Medicinal practices of sacred natural sites: a socio-religious approach for successful implementation of primary healthcare services
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Review

Abstract

**Background:** Sacred groves are model systems that have the potential to contribute to rural healthcare owing to their medicinal floral diversity and strong social acceptance.

**Methods:** We examined this idea employing ethnomedicinal plants and their application documented from sacred groves across India. A total of 65 published documents were shortlisted for the preparation of database and statistical analysis. Standard ethnobotanical indices and mapping were used to capture the current trend.

**Results:** A total of 1247 species from 152 families has been documented for use against eighteen categories of diseases common in tropical and subtropical landscapes. Though the reported species are clustered around a few widely distributed families, 71% of them are uniquely represented from any single biogeographic region. The use of multiple species in treating an ailment, high use value of the popular plants, and cross-community similarity in disease treatment reflects rich community wisdom to explore and apply available natural resources.

**Conclusions:** Building on the findings, integration of the tradition in primary healthcare policy especially in AYUSH (Ayurveda, Yoga, Naturopathy, Unani, Siddha and Homoeopathy) program has been recommended. This would embrace folk medicinal practices along with sustainable utilization of plant genetic resources in rapidly changing rural landscapes.
cannot be underestimated. Sacred groves are part of forests or forest patches protected by religious-cultural beliefs of local communities. They play an active role in providing critical ecosystem services such as water conservation, soil fertility, species conservation, medicinal plants etc. (Blicharska et al. 2013, Ray et al. 2014).

The grove-based medicinal practices reserve a great potential in primary healthcare improvement especially in rural contexts. It is crucial since successful implementation of primary healthcare program at grass-root level is a serious challenge for many developing and under-developed countries (Hollard & Sene 2016, Hone et al. 2018, Pandve & Pandve 2013). The mainstream biomedical healthcare often fails to reach geographically isolated and marginalized people despite a plethora of initiatives at national and international levels (e.g., National Health Program in India, Bangladesh, Sri Lanka and African countries, Alma-Ata declaration 1978). In India, several health missions have been introduced at different administrative levels to include people under the national health program. However, the strategy has been re-framed in recent years to make it more inclusive accepting alternative systems of medicine (i.e., codified traditional medicine) (Katoch et al. 2017, Rudra et al. 2017, Samal 2015) because of the prevalence of plurality in healthcare practices (Anonymous 2017, Minocha 1980, Sheehan 2009).

Traditional medicine, be it codified (e.g., Ayurveda, Unani, Siddha) or not (e.g., ethnomedicine) has a strong support base among rural and indigenous societies due to cost effectiveness, success rate, availability, and social compatibility. Ethnomedicine, compared to codified medical system, is relatively widespread and culturally embedded in the communities who are remotely located and predominantly dependent on natural resources (Albert & Porter 2015, Albert et al. 2015). Largely owing to the informal status of its treatment procedure and knowledge transmission, it has not been formally recognized as a part of the alternative healthcare system at government level, but the documentation is in full swing across the country. Maintaining this connection, sacred groves, tend to play a pivotal role in rural healthcare system (Anyinam 1999, Innocent 2016, Unnikrishnan 2010, Young 1983).

In India, studies on medicinal plants from sacred groves emphasize on plant diversity and use, application procedure, and an infrequent quantitative estimation of reliability and consensus of plant use (Khumbongmayum et al. 2005, Venkatesh & Mahammad 2015). Albeit local in character, the volume of documentation clearly indicates its widespread acceptance, capacity in local resource management, and beliefs of local communities. However, there is a conspicuous lack in the country-wide assessment of resource diversity, cross-cultural practices, possibilities of knowledge sharing, uniqueness in plant use and diseases, etc (see Jain 2004 for ethnomedicinal perspective only) which impedes exploration and tapping of unrealized potential of sacred groves in rural health-care. In this backdrop, we sought answers to the following questions 1) how diverse are the medicinal plant resources in the sacred groves and their distribution pattern, 2) what are the prevalent diseases treated currently and remedial measures and 3) possibilities to identify few hotspots with greater assemblage of frequently used species to link them with rural healthcare network. The answers would not only enable generation of a primary level information pool to reinforce grove based healthcare, but can also be invoked in policy and execution.

**Methods**

**Data Collection**

Our dataset was built using available information extracted from the published studies. The primary criterion was to capture indigenous medicinal knowledge associated with the sacred groves. Here the term ‘indigenous medicinal knowledge’ means the use of medicinal plants by indigenous communities and are commonly known as ‘ethnomedicine’, ‘folk medicine’ or ‘local health tradition (LHT)’ (Holley & Cherla 1998, Mishra et al. 2018). The objective was to analyze ethnomedicinal information from the sacred groves, therefore reports on Ayurvedic usage of plants (even from sacred groves) have been objectively excluded. We have collected information on medicinal plants availability, their usage, plant parts use, and geographic location. Our search activities comprised internet-based search engines (Google, Web of Science), databases on scientific literature (e.g., Science Direct, Scopus), and international and national level ecology and conservation journals using keywords such as ‘medicinal plants sacred grove’, ‘ethnomedicine India’, “sacred medicinal plants”, “Maharashtra sacred grove medicinal plants” and similar searches with other states, “traditional medicine sacred site”. The second major criterion was to ensure a fair coverage of geographic expanse of the country and we were able to accumulate information from 18 out of 28 states and 9 union territories. Our primary search returned a total of 104 documents but many were discarded owing to a mention of ayurvedic usage and inadequate information, so the final list consisted of 65 studies (Table 1).
Table 1. Studies used for the analysis

