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Short Communication

New plant distribution records to Indian states and addition to the flora of Myanmar

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SHORT COMMUNICATION

New plant distribution records to Indian states and addition to the flora of Myanmar

Kanakasabhapathi Pradheep [1], Ganjalagatta Dasaiah Harish [2], Ranbir Singh Rathi [3], Joseph John Kattukkunnel [4], Sheikh Mohmmad Sultan [5], Khoisnam Naveen [6], Iyyappan Jaisankar [7], Anjula Pandey [8], Sudhir Pal Ahlawat [9] & Rita Gupta [10]

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Abstract: Plant genetic resource collection expedition across various parts of India and herbarium study of *Amaranthus* and *Luffa* genera at Botanical Survey of India (BSI), Kolkata and Coimbatore revealed the distribution of 18 plant taxa new to various Indian states/union territory, viz., Arunachal Pradesh (7), Andaman & Nicobar Islands (5), Jammu & Kashmir (3), Andhra Pradesh (2), Manipur (1), and Tamil Nadu (1). Out of these, 14 taxa have importance as wild relatives of 12 crop species. In addition, herbarium studies at the BSI, Kolkata revealed the natural distribution of a cucurbitaceous species – *Siraitia siamensis* in Myanmar, which remained unnoticed and unreported so far. Locality of herbarium/ germplasm collection, habitat and other field observations have been highlighted here.

Keywords: *Amaranthus*, Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, crop wild relatives, Jammu & Kashmir, *Luffa*, Manipur, *Siraitia siamensis*, Tamil Nadu.

Reports on new distribution of economically important plant species not only help in updating the floristic database of the concerned region, but also help in augmenting unrepresented germplasm from such regions for conservation and sustainable utilization (Pradheep et al. 2011, 2018). Such reporting also helps in understanding their weedy potential, if any, so that prophylactic measures may be taken to avoid their fast spread to other areas. During field survey and collection of plant genetic resources, especially in various remote pockets of India for the past two years, authors came across the natural distribution of some plant taxa in different Indian states/union territory which were so far not reported. These taxa were studied critically in the

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natural habitat as well as in herbaria, supplemented with the study of online herbaria of London (BM), Edinburgh (E), Kew (K), Leiden (L), Paris (P) and Beijing (PE) including their type specimens. Apart from this, herbarium study of *Amaranthus* and *Luffa* genera carried out at BSI, Kolkata (CAL) and its southern regional centre, Coimbatore (MH) resulted in spotting of a few more taxa new to some Indian states.

Shortlisted taxa were thoroughly verified/ cross-checked with floristic and other key literature pertaining to the state/union territory and monographic/revisionary works pertaining to particular species/species group (Table 1; Naithani 1990; Karthikeyan et al. 2009; Pradheep et al. 2014b) besides verifying with all the available online sources. While herbarium vouchers are deposited in the National Herbarium of Cultivated Plants (NHCP) at ICAR-National Bureau of Plant Genetic Resources (ICAR-NBPGR), New Delhi, germplasm collections (of relevant taxa) are being conserved in the form of seeds/live plants in National Genebank at ICAR-NBPGR, New Delhi.

Both field and herbaria studies revealed the natural distribution of 18 plant taxa (belonging to 16 genera, 12 families) so far not reported from various Indian states/ union territory are given in Table 1 (Fig. 1). This included seven taxa distributed in Arunachal Pradesh, five in Andaman & Nicobar Islands, three in Jammu & Kashmir, two in Andhra Pradesh, and one each from Manipur and Tamil Nadu. Out of 18 taxa, 14 were identified as wild relatives of 12 crop species. This includes close relatives/ progenitors of important crops such as *Vigna angularis* (Willd.) Ohwi & H.Ohashi var. *nipponensis* (Ohwi) Ohwi for adzuki bean, *Cucumis melo* L. subsp. *agrestis* (Naudin) Pangalo for muskmelon, *Solanum insanum* L. for brinjal, *Diospyros kaki* L. var. *silvestris* Makino for persimmon, *Momordica subangulata* Blume subsp. *subangulata* for teasel gourd, and *Fagopyrum tataricum* (L.) Gaertn. subsp. *potanini* Batalin for tartary buckwheat.

