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New plant records for the flora of Delhi, India

Acharya Balkrishna[1, 2], Bhasker Joshi[1, 2*], Anupam Srivastava[1], Amit Kumar[1] & Rajesh Kumar Mishra[1,3]

[1]Patanjali Research Foundation, Haridwar, Uttarakhand, India, 249405
[2]University of Patanjali, Uttarakhand, India, 249405
[3]Patanjali Bhartiya Ayurvigyan Evam Anusandhan Sansthan, Haridwar, Uttarakhand, India, 249405
[*] Author for correspondence: bhaskerjoshiphd@gmail.com

Abstract

During botanical surveys carried out from 2021 to 2022, in the Rashtrapati Bhavan area of New Delhi, India, we collected numerous species including 5 never before recorded in this region: *Cardamine flexuosa*, *Gloriosa superba*, *Hemidesmus indicus*, *Phoenix acaulis* and *Solanum villosum*. Brief descriptions, ecological and phenological information and some illustrations are provided here for each species.

Résumé

Lors des prospections botaniques réalisées de 2021 à 2022, dans la zone de Rashtrapati Bhavan à New Delhi, en Inde, nous avons collecté de nombreuses espèces dont 5 inédites dans cette région : *Cardamine flexuosa*, *Gloriosa superba*, *Hemidesmus indicus*, *Phoenix acaulis* et *Solanum villosum*. De brèves descriptions, des informations écologiques et phénologiques et quelques illustrations sont fournies ici pour chaque espèce.

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Mots-clés : nouveaux enregistrements, Rashtrapati Bhavan.

Introduction

Delhi is a territory situated in northern part of India between 28°38'8.74"N and 77°13'28.02"E. It covers an area of 1483 sq. km with maximum length of 51.90 km and maximum width of 48.48 km. It is bordered by the state of Haryana on three sides and by Uttar Pradesh to the east. Earlier, the vegetation of Delhi has been studied by Maheshwari (1963; 1966), Dakshini & Vijayaraghavan (1970), Viswanathan *et al.* (1982; 1984), Viswanathan & Singh (1986), Sharma & Ahmad (1990-a, b; 1991), Sharma (1994; 1997; 2002), Lal *et al.* (2002), Kumar & Yadav (2005), Naithani *et al.* (2006), Krishen (2006), Mishra (2015), Mishra *et al.* (2015-a, b, c, d ; 2019), Pandey & Singh (2017). Singh (2007-a, b) studied Trees of Rashtrapati Bhavan and Roses of Mughal Garden, Baviskar (2016) studied the flora and fauna of the Rashtrapati Bhavan. During the survey of the Rashtrapati Bhavan Estate, New Delhi, many plants were collected in the Estate (fig. 1). After critical investigations it was found that 5 species i.e *Cardamine flexuosa* Withering (1796: 578), *Gloriosa superba* Linnaeus (1753: 305), *Hemidesmus indicus* (Linnaeus 1753: 211) Robert Brown (1811: 75), *Phoenix acaulis* Roxburgh (1819: 69) and *Solanum villosum* Miller (1768: 2) had not yet been reported in the floristic documentation of Delhi.

Taxonomic information is provided here for each species. The voucher specimens have been deposited in Patanjali Research Foundation Herbarium (PRFH), Haridwar, Uttarakhand.

Results

1. *Cardamine flexuosa* Withering, *An Arrangement of British Plants* (Third Edition) 3: 578 (1796). *Cardamine hirsuta var. sylvatica* not Link; J. D. Hooker & Anderson, *The Flora of British India* 1: 138 (1872), pro parte. *Cardamine scutata subsp.*

flexuosa (Withering) H. Hara, *Journal of the Faculty of Science: University of Tokyo,* Section 3, Botany 6(2): 59 (1952).

Material examined: India, New Delhi, Rashtrapati Bhavan, 23.02.2022, *Anupam Srivastava* 6501 (PRFH).

