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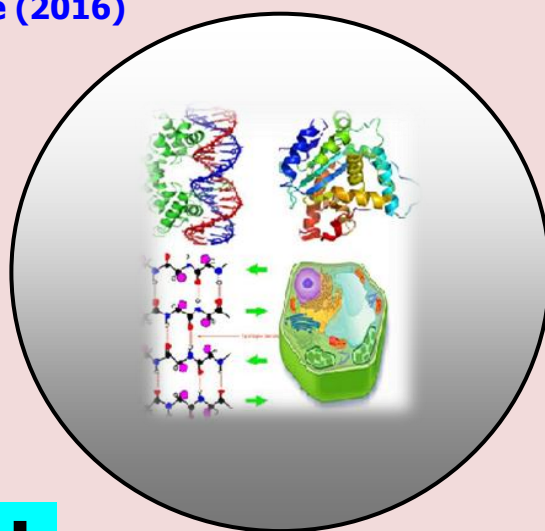
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Reinvestigation of the Occurrence of *Caesalpinia crista* L. (*Caesalpinioideae*, *Leguminosae*) in Uttar Pradesh

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ABSTRACT

Caesalpinia crista L. was previously reported from Uttar Pradesh along with its closely allied species *C. bonduc* (L.) Roxb and other six species (i. e. *C. coriaria* (Jacq.) Willd., *C. decapetala* (roth) Alston, *C. digyna* Rottler, *C. pulcherrima* (L.) Sw., *C. sappan* L., *C. cucullata* Roxb.). However, the present study on the subfamily *Caesalpinioideae* (*Leguminosae*) of Uttar Pradesh confirms that *C. crista* is a coastal species and does not occur in the state. All specimens previously identified as *C. crista* at different herbaria belong to *C. bonduc*. Both species have been compared and illustrated and comments on their distribution pattern have been provided.

Keywords: *Caesalpinia crista*, *C. Bonduc*, Identification, Nomenclature and Distribution.

INTRODUCTION

The genus *Caesalpinia* L. is represented by about 20 species in India (Sanjappa, 1992), out of which about 8 species have been reported from Uttar Pradesh (Khanna, 2017). *Caesalpinia crista* L. and *Caesalpinia bonduc* (L.) Roxb., are two different and much distinct species in the genus. Both are scrambling shrubs or climbers, however, they can easily be separated by their pods. In *C. bonduc* (L.) Roxb. the pods are dehiscent and covered with sharp wiry prickles (Figure 1 & 2) while in *C. crista* L. they are indehiscent and not covered with spines (Figure 3). Apart from this, they also distinctly differ in the stipules, leaves and flowers (Table 1). During the course of the study of legumes of Uttar Pradesh, it was noticed that there is some confusion regarding the identity and distribution of *C. crista* L. in Uttar Pradesh. Hence, the present study was undertaken to reinvestigate and confirm the presence of *Caesalpinia crista* L. in Uttar Pradesh.

In the first comprehensive account of the flora of the Gangetic Plain, Duthie (1903) recorded *C. bonduc* (L.) Roxb. from the area along with other species, but did not mention anything about *C. crista* L. in his work. For the first time *C. crista* L. was reported from Uttar Pradesh by Kanjilal (1933) as accepted name. Mistakenly, Kanjilal (1933) synonymised *C. bonduc* (L.) under *C. crista* L., while the former is a synonym of *C. bonduc* (L.) Roxb. However, he characterised the pods of *C. crista* L. as spiny which is a diagnostic feature of *C. bonduc* (L.) Roxb. The subsequent workers such as Panigrahi *et al.* (1967) and Panigrahi & Saran (1969) followed the work of Kanjilal (1933) and also recorded *C. crista* L. from Uttar Pradesh. Further, Khanna *et al.* (1999) reported both species (i. e. *C. bonduc* (L.) Roxb. and *C. crista* L.) from Uttar Pradesh, that was followed by Kumar *et al.* (2015), Shukla (2016) and Khanna (2017). When the specimens (i. e. R. Prasad 2005; O. P. Misra

