

The enigma of monotypic taxa and their taxonomic implications

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Numerous categories of the inventories of plants are possible. Among these categories, an artificial category can be created for the taxa that are represented by a single genera or a single species known as monotypic taxa. These are an unusual, but important group of plants that are interesting not only in floristics, but also in phylogeography and phylogenetics studies. They also need further taxonomic evaluation and documentation. In this review, we have collated information about their numbers, occurrence, habit-wise distribution and their representation in the country. We have also highlighted some of the important and interesting features of these plants in the form of queries that we consider are still not satisfactorily answered. Monotypic taxa are, therefore, a challenging and stimulating group that merits considerable further attention of both taxonomists as well as molecular biologists.

Keywords: Habitat, monotypic taxa, phylogeography, phylogenetics, taxonomy.

THE varied physiographic and climatic conditions in different parts of India have resulted in high levels of biodiversity in the country. India has one of the largest arrays of environmental conditions, by virtue of significant altitudinal variations, from sea level to the highest mountain ranges in the world, the long coastline, and hot, arid conditions in parts of the country. Thus India has representation of all the ecological zones found in the world. The fact that India is the meeting place for three major global bio-geographic realms: the Indo-Malayan, Eurasian and Afro-tropical, has further rendered the country as one of the 12 mega diversity centres in the world. It also has two of the 25 recognized biodiversity hotspots in the world – the Eastern Himalayas and the Western Ghats¹.

India's biological diversity is one of the most fascinating in the world, and includes nearly 11% of the world's flora and 7% of the world's fauna. The floral diversity consists of over 18,000 species of angiosperms, 64 of gymnosperms, 1022 of pteridophytes, 2843 of bryophytes, 1940 of lichens, 23,000 of fungi and 12,480 species of algae². The wide range of biological diversity is reflected even within each taxonomic level in the above

units. Amongst the flowering plants, several families show great diversity and are represented by more than 100 species. On the other end of spectrum, there are as many as 63 monotypic families in the Indian flora. Moreover, 38% of the flowering plants and 18% of the total flora are endemic to this country³. This is attributed to the fact that the lofty Himalayas in the north and the peninsular region in the south surrounded by oceans have caused isolation of Indian flora, resulting in the development of high endemism. However, the ontogeny of the Himalayas with attendant formation of crests and valleys has created ecological niches for the massive induction of central Asian and Tibetan floristic elements leading to the development of several angiosperm elements. The opening of land connections to Assam–Myanmar borderlands having monsoon rainfall pattern and semi-temperate and tropical climates resulted in the admixture of temperate Chinese and tropical Malaysian floristic elements. According to Nayar⁴, though the Himalayan range acts as a geographical barrier, it also functions as a crucible for the evolution of new species complexes in the ecological niches and habitats offered by the Himalayan mountain systems. Takhtajan⁵ considered the Eastern Himalayan along with the Northern Myanmar and Yunnan axis as the 'cradle of flowering plants'. The Indian flora is thus unique in having not only a high proportion of endemic plants, but also monotypic taxa that exhibit global or regional affinities. Among these various elements that constitute the Indian flora, it is the monotypic taxa that have invariably confounded taxonomic and phylogeographic circumscription. There is an acute need for further researches in monotypic taxa in the country.

Monotypic taxa

The term monotypic is self-explanatory. A family is said to be monotypic if represented by a single genus with single species. Similarly, a genus is monotypic when represented by the 'type species' only. About 236 genera of the flowering plants are monotypic in the Indian flora. Dicots (176 genera) outnumber the monocots (60 genera) (Appendix 1). However, the family Poaceae with 32 taxa can be considered the most dominant, followed by Leguminosae (15), Asteraceae (12), Rubiaceae (11), Orchidaceae (10), since these five families together account for

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about one-third of the total number of monotypic taxa in the country. The other families with multiple monotypic genera include Brassicaceae, Cucurbitaceae, Lamiaceae, Menispermaceae and Cyperaceae (Table 1). The family Poaceae includes the highest number of monotypic genera, though these account for only about 3% of the total plants in this family. In terms of proportion of monotypes relative to the total taxa in a family, the highest proportion of about 12% occurs in the family Menispermaceae (Table 1).

An examination of the monotypic taxa in terms of their habits is also informative. Herbs (150) constitute the largest group and contribute about 64% to the total number of monotypic taxa (Table 2).

The monotypic taxa deserve special attention from the conservation point of view, because they represent species which could be lost forever and because their related genomes of these plants do not exist anywhere else in the world. As is evident from the records, monotypic plants like *Kendrickia walkeri*, *Meeboldia selinoides*, *Meteromyrtus wynaadensis*, *Hubbardia heptaneuron*, *Paracautleya bhattii* and *Seshagiria sahyadrica* are not only endemic to India but are also restricted to small areas. It is a matter of concern that some of them have not been collected again after their original type collection⁶. About 18 monotypic genera are under various categories of threat. Monotypic taxa are different from endemic plants in the sense that all monotypic taxa are likely to be endemic to a region, but all endemic plants are not monotypic taxa. However, this rationale is not absolute as will be evident from the break-up of monotypic taxa in India. Only about 38% of

the monotypic taxa is endemic to India and restricted to different bio-geographical regions of the country. Out of a total number of 236 monotypic genera, about 54% are found to occur in the Asian region including India. Only 31% plants are widely distributed in Europe, North America, South America, Africa and Australia. This indicates that these plants show region specificity and do not have wide geographical affiliations. Their habitat-specific affinities may be one of the impediments in defining the species boundaries. At the same time it may also be possible that such wide distribution of these plants (31%) in Europe, North America, South America, Africa and Australia is more a reflection of their phytogeography and ancient lineages. Whatever be the distribution of monotypes, collectively, all the monotypic taxa in a region are also perhaps the best descriptor of the biodiversity in that region. In Australia, for example, in the rainforests of north Queensland, the diversity is represented by 43 monotypic genera of flowering plants that have been recorded there, including 37 genera that are endemic to Australia and 28 to the rainforests⁷. This is a good documentation of the region-wise plant diversity and has also made a serious attempt to identify the key floristic elements in each region.