Description (fig. 2a & 3)**:** Brassicaceae annual or biennial, suberect or decumbent herb, up to 30 cm tall. Stem simple or sparsely branched, ascending, flexuous, pubescent with simple hairs or sometimes glabrous. Basal leaves scarcely rosulate, petiolate, lyrate, sinuate-dentate to lobed, 3-12 cm long; terminal lobe reniform, broadly ovate, repand or 3-5-lobed; lateral lobes 2-6 pairs, oblong, ovate, or elliptic, entire, repand, crenate, or 3-5-lobed; cauline leaves ovate to lanceolate, 3.5-5.5 cm long; terminal lobe 3-5-lobed; lateral lobes 2-5 pairs, orbicular-ovate. Inflorescence racemes, terminal, 6-25 flowered, ebracteate, 2-15 cm long. Flowers bisexual, white or creamy white, actinomorphic, 3-4 mm across. Sepals oblong, 1.5-2.5 × 0.7-1 mm, acute. Petals spathulate, 2.5-4 × 1-1.7 mm, white. Stamens 6, rarely 4, with 2 outer staminodes. Ovules 18-40 per ovary. Fruits linear, 12-25 × 1-1.2 mm, obtuse. Seeds ovoid-compressed, 0.9-1.5 × 0.6-1 mm, yellow.

Distribution and phenology: This plant, commonly called 'Wood Bitter Cress, Wavy Bitter Cress (Eng.)', is reported earlier from Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Rajasthan, Uttarakhand and West Bengal states of India (Mastakar *et al.*, 2020). In present study it was reported from Dalikhana* as well as in the Ridge forest (Delhi), where it flowers and fructifies from February-July.
* Dalikhana is a region behind the natural ridge forest, while Mughal Gardens is an ornamental garden for different flowering plants. These plants are naturally occurring in the Ridge Forest and other adjoining areas of Rashtrapati Bhavan

2. *Gloriosa superba* Linnaeus, *Species Plantarum* 1: 305 (1753); J. D. Hooker, *The Flora of British India* 6: 358 (1892).
Material examined: India, New Delhi, Rashtrapati Bhavan, 25.08.2021, *Ankur Kumar 6342* (PRFH).

Description (fig. 2b & 4)**:** Colchicaceae climbing or scrambling, glabrous. Rootstock creeping and tuberous. Stem up to 3 m long. Leaves alternate, sometimes

opposite or verticillate, sessile, oblong-lanceolate, 10-20 × 1-3 cm, acuminate, tendril like apex. Flowers showy, 7-12 cm across, on axillary, nodding pedicels up to 15 cm long. Bud oblong, 3 cm long. Tepals 6, lanceolate, 5-8 × 0.8-1.2 cm, margin wavy, yellow. Stamens 6, hypogynous; filaments 4.5 cm long, stout, green; anthers l cm long, linear, extrorse, versatile. Style linear, abruptly bent upwards at the base; stigma trifid. Capsules 3.5-5.0 cm long, septicidal, green, oblong. Seeds many.

Distribution and phenology: This plant, commonly called 'Glory Lily, Flame Lily (Eng.); Kalihari (Hindi)', is not reported earlier from Delhi (Mishra *et al.*, 2015b, e). In present study it was reported from Ridge Forest (Delhi), where it flowers and fructifies from August-January.

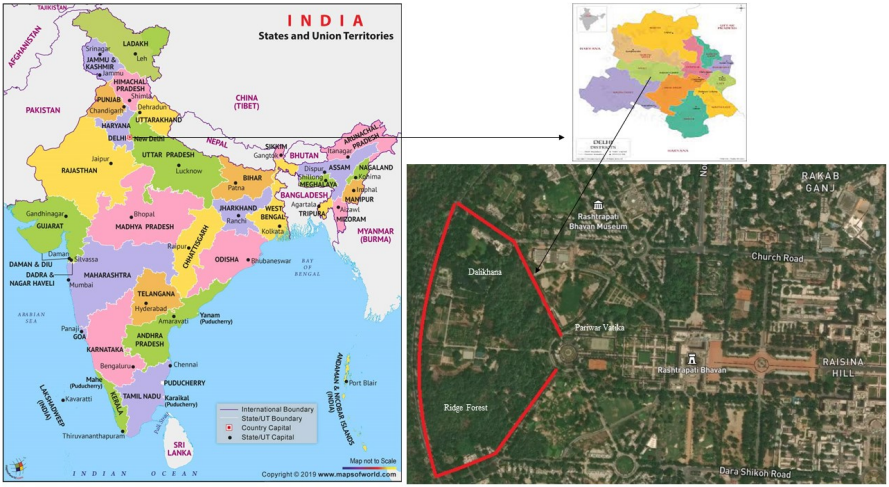

Figure 1. Map of Rashtrapati Bhavan Estates, Delhi (India) showing study sites. The plants listed here are found in the area circled in red.