| S.No. | Title                                                                 | Author                      | Journal/Thesis/Project Report                                    |
|-------|-----------------------------------------------------------------------|-----------------------------|------------------------------------------------------------------|
| 1     | Sacred plants and their Ethno-botanical importance in central India: A mini review | Sahu et al. (2013)          | International Journal of Pharmacy & Life Science, 4(8): 2910-2914 |
| 2     | Assessment of status and role of sacred groves in conservation of biodiversity at different levels in Madhya Pradesh | Shrivastava and Masih (2008-09) | Project report                                                  |
| 3     | Role of Sacred Plants in Religion and Healthcare system of local people of Almora district of Uttarakhand State (India) | Sharma and Joshi (2010)     | Academia Arena, 2(6): 19-22                                     |
| 4     | Biodiversity conservation through a traditional beliefs system : a case study from Kumaon Himalaya, India | Singh et al.(2012)          | International Journal of Conservation Science, 3(1):33-40         |
| 5     | An ethnobotanical study of medicinal plants used in sacred groves of Kumaon Himalaya, Uttarakhand, India | Singh et al. (2014)         | Journal of Ethnopharmacology, 154:98-108                         |
| 6     | Sacred Grove in conservation of plant biodiversity in Mahendergarh district of Haryana | Yadav et al. (2010)         | Indian Journal of Traditional Knowledge, 9(4):693-700            |
| 7     | Local deities in conservation - A conservation practice in Banju Nami Tok sacred grove in Tehri Garhwal, Uttarakhand | Pala et al. (2012)         | The Indian Forester, 138(8): 710-713                             |
| 8     | Patalbhuvneshwar: a new sacred grove from Kumaon Himalaya | Agnihotri et al. (2012)     | Current Science, 102(6):830-831                                  |
| 9     | Traditional knowledge and biodiversity conservation in the sacred groves of Meghalaya | Jeeva et al. (2006)         | Indian Journal of Traditional Knowledge, 5(4) 563-568            |
| 10    | Ethnomedicinal plants in the sacred groves of Manipur | Khumbongmayum et al. (2005) | Indian Journal of Traditional Knowledge, 4(1):21-32              |
| 11    | Distribution and conservation status of sacred groves (SGs) in Garo Hills, Meghalaya | Mohanta et al. (2009)       | The Indian Forester, 135(12):1627-1649                           |
| 12    | Sacred Groves: An analysis made in the cultural perspective within BTC Assam, India | Brahma et al. (2014)        | Journal of Biological & Scientific Opinion, 2(5):320-323          |
| 13    | Status of medicinal plants in the disturbed and the undisturbed sacred forests of Meghalaya, northeast India: population structure and regeneration efficacy of some important species | Laloo et al. (2006)        | Current Science, 90(2):225-232                                  |
| 14    | Geo environmental appraisal of sacred groves and its related traditional practices in West Bengal | Pal (2013)                 | Ph. D. Thesis. Department of Geography, Visva-Bharati, Santiniketan |
| 15    | Role of sacred groves in the conservation and management of medicinal plants | Behera et al. (2015)       | Journal of Medicinal Plants Research, 9(29):792-798             |
| 16    | Ethnomedicinal plant conservation through sacred groves | Bhakat and Sen (2008)      | Tribes And Tribals, Special Volume (2):55-58                    |
| 17    | Differences in tree species diversity and soil nutrient status in a tropical sacred forest Ecosystem on Niyamgiri Hill Range, Eastern Ghats, India | Sahu et al. (2012)         | Journal of Mountain Science, 9:492-500                           |
| 18    | An ethnobotanical study of medicinal plants used in sacred groves of Ambaji forest, Gujarat, India | Patel (2015)               | International Journal of Advanced Technology in Engineering and Science, 3(1):285-295 |
| No. | Title                                                                 | Authors (Year)                                                                 | Journal/Source                                      |
|-----|----------------------------------------------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------|
| 19  | Floristic and ethnobotany of sacred groves of Kheda District (Gujarat) and their significance in conserving biodiversity | Patel (2015)                                                                     | Hemchandracharya North Gujarat University, Patan    |
| 20  | Flora of sacred groves at Sriharikota Island, Andhra Pradesh, India  | Kumar (2010)                                                                     | Ethnobotanical Leaflets, 14:420-426                  |
| 21  | Some ethno medicinal plants of Parnasala sacred groove area Eastern Ghats of Khammam District, Telangana, India          | Rao et al. (2015)                                                                | Journal of Pharmaceutical Sciences & Research, 7(4):210-218 |
| 22  | Sacred groves of Parinche valley of Pune district of Maharashtra, India and their importance                           | Chandrakant et al. (2006)                                                        | Anthropology & Medicine, 13(1):55-76                |
| 23  | Validation of indigenous knowledge of Yanadi tribe and local villagers of Veyilingalakona - A sacred grove of Andhra Pradesh, India | Savithramma et al. (2014)                                                        | Journal of Pharmaceutical Science & Research, 6(11):382-388 |
| 24  | Studies on the phytodiversity of a sacred grove and its traditional uses in Karaikal District, U.T. Puducherry       | Sambandhan and Dhatchanamoorthy (2012)                                           | Journal of Phytology, 492):16-21                     |
| 25  | Role of sacred groves in conservation of ethno medicinal plants in Dapoli tehsil of Ratnagiri district, Maharashtra (India) | Ghalme and Deokule (2014)                                                        | The Indian Forester, 140(7):701-706                   |
| 26  | Medicinal plant resources of Rudrakod sacred grove in Nallamalais, Andhra Pradesh, India                            | Rao and Sunitha (2011)                                                           | Journal of Biodiversity, 2(2):75-89                 |
| 27  | Ethno-floristic survey in sacred groves, Pudukottai district, Tamil Nadu - India                                   | Anbarashan et al. (2011)                                                         | Journal of Medicinal Plants Research, 5(3):439-443   |
| 28  | Floristic composition and practices on the selected sacred groves of Pallapatty village (Reserved forest), Tamil Nadu | Ganesan et al. (2009)                                                            | Indian Journal of Traditional Knowledge, 8(2):154-162 |
| 29  | Studies on the plant diversity of Munianadavar sacred groves of Thiruvaiyaru, Thanjavur, Tamil Nadu, India           | Jayapal et al. (2014)                                                            | Hygeia journal for drugs and medicines, 6(12):48-62  |
| 30  | Phytochemical study of ethnomedicinal plants in sacred groves and its traditional uses in Kabirham district of Chhattisgarh | Rahangdale et al. (2014)                                                         | The Indian Forester, 140(1):86-92                    |
| 31  | Studies on the sacred groves of Kannur District                                                                | Deepamol P.C. (2011)                                                            | Ph. D Thesis. Kannur University                      |
| 32  | Ethnobotanical plants used by the tribes of R.D.F. Poshina forest range of Sabarkantha District, North Gujarat, India | Patel and Patel (2013)                                                           | International Journal of Scientific and Research Publications, 3(2):1-8 |
| 33  | Medicinally valuable plants from sacred groves of Jabalpur forest division (Madhya Pradesh)                       | Duggal et al. (2017)                                                             | Asian Journal of Plant Science and Research, 7(2):37-44 |
| 34  | Ethnobotanical studies on Japali Hanuman Theertham- A Sacred Grove of Tirumala hills, Andhra Pradesh, India.       | Savithramma et al. (2014)                                                        | Journal of Pharmaceutical Sciences and Research, 6(2):83-88 |
| 35  | Ethno-Medicinal plants in sacred groves in East Godavari District, Andhra Pradesh, India                          | Venkatesh and Mahammad (2015)                                                    | European Journal of Medicinal Plants, 9(4):1-29      |
| 36  | Phytodiversity and conservation of Nithypooja Kona sacred grove of Nallamala Hill Range, Eastern Ghats, Andhra Pradesh | Basha et al. (2015)                                                              | International Journal of Environment, 4(2):271-288   |
| 37  | Sacred and medicinal plant diversity of Vandiol sacred grove of Sabarkantha District (N.G)                       | Parmar and Patel (2013)                                                          | Life Sciences Leaflets, 5:34-49                      |
| 38  | Ethnobotanical study of sacred groves of Poshina forest of Sabarkanth district, North Gujarat                     | Mehta and Jain (2011)                                                            | International Journal of Plant Sciences, 6(2):362-366 |
| 39  | Role of traditional conservation practice: highlighting the importance of Shivbari sacred grove in biodiversity conservation | Jaryan et al. (2010)                                                             | Environmentalist, 30:101-110                         |
| 40 | Ethnobotanical studies of Sada Shiv sacred grove, district Kangra, Himachal Pradesh | Sharma et al. (2014) | Life Sciences Leaflets, 53:89-96 |
| 41 | Sacred groves as ethnobotanical gene pools in tribal area of the western Himalaya, India | Thapliyal et al. (2012) | The Indian Forester, 138(1):70-78 |
| 42 | Enumeration of angiosperm medicinal plants of Gavisiddalingeshwara sacred grove, Chintanpalli of Yadgir District, Karnataka | Modi and Mathad (2016) | Journal of Global Biosciences, 5(1):3539-3558 |
| 43 | Medicinal plants in the selected sacred groves of Kodungallur, Thrissur district, Kerala | Deepa et al. (2016) | Journal of Medicinal Plants Studies, 4(3):149-155 |
| 44 | Floristic composition and ethnobotanical practices of the sacred groves of Nemmara, Palakkad District, Kerala | Divya and Manonmani (2013) | International Journal of Pharmaceutical Sciences and Business Management, 1(1):9-17 |
| 45 | Ethnobotanical documentation of a sacred Grove- Palakurumba temple, Olavanna in Kozhikode district, Kerala | Reshma and Indulekha (2016) | Journal of Medicinal Plants Studies, 4(4):296-298 |
| 46 | An Ethnopharmacological survey on medicinal plants from sacred grove of Sree Puthiya Bhagavathi temple, Kaloori, Kannur (dist), Kerala | Poovathur and Joseph (2016) | International Journal of Advanced Science and Research, 1(8):24-35 |
| 47 | Ethno-Medico-Botanical studies on Katei Baba sacred grove and nearby area of Adhalwadi from Akole taluka, Ahmednagar district (Maharashtra) | Waghchaure et al. (2011) | International Journal of Pharma and Bio Sciences, 2(3):393-398 |
| 48 | Observation of medicinal importance of sacred plants of Chitrakoot region Satna (M.P.) | Bala and Singh (2015) | International Journal of Science and Research, 4(8):1783-1787 |
| 49 | Inventory of ethnobotanicals and other systematic procedures for regional conservation of medicinal and sacred plants | Wagh and Jain (2015) | Environment Systems and Decisions, 35:143-156 |
| 50 | An ethnomedicinal survey of medicinal plants from a sacred forest of western Odisha, India. | Pradhan et al. (2016) | International Journal of Phytotherapy, 8(3):325-332 |
| 51 | Ethno-Medicinal plants in five sacred groves in Cuddalore district, Tamilnadu, India | Anbarashan and Anbarashan (2010) | Ethnobotanical Leaflets, 14:774-780 |
| 52 | Medicinal plants conservation through sacred forest by ethnic tribals of Virudhunagar district, Tamil Nadu | Rajendran and Agarwal (2007) | Indian Journal of Traditional Knowledge, 6(2):328-333 |
| 53 | Ethnomedicinal studies on important medicinal plants in two sacred groves at Pudukottai district Tamil Nadu | Vani et al. (2016) | Advances in Applied Science Research, 7(2):123-127 |
| 54 | Medicinal plants and their uses: A study of twelve sacred groves in Cuddalore and Villupuram districts, Tamil Nadu, India | Karihik et al. (2016) | International Education and Research Journal, 2(5):95-102 |
| 55 | Medicinal plants of sacred groves in Kanyakumari district southern Western Ghats | Sukumaran & Raj (2010) | Indian Journal of Traditional Knowledge, 9(2):294-299 |
| 56 | Ethno botanical study of medicinal plants of Sri Pancha Narasimha Swamy and Sri Matsyagiri Narasimha Swamy | Rao (2015) | Journal of Medicinal Plants Studies, 3(3):37-42 |
| 57 | Socio-cultural and ethnobotanical value of a sacred forest, Thal ke Dhar, Central Himalaya | Negi (2005) | Indian Journal of Traditional Knowledge, 4(2):190-198 |
| 58 | Medicinal plant diversity in newly reported sacred grove of Pithoragarh District, Uttarakhand | Singh et al. (2011) | The Indian Forester, 137(8):1005-1008 |
| 59 | Sacred groves: traditional plant conservation through deities | Bhakat and Sen (2016) | Plants the natural wonder: Challenges and Avenues, (eds.) Sumita Bandopadhyay, |
Dataset preparation
We selected angiosperm members for detail analysis due to their dominant presence in all the studies, and verified the binomial with 'World Flora Online (www.worldfloraonline.org). For disease categorization and standard nomenclature, we have followed the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) (World Health Organization 2004).