Monotypic taxa and their documentation

Documentation of monotypic taxa has always been a problem for taxonomists. There are several factors like systematic disposition, phenotypic plasticity, incomplete floristic surveys or incomplete flora records, including fossils or endemism and isolation of the taxon or a combination of any or all of the these factors that results in the recognition of taxa as monotypic. Are there any possibilities of mis-identification, 'new species syndrome' and other related issues responsible for the monotypic taxa? It is these and many other questions that have never been systematically addressed, which make the study of the monotypic taxa interesting, challenging and important. There are numerous examples of these and related factors being responsible for the unresolved in monotypic taxa. Geographical isolation of the species is a barrier for complete circumscription of the plants. In the absence of any records or authentic evidences of species migrations, we have several instances of high proportions of endemism in many habitats where human intervention has been scanty or is actually difficult. Thus in India, the Western Ghats and the northeastern Himalayas have the largest representation of endemic flora. There is another aspect to the geographical barriers or factors for disjunctive distribution of species. In India, we have some 18,000 species of angiosperms. This number could increase once the complete inventory and enumeration of the plants are completed. Unfortunately, this task is so voluminous and challenging that the Botanical Survey of India, till date, has barely completed seven volumes of the flora and

Table 1. Dominant families of monotypic genera of India

Family	Total number of species	Monotypic genera	Proportion of monotypic genera (%)
Poaceae	1100	32	2.91
Leguminosae	1297	15	1.16
Asteraceae	900	12	1.33
Rubiaceae	275	11	4.00
Orchidaceae	890	10	1.12
Brassicaceae	207	08	3.86
Cucurbitaceae	97	08	8.25
Lamiaceae	380	07	1.84
Menispermaceae	43	05	11.63
Cyperaceae	320	05	1.56

Table 2. Statistical analysis of the habits of monotypic taxa of India

Habit	No. of taxa (%)
Herbs	150 (64)
Shrubs	24 (10)
Undershubs	06 (3)
Climbers	11 (5)
Woody climbers	07 (3)
Small trees	08 (3)
Trees	27 (11)

at least five, if not more, volumes are in varying stages of completion⁸⁻¹⁵. As opposed to this, consider the situation of China, Russia and a few more countries or regions that have already completed their flora inventories and have also made these available through internet¹⁶⁻¹⁸. Such completed flora and inventories will be the best source for a true estimate of the number of monotypic or endemic taxa in the region of interest. This is an important reason why there must be high priority accorded to the completion of the nation's flora inventory. As for the 'new species syndrome', it is a pertinent and valid issue because of the numerous examples of new species being created on the basis of only a herbarium search, without an actual field survey. The herbaria do not always have a collection of vouchers representing the entire range of natural variation in the plants. So such a circumscription is not always justified and a full taxonomic survey in natural habitats as well as applying morphometric and reproductive biology criteria can clearly resolve whether or not the new taxon is justified as a separate entity or it is only a variant of an existing taxon. In this context it is relevant to mention that it is essential for the different herbaria to be linked to each other and to cross-match their holdings, so as to ascertain variation range of plants, if any. Here again, the size of the holdings, their age (most herbaria with at least 5000 vouchers or more are probably 30 + years old) and the total number of such herbaria that exist in the country probably preclude such link-ups due to the sheer magnitude of the tasks. Notwithstanding all the above factors, it is essential to collate and document the data about monotypic taxa in India, if not for any other reason, at least because these are unique plants representing unique plant genetic resource that could be lost forever.

Monotypic taxa – abundance of such taxa within a family

Amongst the Indian monotypic genera, the family-level distribution indicates that Poaceae accounts for the largest share. This family includes all the grasses, besides several of the grain and food crops. The family is also perhaps one of the largest in the country. The taxonomic disposition of the grasses has always been considered to be challenging. Small size of floral parts, annual habits, wide dispersal and the technical limitations to hybridization studies in grasses may perhaps be some of the reasons for taxonomic ambiguities in Poaceae. Table 1, listing the dominant families of monotypic genera, shows that these ten families account for nearly half the monotypic genera of the country. What is interesting about these families is that they are also amongst the most evolved. There could be an evolutionary dynamism that governs the frequency of monotypic genera within the family. Intensive phylogenetics studies are therefore not only required, but are also appropriate for these taxa.

Distribution and phylogeography of monotypic taxa

The monotypic taxa show unusual distribution patterns where considerable distances, including different continents or islands separate the provenances. For example, the taxon *Aldrovanda vesiculosa* L. has been reported from West Bengal, India and from Central Europe and Australia. Such a discontinuous distribution needs an explanation. Did this taxon migrate from or to India? Why is it not able to spread and expand its distribution within India? Are their specific ecological niches or reproductive biology factors that favour only West Bengal for localized distribution within India? Could this be related to other Droseraceae and due to misidentification has been given a unique taxon nomenclature that makes it monotypic? Finally, if there is no taxonomic ambiguity in its identification, could this taxon have a migratory history that can be traced? Could it have migrated due to non-reproductive causes such as human, bird or animal intervention? There are many such examples and questions that can be addressed. This is one of the primary reasons for the interest in this artificial group of plants that on one hand represent incomplete taxonomic circumscription, while on the other are also the best possible candidates for phylogeography studies. Relatively less problematic is the group of monotypic taxa with contiguous phylogeographical distribution and the most common examples include floristic elements that span China, Tibet, the Eastern Himalayan states of India, Myanmar and Bhutan, because it is possible to envisage a flora distribution due to habitat similarities that is continuous in its habitat range, but separated only artificially by geo-political boundaries. In a similar situation the floristic elements of Jammu and Kashmir, India have several overlaps and affinities to those of Pakistan, Afghanistan, Mongolia, and North and North-west China. The unequal flora distribution also results in identifying endemics and here we have not only plants that are endemic to countries, but also to a small state or region within the country. This is another oddity of phyto-geography that has varied explanations and clearly is a subject with an acute need of more intensive studies. One of the most important aspects of floristics in a country as large and varied as India is the lack of reliable population estimates of the monotypic taxa. While several efforts are ongoing to identify or ratify the threatened plants, and lists of endangered or rare and threatened plants have been prepared, this work is much slower than the pace at which distribution status of the plants is changing due to ecological, anthropological and natural catastrophic factors. When the monotypic taxa show any promise of economic importance, their vulnerability is increased several fold.

Monotypic taxa – habit and life cycle

An interesting aspect of the monotypic taxa is perhaps the dynamism associated with their habits and life cycles.