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7900; *G. Panigrahi* 10642; *G. Panigrahi* 1064; *C. N. Arora* 1544; *G. Panigrahi* 6586 and *Misra* 7900) included in the previous work as *C. crista* L. (*Panigrahi & Saran*, 1967; *Panigrahi et al.*, 1969; *Kumar et al.*, 2015; *Shukla*, 2016), were critically examined, they turned up *C. bonduc* (L.) Roxb. In the present study, we never noticed and collected any plant of *C. crista* L. from the entire range of Uttar Pradesh. Therefore, we conclude that *C. crista* L. does not occur in Uttar Pradesh and plants identified earlier as *C. crista* L. all belong to *C. bonduc* (L.) Roxb. Further, the distribution pattern of *C. crista* L. also reveals that it is a plant of coastal regions in India (*Gamble*, 1919; *Haines*, 1924; *Talbot*, 1909; *Pullai* & *Chennaiah*, 1997; *Dagar & Singh*, 1999). The work of *Singh* (1993), *Kanjilal* (1938), *Chowdhery & Wadhwa* (1984) and *Maheshwari* (1963) also suggests that *C. crista* L. does not found in non coastal region. However, sometimes it is grown in the gardens in some non coastal regions (Uttarakhand, FRI garden, 14.07.1952, *Hiralal* 4204-DD).

MATERIALS AND METHODS

The present study is based on the examination of several herbarium specimens housed at different herbaria (BSA, BSD, CAL, DD and LWG) as well as observations of plants in the natural habitats. The micro-morphological characters have been observed under stereo zoom microscope (Leica, Germany). Distinguishing characters of both species have been provided in table 1 for their easy segregation. Line drawing illustrations of both species have been also provided for their easy comparison. *C. bonduc* (L.) Roxb. has been elaborately dealt here with all taxonomic information such as correct nomenclature, description, phenology, distribution and reference to voucher specimens to avoid the taxonomic ambiguity between the species. The specimens collected in the present work have been deposited at LWG where the study was conducted.

RESULT AND DISCUSSION

The critical study of literature, examination of several herbarium specimens housed at different herbaria and study of living plant materials in the natural condition, it is concluded that *C. crista* L. is a species of coastal regions and does not occur in Uttar Pradesh. Due to misidentification and nomenclature problems it (*C. crista* L.) was reported from Uttar Pradesh and also from some other non coastal belts. The both species have been compared and detail taxonomic information of *C. bonduc* (L.) Roxb. have been provided.

Caesalpinia bonduc (L.) Roxb., Fl. Ind. 2: 362. 1832 p. p. excl. pl. descr. emend Dandy & Exell, J. Bot 76: 179. 1938; Baker in Hook. f., Fl. Brit. India 2: 255. 1878; Hattink, Reinwardtia 9: 17. 1974; Vidal & Thol, Bull. Mus. Nation. Hist. Nat. 3, 27: 91. 1976; Sanjappa, Legum. India 9. 1992; Singh, Fl. Dudhwa Nat. Park 183. 1997; Srivastava, J. Econ. Taxon. Bot. 28 (2): 302. 2004; Saini, J. Econ. Taxon. Bot. 29 (4): 569. 2005; Kumar *et al.*, J. Threat. Taxa 7 (7): 7345. 2015; Shukla in Singh *et al.*, Fl. Uttar Pradesh 1: 492. 2016. Figures 1 & 2.

= *Guilandina bonduc* L., Sp. Pl. 381. 1753.

= *Guilandina bonducella* L., Sp. Pl. ed. 2: 545. 1762, *nom. illeg.*

= *Caesalpinia bonducella* (L.) Fleming, Asiat. Res. 11: 159. 1810, *nom. illeg.*; Baker in Hook. f., Fl. Brit. India 2: 254. 1878; Duthie, Fl. Upp. Gang. Plain 1: 278. 1903; Mishra & Verma, Fl. Allahabad Dist. 119. 1992.

= *Caesalpinia crista sensu* Kanjilal, Fl. Pilibhit, Oudh, Gorakhpur & Bundelkhand 156. 1933; Panigrahi & Saran, Bull. Bot. Sur. India 9 (1–4): 253. 1967; Panigrahi *et al.*, Bull. Bot. Sur. India 11 (1 – 2): 94. 1969; Srivastava, Fl. Gorakhpurensis 115. 1976.

