, or subcordate; pedicels smaller .....(3)
- 3a. Plant robust, scaberulously pubescent; leaf-blades 1.5-3 x 1.2-2.9 cm, scabrid on both the surfaces, margin crisped .....**1. *B. crispa***
- 3b. Plant diffused to slender, almost glabrous; leaf-blades 3-5 x 2-3.5 cm, glabrous above, margin entire or slightly undulate.....**2. *B. diffusa***

**1. *Boerhavia crispa*** Heyne (Wall. Cat. List no. 6771. 1832 ) *ex* Hook. *f.* in Hook. *f.*, Fl. Brit.

India 4: 709. 1885; Gamble, Fl. Pres. Madras 2: 814. 1956 (rep. ed.); Sharma *et al.*, Fl. Karnataka 226. 1984; Henry *et al.*, Fl. Tamil Nadu 2: 188. 1987. Singh, Fl. East Karnataka 2: 529. 1988.

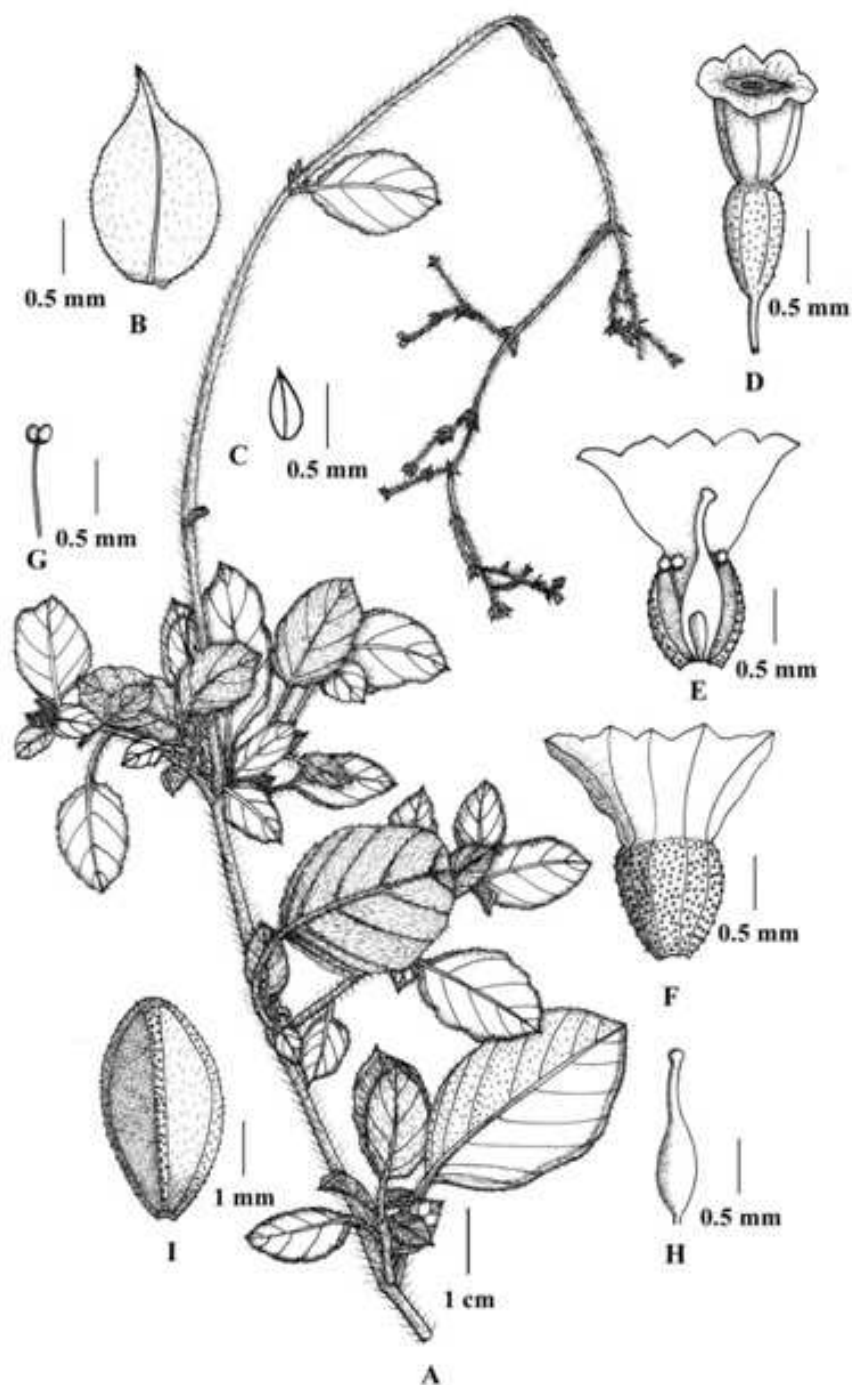


Figure 1. *Boerhavia crispera* Heyne ex Hook. f.: A. Portion of flowering twig; B. Involucral bract; C. Floral bract; D. Flower; E. Flower splitted open; F. Perianth splitted open - stamens and carpel removed; G. Stamen; H. Carpel; I. Anthocarp. [A - I: *Debasmita Pramanick* 38403 (CAL)]