Appendix 1. An enumeration of monotypic angiosperm taxa in India

Botanical name	Family	Habit	Distribution	Status
<i>Aboriella myriantha</i> (Dunn) Bennet	Urticaceae	H	India (Arunachal Pradesh)	Endemic
<i>Acrotrema arnottianum</i> Wight	Dilleniaceae	H	India (Western Ghats)	Endemic
<i>Adenoon indicum</i> Dalz.	Asteraceae	H	India (Western Ghats)	Endemic
<i>Aegle marmelos</i> Corr.	Rutaceae	T	India (all over India except the most arid regions, higher altitudes in Himalayas), SE Asia, South Asia	
<i>Aldrovanda vesiculosa</i> L.	Droseraceae	H	India (West Bengal), Central Europe, Australia	
<i>Albertisia mecistophylla</i> (Miers) Forman	Menispermaceae	WC	India (Assam and Meghalaya), Africa	
<i>Anamirta cocculus</i> (L.) Wight & Arn.	Menispermaceae	WC	India (Uttar Pradesh, Maharashtra, Karnataka, Tamil Nadu, Kerala, and Andaman and Nicobar Islands), Sri Lanka, Bangladesh, Myanmar, Indonesia, Thailand to Malaysia	
<i>Anthogonium gracile</i> Wall. ex Lindl.	Orchidaceae	H	India (Sikkim, Nagaland and Meghalaya), China, Thailand	
<i>Arcyosperma primulifolium</i> (Thoms.) O. Schulz	Brassicaceae	H	India (Jammu & Kashmir, Himachal Pradesh, Uttarakhand and Sikkim), Pakistan, Bhutan and Nepal	
<i>Ariopsis peltata</i> Nimmo	Araceae	H	India (Sikkim and Western Ghats) Nepal, Burma	
<i>Ascopholis gamblei</i> Fischer	Cyperaceae	H	India (Sikkim and Western Ghats), Nepal, Burma	
<i>Aspidocarya uvifera</i> Hook. f. & Thoms.	Menispermaceae	WC	India (Eastern Himalaya), Bhutan, Myanmar and SW China	
<i>Atelanthera perpusilla</i> Hook. f. & Thoms.	Brassicaceae	H	India (Jammu & Kashmir), Pakistan, Afghanistan and China	
<i>Benincasa hispida</i> (Thunb.) Cogn.	Cucurbitaceae	C	India (throughout), Malaysia, China, Japan	
<i>Biswarea tonglensis</i> (Cl.) Cogn.	Cucurbitaceae	C	India (Sikkim, West Bengal, Assam and Manipur)	Endemic
<i>Blepharistemma corymbosum</i> Wall. ex Benth.	Rhizophoraceae	T	India (Western Peninsula)	Endemic
<i>Boeninghausenia albiflora</i> L.	Rutaceae	H	India (Himalaya), Japan	
<i>Bonnayodes limnophiloides</i> Blatt. et Hallb.	Scrophulariaceae	H	India (Maharashtra)	Endemic
<i>Brachycaulos simplicifolius</i> Dixit et Panigrahi	Rosaceae	S	India (Sikkim)	Endemic
<i>Brachystemma calycinum</i> D. Don	Caryophyllaceae	H	India (Uttarakhand, NE and Eastern Himalaya), Nepal, Bhutan, Myanmar, China and Indo-China	
<i>Brasenia schreberi</i> J.F. Gmel.	Cabombaceae	H	India (Meghalaya), Bhutan, North America, East Australia, East Africa	
<i>Bryocarpum himalaicum</i> Hook. f. & Thoms.	Primulaceae	H	India (Eastern Himalaya)	
<i>Bulleyia yunnanensis</i> Schltr.	Orchidaceae	H	India (Eastern Himalaya, Arunachal Pradesh and North Bengal), SW China	I
<i>Butomopsis latifolia</i> (D. Don) Kunth.	Butomaceae	H	India (Plains, Assam and the Deccan), Tropics of the Old World	
<i>Butomus umbellatus</i> L.	Butomaceae	H	India (Jammu & Kashmir and Punjab), Europe and North Asia	
<i>Bythrophyton indicum</i> Hook. f.	Scrophulariaceae	H	India (Meghalaya)	Endemic
<i>Cabomba caroliniana</i> Gray	Cabombaceae	H	India (Kerala), North America	
<i>Caesulia axillaries</i> Roxb.	Asteraceae	H	India (North India and Deccan), Pakistan, Nepal, Bangladesh and Myanmar	
<i>Calacanthus dalzelliana</i> T. Anders. ex Benth.	Acanthaceae	S	India (Maharashtra and Karnataka)	Endemic
<i>Calpurnia indica</i> (Brum.) Yakolov	Leguminosae	S	India (Karnataka and Tamil Nadu)	Endemic
<i>Cannabis sativa</i> L.	Cannabinaceae	H	India (throughout India), Central Asia	
<i>Catamixis bacharoides</i> Thoms.	Asteraceae	S	India (Uttarakhand – Siwalik & Tehri Garhwal)	Endemic, V
<i>Centrostachys aquatica</i> Wall. ex Moq.	Amaranthaceae	H	India (Assam, Coromandal, and the Circars), Bangladesh, Nepal, Burma, Tropical Africa	
<i>Chandrasekharania keralensis</i> Nair, Ramachandran & Sree Kumar	Poaceae	H	India (Kerala)	Endemic
<i>Chionocharis hookeri</i> (Clarke) I.M. Johnston	Boraginaceae	S	India (Eastern Himalaya), Bhutan, China, Nepal, Tibet	
<i>Chloroxylon swietenia</i> DC	Rutaceae	S	Madhya Pradesh, Orissa, Andhra Pradesh, Karnataka, Tamil Nadu and Kerala	Endemic, V
<i>Chydenanthes excelsus</i> (Bl.) Miers	Barringtoniaceae	T	India (Andaman & Nicobar Islands), Burma, Indonesia	

(Contd.)