3. *Hemidesmus indicus* (Linnaeus) Robert Brown in W. T. Aiton, *Hortus Kewensis* (ed. 2) 2: 75 (1811); J. D. Hooker, *The Flora of British India* 4: 5. 1883. *Periploca indica* Linnaeus, *Species Plantarum* 211 (1753).

Material examined: India, New Delhi, Rashtrapati Bhavan, 07.03.2020, *Bhasker Joshi 6116* (PRFH).

Description (fig. 2c & 5)**:** Apocynaceae perennial, slender climber with woody, fragrant, thick root stock. Stem slender, wiry, laticiferous. Leaves linear-lanceolate or elliptic-oblong, 4-9 × 1-3 cm, base rounded-acute, apex acuminate, white above, silvery-white pubescent beneath. Flowers greenish purple, in axillary cymes in small, compact clusters, crowded. Calyx lobes ovate-oblong, 0.1-0.25 cm long. Corolla 0.5-0.6 cm long. Follicles paired, divaricate, 9-12 × 0.5-1.0 cm, cylindrical, tapering towards apex, slightly curved, ribbed. Seeds ovate-oblong, 5-7 cm long, flat, blackish; coma white, 2.5 cm long.

Distribution and phenology: This plant, commonly called 'Indian Sarsaparilla (Eng.), Anantamul (Hindi)', is reported earlier from Andhra Pradesh, Assam, Bihar, Dadra and Nagar Haveli, Goa, Gujarat, Haryana, Kamataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Odisha, Rajasthan, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal states of India (Jayanth *et al.*, 2020). In present study it was reported from Ridge Forest (Delhi), where it flowers and fructifies from August-January

4. *Phoenix acaulis* Roxburgh, *Plants of the Coast of Coromandel* 3: 69 t. 273 (1819); Beccari & J. D. Hooker in J. D. Hooker, *The Flora of British India* 6: 426 (1892).

Material examined: India, New Delhi, Rashtrapati Bhavan, 24.02.2022, *Anupam Srivastava, 6085* (PRFH).

Description (fig. 2d & 6): Arecaceae dwarf. Stem very short, bulb-like, 4-20 cm across, clothed with leaf-sheaths and densely covered with persistent leaf base stumps. Leaves up to 150 cm long; leaflets arranged irregularly on the rachis, lanceolate, 18-40 × 0.8-1.5 cm, rigid, thickened at base, apex acicular. Flowers on axillary spadices 14-26 cm long, pale yellow. Male flowers; calyx 3 lobed, cupular; corolla 3 lobed, obliquely lanceolate. Female flowers: calyx 3 lobed, cupular; corolla 3 lobed, subrotund, fleshy. Drupes oblong-ellipsoid, 1-1.8 cm long, mucronate, blue-black; stone oblong, 0.8-0.1 cm long, ventrally grooved.

Distribution and phenology: This plant, commonly called 'Dwarf Palm (Eng.), Jangli Chhina (Hindi)', is not reported earlier from Delhi (Mishra *et al.*, 2015b, e).

In present study it was reported from Ridge Forest and outskirts of Pariwar Vatika (Delhi), where it flowers and fructifies from October-June.

5. *Solanum villosum* Miller, *The Gardeners Dictionary* ed. 8. no. 2 (1768); Kumar *et al.* in *The Indian Forester* 139 (11): 1053 (2013); Murugan *et al*. in *Indian Journal of Forestry* 40(1): 73 (2017).

Material examined: India, New Delhi, Rashtrapati Bhavan, 24.02.2022, *Anupam Srivastava 6540* (PRFH).

Description (fig. 2e & 7)**:** Solanaceae annual or perennial, much-branched, greyish, villous, pubescent herb, up to 75 cm tall. Stem angular, green. Leaves ovate or ovate-lanceolate, alternate, 5-10 × 3-6 cm, base decurrent, margin entire, apex acute, pinnatifid; petiole up to 2 cm long. Inflorescence axillary, 4-8-flowered; peduncle up to 1 cm long, erect; pedicels up to 0.1 cm long, glabrous. Flowers pentamerous, actinomorphic. Sepals acute up to 3 mm long, green. Corolla 5-lobed, ovate, 3-4 mm long, white, apex acute. Stamens 5, yellow; filaments 0.5 mm long; anthers oblong, 2 mm long, basifixed. Ovary globose, 2 mm long; style 4 mm long, glabrous; stigma capitate, green. Berries subglobular, 5-7 mm across, orange or orange-red. Seeds discoid, pale yellow.