**Type:** Described from Deccan Peninsula.

Annual or perennial, terrestrial, prostrate to erect, stout, pubescent, robust herb, about 1 m long. Roots stout, branched; tap root woody. Stems cylindrical, densely pubescent, pale brown, base woody, rough. Leaves opposite, either in equal or unequal pair, simple, oblong to ovate-oblong or ovate, 2-4 x 1.2-2.9 cm, obtuse at apex, crisped at margin, rounded at base, very thick and hard, coriaceous, scabrid on both the surfaces, venation pinnately reticulate; veins 5-6 pairs on each side of lamina, distinct beneath; green

above, whitish beneath; petioles stout, slender, 0.5-1 cm long, densely puberulous, sulcate above, convex beneath, green; exstipulate. Inflorescence axillary or terminal laxly branched panicle, composed of few capitate flowers; peduncles capillary, 0.5-1.8 cm long, greyish green, bracteate. Flowers incomplete, bisexual, hypogynous, actinomorphic, monochlamydous, sessile to sub-sessile, 0.2-0.25 cm long; bracts ovate-lanceolate, 0.05-0.09 cm long, acute, entire, cordate to subcordate at base, scabrid, rough, 1-veined, hairy, greyish, deciduous; bracteoles 2, below the flower, lanceolate, 0.05-0.07 cm long, acute, entire, subcordate, rough, 1-veined, puberulous, greyish green, deciduous. Perianth corolliformis, gamocorolline; tube enclosing the ovary at base; upper portion campanulate or infundibuliform; limb 5-lobed, pink. Stamens 2; filaments slender, capillary, 0.05-0.15 cm long, included, glabrous; anthers 2-celled, orbicular, monomorphic, dehiscence longitudinal, extrorse, yellow. Carpel 1; ovary superior, ellipsoid, 0.05-0.1 x 0.03-0.05 cm, glabrous, white or dull colour; ovule solitary in single chamber of ovary on basal placentation; style 1, terminal, filiform, 0.5-1 cm long, glabrous; stigma 1, capitate; included. Fruit (anthocarp) true, simple, dry, indehiscent, obovoid-obconical to clavate, or ellipsoid, 5-ribbed, glandular hairy throughout, top rounded, green or pale pink, 0.25-0.4 x 0.2-0.25 cm, seed-1.

**Fl. & Frt.:** August – October.

**Distribution:** India -Tamil Nadu, Karnataka.

**Ecology:** Restricted to Deccan Peninsula, represented from two states only; not common. Grows on bouldery, grassy slopes in forest plantations in a dry locality.

**Taxonomic Notes:** *B. crispa* was enlisted in Wall. Cat. (1832) based on the specimen collected by Heyne from Deccan Peninsula[23]. Choisy (1849) directly treated the plant as an unknown one[24]. Hook. f. (1885) and Gamble (1956, rep. ed.) based on the collections of Heyne so far had reported that the plant is very rare and found in dry districts of Deccan peninsula. Subsequently the plant has not been reported by anyone from any definite locality in Deccan Peninsular region. Even Almeida (1968) was also unable to locate the species in any of the Indian Herbaria[25]. It has been noticed that Mukherjee (1984) overlooked and did not include the species *B. crispa* Heyne ex Hook. f. in his treatment[26]. Bramadhayalaselvam *et al.* (1994) during the revisionary work on south Indian Nyctaginaceae studied the species and included it within the genus *Boerhavia* L.[27]. *Boerhavia crispa* Heyne ex Hook. f. is an additional taxon for the revisionary work of the family Nyctaginaceae that was not included in the previous revisionary work in India. Singh (1988) has recorded this interesting and noteworthy plant from Karnataka[28].

**Specimens examined:** TAMIL NADU: Tinnevely, Anlankolum, 30.06.1901, Barber 3335 (CAL); Nilgiri dist., Thengumarada, 525 m, 04.08.1971, Subba Rao 41622 (MH); Coimbatore dist., Mettupalayam, 340 m, 22.01.2006, Dabasmitha Pramanick 38403 (CAL, MH).

**2. *Boerhavia diffusa* L.,** Sp. Pl. ed. 1: 3. 1753; Kanjilal & Das, Fl. Assam 4: 1. 1940; Cooke, Fl. Pres. Bombay 2: 563. 1958 (Rep. ed.). *B. repens* L., Sp. Pl. 3. 1753; Hook. f. in Hook. f., Fl. Brit. India 4: 709. 1885. *B. diandra* L., Sp. Pl. ed. 1, 2: 1194.1753; Burm. f., Fl. Indica 3, t. 1, f. 1.1768; *B. procumbens* Banks ex Roxb., Fl. Indica (ed. Carey & Wallich) 1: 148. 1820, *nom. superfl.*