Statistical analysis
Summary statistics, such as taxonomic diversity, species used for treating different diseases, and plant part use were determined for the whole dataset. Disease prevalence was determined based on the number of species use against specific organ system as per ICD-10 classification. We used relative frequency of citation (RFC) for shortlisting fifty most frequently used species. They were further analyzed through standard ethnobotanical indices [use value (UV), consensus value for plant parts (CPP) and fidelity level (FL)] for their distribution, use details, part use, and reliability against specific ailments to capture the major trends in ethnomedicinal practices. All indices were calculated using MS-Excel software.

Grove prioritization
To search for candidate members for implementation in rural healthcare, we attempted to identify grove or grove clusters as hotspots. The selection was made based on the assemblage of greater than fifty percent (50%) of the prioritized species. We recognized that frequently cited species may not represent the true status of medicinal practices and information about the rare plants and their use could be lost. However, for broad regional and national level priority setting, one has to go for widely known species with higher acceptance across communities excluding lesser-known species which are localized in their use. Moreover, frequently cited species also indicate public consciousness towards their remedial power, traditional use, and substantial economic support through cultivation and business (Karki & Williams 1999). Complementing this notion further, we have generated cumulative species distribution as well as thematic maps on grove prioritization and fidelity value distribution.

Results
Taxonomic spectrum of the medicinal plant resources
A total of 1247 medicinal species included under 711 genera and 152 families was documented in our analysis (Appendix 1). Among these, herbs were dominant plant form (35%), followed by trees (31%), shrubs (18%) and climbers (14%). A small fraction of invasive, exotic and lower group plant members has found their way to the list. The species pool was not evenly distributed among the families; out of the 152 plant families, 50% of the total species were from 15 families whereas 39 families possessed 75% of total species (Fig 1). Among 1247 species, 897 (71%) were solely recorded from any single biogeographic region while the rest were shared between at least two regions. The Himalayas held maximum number of unique species (64%) followed by the north-
eastern region (62%) and the Deccan peninsula (58%) (Fig 2). When contribution of various families to species pool was examined, Fabaceae had the highest share (10.5%) followed by Compositae, Lamiaceae, and Rubiaceae (4.9% each).

**Diseases and remedial measures**
We conducted the analysis in two phases, i.e., with the whole dataset and the data pertaining to fifty prioritized species. Analyses to determine fidelity value and use value were conducted for prioritized species only.