Addition to the flora of Myanmar

Herbarium study at CAL and cross-checking of available references – Kress et al. (2003), de Wilde & Duyfjes (2010) and efloras of China (http://efloras.org/flora_page.aspx?flora_id=2), further revealed the natural occurrence of a cucurbitaceous species, *Siraitia siamensis* (Craib) C. Jeffrey ex S.Q. Zhong & D. Fang, in Myanmar, which remained unnoticed so far.

Siraitia siamensis

(Craib) C. Jeffrey ex S.Q. Zhong & D. Fang, Guihaia 4(1): 23. 1984. W.J. de Wilde & Duyfjes, Blumea 51: 501. 2006; Fl. Thailand 9(4): 501. 2008; Fl. Males., Ser. 1, 19: 220. 2010. *Thladiantha siamensis* Craib, Bull. Misc. Inform. Kew No. 1: 7. 1914; Fl. Siam. 759. 1931. Cogn. in Engl., Pflanzenr. 66, 4.275.I: 47. 1916. Keraudren in Aubrév. & J.-F.Leroy, Fl. Cambodge, Laos & Vietnam 15 (34): 5. 1975. [Cucurbitaceae] (Image 3).

Type: *Kerr 1171*, Doi Suthep, Thailand (holotype K; isotype E 00433809).

Dioecious climber. Young twig yellow-brown pubescent, ± angular, c. 3mm diam. Tendrils short-pubescent, 2-branched, spiraling both below and above point of branching. Leaves: petiole 7–7.5 cm long, brown, hairy; blade simple, unlobed, ovate-cordate, 10–11 x c.8 cm, membranous, palmately 7-veined, adaxially sparsely hairy, abaxially dense brown tomentose, especially along nerves, margin almost entire, apex acuminate. Male inflorescence a simple raceme, 5–7 flowered, 12–13 cm long, flowers occur at the apex; bracts minute; peduncle c.8 cm long; all parts short brown-pubescent. Information on male and female flowers, fruits and seeds not known (from Myanmar).

Distribution: China (Guangxi, Yunnan), Indonesia (Java, Sumatra), Malaysia, Thailand, Vietnam; Myanmar (new report)

Herbarium examined: 3 (CAL), 30.iii.1930, La-pal Chaung, Tennasserim [Tanintharyi Region], Myanmar, 200ft, coll. K. Biswas.

Notes: In CAL, an anonymous annotation on the above herbarium sheet indicates "not present in India, *Luffa* sp. nov.". This herbarium record signifies the westward range extension of this medicinally important species, which was otherwise reported from south China, Indochina to West Malesia. In light of absence of fresh collections as well as reports, it appears to be a rare species in Myanmar. Present herbarium specimen showing flower bud initiation indicates that flowering would take place in April, which is in accordance with the literature.