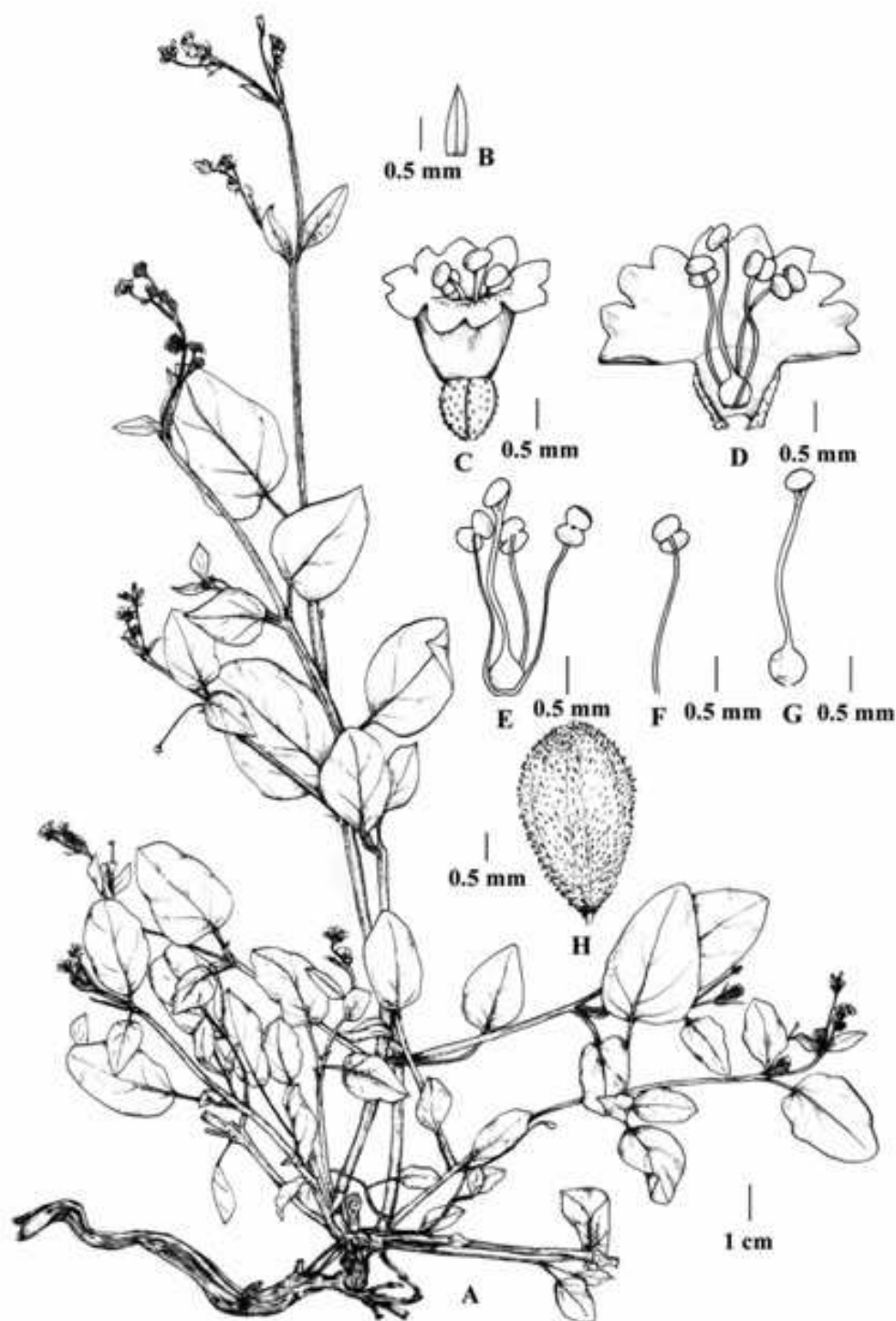


Figure 2. *Boerhavia diffusa* L.: A. Portion of flowering twig; B. Floral bract; C. Flower; D. Flower splitted open; E. Carpel surrounded by stamens; F. Stamen; G. Carpel; H. Anthocarp. [A: R.P. Pandey 4823 (CAL); B - H. Debasmita Pramanick 38405 (CAL)].

**Type:** Conserved Type : Virgin Islands. St Croix, Teague Bay, West Indies Laboratory, 30 May, 1977, Fosberg 56776 (BM 000593477). Designated by : Whitehouse in Taxon 47: 873. 1998.

**Vern. Names:** **Asm.:** Pononua; **Beng.:** Punarnaba, Gadhapurna, Sveta punarnaba; **Bomb.:** Ghetuli, Khapara, Punarnava; **Eng.:** The spreading Hog-weed; **Guj.:** Dholi saturdi, Moto satodo, Vakha kaparo, Satodi; **Hind.:** Sant, Thikri, Biskhafra; **Kan.:**

Balvadike, Gonajali, Rakta punarnava; **Kon.:** Punarnavo; **Mal.:** Thazhuthama; **Mar.:** Punarnava, Vasu; **Mun.:** Kechoara; **Orn.:** Khapra ara; **San.:** Ohio-arak, Khapra shak; **Tam.:** Mukaratte-kirei, Kukkaratai.