**Disease category**
We recorded eighteen (18) categories of ailments from the full dataset following the nomenclature of ICD10. However, seven categories were more prevalent than others for fifty prioritized species (60-100%). The seven dominant categories were diseases related to digestive system (17%), infections and parasitic attacks (17%), skin and subcutaneous tissues (15%) and others (Fig 3).

**Species diversity in disease**
Taking account of the whole species pool, more than hundred species were employed against each disease category. To the higher end of the spectra, infections and parasitic attacks were treated with the highest number of species (366), followed by general health purposes (358 species), external injury and attacks (324 species) and respiratory problem (240 species). However, in each disease category, species distribution was skewed towards only handful of families. In general, 50% of the total species were represented by 11% -17% of the total families. The family contribution rose up to 44% when 75% of the total species was considered (Appendix 2).

**Useful plant parts**
We recorded an employment of variety of plant parts treating different diseases. In the whole data set, leaves (94%) were the most frequently used across all forms of plants followed by stems (55%) and roots (53%). The same trend was observed for fifty prioritized species, where CPP value showed leaf as a dominant ingredient (CPP 0.47) followed by root (CPP 0.39) and stem (CPP 0.29) (Fig 4). Plant part use also tended to vary with habit type, trees exhibited maximum number of part usage (6 ± 1.41) in comparison to climbers (4 ± 1.4), herbs (4 ± 1.3), and shrubs (5 ± 1.06) (Fig 5) as observed in prioritized species.

**Fidelity values (FL)**
The index varied widely from 9% to 100% for the prioritized species. A total of fifteen species out of fifty demonstrated > 50% FL value against specific treatments (Table 2). For instance, Gymnema sylvestre had highest fidelity value (FL = 100) for treating diabetes irrespective of reporting area. Similar results were also obtained for Ocimum tenuifolium (FL = 91, cough and cold), Tridax procumbens (FL = 80, cut and wounds), and Syzygium cumini (FL= 78.5, diabetes). In contrast, few other popular remedies scored less e.g. Cissus quadrangularis (FL=53.3, bone fracture), Mangifera indica (FL=53.3, diarrhoea), Achyranthes aspera (FL=52.1, animal bite), etc.

**Use value (UV)**
The use value for the selected species ranged from 0.03 to 0.78 indicating their diversity of use and availability across the study area (Table 3). Geographic distribution of species was moderately correlated with use value, i.e., widely distributed species generally had higher use-value indicating diverse use across communities and cultures (Kendall’s tau = 0.425, p-value = 0.00003). Maximum use value was reported from Gloriosa superba (0.78) with 51 different types of use covering all recorded disease categories, while minimum value was shown by Gymnema sylvestre (0.03) with specific uses only in diabetes and fracture.

**Spatial distribution pattern**
The 65 shortlisted studies recorded 840 sacred groves from eighteen states of India. However, they were heterogeneously distributed. Tamil Nadu, Uttarakhand, West Bengal, and Andhra Pradesh outnumbered others reporting an average of seven studies from each. Biogeographic zone-wise, the Deccan peninsular region is over-represented in our dataset since majority of the studies (43%) have been reported from this area. Considering enlisted groves, the number of studies do not exactly correspond to the grove numbers, as many surveyed multiple groves in a single study. Taking account of remedial measures, higher fidelity value (FL value) assigned to a species against specific diseases corresponded to their wider reporting area (Fig 6 a,b). We have also identified 12 groves or grove clusters as hotspots based on ≥ 50% availability of highly cited species (Fig 7). These hotspots with greater number of popular species are recommended as primary candidate for connecting grove system with local healthcare.
Figure 1. Cumulative graph of total species pool (1247 spp.) against 152 families. Dotted grey line represent 50% species cut-off, and continuous grey line represents 75% species cut-off.

Figure 2. Patterns of sacred grove species distribution in different biogeographic regions of India. Percentage of unique and shared species in different regions is presented in pie chart. (Map courtesy: Wildlife institute of India, 2000)
Figure 3. Prevalent disease categories from sacred grove based medicine practices. A = digestive system; B = infectious and parasitic diseases; C = skin and sub-cutaneous tissues; D = unspecified or general health problem; E = injury, poisoning and other external causes; F = respiratory system and G = genito-urinary system.

Fig 4. Preferred plant part use in medicine preparation. Upper panel shows findings from whole dataset (i.e. 1247 spp.) expressed in percentage (left axis); lower panel shows findings from fifty prioritised species expressed in CPP value (right axis).
Figures 6a & b. Spatial Fidelity map for selected species; 6a) *Ocimum tenuiflorum* (FD = 91 for cough and cold) and 6b) *Azadirachta indica* (FD = 69 for skin disease). Dots indicate species geographic distribution (from consulted papers) and black dots indicate reporting of the specific use of the species against the disease for which the FL value was calculated.

Figure 7. Distribution of studied grove / grove clusters across India. * = case studies and ▲ = prioritised groves / grove clusters.

Table 2. Fidelity level of selected species against specific ailments (value > 50%)

| Species                  | Ailments treated | Fidelity value (%) |
|--------------------------|------------------|--------------------|
| *Gymnema sylvestre*     | Diabetes         | 100                |
| *Ocimum tenuiflorum*     | Cough and cold   | 90.90909           |
| *Tridax procumbens*      | Cut and wound    | 80                 |
| *Syzygium cumini*        | Diabetes         | 78.57143           |
| *Argemone mexicana*      | Skin disease     | 76.92308           |
| *Acalypha indica*        | Skin disease     | 75                 |
| Species                | Use value | Relative frequency of citation |
|------------------------|-----------|-------------------------------|
| Eclipta prostrata      | 0.47692   | 0.35385                       |
| Abutilon indicum       | 0.35385   | 0.2                           |
| Acalypha indica        | 0.33846   | 0.21538                       |
| Achyranthus aspera     | 0.43077   | 0.36923                       |
| Aegle marmelos         | 0.63077   | 0.46154                       |
| Aerva lanata           | 0.2       | 0.18462                       |
| Ageratum conyzaoides   | 0.33846   | 0.21538                       |
| Alangium salvifolium   | 0.35385   | 0.24615                       |
| Albizia lebbeck        | 0.46154   | 0.18462                       |
| Andrographis paniculata| 0.4       | 0.33846                       |
| Annona squamosa        | 0.35385   | 0.21538                       |
| Argimone mexicana      | 0.29231   | 0.21538                       |
| Asparagus racemosus    | 0.49231   | 0.29231                       |
| Azadirachta indica     | 0.67692   | 0.46154                       |
| Boerhaavia diffusa     | 0.43077   | 0.24615                       |
| Bombax ceiba           | 0.30769   | 0.2                           |
| Butea monosperma       | 0.55385   | 0.26154                       |
| Calotropis gigantea    | 0.43077   | 0.21538                       |
| Cassia fistula         | 0.41538   | 0.38462                       |
| Centella asiatica      | 0.46154   | 0.23077                       |
| Chelocostus speciosus  | 0.23077   | 0.16923                       |
| Cissampelos pariera    | 0.23077   | 0.18462                       |
| Cissus quadrangularis  | 0.26154   | 0.23077                       |
| Curculigo ochroides    | 0.43077   | 0.26154                       |
| Cynodon dactylon       | 0.49231   | 0.36923                       |
| Datura metel           | 0.23077   | 0.18462                       |
| Eclipta prostrata      | 0.24615   | 0.16923                       |
| Euphorbia hirta        | 0.30769   | 0.30769                       |
| Ficus bhenghalensis    | 0.61538   | 0.36923                       |
| Ficus religiosa        | 0.69231   | 0.33846                       |
| Gloriosa superba       | 0.78462   | 0.27692                       |
| Gymnema sylvestre      | 0.03077   | 0.23077                       |