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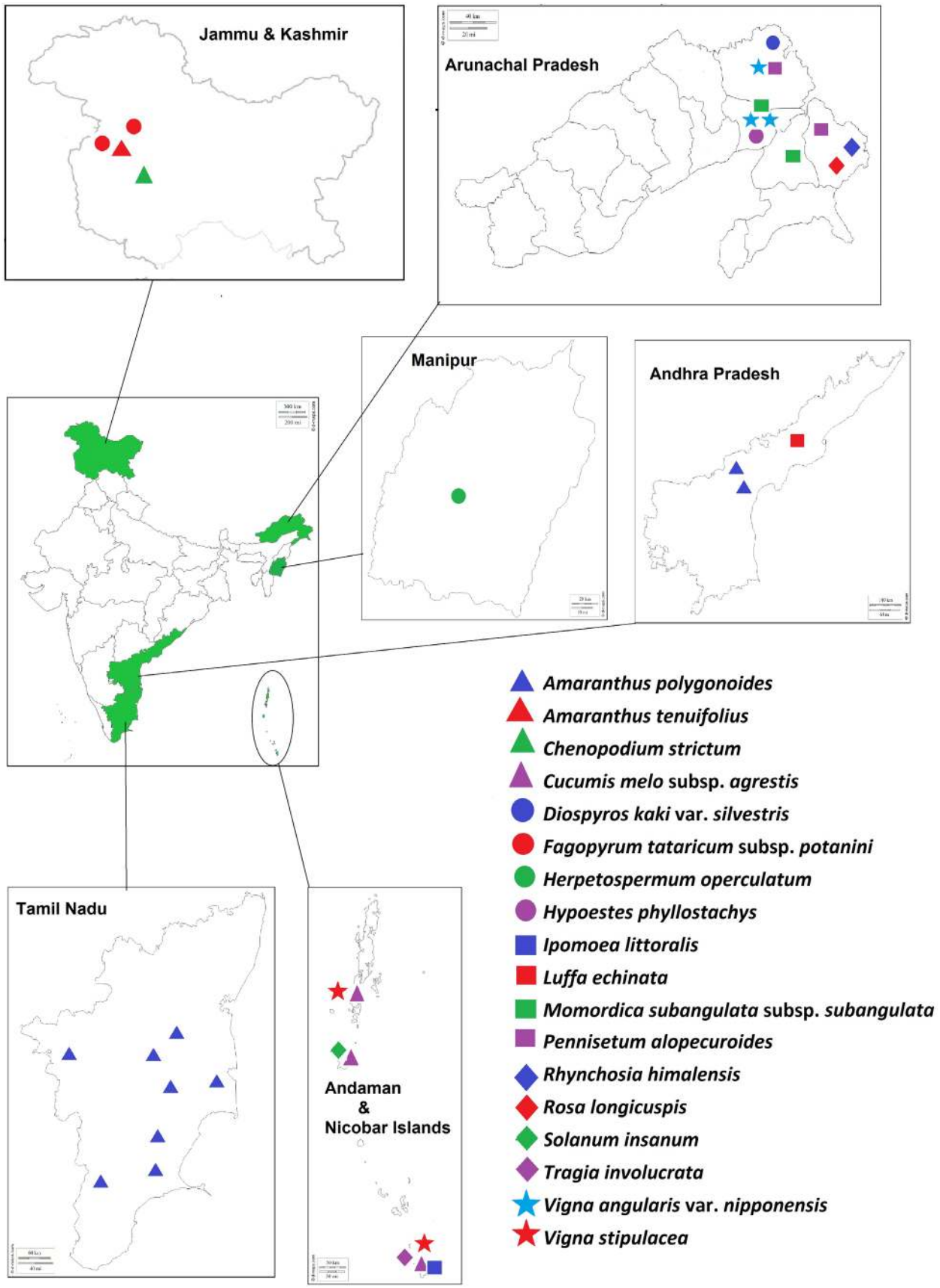


Figure 1. New distribution of plant species in various Indian states and union territory.

Table 1. Plant taxa new to Indian states and union territory.