Perennial herb, sometimes up to 1 m high while creeping or hanging from wall surface, prostrate, ascending, creeping. Roots large, stout, fusiform with basal woodstock. Stems cylindrical to terete, glabrous or rusty puberulous, sometimes viscid or sub-glabrous, often with club-shaped or stalked glands and glandular hairs, rarely hirsute, slender, swollen at the node, green, often tinged with purple. Leaves opposite in unequal pair, simple, ovate-rounded or sub-orbicular or ovate-lanceolate to oblong, 3-5 x 0.5-4 cm, rounded at apex, sometimes obtusely acuminate or acute, entire or slightly undulate, often red due to marginal glands, base rounded or sub-cordate or truncate, slightly tapering from the center, thick and sub-fleshy; venation reticulate, glabrous or sparingly hairy above with minute scales beneath; upper surface green, lower surface pale white; petioles slender, 1-3.5 cm long, deeply grooved, glabrous, green or reddish-purple; exstipulate. Inflorescences heads or small umbels arranged in slender long-stalked corymbs, extra-axillary and terminal panicles of 4 to 10 flowers together, compactly arranged, glandular-viscid-pubescent; peduncles slender, 1-3 times branched, 1-3.5 cm long, glabrous, green; bracteate. Flowers incomplete, bisexual, hypogynous, actinomorphic, monochlamydous, rose to pale pink, minutely pedicellate; pedicels articulate, 0.5-0.2 cm long; bracts 1-3, linear-lanceolate, oblong, or lanceolate-ovate, 0.01-0.15 x 0.03-0.5 cm, acute, entire, base cordate to truncate, herbaceous, unicostate reticulate, puberulous to glabrescent, green, deciduous. Perianth corolliform, gamocorolline, campanulate, with a distinct constriction halfway above; tube 0.2 to 0.25 cm long, glandular-hairy below the constriction, about 0.1 cm long, bright-purple or pink; limb with 5 narrow vertical bands outside, 5-lobed, 0.1-0.3 cm across. Stamens 1-3, usually 2; filaments filiform to wiry, 0.2-0.3 cm long, alternate to tepals, free above, connate at base, slender, glabrous, slightly exerted; anthers 2-celled, c. 0.05 cm wide, monomorphic, dorsifixed, dehiscence longitudinal, latrorse. Carpel 1; ovary superior, ovoid, 0.01-0.05 x 0.02-0.03 cm long, glabrous, green, 1-loculed; ovule solitary in each chamber in basal placentation; style 1, terminal, slender, 0.1-0.15 cm long, glabrous, greenish; stigma 1, peltate, slightly exerted. Fruit (anthocarp) true, simple, indehiscent, clavate or obovoid or club-shaped or fusiform, sometimes rounded at apex, broadly and bluntly 5-ribbed, 0.25-0.4 x 0.15-0.2 cm long, pubescent, glandular-viscid outside. Seed 1, minute; embryo hooked; radicle long.

**Fl. & Frt.:** June - December; almost throughout the year.

**Distribution:** India-Throughout India - Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu, Tripura, Uttaranchal, Uttar Pradesh, West Bengal

AFRICA; AUSTRALIA; CENTRAL AMERICA; CHINA; EUROPE; MALAYA PENINSULA, MALESIAN ISLANDS, MYANMAR; NEPAL; NORTH AMERICA; PACIFIC ISLANDS; PAKISTAN; PHILIPPINE ISLANDS; SOUTH AMERICA; SRI LANKA; VIETNAM; YUNAN and in several countries of the Middle East.

**Ecology:** The plant is very common and considered often as a troublesome weed, highly adaptable to any situation except water logged condition, found in old walls, grassy fields, waste places, roadsides, railway-yards, forest edges, gardens, on rocks and sands from the coastal plain up to c. 1000 m (up to 2000 m in the Himalayas). It is a protean plant shows high degree of variability in habit, size and shape of leaves, hairiness, etc., according to soil and climate.

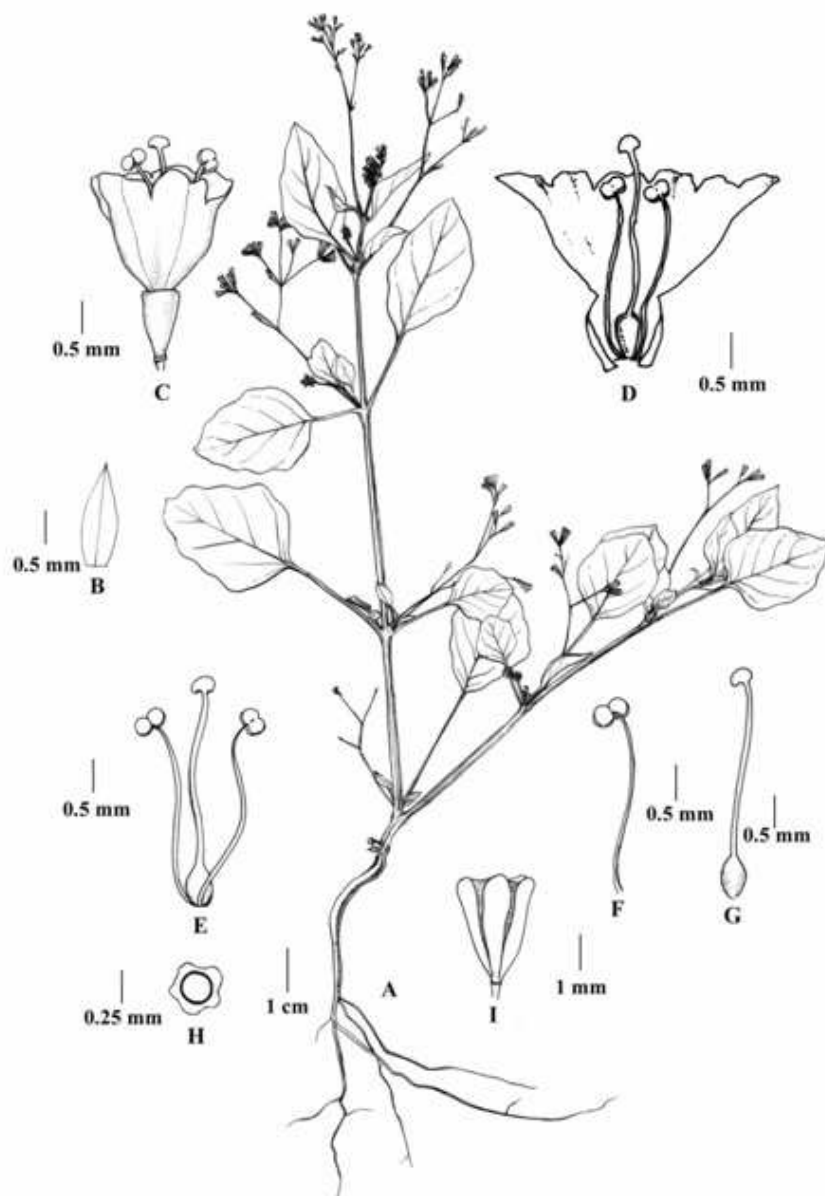
**Taxonomic Notes:** There are great difficulties to distinguish *B. diffusa* L. from *B. repens* L. and *B. procumbens* Banks ex Roxb. Choisy (1849) retained separate species status of *B. diffusa* L. and *B. repens* L. Boissier (1879) and Hook. f. (1885) reduced *B. diffusa* L. to *B. repens* L.[29]. Ridley (1924) reduced *B. repens* L. to *B. diffusa* L.[30]. Backer & Bakhuizen f. (1963) took both the species together under *B. diffusa* L.[31]. Steemerick (1964) treated *B. diffusa* L. as valid species and retained *B. repens* L. within this species under synonym [32]. Mukherjee (1973) again reduced *B. repens* L. to *B. diffusa* L.[33]. Chartek & Krisa (1976) reduced *B. repens* L. to *B. diffusa* L.[34]. Nasir (1977) and Dequan & Gilbert (2003) retained separate species status for the both species[35-36]. Grierson & Long (1984) took *B. diffusa* L. and *B. repens* L. as synonyms under *Boerhavia coccinea* Mill.[37]. The above treatment was based upon creeping versus ascending habit, presence or absence of glands or hairs and inflorescence type. As the species is a tropical-ubiquitous weed show a high degree of variability, thus different extreme is not unexpected.