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Botanical name	Family	Habit	Distribution	Status
<i>Circaeaster agrestis</i> Maxim.	Circaesteraceae	H	India (Western Himalaya), Bhutan, China, Tibet	
<i>Codiocarpus andamanicus</i> (Kurz.) Howard	Icacinaeae	ST	India (Andaman Islands), Malaysia, the Philippines	Endemic
<i>Colebrookea oppositifolia</i> Sm.	Lamiaceae	S	India (subtropical Himalaya, Madhya Pradesh and Deccan Peninsula), Burma	
<i>Corbichonia decumbens</i> (Forssk.) Exell.	Aizoaceae	H	India (Punjab, Karnataka and Tamil Nadu), West Asia and Africa	
<i>Cottonia peduncularis</i> (Lindl.) Reichb.f.	Orchidaceae	H	India (Deccan Peninsula), Sri Lanka	
<i>Craniotome versicolor</i> Reichb.	Lamiaceae	H	India (temperate Himalaya and Meghalaya), Bhutan	Endemic
<i>Cucubalus baccifer</i> L.	Caryophyllaceae	H	India (Himalaya), Japan, Russia, Europe	
<i>Cullenia exarillata</i> A. Robyns	Bombacaceae	T	India (Western Ghats), Sri Lanka	Endemic
<i>Curcumorpha longiflora</i> (Wall.) A.S. Rao & D. M. Verma	Zingiberaceae	H	India (Assam and Meghalaya)	
<i>Cyathopus sikkimensis</i> Stapf.	Poaceae	H	India (Sikkim)	Endemic
<i>Cydonia vulgaris</i> Pers.	Rosaceae	S	India (NW), China, East and South Europe	
<i>Danthonidium gammici</i> (Bhide) Hubb.	Poaceae	H	India (Maharashtra and Karnataka)	Endemic
<i>Datisca cannabina</i> L.	Datisceae	H	India (Himalaya), Nepal, Afghanistan, West Asia	
<i>Decaisnea insignis</i> (Griff.) Hook. f. & Thoms.	Lardizabalaceae	S	India (Eastern Himalaya), Bhutan, China	
<i>Deccania pubescence</i> (Roth) Trivangadan	Rubiaceae	H	India (Deccan)	
<i>Desmostachya bipinnata</i> (L.) Stapf.	Poaceae	H	India (cosmopolitan)	
<i>Dicaelospermum ritchici</i> C. B. Clarke	Cucurbitaceae	H	India (Karnataka, Maharashtra, Punjab and Tamil Nadu)	Endemic
<i>Dickasonia vernicosa</i> L. O. Williams	Orchidaceae	H	India (Manipur and Burma)	
<i>Didickea cunninghamii</i> King & Prain ex King & Prantl.	Orchidaceae	H	India (Uttar Pradesh and Sikkim)	E
<i>Dipterygium glaucum</i> Decne.	Capparaceae	S	India (Rajasthan and Punjab), Arabia and NE Africa	
<i>Dittelasma rarak</i> (DC.) Hook. f.	Sapindaceae	T	India (West Bengal, Assam and Meghalaya), Bhutan, Myanmar, Vietnam, China, Sumatra, Malaysia, Java and Sri Lanka	
<i>Drabopsis verna</i> C. Koch	Brassicaceae	H	India (Jammu & Kashmir), Pakistan, Turkey and Central Asia	
<i>Edgaria darjeelingensis</i> Clarke	Cucurbitaceae	H	India (Sikkim and West Bengal)	Endemic
<i>Eleutharrhena macrocarpa</i> (Diels) Forman	Menispermaceae	WC	India (Meghalaya), China	
<i>Eleutheranthera ruderalis</i> (Sw.) Sch. – Bip.	Asteraceae	H	India (West Bengal and Andaman & Nicobar Islands), Sri Lanka, Indonesia, Singapore, New Guinea, Fiji, Africa, Central and South America	
<i>Enhalus acoroides</i> (L.f.) Royle	Hydrocharitaceae	H	India (South India and Andaman & Nicobar Islands), Australia	
<i>Eriocarpus nimmonii</i> Nimmo ex Graham	Tiliaceae	T	India (western Peninsula and Deccan)	Endemic, R
<i>Eriodes barbata</i> (Lindl.) Rolfe	Orchidaceae	H	India (Meghalaya), Burma, China, Vietnam	
<i>Eriophyton wallichianum</i> Benth.	Lamiaceae	H	India (Sikkim), Nepal	
<i>Fergusonia zeylanica</i> Hook. f.	Rubiaceae	H	India (Karnataka), Sri Lanka	
<i>Fissendocarpa linifolia</i> (Vahl) Bennet	Onagraceae	H	India; tropical Africa, America	
<i>Flagellaria indica</i> L.	Flagellariaceae	T	India (throughout), Africa, Malaysia, Australia	
<i>Frerea indica</i> Dalz.	Asclepiadaceae	H	India (Maharashtra)	Endemic, E
<i>Getonia floribunda</i> Lam.	Combretaceae	S	India (Deccan and Assam), Singapore	
<i>Gluta travancorica</i> Bedd.	Anacardiaceae	T	India (Western Ghats), SE Asia	
<i>Goniocaulon glabrum</i> Cass.	Asteraceae	H	India (Uttar Pradesh, Madhya Pradesh, Bihar, Central India, Deccan and West Bengal)	
<i>Gontscharovia popovii</i> (Fedtsch. & Gontsch.) Boiss.	Lamiaceae	H	India (Jammu & Kashmir), Central Asia	
<i>Gynandropsis pentaphylla</i> DC.	Capparidaceae	H	India (throughout warm parts), tropical countries	

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Appendix 1. (Contd.)