Woody scrambling shrubs or climbers, up to 15 m long. Branchlets dull, glabrous to ferruginous-tomentose, with dense, straight or recurved prickles. Stipules subpersistent, pinnate or bipinnate, consisting of 3–5 leaflets, leaflets 0.5–2 cm long, ovate, often mucronate. Leaves alternate, bipinnate; petiole 6–10 cm long, ferruginous-tomentose; rachis 15–60 cm long, with prickles at base, ferruginous-tomentose; secondary rachis 8–18 cm long, opposite, 4–10 pairs, ferruginous-tomentose; leaflets 6–12 pairs, 1.5–3.5 × 1–2 cm, ovate-oblong to elliptic-lanceolate, oval or unequal at base, entire along margins, obtuse to subacute and mucronate at apex, sparsely pubescent at abaxial surface and veins including adaxial surface. Inflorescence racemes, 20–60 cm long, many-flowered, axillary or terminal, often branched; peduncles covered with short prickles and dense hairs. Bracts 6–8 mm long, caducous, reflexed, subulate and pubescent. Pedicels 6–10 mm long, pubescent. Sepals 5, free, 0.4–1.2 × 0.4–0.6 cm, subequal, lowermost cucullate and all others nearly boat-shaped, reflexed during anthesis, yellowish-green in colour, truncate at base, entire along margins, rounded at apex, hairy mainly at abaxial surface.

Petals 5, free, creamy-yellow or yellow, equal to or slightly exceeding the sepals; standard petal with red spots or patches, claw $3-4 \times 1-2$ mm, densely hairy on both sides, limb $4-7 \times c. 3$ mm, reflexed, glabrous or with a few hairs, other 4 petals $10-15 \times 3-4$ mm, mostly spatulate, hairy at base and on the outer side. Stamens 10, all fertile; filaments $6-10$ mm long, nearly straight, hairy in the basal part; anthers $c. 1$ mm long, dehiscent by longitudinal slits. Ovary $2.5-3 \times c. 2$ mm, seated on a short gynophore ($c. 1$ mm long), style $3-4$ mm long; stigma ciliate. Pods $5-9.0 \times 3.5-4.5$ cm, dehiscent, oblong, base acute, thickened at sutures, top rounded, beaked ($c. 8$ mm long), surfaces more or less densely set with $5-10$ mm long spines. Seeds $1-2$, ovoid to globular, $15-20 \times c. 13$ mm, grey in colour (greenish-grey when unripe), and smooth.

Fl. & Fr.: Aug.-Feb.

Distribution in India: Throughout India (Sanjappa, 1992).

Distribution in Uttar Pradesh: Almost throughout.