Table 3. Use value (UV) and Relative frequency of citation (RFC) for fifty prioritised species.
Discussion

Taxonomic characteristics and assessment with other studies
A total of 1247 medicinal species from 152 families illustrated the reliance of local people on a rich source of medicinal flora from the sacred groves. The high species diversity perhaps ensured their availability and sustainable usage for health benefits. Apart from angiosperms, moderate representation of lower group of plants (e.g., pteridophytes, lichens) highlighted the existing traditional knowledge-base on curative potential (Nayaka et al. 2010, Shirsat 2008). Similarly, use of invasive and exotic species in ethnomedicine (e.g., Lantana camara, Chromolaena odorata, Sphagneticola sp.) demonstrated human adaptive strategy to utilize alternate resources (Sandilyan & Klooster 2016), which implied the choice has been dynamic and contingent on local materials.

Considering ethnomedicinal plant resource, our study is fairly comparable with other findings, such as 8000 medicinal plants from 550 tribal communities revealed by All India Coordinated Research Project on Ethnobiology (AICRPE) (Pushpangadan et al. 2018); 782 species belonging to 132 families from the Eastern Ghats and the Deccan region (Karuppusamy & Pallaiah 2017), and 528 species of 112 families from the Indo-Gangetic plains (Chowdhury et al. 2017). Despite our study being restricted to sacred groves, availability of such a large number of species clearly underscores the potential of the system as a reservoir of useful medicinal plants.

In terms of family level contribution, Fabaceae, Compositae, Lamiaceae, Rubiaceae, and Malvaceae have occupied the dominant position which corroborated other regional assessments of ethnomedicinal plants, e.g., the Eastern Ghats and the Indo-Gangetic plains (Chowdhury et al. 2017, Karuppusamy & Pallaiah 2017). Pertinently, nearly same suite of families overwhelms the floral assemblage in overall angiosperm diversity in India (Arisdason & Lakshminarasimhan 2017). It might be an indirect support for ecological apparency hypothesis, where apparent or abundant floral assemblages supposed to have greater contribution in livelihood maintenance (Albuquerque et al. 2015). Taxonomic inclination of this assembled ethnomedicinal pharmacopeia towards certain families can be statistically tested with the complete family monographs, but their unavailability at country-level impaired such an analysis. In spite of this limitation, a comparative assessment with the other works has depicted fairly similar trend across the tropical and sub-tropical regions. A total of 11 frequently used families from our list was shared by overly-used categories in the South African ethnomedicinal study (Douwes et al. 2008). Amiguet et al. (2006) highlighted the similarity in tropical useful medicinal floras among Chiapaz, Ecuador, and Veracruz, three southern neo-tropical regions, where Rubiaceae and Compositae have higher use along with few other families. Likewise, Leonti et al. (2003)
have also reported the dominance of Fabaceae, Compositae, Euphorbiaceae, and Lamiaceae from Popoluca, Mexico.

**Distribution of medicinal plants**

The diversity of species was not homogeneous across administrative or biogeographic regions. The skewed distribution could be partly due to the access of the relevant studies from certain regions and lack of from the other. Although the biogeographic classification is very basic in contrast to the enormous local and regional variations, it provides a preliminary understanding on groves' association with certain ecosystems of India. In this regard, the Himalaya and the North-eastern regions demonstrated higher percentage of unique species (64% and 62%, respectively) owing to their distinct floral assemblage resulting from complex history (Mani 2012). On the other hand, higher percentage of unique species (58%) from the Deccan peninsula could be attributed to its geographical expanse and better documentation, since 28 of 65 (43%) studies are from this region. However, the assessment of uniqueness may have been overestimated due to the lack of sufficient data from the other regions. Alternatively, our grove-centric analyses may influence species comparison exercise as it selectively focused on grove flora ignoring the entire floral assemblage. Despite these limitations, these findings provided us with important clues related to floral availability, acceptance, and use pattern across cultures and communities. The aspect of shared species (i.e., remaining 29%), the species documented from two or more regions, deserves further research to gain an insight into the processes leading to their multiple use and applications over a broader area. They may provide an opportunity to understand the larger context of human-environment interaction and socio-cultural knowledge sharing and transmission among communities - the factors are important to uncover basic ethnomedicinal principles.

**Rural healthcare system**

Our interpretation unraveled a distinct pattern in prevalent disease categories, spectrum of plant use, and its country-level variation in acceptance. The major advantages were a steady supply of authentic resource and a vast body of socially accepted traditional medical knowledge.

**Prevalent disease categories**

Eighteen disease categories and their remedial floral package indicated heavy reliance on the existing system as well as exploitation of resource diversity to fulfill the need. However, not all the categories were equally common, e.g., diseases related to digestive system, bacterial and parasitic attacks, skin problems, and external injuries were more treated than the others; the observation reflected the general trend of disease prevalence throughout the tropics (Cunningham et al. 2012, Mitra & Mawson 2017). The causal factors could be multiple: malnutrition, ineffective food storage and family history; while, the agents inciting infections and skin problems are mostly external in nature (Negi & Singh 2018). These are closely related to the surrounding environment and the way people lead their daily chores. Majority of the diseases in our study were water- or animal-borne (e.g., cholera, diarrhoea, dysentery, malaria, scabies, rabies), and few were sexually transmitted (e.g., syphilis, gonorrhoea). Bacterial and parasitic agents were common in rural and forested landscapes, and their population shot up in specific seasons (e.g., rainy season). A general lack of awareness regarding their possible source and epidemiology was another reason of sickness (Anonymous 2017a). The other category, e.g., injuries and wounds could be caused by both biotic (e.g., snake, scorpion, insects, rodents and small mammals) and abiotic agents (accidental contacts). Summarizing, major diseases reported from the grove specific medicine system were related to low to moderately serious ailments associated with communities’ lifestyle choice and interaction with surroundings.