Botanical name	Family	Habit	Distribution	Status
<i>Gynocardia odorata</i> R. Br.	Flacourtiaceae	S	India (Sikkim and Meghalaya), Bangladesh, Burma	
<i>Gynostemma pedata</i> Blume	Cucurbitaceae	C	India, East Asia, Indomalaya	
<i>Haldina cordifolia</i> (Roxb.) C.E. Ridsdale	Rubiaceae	T	India (throughout the hilly parts), Burma, China, Sri Lanka, Vietnam, Thailand	
<i>Halopyrum mucronatum</i> (L.) Stapf.	Poaceae	H	India (Maharashtra and Tamil Nadu), NE Africa, Southern Arabia, Pakistan, Sri Lanka	
<i>Haplothymia exanulata</i> Airy Shaw	Burmanniaceae	H	India (Kerala)	Endemic, I
<i>Hedina tibetica</i> (Thoms.) Ostenf.	Brassicaceae	H	India (Jammu & Kashmir and Sikkim), Pakistan, Nepal, Bhutan, China (Tibet) and Central Asia	
<i>Hemidesmus indicus</i> (Willd.) Schult.	Periplocaceae	WC	India (North India, Sikkim, southwards to Kerala), SE Asia	
<i>Hemiphragma heterophyllum</i> Wall.	Scrophulariaceae	H	India (temperate Himalaya and Meghalaya), Bhutan	Endemic
<i>Herpetospermum pedunculatum</i> (Seringe) Baillon	Cucurbitaceae	C	India (Himalaya), China	
<i>Hodgsonia heteroclita</i> (Roxb.) Hook. f. & Thoms.	Cucurbitaceae	C	India (Sikkim, Assam and Meghalaya), Bangladesh, Burma, Penang, Malacca	
<i>Hubbardia heptaneuron</i> Bor	Poaceae	H	India (Karnataka)	Endemic
<i>Hydrobryopsis sessilis</i> (Willis) Engler	Podostemaceae	H	India (Andhra Pradesh, Karnataka and Kerala)	Endemic, I
<i>Hydrocera triflora</i> (L.) Wight & Arn.	Balsaminaceae	H	India (throughout Bengal, Deccan Peninsula), Sri Lanka, Burma	
<i>Hygrophiza aristata</i> (Retz.) Nees ex Wight & Arn.	Poaceae	H	India (throughout), Sri Lanka	
<i>Indobanalia thyrsoiflora</i> (Moq.) Henry & B. Roy	Amaranthaceae	H	India (Tamil Nadu)	Endemic
<i>Indofevellia khasiana</i> Chatterjee	Cucurbitaceae	C	India (Assam, Meghalaya and Arunachal Pradesh), Bhutan	Endemic
<i>Indopiptadenia oudhensis</i> (Brandis) Brenan	Leguminosae	T	India (Uttar Pradesh), West Nepal	Endemic
<i>Indopoa paupercula</i> (Stapf) Bor	Poaceae	H	India (Western Ghats)	Endemic
<i>Ivanjohnstonia jaunsariensis</i> Kazmi	Boraginaceae	S	India (NW Himalaya)	
<i>Jainia nicobarica</i> Balak.	Rubiaceae	H	India (Nicobar Island)	Endemic
<i>Janakia aravapathra</i> Joseph & Chandrasekaran	Asclepiadaceae	H	India (Tamil Nadu and Kerala)	Endemic
<i>Jansenella griffithiana</i> (C. Muller) Bor	Poaceae	H	India (Assam, Maharashtra and Tamil Nadu), Sri Lanka	
<i>Jejosephia pusilla</i> (Joseph & Deka) Rao & Mani	Orchidaceae	H	India (Meghalaya)	Endemic
<i>Jerdonia indica</i> R. Wight	Gesneriaceae	H	India (South)	Endemic
<i>Kandelia rheedii</i> (L.) Wight & Arn.	Rhizophoraceae	H	India (West Bengal and Peninsula), Sri Lanka, Malaysia	
<i>Kanjarum palghatense</i> Ramamurthy	Acanthaceae	S	India (Kerala)	Endemic
<i>Kashmiria himalaica</i> Hook. f. & D. Y. Hong	Scrophulariaceae	H	India (Western Himalaya)	Endemic
<i>Kedarnatha sanctuarii</i> Mukherjee & Constance	Apiaceae	H	India (Western Himalaya)	Endemic
<i>Keenania modesta</i> Hook. f.	Rubiaceae	S	India (Assam), SE Asia	
<i>Kendrickia walkeri</i> (Wight) Hook. f. ex Triana	Melastomaceae	C	India (Tamil Nadu), Sri Lanka	
<i>Khasiaclunea oligocephala</i> (Havil) Ridsdale	Rubiaceae	T	India (Assam, Manipur and Meghalaya), Burma, China	
<i>Kingiodendron pinnatum</i> (Roxb. ex DC.) Harms	Leguminosae	S	India (Western Ghats)	Endemic, R
<i>Kleinhovia hospita</i> L.	Sterculiaceae	T	India (Karnataka, Kerala and Tamil Nadu), Singapore, Sri Lanka, Java, Philippines	
<i>Kunstleria keralensis</i> Mohanan & Nair	Leguminosae	H	India (Kerala)	Endemic
<i>Lamarkia aurea</i> Moench.	Poaceae	H	India (NW and North India), Mediterranean, Middle East	
<i>Lamprachaenium microcephalum</i> (Dalz.) Benth.	Asteraceae	H	India (Goa, Maharashtra and Karnataka)	Endemic

(Contd.)

Appendix 1. (Contd.)