**Uses:** The plant is valued in the indigenous medicine from the time immemorial. Root decoction is used as an expectorant, diuretic and laxative; also useful in asthma. Root of this plant is effective in the disease of heart and kidney and in gonorrhoea, dropsy, etc. It is purgative, anthelmintic and febrifuge, given in diarrhoea, dysentery, cholera, urogenital and liver disorder. Decoctions of roots and leaves are used in the treatment of rheumatism. Root-paste is used to hasten delivery. Leaves are used for the treatment of skin diseases and antidote of snake-bite, against itches, eczema, jaundice. The young leaves are eaten as pot herb. Plant extract is used in dropsy, ascites of liver and peritonitis. Plant decoction is also used against leucorrhoea. It is an ingredient in a number of Ayurvedic preparations used as anti-ageing agent. The plant is an important ingredient of a number of ayurvedic formulations, for example, Punarnavastak, Punarnavasab, Punarnavambu, Punarnavadi-mandur, Rasnasaptka-kwath and Punarnavadi-kwathas well as of modern medicine, such as, 'Biliarin' and 'Styplon'.

**Specimens examined: ANDAMAN & NICOBAR ISLANDS:** Little Andaman, Hut Bay, Sea level, 06.05.1975, *Bhargava* 2398 (CAL); North Nicobar, Kakana, Car Nicobar, 18.09.1976, *Nair* 4436 (CAL). **ANDHRA PRADESH:** Hyderabad Dist., along Moosi river bank, 833 m, 24.06.1958, *Sebastine* 5942 (MH); Cuddapah Dt., near Dongalachenava lake, 600 m, 20.08.58, *Subramanyam* 6308 (MH). **ASSAM:** K & J Hills Dist., Station Nursery, Shillong, 28.09.1950, *Deka* 22962 (ASSAM); Mikir hills Dist., Tamulbari unclassified Forest, Diphu, 24.06.1963, *Deb* 35303 (ASSAM). **BIHAR:** Chota Nagpur, Lohardunga, 18.10.1883, *Clarke* 33826A (CAL); Bihar, Dharampur, Kaldam Santal Village, 15.12.1957, *Panigrahi* 11776 (CAL, ASSAM). **GOA, DAMAN & DIU:** Goa, Panjuin beach side, 30.04.1963, *Kanodia* 88325 (CAL); Daman, Daman growde (Fort compound), 02.05.1963, *Rolla* 88912 (CAL). **GUJARAT:** Saurashtra coast, Porbandar, 17.02.1963, *Safui* 2476 (CAL). **KARNATAKA:** Sandy beaches of Karnataka Coast, 15.11.1985, *Smeth* 746 (MH). **KERALA:** Madras Presidency, Malabar Dist, Calicut, Sea level, 11.12.1931, *Narayana* 69281 (MH); Kottayam Dist., Chinnar to Mariyur – Devicolam, 1000 m, 1904.1964, *Sebastine* 18309 (MH). **MADHYA PRADESH:** Central Province, Khandwa, Bhano tanti, 24.08.1949, *Narayanaswami* 3656 (CAL); Hoshangabad Dist., round about Hoshangabad, 300 m, 28.09.1960, *Joseph* 11071 (MH). **MAHARASHTRA:** Nagpur Dist., Laximinarain's Institute, 300 m, 13.11.1957, *Subramanyam* 4574 (MH); Sangam bridge, Poona, 02.09.1960, *Wadhwa* 64208 (CAL). **MEGHALAYA:** Khasi & Garo Hills Dist., Nongpoh, 24.04.1942, *Deka* Acc. No. 23233 (ASSAM). **ORISSA:** Ganjam Dist., Raikia to Digi, 29.01.1900, *Barber* 1294 (MH); Sundargarh Dist., Gambaridihi, 26.12.1986, *Mukherjee & Namhata* MN 863 (CAL); **PONDICHERRY:** Pondicherry, Auroville, 35 m,