Distribution and phenology: This plant, commonly called 'Hairy Nightshade, Red Nightshade (Eng.), Lal Makoy (Hindi)', is not reported earlier from Delhi (Mishra *et al.*, 2015b, e). In present study it was found naturally in Dalikhana and along the roadsides in the Rashtrapati Bhavan (Delhi), where it flowers and fructifies from October-June.

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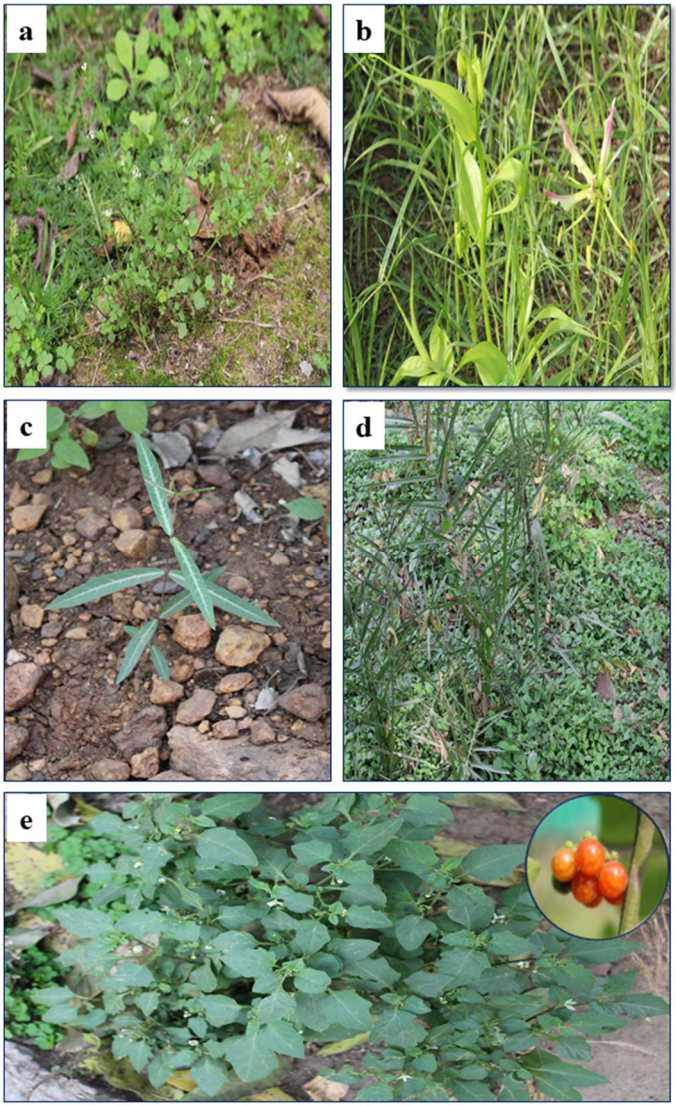

Figure 2: illustration of listed species. a – *Cardamine flexuosa ;* b – *Gloriosa superba*; c – *Hemidesmus indicus*; d – *Phoenix acaulis*; e – *Solanum villosum*. Photos Bhasker Joshi.

Figure 3: ***Cardamine flexuosa*****.** [© Herbarium (PRFH), Haridwar, Uttarakhand].

Figure 4: ***Gloriosa superba*****.** [© Herbarium (PRFH), Haridwar, Uttarakhand].

Figure 5: ***Hemidesmus indicus*****.** [© Herbarium (PRFH), Haridwar, Uttarakhand].