**Diversity in plant use spectrum**

It was found that nearly one-third of the total recorded plant species was in use to treat the dominant ailments. It was an indication that the treatment of a disease is not generally restricted to a few but employed a wide array of medicinal plants, an observation which also receives support from other studies (Jeeva et al. 2007, Sheikh et al. 2015). The finding of a number of species against a particular ailment also signified the flexibility, strong knowledge system, and rich resource base; it also insulated the loss of a species by replacement with other available and effective flora (Junior et al. 2015). On the other hand, employing a particular species against several diseases has been a common practice and the notion was supported by the fact that highly cited members demonstrated higher use values. The underlying reasons perhaps were easy availability, higher abundance, and cross-cultural knowledge base which allow experimentation against different ailments and facilitates cultural inclusion (Albuquerque et al. 2015, Leucena et al. 2012). However, species like Gymnema sylvestre and Gloriosa superba deviated from the predicted linear relation between citation index and use value. Both of them with moderate value of relative citation (0.23 and 0.27, respectively) have shown extreme opposite magnitude of use value. G. sylvestre scored the lowest with its major use in diabetes, irrespective
of its geographic and cultural presence. Its overly acceptance against diabetes could be an example of acquired knowledge through sharing of information or an independently perceived time-tested experience. Although the referred studies claimed to gather information from the local communities, the chances of information transfer from codified knowledge (i.e., Ayurvedic/Siddha/Unani) cannot be overruled (Biswas et al. 2017, Chandran 2016). On the other end of the spectrum, G. superba reportedly used in 51 ailments (highest among the priority species) portrayed its high acceptance among communities, but for its multipurpose use. The multifarious use of G. superba was in agreement with other studies where ethno-medical, pharmacological, and botanical aspects of the species have been discussed at length (Ashokkumar 2015, Padmapriya et al. 2015). Likewise, there were reviews on other plants, such as Azadirachta indica, Syzygium cumini, Ocimum tenuifolium (Ayyanan & Suresh-Babu 2012, Biswas et al. 2002. Gupta et al. 2002) indicating their wider acceptance but multi-community compilations, use-value determination, spatial patterns have rarely been described (but see Jain 2004, Srikanth et al. 2017).

Reliability in plant use
Evaluation of medicinal information from sacred groves revealed a considerable similarity in species and plant part use. Contrary to the popular use of the fidelity value index in one particular area, we have attempted to use the index to capture the acceptance level of a species throughout the country that may act as an indicator of its reliability. Inclusion of spatial dimension in reliability measure was an important addition to this study since it strengthened the widely held view on therapeutic potential of a plant. For instance, the common beliefs advocate the use of Gymnema sylvestre and Syzygium cumini in diabetes, Ocimum tenuifolium in cough and cold, which were quantitatively validated employing this index. The wider spatial distribution of the species with higher fidelity values also indicated broader cultural geographic acceptance than localized reliance. Jain (2004) earlier in his assessment of credibility of traditional medicinal knowledge performed a point-based credibility exercise to identify widely accepted plants against certain ailments. His findings demonstrated the cross-community applications of G. sylvestre and S. cumini in diabetes, Boerhaavia diffusa in liver problems which was in concord with our findings.

Among all, leaves appeared to be the most frequently used plant part. The underlying reason of such preference could be regular collections from herbs and trees where quantity and availability remained consistent throughout the year (Khan et al. 2014). Likewise, stem (or stem bark) and root were also regularly harvested probably due to the same reason. On the contrary, relatively lower use of reproductive parts (i.e., flower, fruits except seeds) may be explained by their seasonal availability, inconsistent quantity, and other uses in commercial, religious and cultural activities. Trees with highly differentiated morphology and longer life span allowed highest use of their parts than herbs and shrubs. Moreover, multiple other components (bark, secondary by-products, and aerial roots) were available from trees which collectively contributed to medicine preparation.

Implementation of grove tradition to rural healthcare system
The repertoire of medicinal flora conserved and managed in the sacred groves reinforced the fostering role of social institutions in biodiversity conservation and utilization (Colding & Folke 2001, Persha et al. 2011). From our analysis, we found that sacred groves allowed treatment of a wide variety of ailments with the available medicinal plants. It earned a strong support from isolated and marginalized people for whom accessibility and affordability to standard healthcare is a distant goal. To bridge the gap between healthcare services and marginalized and rural communities, the Government of India took initiatives at different levels which included plurality in medical practices (Katoch et al. 2017). The major aim to incorporate plurality was to make the healthcare sector more inclusive so that people may exercise different choices according to their socio-economic status, cultural inclination, and comfort level (Samal 2015). Similarly, plurality is also beneficial from the administrative and technical standpoint since it offers an option for healthcare services without heavy reliance on infrastructure and administrative intervention. For example, plurality in Indian context revolves around the inclusion of AYUSH (Ayurveda, Naturopathy, Yoga, Unani, Siddha, and Homoeopathy) codified systems in national health mission so that people get the benefit of age-old traditional medicine system with all divergent choices (Katoch et al. 2017, Samal 2015). The co-location of AYUSH facilities with Primary Health Centre (PHC), Community Health Centre (CHC), and District Hospital (DH) is the judicious implementation of this very idea (Priya & Sweta 2010). Medicinal plants are one of the integral component of the AYUSH system as the preparation mostly relies on resource availability, quality, and skilled handling. Pertinently, sacred groves in the villages could be an alternative resource for medicinal plants in the already established AYUSH program with an assurance for quality and availability. So, the need of the hour is the documentation of the medicinal plants and their
proper maintenance. Our study, in this line, revealed several important aspects of ethnomedicinal practices, e.g., multiple species use in particular ailments, spatial validity in disease treatment (spatial fidelity assessment), and multiple usages of certain species; these underscore the long term association of traditional healers with local flora and environment. This valuable experience pool can be utilized in for the improvement of the AYUSH program to render higher cultural acceptance (Dehury & Chatterjee 2016), since ethnomedicinal knowledge is informally accepted in medical research but lacks official recognition as a mode of treatment (Chandra & Patwardhan 2018).

Employing data-driven prioritization exercise, we have identified 12 groves or groove clusters with greater than 50% of widely used species; these can be taken as a model candidate for mending the local connection between primary healthcare and ethnomedicinal expertise. The groove flora could be useful for medicine preparation under proper management and skilled manpower, whereas the local healer can be consulted for treatment modality and socio-cultural link establishment with local community. Moreover, our analyses also demonstrated higher value in spatial fidelity of many frequently cited species (e.g. Gymnema sylvestre, Syzygium cumini, Ocimum tenuiflorum, Eclipta prostrata), i.e., their use against specific disease is well established across the country; it ensures long-term acceptance across wider cultural geographic regions which is advantageous for AYUSH program. Our prioritization exercise is an initial attempt to identify those spots where frequently used species with multi-community reliance are available in a cluster; we, therefore, intentionally kept aside the region-specific rare species which may have equal importance in medicine practice, for the sake of broad country-wide pattern. For instance, the Himalaya possesses a large number of valuable medicinal plants in the sacred groves but majority of them are locality specific (e.g., Aconitum heterophyllum, Arnebia benthamii, Nardostachys grandiflora, etc) thus exhibit low score as national candidates. However, this exercise can be region specific, improved, and extended further by adding other parameters, e.g., details of treatments, medicine preparation method, and community involvement, which can be further assimilated into health policies for successful implementation.