11.07.1987, *Rajan* 86245 (MH). **RAJASTHAN:** Marawar, March 1808, *King*, s.n. (CAL); Jodhpur Dist., KailanRe d afforestation area compartment I, 25.07.1972, *Singh* 5 (CAL); **TAMIL NADU:** Kurnool Dist., Dupad, Feb. 1883, *Gamble* 18667 (CAL); Salem Dist., Hosur Caule Farm, 06.06.1930, *Narayanaswami* 2926 (MH). **UTTAR PRADESH:** Upper Gangetic Plain, Kheri Dist., (Oudh), 24.03.1898, *Inayat* 22756 (CAL); Mirzapur, Ahraura, 30.10.1964, *Dr. G. Panigrahi* 2252 (CAL). **WEST BENGAL:** Bengal Plain, Sundarban, 27.04.1883, *Clarke* 33363 (CAL); Burdwan Dist., Damodar bank near Sadarghat, 04.04.1960, *Dutta* 57 (CAL).

**3. *Boerhavia erecta* L.**, Sp. Pl. ed. 1: 3. 1753; Nair & Nair in J. Bombay Nat. Hist. Soc. 61(1): 216. 1964; Stemm. in van Steenis, Fl. Males. Ser. 1, 6: 454. 1964; Almeida in J. Bombay Nat. Hist. Soc. 65(1): 267. 1968; Rao & Hemadri in Sci. & Cult. 36: 218. 1970; Maiti and Hore in Bull. Bot. Soc. Bengal 32: 36. 1976. *Boerhavia punarnava* Saha & Krishnam. in J. Sci. Industr. Res. 21(C): 254. 1962.



**Figure 3.** *Boerhavia erecta* L.: A. Portion of flowering twig; B. Inflorescence bract; C. Flower; D. Flower splitted open; E. Carpel surrounded by stamens; F. Stamen; G. Carpel; H. Transverse section of ovary; I. Anthocarp. [A - I: *V.J. Nair* 28497 (CAL & BSD)]



**Neotype:** Herb. Linn. No. 9.1 (LINN). [Fawcett & Rendle, Fl. Jamaica 3: 148. 1914]

**Vern. Name:** **Hind.:** Shweta; **Mar.:** Pandhari-Punarnava; **Mal.:** Thazhwthama.

Erect to suberect herb, perennial, upto 1 m tall. Roots stout, white, straight, downwards. Stems terete, ribbed, glabrous or shortly hairy, often purple pigmented, base woody, swollen at node. Leaves opposite in unequal pairs, simple, ovate or ovate-oblong or ovate-lanceolate to lanceolate or elliptic ovate or linear-lanceolate, 1-6 x 0.5-4.5 cm, acute or apiculate, rarely obtuse or acuminate at apex, undulate at margin, often with purple tinged, truncate or cuneate or sub-acute at base, herbaceous, thick when fresh, venation pinnately reticulate, 4-5 veined at base; veins sulcate above, elevated beneath, often bifurcated at tip, glabrescent, green above, pale and punctate beneath with red sunken glands on the lower surface; petioles 0.5-4 cm long; exstipulate. Inflorescence mostly laxly arranged, comprising of 2-3-flowered cymose panicles, sometimes paniced umbels; panicles zigzag, 2-4 cm long, slender, axillary or terminal or at the forks of dichotomy; peduncles slender, glabrous, green. Flowers incomplete, bisexual, hypogynous, actinomorphic, monochlamydous; pedicels slender, 0.5-0.6 cm long, glabrous, green, bracteate; bracts leafy, 1-2, lanceolate, 0.03-0.05 x 0.02-0.03 cm, acute, entire, unicostate, hairy, light pink, persistent. Perianth gamocorolline, lower part of perianth-tube sepaloid, obconic, faintly 5-ribbed, 0.15-0.25 x 1-1.6 cm, enclosing ovary; upper part of perianth petaloid, white with pink-striped, funnel-shaped; 5-lobed; lobes bifid, ca. 0.3 cm across, glabrous. Stamens 1-3; filaments slender, glabrous, ca. 0.16-0.26 cm long, exerted, white; anthers 2-celled, ovoid to broadly ovoid, monomorphic, dorsifixed, longitudinal, latrorse. Carpel 1; ovary superior, ellipsoid, glabrous, 0.04-0.06 x 0.02-0.03 cm, white; ovule solitary in basal placentation; style 1, terminal, filiform, 0.18-0.25 cm long, white; stigma 1, capitate or discoid, exerted. Fruits (anthocarp) true, simple, indehiscent, obconic, 0.3-0.45 x 0.1-0.2 cm, 5-ribbed, grooved between the ribs somewhat undulate, glabrous, truncate at top, angular, green or greenish-pink, eglandular; seed 1, club-shaped, longitudinally ribbed.

**Fl. & Frt.:** May – August; often shows flowering in winter season in crop field while growing as wild.

**Distribution:** **India-** Andhra Pradesh, Kerala, Maharashtra, Punjab, Rajasthan, Tamil Nadu, Uttaranchal, West Bengal.

TROPICAL AMERICA; CHINA; JAVA; LESSER SUNDA ISLANDS; MALESIA; NEW GUINEA; SINGAPORE; SUMATRA; WEST INDIES.

**Ecology:** This plant grows well along railway embankments, in open sandy places, waste places, gardens, also reported from the coast up to 700 m altitude.