Botanical name	Family	Habit	Distribution	Status
<i>Lasiurus scindicus</i> Henr.	Poaceae	H	India (NW), Iraq, Ethiopia, Egypt, Mali, Somalia, tropical Arabia	
<i>Lawsonia inermis</i> L.	Lythraceae	H	India (throughout), Afghanistan, Iran	
<i>Lepidostemon pedunculatus</i> Hook. f. & Thoms.	Brassicaceae	H	India (Sikkim Himalaya)	Endemic
<i>Leptocodon gracilis</i> Hook. f. & Thoms.	Campanulaceae	H	India (Eastern Himalaya)	Endemic
<i>Limnocharis flava</i> (L.) Buchen.	Butomaceae	H	India (Kerala), tropical South America	
<i>Limnopoa meeboldii</i> (Fischer) Hubb.	Poaceae	H	India (Kerala)	Endemic
<i>Limonia acidissima</i> L.	Rutaceae	T	Punjab, Uttar Pradesh, West Bengal, Maharashtra, Andhra Pradesh, Karnataka, Tamil Nadu and Kerala	
<i>Lopholepis ornithocephala</i> Steud.	Poaceae	H	India (South), Sri Lanka	
<i>Lygeum spartum</i> Loefl. ex L.	Poaceae	H	India (Jammu & Kashmir), Mediterranean	
<i>Manisuris myuros</i> L.	Poaceae	H	India (South)	Endemic
<i>Meeboldia selinoides</i> H. Wolff.	Apiaceae	H	India (Western Himalaya)	Endemic
<i>Mecopus nidulans</i> Bennett	Leguminosae	H	India (Himalaya), South China, Malaysia	
<i>Metadina trichotoma</i> (Zoll. & Mor.) Bakhuizen	Rubiaceae	S	India (Assam, Manipur and Meghalaya), Burma, Cambodia, Borneo, Java, Philippines, Sumatra, Vietnam	
<i>Meteoromyrtus wynaadensis</i> (Bedd.) Gamble	Myrtaceae	ST	India (South)	Endemic
<i>Micholitzia obcordata</i> N.E. Br.	Asclepiadaceae	S	India (Meghalaya and Manipur)	Endemic
<i>Microschoenus duthiei</i> C.B. Clarke	Cyperaceae	H	India (Western Himalaya)	Endemic, I
<i>Milula spicata</i> Prain	Liliaceae	H	India (Jammu & Kashmir), Tibet	Endemic
<i>Mischodon zeylanicus</i> (Thw.) Hooker	Euphorbiaceae	T	India (South), Sri Lanka	
<i>Moullava spicata</i> (Dalz.) Nicolson	Leguminosae	WC	India (Karnataka, Kerala and Maharashtra)	Endemic
<i>Myagrurn perfoliatum</i> L.	Brassicaceae	H	India (Uttar Pradesh and West Bengal), Europe, Mediterranean	
<i>Myosoton aquaticum</i> (L.) Moench	Caryophyllaceae	H	India (Himalaya), West Asia and Europe	
<i>Myrica esculenta</i> Buch.-Ham. ex D. Don	Myricaceae	T	India (Himalaya), Bhutan, Myanmar, China and SC Asia	
<i>Myriopterum paniculatum</i> Griff.	Periplocaceae	S	India (Assam), Bangladesh, Burma, Indonesia	
<i>Myriostachya wightiana</i> Hook. f.	Poaceae	H	India (Tamil Nadu), Sri Lanka, Burma, Malay Peninsula, Indo-China	
<i>Nanothamnus sericeus</i> Thoms.	Asteraceae	H	India (Karnataka and Maharashtra)	Endemic, R
<i>Naringi crenulata</i> (Roxb.) Nicolson	Rutaceae	ST	India (NW Himalaya, Bihar, Assam and western Peninsula), Sri Lanka, Pakistan, Myanmar, Bangladesh, SW China, Thailand and Java	
<i>Natsiatum herpeticum</i> Hamilt. Ex Arnott	Icacinaceae	C	India (Eastern Himalaya), Burma, Indo-China	
<i>Nayariophyton zizyphifolium</i> (Griff.) Long & Miller	Malvaceae	T	India (Manipur, Meghalaya, Mizoram, Sikkim and West Bengal), Bhutan, China	
<i>Nelsonia canescens</i> (Lam.) Spreng.	Acanthaceae	H	India (throughout sub Himalayan tracts), Sri Lanka, SE Asia, Australia China, tropical Africa	
<i>Neodistemon indicum</i> (Wedd.) Babu & Henry	Urticaceae	H	India (Assam and Uttarakhand), Burma, Indonesia	
<i>Neogyna gardneriana</i> Lindl.	Orchidaceae	H	India (Meghalaya), Bhutan, Burma, China, Laos	
<i>Neonotonia wightii</i> (Arnott) J. A. Lackey	Leguminosae	H	India (Tamil Nadu), Indonesia, tropical Africa	
<i>Neurada procumbens</i> L.	Neuradaceae	H	India (Rajasthan), Pakistan, East Mediterranean	
<i>Nicandra physaloides</i> (L.) Gaertn.	Solanaceae	S	India (Himalaya, Kashmir to Sikkim and Western Deccan), Peru	
<i>Nicobariodendron sleumeri</i> Vasud. & Chakrabarty	Celastraceae	T	India (Nicobar Islands)	Endemic
<i>Nitraria schoberi</i> L.	Zygophyllaceae	S	India (Jammu & Kashmir), Pakistan, China, Russia, Iran, Israel, Syria and Turkey	
<i>Nothosaerva brachiata</i> (L.) Wight.	Amaranthaceae	H	India (Upper Gangetic Plain, Punjab, Maharashtra and Tamil Nadu), Sri Lanka, Burma	
<i>Notochaete hamosa</i> Benth.	Lamiaceae	H	India (Eastern Himalaya)	Endemic
<i>Nypa fruticans</i> Wurm.	Arecaceae	H	India (West Bengal), Sri Lanka, Malay Peninsula, Australia	
<i>Ochthochloa compressa</i> (Forsk.) Hilu	Poaceae	H	India (plains), Afghanistan, Pakistan, Arabia to NE Africa	

(Contd.)

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Appendix 1. (Contd.)

Botanical name	Family	Habit	Distribution	Status
<i>Olgaea thomsonii</i> (Hook. f.) Ijin	Asteraceae	H	India (Western Himalaya)	Endemic
<i>Ophrestia pentaphylla</i> (Dalz.) Verdc.	Leguminosae	H	India (Karnataka, Maharashtra and Meghalaya)	Endemic
<i>Otonephelium stipulaceum</i> (Bedd.) Radlk.	Sapindaceae	T	India (peninsular India)	Endemic
<i>Pachystylidium hirsutum</i> (Blume) Pax et Horrm.	Euphorbiaceae	H	India (peninsular India), Indo-China, Indonesia, Thailand	
<i>Pajanelia rheedii</i> DC.	Bignoniaceae	T	India (Meghalaya and Andaman & Nicobar Islands), Bangladesh, Burma	
<i>Pamburus missionis</i> (Wall. ex Wight) Swingle	Rutaceae	ST	India (Peninsula and West Bengal), Sri Lanka	
<i>Pangium edule</i> Reinw.	Flacourtiaceae	T	India (Great Nicobar Island), Malaysia and Micronesia	
<i>Paracaulleya bhatii</i> R.M. Smith	Zingiberaceae	H	India (Karnataka)	Endemic, V
<i>Parakaempferia synantha</i> Rao & Verma	Zingiberaceae	H	India (Assam)	Endemic
<i>Parochetus communis</i> Buch.-Ham. ex D. Don	Leguminosae	H	India (Himalaya, Assam and Tamil Nadu), Sri Lanka, Burma, Java	
<i>Paroxygraphis sikkimensis</i> Smith	Ranunculaceae	H	India (Sikkim), Nepal and Bhutan	
<i>Pauia belladonna</i> Deb & Dutta	Solanaceae	H	India (Arunachal Pradesh)	Endemic, R
<i>Pauldopia ghorta</i> (Buch.-Ham. ex G. Don) Van Steenis	Bignoniaceae	C	NE India, China, SE Asia	
<i>Pedaliium murex</i> L.	Pedaliaceae	H	India (Deccan peninsula), Sri Lanka, tropical Africa	
<i>Pentabothra nana</i> Hook. f.	Asclepiadaceae	US	India (Assam and West Bengal)	Endemic
<i>Pentapetes phoenicea</i> L.	Sterculiaceae	H	India (throughout the hotter parts and western Peninsula), Burma	
<i>Peracarpa carnososa</i> Hook. f. & Thoms.	Campanulaceae	H	India (Eastern and Western Himalaya, NE region, and Andaman & Nicobar Islands), Myanmar, South China, Indo-China, Thailand to Malaysia	
<i>Phaeanthus malabaricus</i> Bedd.	Annonaceae	S	India (Western Ghats), Myanmar, Cambodia, Malaysia, Borneo, Indonesia, Philippines and New Guinea	V
<i>Phaenosperma globosa</i> Benth.	Poaceae	H	India (NE, Eastern Himalaya), China, Bhutan, South Tibet	
<i>Philydrum lanuginosum</i> Banks ex Gaertn.	Philydraceae	H	India (Andaman & Nicobar Islands), Australia, China, Burma, Malay Peninsula	
<i>Pistia stratiotes</i> L.	Araceae	H	India (throughout), Sri Lanka, tropics of the world	
<i>Platystemma violoides</i> Wall.	Gesneriaceae	H	India (Western Himalaya)	Endemic
<i>Pogonachne racemosa</i> Bor	Poaceae	H	India (Maharashtra)	Endemic
<i>Polysolenia wallichii</i> Hook. f.	Rubiaceae	US	India (Assam)	Endemic
<i>Polytrias amaura</i> (Buse) O. Ktze.	Poaceae	H	India (West Bengal), SE Asia	
<i>Polyura germinata</i> (Wall.) Hook. f.	Rubiaceae	H	India (Meghalaya and Arunachal Pradesh)	Endemic
<i>Polyzygus tuberosus</i> Dalz.	Apiaceae	H	India (Gujarat, Karnataka and Maharashtra)	Endemic, I
<i>Pommereula connocopiae</i> L. f.	Poaceae	H	India (South), Sri Lanka	
<i>Pongamia pinnata</i> (L.) Pierre	Leguminosae	T	India (throughout)	
<i>Proteroceras holtumii</i> Joseph & Vajravelu	Orchidaceae	H	India (Tamil Nadu)	Endemic
<i>Pseudaechmanthera tomentosa</i> Nees	Acanthaceae	S	India (Uttarakhand), Nepal	Endemic
<i>Pseudodichanthium serrafalcoides</i> (Cooke & Stapf) Bor	Poaceae	H	India (Maharashtra)	Endemic
<i>Pseudojacobaea lavandulaefolius</i> (DC.) R. Mathur	Asteraceae	H	India (Tamil Nadu, Kerala and Rajasthan)	Endemic
<i>Pseudostachyum polymorphum</i> Munro.	Poaceae	H	India (Eastern Himalaya), Burma	Endemic
<i>Pseuduvaria prainii</i> (King) Merr.	Annonaceae	T	India (Andaman & Nicobar Islands), Bangladesh, Indonesia, Myanmar, Thailand, Malaysia, Philippines and New Guinea	R
<i>Pterocymbium tinctoria</i> (Blanco) Merr.	Sterculiaceae	T	India (Andaman & Nicobar Islands and Tripura), SE Asia, New Guinea	
<i>Pycnophilanthus uniflora</i> (Hook. f. & Thoms.) Schult.	Brassicaceae	H	India (Himalaya), Pakistan and China (Tibet)	Endemic
<i>Pycnospora lutescens</i> (Poir.) Schindler	Leguminosae	H	India (throughout), tropics of the Old World	
<i>Remirea maritima</i> Aubl.	Cyperaceae	H	India (peninsular India and Nicobar Islands), tropical sea coasts	
<i>Risleya atropurpurea</i> King & Prantl.	Orchidaceae	H	India (Sikkim)	Endemic, I