	New to state/ UT	Taxon name [Family] and type details	Locality & herbarium/ germplasm collection details	Observations and remarks	Specific literature cross-checked
1	Andaman & Nicobar Islands	*Cucumis melo* L. subsp. *agrestis* (Naudin) Pangalo* [Cucurbitaceae] Type: *Naudin* s.n., cultivated from seeds from India (lectotype P00644216, designated by Kirkbride (1993)). [Image 1B]	Great Nicobar, Little Andaman, and South Andaman. JP/17-09 (live collection), 04.iii.2017, Campbell Bay, Great Nicobar; JPJ/18-50 (live collection), 19.i.2018, 3 km from Sastry Nagar to Galathea, Great Nicobar; JP/17-72 (live collection), 12.iii.2017, Hut Bay beach, Little Andaman; JPJ/18-12 (live collection), 13.i.2018, Guptapara, Port Blair, South Andaman.	Occasional weed in agricultural fields, roadsides, and other disturbed areas; flowering and fruiting throughout the year; distinguished from muskmelon (*C. melo* subsp. *melo*) by very shortly and densely puberulent ovary and small insipid fruits.	Chakravarty (1982); Dagar & Singh (1999); Diwakar & Pandey (2008); Renner & Pandey (2013); Yadav et al. (2014); Bheemalingappa et al. (2015); Naik et al. (2015); Rasingam (2015); Soyimchiten et al. (2015); Murugan et al. (2016); http://www.ildis.org/
		Ipomoea littoralis (L.) Blume* [Convolvulaceae] Type: *Blume 1710*, Java, Indonesia (holotype L0004195).	Great Nicobar. Also observed in Trinket Island. 2447 (NHCP23003), 06.iii.2017, Chingan, Great Nicobar, Coll. K. Pradheep & K. Joseph John.	Rare weed in coconut plantations and fields near coasts. This is the only relative of sweet potato reported from the Old World. It is characterized by mucronulate sepals and pink-purple corolla with a darker centre.	
		Solanum insanum L.* [Solanaceae] Type: *Herb. Linn.*, Surat, India (lectotype LINN 248.9, designated by Hepper & Jaeger 1985). [Image 1D]	Little Andaman. 2777 (NHCP23138; JP/17-71), 12.iii.2017, Hut Bay beach, Little Andaman, Coll. K. Pradheep & K. Joseph John.	Rare in coastal areas of Little Andaman. Progenitor of brinjal distinguished by prickly stem, more than one long-styled flower/ inflorescence, small fruits and green pulp.	
		Tragia involucrata L. [Euphorbiaceae] Type: Sri Lanka, Fl. Zeylanica 2: 12. p. 161. No. 340, Hermann herbarium (BM) (Chakrabarty & Balakrishnan 2006). [Image 1C]	Great Nicobar. 2764 (NHCP23125), 19.i.2018, Campbell Bay, Great Nicobar, Coll. K. Pradheep, K. Joseph John & I. Jaisankar.	Spreading fast in gravel heaps; this skin-irritant species is common in mainland of India.	
		Vigna stipulacea Kuntze* [Fabaceae] Type: Lamarck's collection (P00296830). [Image 1A]	Great Nicobar and South Andaman. 2459 (NHCP23008; JP/17-70), 09.iii.2017, Jetty Point, Campbell Bay, Great Nicobar, Coll. K. Pradheep & K. Joseph John; 2778 (NHCP23154), 14.i.2018, Brooksabad, Port Blair, South Andaman, Coll. K.Pradheep, K. Joseph John & I. Jaisankar .	Rare in disturbed areas; flowering and fruiting throughout the year. It is distinguished from related *V. trilobata* (L.) Verdc. by large ovate stipules, longer peduncle, brown-hairy mature pods and blackish seeds, and reports on the occurrence of the latter species in these islands is probably its misidentification.	
2	Andhra Pradesh	*Amaranthus polygonoides* L.* [Amaranthaceae] Type: Jamaica, [Icon] t. 92, f. 2 "*Blitum polygonoides viride seu ex viridi et albo variegatum polyanthos*" from Sloane (1707) (lectotype designated by Hendrickson 1999).	Guntur and Prakasam districts. 9639 (CAL), 13.vii.1961, Way to Siddhartha Hill, Nagarjuna Konda Valley, Guntur District, Coll. K. Thothathri; 194 (CAL), 01.x.1983, Mederametla, Prakasam district, Coll. R.K. Mohan; 289 (CAL), s.d., Kondaepi, Prakasam District, Coll. R.K. Mohan.	Herbarium label information indicates that this tropical American species is a common weed in waste and moist places.	Chakravarty (1982); Pullaiah & Chennaiah (1997); Pullaiah & Ali Moulali (1997); Pullaiah & Karuppusamy (2008); Renner & Pandey (2013); Yadav et al. (2014)
		Luffa echinata Roxb.* [Cucurbitaceae] Type: *Roxburgh 1694,* Coromandel, India, (lectotype K, designated by Jeffrey (1980)). [Image 6]	West Godavari District. 5296 (CAL), 10.xii.1910, Tummileru, (West) Godavari District, Coll. C.A. Barber.	Rare; although correctly identified in the herbarium specimen, it was overlooked by floras; nevertheless new collections are warranted. Relative of sponge and ridge gourd.	