Conclusion

The study summarized an enormous diversity of folk medicinal flora conserved, managed, and utilized in sacred groves throughout the country. It further exhibited a heavy dependence of the users for a wide variety of ailments common in tropical and subtropical rural landscapes; not limited to a few set, a diverse suite of plants has been generally applied to curing of different ailments.

Armed with data-driven inference, our study has stressed on the notion that sacred grove could be a strong base for traditional medicinal knowledge which can be complemented in local healthcare program as a part of national health mission agenda. Sacred groves, being a social institution, have an enduring association with local communities which hints at their embeddedness that raises their credibility in healthcare and promotes their conservation at local scale. A resurgence of popularity and awareness on ethnomedicine would resurrect the conservation and healthcare nexus liaising among the sacred grove stakeholders, local medical practitioners, and administrative bodies. In many areas, the community-led framework has already been in place which requires to be strengthened through proper planning, policy, and execution.

Declarations

List of abbreviations:

- ICD10 - 10th revision of the International Statistical Classification of Diseases and Related Health Problems
- RFC - relative frequency of citation
- UV - use value
- CPP - consensus value for plant parts
- FL - fidelity level
- AICRPE - All India Coordinated Research Project on Ethnobiology
- AYUSH - Ayurveda, Naturopathy, Yoga, Unani, Siddha, and Homoeopathy
- PHC - Primary Health Centre
- CHC - Community Health Centre
- DH - District Hospital

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Appendix 1. Medicinal plants reported from the studied groves