(Contd.)

Appendix 1. (Contd.)

Botanical name	Family	Habit	Distribution	Status
<i>Roylea elegans</i> Wall. ex Benth.	Lamiaceae	US	India (Western Himalaya)	Endemic
<i>Santapaua madurensis</i> Balak. ex Subramanyan	Acanthaceae	H	India (Tamil Nadu)	Endemic, E
<i>Sarcochlamys pulcherrima</i> Gaud.	Urticaceae	ST	India (Assam and Meghalaya), Bangladesh, Burma, Sumatra	
<i>Schima wallichii</i> (DC.) Korthals	Theaceae	T	India (Eastern Himalaya and Western Ghats), Nepal, Bhutan, Bangladesh, Myanmar and China	
<i>Schoenus nigricans</i> L.	Cyperaceae	H	India (NW)	Endemic
<i>Scirpodendron ghaeri</i> (Gaertn.) Merr.	Cyperaceae	H	India (Nicobar Island), Sri Lanka	
<i>Sclerachne punctata</i> R. Br.	Poaceae	H	India (Tamil Nadu), Indo-China	
<i>Scyphiphora hydrophyllacea</i> Gaertn.	Rubiaceae	T	India (Andamans and Karnataka), Australia, Caledonia	
<i>Schizolobium parahybrum</i> (Vell.) Blake	Leguminosae	T	India (cultivated in gardens)	
<i>Seshagiria sahyadrica</i> Ansari & Hemadri	Asclepiadaceae	US	India (Maharashtra)	Endemic, R
<i>Silentvalleya nairii</i> Nair & Bhargavan	Poaceae	H	India (Kerala)	Endemic
<i>Solenocarpus indica</i> Wight & Arn.	Anacardiaceae	ST	India (Western Ghats)	Endemic
<i>Souliea vaginata</i> (Maxim.) Franch	Ranunculaceae	H	India (Sikkim), Bhutan and West China	
<i>Spartium junceum</i> L.	Leguminosae	S	India (North India and Tamil Nadu)	
<i>Spermodictyon suaveolens</i> Roxb.	Rubiaceae	US	India (tropical and subtropical Himalaya, Madhya Pradesh, western Peninsula, Bihar and Karnataka), Bhutan, China, Pakistan	
<i>Sphaerocaryum malaccense</i> (Trin.) Pilger	Poaceae	H	India (Assam and Manipur), Sri Lanka, Burma, SE Asia, China	
<i>Sphaeromorphaea australis</i> (Less.) Kitam.	Asteraceae	H	India (Orissa), Thailand, China	
<i>Sphaerosacme decandra</i> (Wall.) Pennington	Meliaceae	T	India (Sikkim), Bhutan, Nepal	
<i>Stilbanthus scandens</i> Hook. f.	Amaranthaceae	C	India (Eastern Himalaya), Bangladesh	Endemic
<i>Stracheya tibetica</i> Benth.	Leguminosae	S	India (temperate Himalaya), Nepal, Tibet	
<i>Streptolirion volubile</i> Edgew.	Commelinaceae	H	India (temperate Himalaya, Assam and Manipur), Bhutan, China, Indo-China, Korea	
<i>Struchium sparganophorum</i> (L.) O. Ktze.	Asteraceae	H	India (Nicobar Islands and Kerala), Africa, Mexico, South America, West Indies	
<i>Sumbaviopsis albicans</i> (Blume) J. J. Sm.	Euphorbiaceae	H	India (Assam, Arunachal Pradesh, Nagaland and Tripura), Thailand	
<i>Suriana maritima</i> L.	Surianaceae	ST	India (Andaman & Nicobar Islands, Lakshadweep and Tamil Nadu), Pakistan, Sri Lanka	
<i>Tamarindus indica</i> L.	Leguminosae	T	India, native of tropical Africa	
<i>Tauscheria lasiocarpa</i> DC.	Brassicaceae	H	India (Jammu & Kashmir and Himachal Pradesh), Central and SW Asia	
<i>Tecomella undulata</i> (G. Don) Seemann	Bignoniaceae	ST	India (West, Punjab, Gujarat and Rajasthan), Pakistan, SW Asia	
<i>Tetracentron sinense</i> D. Oliver	Tetracentraceae	T	India (Eastern Himalaya), Bhutan, Burma, SW China	
<i>Thelepogon elegans</i> Roem. Sch.	Poaceae	H	India (Madhya Pradesh, Maharashtra and Tamil Nadu), Tropical Africa	
<i>Theropogon pallidus</i> (Kunth.) Maxim.	Liliaceae	H	India (temperate Himalaya, Meghalaya and Sikkim)	Endemic
<i>Thylacospermum caespitosum</i> Sch.	Caryophyllaceae	H	India (Himalaya), China, Central Asia	
<i>Thysanolaena maxima</i> (Roxb.) O. Ktze.	Poaceae	H	India (throughout), tropical Asia	
<i>Tinomiscium petiolare</i> Hook. f. & Thoms.	Menispermaceae	C	India (Assam and Andaman & Nicobar Islands), China, Myanmar, Vietnam, Thailand, Malaysia, Indonesia, Philippines to New Guinea	
<i>Trachys muricata</i> (L.) Pers. ex Trin.	Poaceae	H	India (Tamil Nadu), Burma, Sri Lanka	
<i>Treutlera insignis</i> Miq.	Asclepiadaceae	WC	India (Eastern Himalaya)	Endemic
<i>Trichuriella monsoniae</i> (L.f.) Bennet	Amaranthaceae	H	India (Orissa, West Bengal and the Deccan Peninsula), Burma	
<i>Trichopus zeylanicus</i> Gaertn.	Dioscoreaceae	H	India (South), Sri Lanka, Malay Peninsula	
<i>Trilobanche cookii</i> (Stapf) Sch. ex Henr.	Poaceae	H	India (Maharashtra and Karnataka)	Endemic