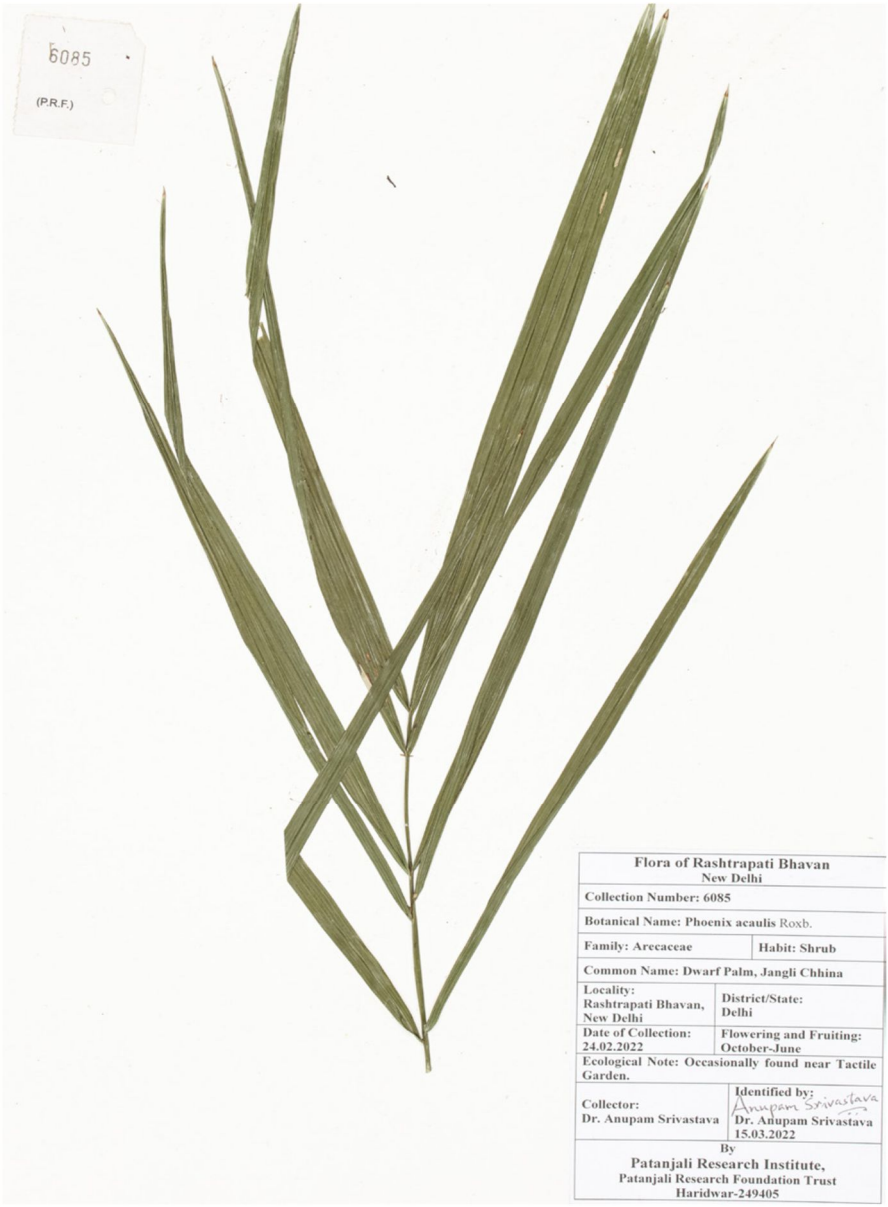

Figure 6: ***Phoenix acaulis*****.** [© Herbarium (PRFH), Haridwar, Uttarakhand].

Figure 7: *Solanum villosum*. [© Herbarium (PRFH), Haridwar, Uttarakhand].

References

Baviskar, A., 2016. *First Garden of the Republic*. Rashtrapati Bhavan, New Delhi, India. Publications Division Ministry of Information and Broadcasting, Government of India. 255 pp.

Brown, R., 1811. *Hemidesmus*. In: Aiton, W. T., *Hortus Kewensis: Or, a Catalogue of the Plants Cultivated in the Royal Botanic Garden at Kew. (Vol. 2)*. Longman, Hurst, Rees, Orme, and Brown. 432 pp.

Dakshini, K. M. M. & M. R. Vijayaraghavan, 1970. *Cotula australis* (Sieb. Ex. Spreng.) Hook.f.- A new record for North India. *Indian Forester*, 96 (1): 24-25.

Jayanth, J., A. P. Jagtap & N. P. Singh, 2020. Asclepiadaceae. In: A. A. Mao & S. S. Dach (Eds.), Flowering Plants of India: An Annotated Checklist (Dicotyledons). *Botanical Survey of India, Kolkata* 2: 104-132.

Krishen, P., 2006. *Trees of Delhi: A Field Guide*. Dorling Kindersley (India) Pvt. Ltd. 360 pp.

Lal, C., J.C. Ghildiyal & D. K. Maheshwari, 2002. Survey of aquatic vegetations in and around Delhi. *Journal of Economic and Taxonomic Botany*, 26(3): 547-549.