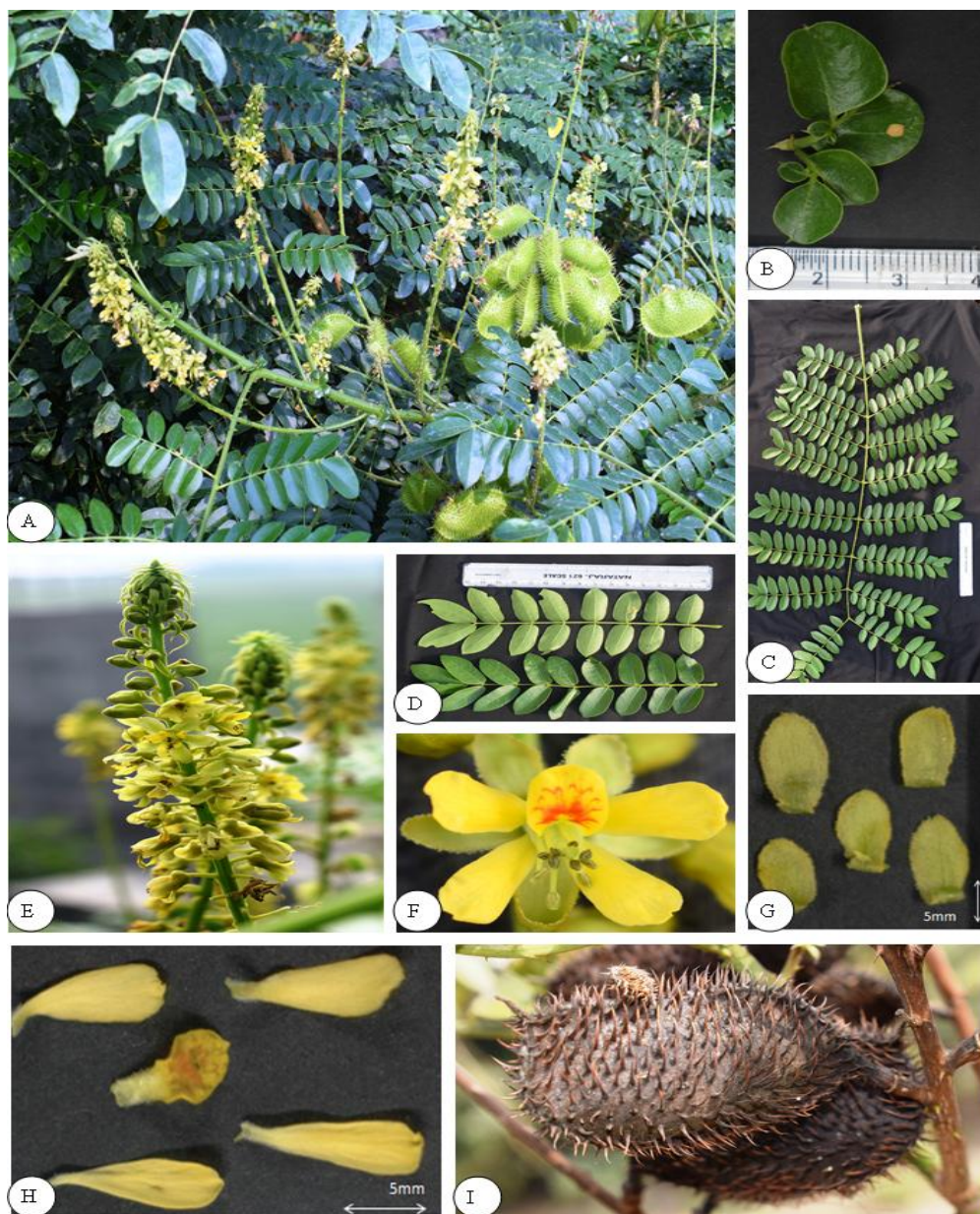


Figure 1. *Caesalpinia bonduc* (L.) Roxb. (A) Habit, (B) Stipules, (C) A leaf, (D) Leaflets, (E) Inflorescence, (F) A flower, (G) Sepals, (H) Petals, (I) Pods.