	New to state/ UT	Taxon name [Family] and type details	Locality & herbarium/ germplasm collection details	Observations and remarks	Specific literature cross-checked
3	Arunachal Pradesh	*Diospyros kaki* L. var. *silvestris* Makino* [Ebenaceae] Type: Untraceable. [Image 2D]	Upper Dibang Valley District. 2734 (NHCP23041), 31.x.2017, Acheso, Angrim Valley, Upper Dibang Valley District, Coll. K. Pradheep, R.S. Rathi & G.D. Harish.	Although this botanical variety was not mentioned in Indian literature, this wild form (reported as *D. kaki*) of persimmon with smaller fruits was mentioned in Flora of Assam by Kanjilal et al. (1938). Associated with *Maclura cochinchinensis* (Lour.) Corner, *Rosa* sp., *Holboellia latifolia* Wall., etc. from 1100–1300 m.	Chakravarty (1982); Ghora & Panigrahi (1995); Hajra et al. (1996); Shukla (1996); Giri et al. (2008); Chowdhery et al. (2009); Renner & Pandey (2013), Yadav et al. (2014), Soyimchiten et al. (2015); Dash & Singh (2017); http://www.ildis.org/
		Hypoestes phyllostachya Baker [Acanthaceae] Type: *R. Baron 4907*, Madagascar (syntype P00089480).	Lower Dibang Valley District. 2698 (NHCP23039), 27.x.2017, Simari, Lower Dibang Valley District, 250m, Coll. K. Pradheep, R.S. Rathi & G.D. Harish.	This species, native to Madagascar, is naturalized in lower areas of eastern parts of the state; has foliage ornamental value due to leaves heavily-spotted pink or white.	
		Momordica subangulata Blume subsp. *subangulata** [Cucurbitaceae] Type: *Blume 769*, Java, Indonesia (lectotype L0001618, designated by De Wilde & Duyfjes (2002); isotypes L0001619 and L0001620). [Image 2A]	Lohit and Lower Dibang Valley districts. 2389 (NHCP22858), 17.x.2016, 15km before Salangan from Parasuram Khund, Lohit District, 1250m, Coll. K. Pradheep, G.D. Harish & K. Naveen; 2690 (NHCP23038), 28.x.2017, 5 km before Tewari Gaon from Roing, Lower Dibang Valley District, 1300m, Coll. K. Pradheep, R.S. Rathi & G.D. Harish.	Rare in open forests along with *Musa* spp., between 1000–1300 m; characterized by slender habit, long-peduncle and smaller and irregularly-ribbed fruit; valuable genetic resource for teasel gourd improvement.	
		Pennisetum alopecuroides (L.) Spreng.* [Poaceae] Type: *Herb. Linn*. (lectotype LINN 80.1, designated by Veldkamp (2000)). [Image 2B]	Anjaw and Upper Dibang Valley districts. 2397 (NHCP22859), 19.x.2016, Metengliang, Anjaw district, 1200m, Coll. K. Pradheep, G.D. Harish & K. Naveen; 2741 (NHCP23042; RPH-58), 30.x.2017, Etalin, Punli, Upper Dibang Valley District, 1350m, Coll. K. Pradheep, R.S. Rathi & G.D. Harish.	A striking perennial tussock-forming species, native to east and southeast Asia, Australia and Pacific Islands; gregarious in open disturbed areas, field margins and roadsides from 1200–1500 m. It is of value as forage cum ornamental.	
		Rhynchosia himalensis Benth. ex Baker [Fabaceae] Type: *T. Thomson* s.n., Himal. Bor. Occ. Regio trop., 3000–5000 ft, (M0240753). [Image 2C]	Anjaw District. 23856 (NHCP22856; IC621881), 22.x.2016, Badakandun, Kibithu, Anjaw District, Coll. K. Pradheep, G.D. Harish & K. Naveen.	Rare along hill slopes, this species is characterized by circular-rhomboid terminal leaflet with acuminate apex and loose flowers in inflorescence; found between 1300–1400 m.	
		Rosa longicuspis Bertol.* [Rosaceae] Type: J.*D. Hooker & T. Thomson* s.n., Khasia, 2–5000 ft., India (holotype K000730903, isotype P01819332). [Image 2F]	Anjaw District. 2356 (NHCP22846), 24.x.2016, 2 km from Hawai to Marbo, Anjaw District, 1650m, Coll. K. Pradheep, G.D. Harish & K. Naveen.	Occasional in mixed forests between 1200–1700 m. Close to the Himalayan musk rose, *R. brunonii* Lindl., but differing in glabrous, leathery more acuminate leaflets and fewer-flowered inflorescence. Dash & Singh (2017) mentioned as doubtful species in Kurung Kumey District of this state.	
		Vigna angularis (Willd.) Ohwi & H.Ohashi var. *nipponensis* (Ohwi) Ohwi *[Fabaceae] Type: *J. Ohwi 9069*, Hondo, Kyoto, Japan, 12.ix.1936 (isotype P02943396). [Image 2E]	Lower & Upper Dibang Valley districts. 2662 (NHCP23034), 28.x.2017, 10 km after Tiwari Gaon to Hunli, Lower Dibang Valley District, 1720m, Coll. K. Pradheep, R.S. Rathi & G.D. Harish; 2682 (NHCP23036), 27.x.2017, Kebali, Lower Dibang Valley District, 750m, Coll. K. Pradheep, R.S. Rathi & G.D. Harish; 2654 (NHCP23032; RPH-51), 29.x.2017, 10 km after Arali to Etalin, Upper Dibang Valley District, Coll. K. Pradheep, R.S. Rathi & G.D. Harish.	Occasional in partially disturbed habitats along roadside thickets between 600–1800 m; considered as the progenitor of adzuki bean, differing from it with respect to traits associated with domestication such as less seed number, small seed size and shattering nature of pod.	