Linnaeus, C., 1753. *Species Plantarum*. Tomus I [et II]. Cum Privilegio S. R. M:tis Sueciae & S. R. M:tis Polonicae ac Electoris Saxon. Impensis Laurentii Salvii, Holmiae [Stockholm], 1200 pp. [https://doi.org/10.5962/bhl.title.669].

Maheshwari, J. K., 1963. *The Flora of Delhi*. Council of Scientific and Industrial Research. New Delhi. 447 pp.

Maheshwari, J. K., 1966. Illustrations of the Flora of Delhi. Council of Scientific and Industrial Research. New Delhi. 282 pp.

Mastakar, V. K., S. S. Dash, D. D. Pramanick, H. S. Debnath, P. K. Hajra & H. J. Chowdhery, 2020. Brassicaceae. In: Mao, A. A. & S. S. Dash (Eds.), Flowering Plants of India: An Annotated Checklist (Dicotyledons). *Botanical Survey of India, Kolkata* 1: 78-107.

Miller, P., 1768. *The gardener's dictionary, Abridged 8th ed*. London. 1344 pp.

Mishra, A. K., 2015. New Record of Pteridophytes for Delhi Flora, India. *Trends in Biosciences*, 8(22): 6376-6380.

Mishra, A.K., M. P. Sharma & H. Singh, 2015a. Floristic diversity of Delhi, India: A checklist. *International Journal of Herbal Medicine*, 3(4): 08-18.

Mishra, A. K., M. P. Sharma & H. Singh, 2015b. Additions to the Flora of Delhi: Part II. *Indian Journal of Plant Sciences*, 4(2): 1-6.

Mishra, A. K., M. P. Sharma & H. Singh, 2015c. Additions to the Flora of Delhi: Part III. *Indian Journal of Plant Sciences*, 4(3): 38-40.

Mishra, A.K., M. P. Sharma & H. Singh, 2015d. Angiospermic Flora of Delhi, India: An Updated Checklist. *Indian Journal of Plant Sciences*, 4(3): 58-84.

Mishra, A. K., S. A. Mir, M. P. Sharma & H. B. Singh, 2019. Addition to the Flora of Delhi. *Indian Journal of Plant Sciences*, 39(2): 64-67.

Naithani, H. B., S. Chandra & M. Pal, 2006. Additions to the Flora of Delhi. *Indian Forester*, 132(5): 589-599.

Roxburgh, W., 1819. *Plants of the coast of Coromandel. Vol. 3rd*. Bulmer & Co., London. 300 pp.

Sharma, M. P., 1994. *Alternanthera paronychioides* (Amaranthaceae) New Plant Record for Delhi. *Journal of Economic and Taxonomic Botany*, 18(2): 395.

Sharma, M. P., 1997. Flora of Delhi: New Plant Record for Delhi. *Journal of Economic and Taxonomic Botany*, 21(1): 245-246.

Sharma, M. P., 2002. *Balanophora dioica* Royle. *Journal of Economic and Taxonomic Botany*, 26(1) 103-104.

Sharma, M. P. & J. Ahmad, 1990a. Some rare or less known plants of Delhi. *Journal of Economic and Taxonomic Botany*, 14(1): 177-180.

Sharma, M. P. & J. Ahmad, 1990b. *Capparis zeylanica* (L.) (Capparidaceae): An addition to flora of Delhi. *Journal of Economic and Taxonomic Botany*, 14(3): 740.

Sharma, M. P. & Ahmad, J., 1991. *Cocculus pendulus* (J.R. and Forst.) Diels (Menispermaceae): New record for Delhi. *Indian Journal of Forestry*, 14(1): 76.

Singh, B., 2007a. Trees of Rashrapati Bhavan. Rashtrapati Bhavan, New Delhi, India.

Singh, B., 2007b. Roses of Mughal Garden. Rashtrapati Bhavan, New Delhi, India.

Viswanathan, M. V. & Singh, H. B., 1986. A new exotic Solanaceous weed in old world. *Journal of the Bombay Natural History Society*, 83(Suppl.): 226-330.

Viswanathan, M. V., H. B. Singh & P. R. Bhagwat, 1982. Additions to the Flora of Delhi. *Journal of Economic and Taxonomic Botany*, 14(3): 579-580.

Viswanathan, M. V., H. B. Singh & P. R. Bhagwat, 1984. New Plant Records for the Upper Gangetic Plain from Delhi. *Indian Journal of Forestry*, 7(2): 157-158.

Withering, W., 1796. *An arrangement of British plants*. 3rd editon. Swinney, London. 513-920.