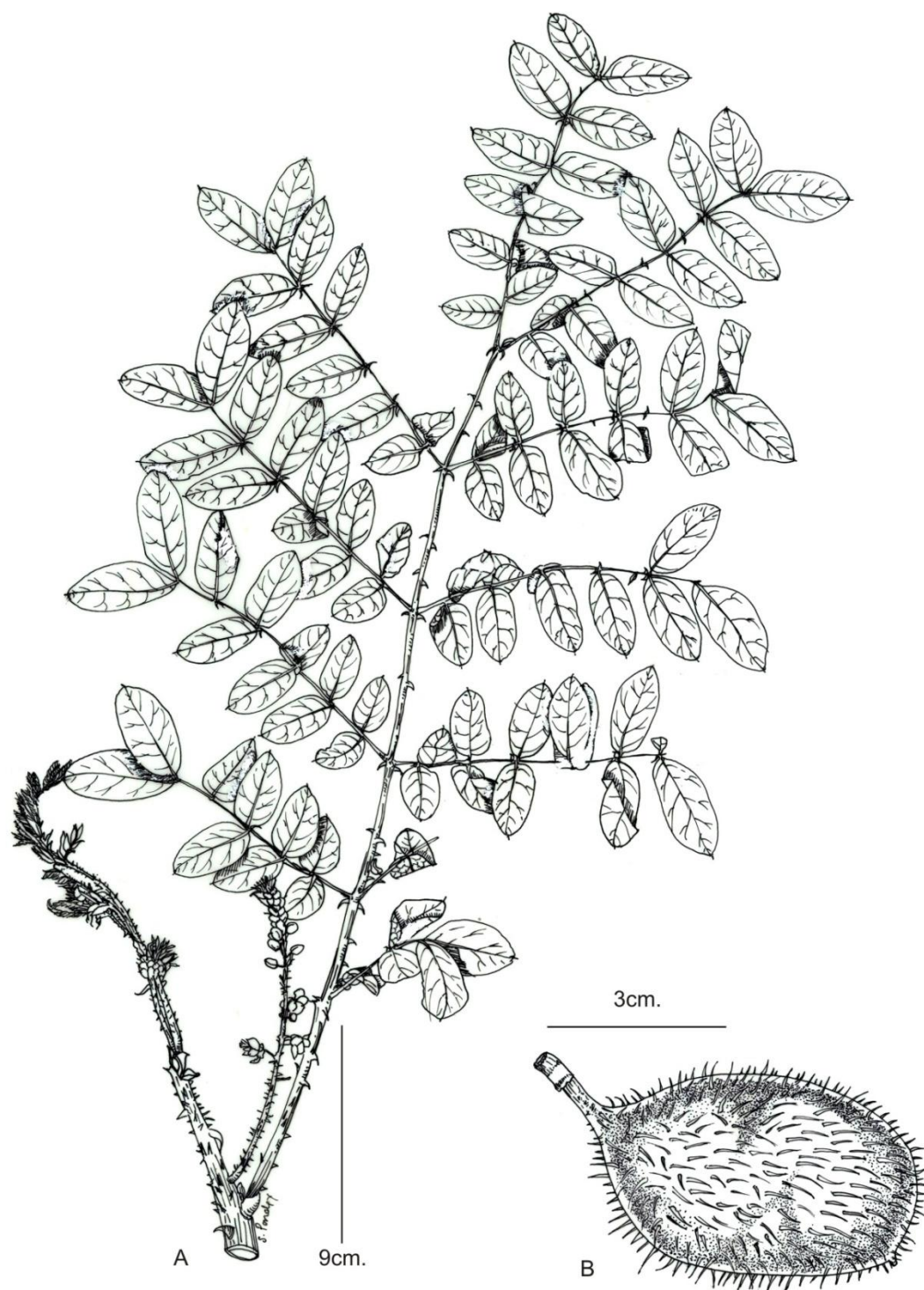


Figure 2. *Caesalpinia bonduc* (L.) Roxb. (A) A twig, (B) A pod.

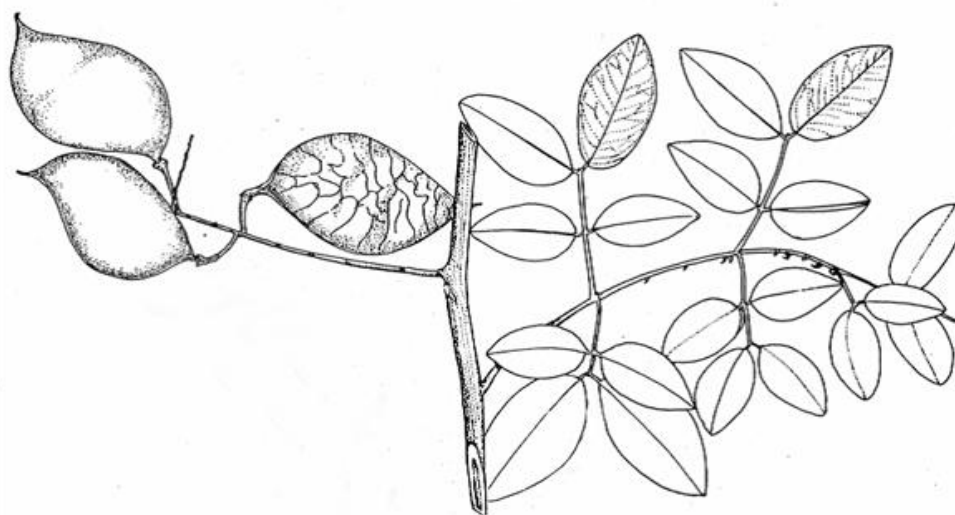


Figure 3. *Caesalpinia crista* L. A twig with pods (Reproduced from Khatun and Rahman, 2006).