**Taxonomic Notes:** Saha & Krishnamurthy (1962) described new species *Boerhavia punarnava* Saha et Krishn. on the basis of a type collected by J.C. Saha from Pondicherry (India)[38]. Subsequently, this taxon was recorded from Kerala (Nair & Nair, 1964), Maharashtra (Ramarethinam, 1964) and from West Bengal (Maiti and Hore, 1976)[39-41]. But Rao and Hemadri (1970), Maiti and Hore (1976) all had stated that it is *Boerhavia erecta* L. and thus *B. punarnava* Saha et Krish. is a superfluous name of *B. erecta* L. which had entered to India as an exotic species[42]. It is now established and growing in different parts of West Bengal and Peninsular India.

**Uses:** The leaves are cooked and eaten as spinach in some parts of the tropical countries.

**Specimens examined:** **ANDHRA PRADESH:** Cuddapah dist., Balapalle Range, Seshachalam R.F. (Reserve Forest), 250 m, 17.07.1962, *Ellis* 14221 (CAL, MH); Anantapur dist., Pennahobilam, 17.09. 1981, *Pullaiah & Yesoda* 368 (MH). **KERALA:** Port Cochin, April 1961, *Nair* 1160 (BSD); Palghat dist., Walayar Forest, 75 m, 09.07.1963,

*Joseph* 17014 (MH). **PUNJAB:** Hoshiarpur dist., Tanda, 14.09.1979, *Daniel* 67397 (BSD). **RAJASTHAN:** Pali dist., near Barr, along Jodhpur-Ajmer Road, 324 m, 17.08.1975, *Shetty* 1788 (CAL). **TAMIL NADU:** Coimbatore dist., On the way to Varapalayam, 666 m, 06.07.1956, *Subramanyam* 140 (CAL, MH); South Arcot dist., Coimbatore dist., T.N.A.U. Campus, 24.01.2006, *Debasmita Pramanick* 38406 (CAL). **WEST BENGAL:** Howrah dist., Chengail, 22.02.1964, *Bennet* 592 (CAL); Ramrajatala Rly. Station area, 12.06.1975, *Maiti* 26 (CAL).

**4. *Boerhavia rubicunda*** Steud., *Nom. Bot.* ed. 2. 1: 213.1840 (*nom. nud.*); Nasir in Nasir & Ali (ed.), *Fl. West Pak.* 115: 7. 1977; V. Singh & Singh, *Biodiver. Desert National Park, Rajasthan* 141. 2006. *Boerhavia elegans* Choisy in DC., *Prodr.* 13(2): 453. 1849; Bamber, *Pl. Punjab* 180.1916; Stewart, *Punjab Pl.* 182. 1920; Cooke, *Fl. Pres. Bombay* 2: 565. 1958 (Rep. ed.); Bhandari, *Fl. Indian Desert* 286. 1978.