(Contd.)

Appendix 1. (Contd.)

Botanical name	Family	Habit	Distribution	Status
<i>Triplopogon ramosissimus</i> (Hack) Bor	Poaceae	H	India (Maharashtra)	Endemic
<i>Tussilago farfara</i> L.	Asteraceae	H	India (Western Himalaya), Afghanistan, Asia, America, North Africa, Europe	
<i>Urochondra setulosa</i> (Trin.) Hubb.	Poaceae	H	India (Gujarat), Pakistan, NE tropical Africa	
<i>Urena lobata</i> L.	Malvaceae	US	India (throughout), Pantropical	
<i>Vanasushava pedata</i> (Wight) Mukerjee & Constance	Apiaceae	H	India (South)	Endemic
<i>Vossia cuspidata</i> (Roxb.) Griff.	Poaceae	H	India (Assam and West Bengal), Burma, tropical Africa	
<i>Zataria multiflora</i> Boiss.	Lamiaceae	H	India (Jammu & Kashmir), Afghanistan, Iran, Pakistan	

Herbs (H), Shrubs (S), Undershrubs (US), Climbers (C), Woody climbers (WC), Small trees (ST), Trees (T), Endangered (E), Vulnerable (V), Rare (R), Indeterminate (I).

Herbs dominate the habit group amongst the monotypic genera (Table 2), but herbs are also amongst the most efficient colonizers of the plant community. For instance, it is well known that herbs from Asteraceae and Poaceae are amongst the most efficient colonizers and are capable of widespread distribution. The monotypic taxa could be variants of other common plants, but those that have migrated far from their original locales have further evolved and adapted to the new locales, and in the process have been identified as 'new' plant records with unique identifying features. In contrast to herbs, trees have the perennial or longevity of life cycle as another parameter to consider with reference to monotypic status. Trees have been considered the dominant life forms in any forest and the number of trees in unit area primarily determines the denseness of the forest. Considering this and the fact that the trees have a long lifespan, is it possible that some of the monotypic trees are actually relics of past forests, where the other forest elements have declined due to ecological and anthropological causes? However, there are other trees listed that may have been introduced in the past, but have not spread, diversified or hybridized with native trees due to reproductive and post-mating barriers, and have thereby remained isolated as monotypic taxa. The case of two Leguminosae trees, *Tamarindus indica* L. and *Pongamia pinnata* L. (Pierre) is interesting. The former is a native of Africa and therefore, an important question that needs to be answered is when and how was this introduced in India? Or is it possible that this tree is an ancient one and was a dominant element of the flora of the erstwhile Gondwanaland prior to the separation of the landmass and continental drift? The tree has considerable economic importance in India and is also known to have tremendous diversity. *P. pinnata* is also economically important for the seed oil content and quality, due to which the oil has been recognized as an important bio-fuel. Botanically, the tree presents several interesting features; however, relative to *Tamarindus*, this taxon has lesser variability.

Monotypic taxa – perspectives for the future

The more we examine the monotypic taxa, it becomes apparent that they have several queries associated with their occurrence, distribution and systematic dispositions that are unresolved even today. Undoubtedly, the first priority would probably be the complete enumeration of all the plants of the country and their systematic circumscription by involving the disciplines of morphometrics, reproductive biology, cytology, biochemistry and molecular biology. The sooner this is done, the better are the prospects for completing this voluminous task. Given that evolutionary processes are directional, it is equally important to establish the clear phylogenetic status of these taxa and to satisfactorily account for the evolutionary direction that a particular taxon and its higher levels have taken. It is difficult to envisage that in the same higher taxonomic unit, different subunits are subjected to different or opposing evolutionary directions and pressures. Some effort is also required to trace the distribution limits for a monotypic taxon and to then explain how this distribution is linked to geographic and geological factors. The recent trend is to apply molecular phylogenetics methods to resolve many taxonomic problems, and even the monotypes can be studied using these methods. For instance, in a study of the Australian *Mimulus* and related genera using molecular phylogeny data from chloroplast and nuclear genes, Beardsley and Barker¹⁹ have resolved the status of the erstwhile monotypic *Elacholoma hornii* by recognizing a new species of this genus, *Elacholoma* based on clade structures from the molecular data and by including a number of undescribed elements in this study. Their new species was from amongst the undescribed elements. This study was more about the radiations of the genus *Mimulus* in Australia and was not exclusively focused to address the monotypic taxa. However, the time is now ripe for such studies to be taken up in this interesting group of taxa in a comprehensive and holistic way.

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