	New to state/ UT	Taxon name [Family] and type details	Locality & herbarium/ germplasm collection details	Observations and remarks	Specific literature cross-checked
4	Jammu & Kashmir	*Amaranthus tenuifolius* Willd.* [Amaranthaceae] Type: *V.V. Jacquemont 1152*, Indes Orientales, (isotype (of *Mengea tenuifolia* Moq.) (P04021731)).	Baramulla District. 460 (CAL), vii.1905, Sumbal, [Baramulla District], Kashmir, 5000ft, Coll. A. Meebold.	Related to *A. graecizans* L., but distinguished from linear-oblong leaves, 2-tepals and 2-stamens; new collections warranted.	Kaul (1986); Paul (2012); Shrivastava & Shukla (2015)
		Chenopodium strictum Roth* [Chenopodiaceae] Type: *Heyne*, India oriental, *'Innominatum erat in Collectione spectatissima, qua me ditavit Clariss* ', Nov. Pl. Sp., 180. 1821. [Image 1E]	Budgam District. 2535 (NHCP23024; SHEIKH/KP/ SR-682), 08.ix.2017, Chadoora, Hanjura, Budgam District, Coll. K. Pradheep & Sheikh M. Sultan.	Efloras of Pakistan (http://efloras.org/florataxon.aspx?flora_id=5&taxon_id=200006825) mentioned occurrence of this species in India, without further details; occasional along roadsides; also found in Beerwah area; related to chenopod (*Chenopodium album*) and differing from it by dark olive-green leaves, dense spike-like inflorescence and small, ovate seeds.	
		Fagopyrum tataricum (L.) Gaertn. subsp. *potanini* Batalin* [Polygonaceae] Type: untraceable [Image 1F]	Bandipore and Kupwara districts. 2542 (NHCP23105; IC625052), 13.ix.2017, Izmarg, Gurez Valley, Bandipore District, Coll. K. Pradheep & Sheikh M. Sultan; 2595 (NHCP23106), 14.ix.2017, Nacha, Sadhna Pass, Kupwara District, 2450m, Coll. K. Pradheep & Sheikh M. Sultan.	Seeds are characterized by crenate margin. Spontaneously comes up in cultivated fields and farm areas from 2000–3000 m. Though mentioned to occur in northern Kashmir (Ohnishi 1994), this progenitor of tartary buckwheat remained overlooked in Indian literature.	
5	Manipur	*Herpetospermum operculatum* K.Pradheep, A.Pandey, K.C.Bhatt & E.R.Nayar [Cucurbitaceae] Type: *K. Pradheep 1449*, Sadam, South Sikkim, India, (holotype CAL; isotypes NHCP, DD). [Image 4]	Bishnupur District. 6361 (CAL183461), ix.1907, Laimatak [Bishnupur dt.], 4000ft, Coll. A. Meebold.	This recently described species is so far known from Nagaland, Sikkim and Arunachal Pradesh in India. This herbarium specimen was originally kept as *H. caudigerum* Wall. (=*H. pedunculosum* (Ser.) Baill.).	Pradheep et al. (2014a)
6	Tamil Nadu	*Amaranthus polygonoides* L.* [Amaranthaceae] [Image 5]	Coimbatore, Pudukkottai, Ramanathapuram, Thanjavur, Tiruchirappalli and Virudhunagar districts. 8545 (CAL), 28.vii.1959, RS Puram, Coimbatore District, 467m, Coll. K. Subramanyam; 512 (CAL), 22.vi.1973, Maruthamalai, Coimbatore District, Coll. R.N. Kayal & G.N. Tribedi; 213 (MH141638), 13.x.1984, Pudukkottai, Pudukkottai District, 110m, Coll. C. Arulappan; 1060 (MH144151), 21.xii.1986, Valantharavai, Ramanathapuram District, 50m, Coll. V. Balasubramanian; 2364 (MH144625), 30.xii.1989, Sikkal, Ramanathapuram District, ±40m, Coll. V. Balasubramanian; 941 (CAL), 09.i.1989, Manakkal, Thanjavur District, 50m, Coll. S. Ragupathy; RHT 11940 (CAL), 17.ii.1978, Kilikkoodu, near Grand Anicut, Tiruchirappalli District, Coll. Rajendran & Diraviam; 61471 (CAL), 26.ii.1979, Sanjeevimalai, Rajapalayam, Virudhunagar District, ±275m, Coll. N.C. Nair.	Common in low-lying moist grounds. Mostly misidentified in herbaria as *A. roxburghianus* Nevski or *A. mangostanus* L. Easily distinguished from the above species of flowers with 5 linear-spathulate tapes which are connate at base.	Henry et al. (1987); Matthew (1991); http://www.tnenvis.nic.in/PDF/floralchecklist.xls