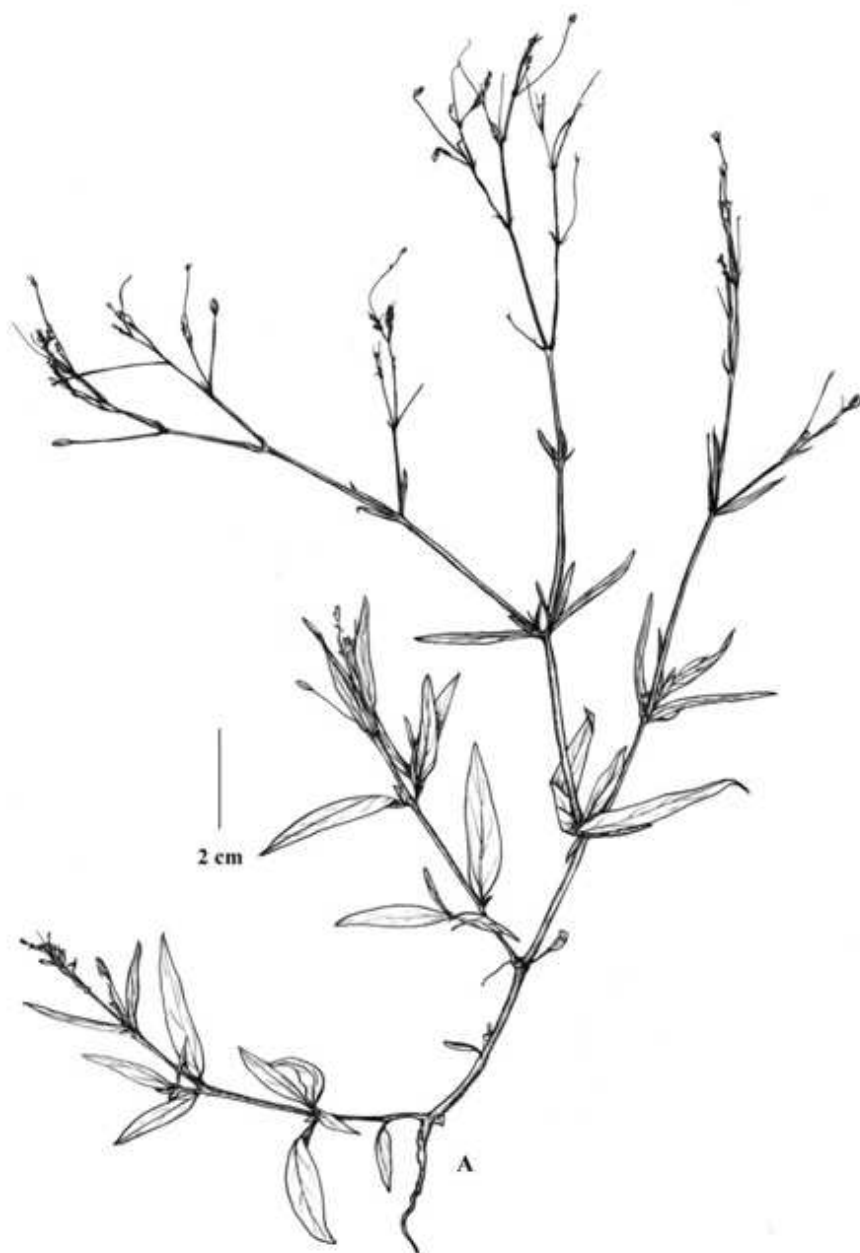


Figure 4. *Boerhavia rubicunda* Steud.: A. Portion of flowering twig. [A: G.P. Roy 2095 (CAL)]

**Type: Holotype:** Arabia Felix, in ruppibus Montis Seddar, Schimper 744 (PRC).

**Vern. names: Baluch.:** Lanti, Sohr-mard, Giawan Be; **Punj.:** Sant; **H.P.:** Helra.

Perennial, erect or diffuse, herb or shrub, up to 50 cm high. Rootstock woody, much divided. Stems terete, woody below; branches erect, diffuse, 30-60 cm long, glaucous below, glabrous above, thinly pubescent near the base, green. Leaves opposite, whorled, simple, lanceolate to elliptic-lanceolate or ovate-oblong to oblong-lanceolate or linear-oblong, 1.5-5.2 cm long and 0.4-0.9 cm wide, obtuse, often apiculate or mucronulate at apex, entire at margin, gradually narrowed and rounded at base, fleshy, rugose and canescent beneath; venation reticulate; glabrous to puberulous, mottled with white (in dry condition); petioles slender, 0.15-0.1 cm long; exstipulate. Inflorescence very large, lax, di-or-tri-chotomously much branched, glabrous panicle; peduncles slender, 0.2-0.25 cm long. Flowers incomplete, bisexual, hypogynous, actinomorphic, monochlamydous, pale pink to pinkish-purple, 0.15-0.2 cm long; pedicillate; pedicels very slender, 0.15-0.2 cm long, glabrous; bracts 0.15-0.25 cm, long, lanceolate to linear, acute, entire, cordate or elliptic, unicostate, villous, setaceous, green, deciduous. Perianth corolliformis, gamocorolline, campanulate, 1.5-2.5 cm long, glabrous or rusty puberulous, pale pink. Stamens 1-5, usually 2; filaments slender, 0.2-0.22 cm long, projecting, connate at base, glabrous; anthers 2-celled, dumbbell-shaped, monomorphic, dorsifixed, dehiscence longitudinal, glabrous, reddish-brown. Carpel 1; ovary superior, ovoid, c. 0.1 cm long, glabrous, green, enclosed in the persistent lower half of the perianth, ovule solitary in each chamber, basal placentation; style 1, terminal, 0.15-0.18 cm long, glabrous, green; stigma 1, capitate, included. Fruits simple, indehiscent, clavate to oblong-clavate or narrow to narrowly ellipsoid, 0.25-0.3 cm long, pentagonal with 5, strong, obtuse perfectly glabrous ribs, minutely hairy between ribs; seed 1.

**Fl. & Frt.:** September – March.

**Distribution: India** -Himachal Pradesh, Maharashtra, Rajasthan  
AFRICA; ARAB; PAKISTAN.

**Ecology:** The plant is found occasionally in dry rocky or sandy habitats of west Rajasthan desert; outskirts of forests in Maharashtra.

**Taxonomic notes:** The nomenclature of *Boerhavia rubicunda* Steud. faces the difficulty of writing a code of rules that is universally satisfactory. The name *Boerhavia elegans* Choisy is accompanied by a reasonably well prepared and adequate description. However, Choisy (1849) cited the earlier name *B. rubicunda* Steud. as a synonym. Examination of protologue of this earlier name shows that the only descriptive information accompanying it is the symbol ♣, explained by him as meaning “perennial”. A specimen “Arab, fel. Boerhavia nr. 744 Herb. arab. un it” is cited that is certainly the same Schimper collection cited by Choisy for *B. elegans*. Both the names are borne out by two sheets of this collection of which one in P and another in US with “Herbarium Steudel”.

The symbol ♣ is certainly not an adequate description. However, the International Code of Botanical Nomenclature, Art. 32, dealing with conditions for valid publications requires only a “descriptions”, not necessarily an adequate one. Thus there is no way to avoid regarding *B. rubicunda* Steud. as validly published to avoid the name *B. elegans* Choisy considering as Choisy did not take up the earliest available epithet.

**Uses:** It is reported that the sheep, when eat this plant get over their teeth a golden colour and appear just like gold. The plant parts are used as fodder for sheep. The leaves are diuretic and the seeds are edible [43]. The natives of desert use the mucilaginous seeds for cooking purpose [44].

**Specimens examined: HIMACHAL PRADESH:** Lower of Scinde, Hills, 1849, *Stocks* 814 (CAL). **RAJASTHAN:** W. Rajasthan, Thikana Bir (Pokran), 17.09.56, *Nanda* 559 (CAL); Jaisalmer dist., Bada Bag, 14.11.1973, *Tiwari* 802 (CAL); Bikaner dist., near Ranjitpura village, 145 m, 15.09.1975, *Roy* 2095 (CAL).

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