Table 1. Differences between *C. bonduc*(L.)Roxb.and *C. crista* L.

	Characters	<i>Caesalpinia bonduc</i> (L.) Roxb.	<i>Caesalpinia crista</i> L.
1.	Branch	Dull, glabrous to ferruginous-tomentose with comparatively dense, straight or recurved prickles.	Glossy, glabrous or with few recurved prickles.
2.	Stipule	Subpersistent.	Caducous.
3.	Primary leaf rachis	15–80 cm long, ferruginous-tomentose.	10–30 cm long; glabrous.
4.	Leaflet	6–12 pairs, ovate-oblong.	2–3 (–5) pairs, ovate-elliptic.
5.	Peduncle	Densely hairy when young.	Sparsely hairy when young.
6.	Bract	6–8 mm long.	Approx. 1 mm long.
7.	Pedicel	2–6 mm.	7–15 mm.
8.	Calyx	Often hairy.	Often glabrous.
9.	Style	3–4 mm long.	Approx. 10 mm long.
10.	Pod	Covered with spines, dehiscent, turned brown when dry.	Without spines, indehiscent, turned blackish when dry.

Specimens examined

Allahabad Dist.: Kumbh Mela Area, 30.10.2003, *K.K.Khanna* 58436 (BSA). **Bahraich Dist.:** Bahraich, 21.05.1987, *K.K.Singh* 5984 (LWG); Kakardari, 08.07.1954, *V.Chandra & party* 12175 (LWG); Payagpur, 03.07.1954, *V.Chandra & party* 11860 (LWG); 17 km away from Bahraich on Nanpara road, *P.Singh* 16642 (LWG); Harabasari village, 28.11.1954, *S.K.Jain* 16542 (LWG); Chakia, 07.02.1965, *O.P.Misra* 7900 (BSA); Chathamline, 16.09.1964, *R.prasad* 2005 (BSA); Motipur, 22.11.1964, *G.Panigrahi* 6586 (CAL). **Gonda Dist.:** Jarwa forest, 09.01.1800, *Shriram* 872 (DD); Parvati Arga, 09.10.2005, *K.K.Khanna* 63843 (BSA). **Gorakhpur Dist.:** Campierganj, 20.10.2007, *K.K.Khanna* 66541 (BSA); Laxmipur forest, *Gupta, Singh & team* 9496 (LWG); Lakshmipur, 05.11.1963, *C.N.Arora* 1544 (BSA); Tehrighat, 25.02.1966, *G.Panigrahi* 10642 (BSA); Motipur, 22.11.1964, *O.P.Misra* 6586 (BSA). **Lucknow Dist.:** Banthara research station, 08.09.1987, *R.Ahuja* 850 (LWG); NBG, 28.06.1954, *Angelina* 20009 (LWG); Lucknow, *Ramsingh* (LWG); Bharwara, 05.09.2017, *S.Pandey* 304212 (LWG). **Mainpuri Dist.:** Kushmara road crossing, 24.12.1998, *S.D.Malya* 217703 (LWG). **Muzaffarnagar Dist.:** Near D.A.V.College mess, 1953, *R.C.Bharadwaj* s.n., acc. no. 8474 (LWG). **Pilibhit Dist.:** Mala, 04.05.1901, *C.L.Malhotra* 50767 (CAL). **Shravasti Dist.:** Bhinga, 17.10.2005, *K.K.Khanna* 65609 (BSA). **Siddharthnagar Dist.:** Shohratgarh, 20.10.2005, *K.K.Khanna* 65429 (BSA). **Sitapur Dist.:** Sitapur-Kasta road, near Kajikamalpur, 17.08.2017, *S.Pandey* 304236 (LWG). **Varanasi Dist.:** Banaras Nagwa Garden, 07.09.1956, *G.Saran & party* 25212 (LWG).

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