*Wild relative of crop species



Image 1. New distribution of plant species in Indian states/union territory: A - *Vigna stipulacea* in South Andaman (inset: flower & fruit) | B - *Cucumis melo* subsp. *agrestis* in Great Nicobar | C - *Tragia involucrata* in Great Nicobar | D - *Solanum insanum* in Little Andaman (inset: fruit) | E - *Chenopodium strictum* in Jammu & Kashmir | F - *Fagopyrum tataricum* subsp. *potanini* in Jammu & Kashmir. © K. Pradheep.



Image 2. New distribution of plant species in Arunachal Pradesh: A - *Momordica subangulata* subsp. *subangulata* (inset: opened-up dead-ripe fruit) | B - *Pennisetum alopecuroides* | C - *Rhynchosia himalensis* | D - *Diospyros kaki* var. *silvestris* | E - *Vigna angularis* var. *nipponensis* | F - *Rosa longicuspis* (inset: fruits). © K. Pradheep.



Image 3. Herbarium of *Siraitia siamensis* from Myanmar at CAL [image by Director, BSI, Kolkata].



Image 4. Herbarium of *Herpetospermum operculatum* from Manipur at CAL [image by Director, BSI, Kolkata].

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Image 5. Herbarium of *Amaranthus polygonoides* from Tamil Nadu at MH [credit: Director, BSI, Kolkata].



Image 6. Herbarium of *Luffa echinata* from Andhra Pradesh at MH [credit: Director, BSI, Kolkata].

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