| Species                              | Family          |
|-------------------------------------|-----------------|
| Acanthus ilicifolius Lour.           | Acanthaceae     |
| Acanthus leucostachyus Wall. ex Nees | Acanthaceae     |
| Andrographis paniculata (Burm.f.) Nees | Acanthaceae     |
| Andrographis alata (Vahl) Nees       | Acanthaceae     |
| Andrographis echoides (L.) Nees      | Acanthaceae     |
| Asystasia chelonoides Nees           | Acanthaceae     |
| Avicennia officinalis L.              | Acanthaceae     |
| Barleria buxifolia L.                | Acanthaceae     |
| Barleria cristata L.                 | Acanthaceae     |
| Barleria cuspidata F.Heyne ex Nees   | Acanthaceae     |
| Barleria lupulina Lindl.             | Acanthaceae     |
| Barleria prionitis L.                | Acanthaceae     |
| Blepharis maderaspatensis (L.) B.Heyne ex Roth | Acanthaceae |
| Crossandra infundibuliformis (L.) Nees | Acanthaceae     |
| Dicliptera bupleuroides Nees         | Acanthaceae     |
| Dicliptera chinensis (L.) Juss.      | Acanthaceae     |
| Dicliptera paniculata (Forssk.) I.Darbysh. | Acanthaceae |
| Ecbolium ligustrinum (Vahl) Vollesen  | Acanthaceae     |
| Ecbolium viride (Forssk.) Alston     | Acanthaceae     |
| Elytraria acaulis (L.f.) Lindau      | Acanthaceae     |
| Eranthemum purpurascens Wight ex Nees | Acanthaceae     |
| Eranthemum roseum (Vahl) R.Br.       | Acanthaceae     |
| Hemigraphis hirta (Vahl) T.Anderson  | Acanthaceae     |
| Hygrophila auriculata (Schumach.) Heine | Acanthaceae     |
| Justicia adhatoda L.                 | Acanthaceae     |
| Justicia betonica L.                 | Acanthaceae     |
| Justicia gendarussa Burm.f.          | Acanthaceae     |
| Justicia glauca Rottler              | Acanthaceae     |
| Justicia japonica Thunb.             | Acanthaceae     |
| Lepidagathis cristata Wild.          | Acanthaceae     |
| Peristrophe bicalyculata (Retz.) Nees | Acanthaceae     |
| Phlogacanthus thyrsiflorus Nees      | Acanthaceae     |
| Phlogacanthus thyrsiformis (Roxb. ex Hardw.) Mabb. | Acanthaceae |
| Ruellia prostrata Poir.              | Acanthaceae     |
| Rungia pectinata (L.) Nees           | Acanthaceae     |
| Strobilanthes ciliata Nees           | Acanthaceae     |
| Strobilanthes scaber T.Anderson      | Acanthaceae     |
| Thunbergia fragrans Roxb.            | Acanthaceae     |
| Thunbergia grandiflora (Roxb. ex Rottl.) Roxb. | Acanthaceae |
| Thunbergia laevis Nees               | Acanthaceae     |
| Hydnocarpus macrocarpa Warb.         | Achariaceae     |
| Hydnocarpus pentandrus (Buch.-Ham.) Oken | Achariaceae     |
| Hydnocarpus wightianus Blume         | Achariaceae     |
| Acorus calamus L.                    | Acoraceae       |
| Viburnum cotinifolium D. Don         | Adoxaceae       |
| Species                          | Family         | Family         |
|---------------------------------|----------------|----------------|
| *Viburnum foetidum* Wall.       | Adoxaceae      |                |
| *Trianthema portulacastrum* L.  | Adoxaceae      | Anacardiaceae  |
| *Achyranthes aspera* L.         | Amaranthaceae  |                |
| *Aerva javanica* (Burm.f.) Juss. ex Schult. | Amaranthaceae  |                |
| *Aerva lanata* (L.) Juss.       | Amaranthaceae  |                |
| *Allmania nodiflora* (L.) R.B. ex Wight | Amaranthaceae  |                |
| *Alternanthera brasiliana* (L.) Kuntze | Amaranthaceae  |                |
| *Alternanthera pungens* Kunth    | Amaranthaceae  |                |
| *Alternanthera sessilis* (L.) R.B. ex DC. | Amaranthaceae  |                |
| *Amaranthus caudatus* L.        | Amaranthaceae  |                |
| *Amaranthus spinosus* L.        | Amaranthaceae  |                |
| *Amaranthus tricolor* L.        | Amaranthaceae  |                |
| *Amaranthus blitum* L.          | Amaranthaceae  |                |
| *Celosia argentea* L.           | Amaranthaceae  |                |
| *Chenopodium album* L.          | Amaranthaceae  |                |
| *Cyathula prostrata* (L.) Blume | Amaranthaceae  |                |
| *Cyathula tomentosa* (Roth) Moq. | Amaranthaceae  |                |
| *Dysphania ambrosioides* (L.) Mosyakin & Clemants | Amaranthaceae  |                |
| *Gomphrena serrata* L.          | Amaranthaceae  |                |
| *Pupalia lappacea* (L.) Juss.   | Amaranthaceae  |                |
| *Allium cepa* L.                | Amaryllidaceae |                |
| *Allium sativum* L.             | Amaryllidaceae |                |
| *Crinum asiaticum* L.           | Amaryllidaceae |                |
| *Anacardium occidentale* L.     | Anacardiaceae  |                |
| *Buchanania axillaris* (Desr.) Ramamoorthy | Anacardiaceae  |                |
| *Buchanania cochin chinensis* (Lour.) M.R.Almeida | Anacardiaceae  |                |
| *Holigarna amrottiana* Hook.f.  | Anacardiaceae  |                |
| *Holigarna caustica* (Dennst.) Oken | Anacardiaceae  |                |
| *Lannea coromandelica* (Houll.) Merr. | Anacardiaceae  |                |
| *Mangifera indica* L.           | Anacardiaceae  |                |
| *Rhus chinensis* Mill.          | Anacardiaceae  |                |
| *Rhus mysoresensis* G.Don       | Anacardiaceae  |                |
| *Rhus parviflora* Roxb.         | Anacardiaceae  |                |
| *Rhus succedanea* L.            | Anacardiaceae  |                |
| *Semecarpus anacardium* L.f.    | Anacardiaceae  |                |
| *Spondias pinnata* (L. f.) Kurz | Anacardiaceae  |                |
| *Ancistrocladus heyneanus* Wall. ex J.Graham | Ancistrocladaceae | Annonaceae |
| *Annona reticulata* L.          | Annonaceae     |                |
| *Annona squamosa* L.            | Annonaceae     |                |
| *Artabotrys hexapetalus* (L.f.) Bhandari | Annonaceae     |                |
| *Miliusa tomentosa* (Roxb.) J.Sinclair | Annonaceae     |                |
| *Polyalthia longifolia* (Sonn.) Thwaites | Annonaceae     |                |
| *Uvaria narum* A.DC.            | Annonaceae     |                |
| *Angelica gauca* Edgew.         | Apiaceae       |                |
| *Bunium persicum* (Boiss.) B.Fedtsch. | Apiaceae       |                |
| *Centella asiatica* (L.) Urb.   | Apiaceae       |                |
| Scientific Name                        | Family          |
|---------------------------------------|-----------------|
| Chaerophyllum reflexum Aitch.         | Apiaceae        |
| Ferula jaeskeana C.B.Clarke           | Apiaceae        |
| Heracleum lanatum Michx.              | Apiaceae        |
| Narthex asafoetida Falc. ex Lindl.    | Apiaceae        |
| Oenanthe javanica (Blume) DC.         | Apiaceae        |
| Peucedanum napurense Prain            | Apiaceae        |
| Pimpinella diversifolia DC.           | Apiaceae        |
| Allamanda cathartica L.               | Apocynaceae     |
| Alstonia scholaris (L.) R. Br.         | Apocynaceae     |
| Alstonia venenata R.Br.               | Apocynaceae     |
| Calotropis gigantea (L.) Dryand.      | Apocynaceae     |
| Calotropis procera (Aiton) Dryand.    | Apocynaceae     |
| Caralluma adscendens (Roxb.) R.Br.    | Apocynaceae     |
| Caralluma stalagmifera C.E.C.Fisch.   | Apocynaceae     |
| Carissa carandas L.                   | Apocynaceae     |
| Carissa spinarum L.                   | Apocynaceae     |
| Cascabela thevetia (L.) Lippold       | Apocynaceae     |
| Catharanthus pusillus (Murray) G.Don   | Apocynaceae     |
| Catharanthus roseus (L.) G.Don         | Apocynaceae     |
| Ceropegia attenuata Hook.             | Apocynaceae     |
| Ceropegia bulbosa Roxb.               | Apocynaceae     |
| Ceropegia candelabrum L.              | Apocynaceae     |
| Ceropegia vincifolia Hook.            | Apocynaceae     |
| Chonemorpha fragrans (Moon) Alston    | Apocynaceae     |
| Cryptolepis dubia (Burm.f.) M.R.Almeida | Apocynaceae   |
| Cryptostegia grandiflora Roxb. ex R.Br. | Apocynaceae    |
| Cynanchum viminale (L.) L.            | Apocynaceae     |
| Dregea volubilis (L.f.) Benth. ex Hook.f. | Apocynaceae |
| Gymnema decaisneanum Wight            | Apocynaceae     |
| Gymnema sylvestre (Retz.) R.Br. ex Sm. | Apocynaceae     |
| Hemidesmus indicus (L.) R. Br. ex Schult. | Apocynaceae |
| Holarrhena pubescens Wall. ex G.Don   | Apocynaceae     |
| Hoya parviflora Wight                 | Apocynaceae     |
| Ichnocarpus frutescens (L.) W.T.Aiton | Apocynaceae     |
| Leptadenia reticulata (Retz.) Wight & Arn. | Apocynaceae |
| Nerium oleander L.                    | Apocynaceae     |
| Pergularia daemia (Forssk.) Chiov.    | Apocynaceae     |
| Plumeria obtusa L.                    | Apocynaceae     |
| Plumeria rubra L.                     | Apocynaceae     |
| Rauvolfia serpentina (L.) Benth. ex Kurz | Apocynaceae   |
| Rauvolfia tetraphylla L.              | Apocynaceae     |
| Sarcostemma acidum (Roxb.) Voigt      | Apocynaceae     |
| Secamone emetica (Retz.) R. Br. ex Schult. | Apocynaceae |
| Tabernaemontana alternifolia L.       | Apocynaceae     |
| Tabernaemontana divaricata (L.) R.Br. ex Roem. & Schult. | Apocynaceae |
| Telosma pallida (Roxb.) W. G. Craib    | Apocynaceae     |
| Thevetia neriifolia Juss. ex Steud.   | Apocynaceae     |
| Scientific Name                                           | Family              |
|----------------------------------------------------------|---------------------|
| Tylophora asthmatica (L. f.) Wight & Arn.               | Apocynaceae         |
| Tylophora indica (Burm. f.) Merr.                       | Apocynaceae         |
| Tylophora rotundifolia Buch.-Ham. ex Wight              | Apocynaceae         |
| Vallaris solanacea (Roth) Kuntze                        | Apocynaceae         |
| Wrightia tinctoria R.Br.                                | Apocynaceae         |
| Ilex embelioides Hook.f.                                | Aquifoliaceae       |
| Ilex khasiana Purkay.                                   | Aquifoliaceae       |
| Alocasia macrorrhizos (L.) G.Don                         | Araceae             |
| Amorphophallus paeoniifolius (Dennst.) Nicolson         | Araceae             |
| Amorphophallus sylvaticus (Roxb.) Kunth                 | Araceae             |
| Arisaema consanguineum Schott                           | Araceae             |
| Arisaema jacquemontii Blume                             | Araceae             |
| Arisaema tortuosum (Wall.) Schott                       | Araceae             |
| Colocasia esculenta (L.) Schott                         | Araceae             |
| Lasia spinosa (L.) Thwaites                             | Araceae             |
| Pothis curtisii Hook.f.                                 | Araceae             |
| Pothis scandens L.                                       | Araceae             |
| Remusatia vivipara (Roxb.) Schott                       | Araceae             |
| Rhaphidophora hookeri Schott                            | Araceae             |
| Sauromatum venosum (Dryand. ex Aiton) Kunth             | Araceae             |
| Scindapsus officinalis (Roxb.) Schott                   | Araceae             |
| Hedera nepalensis K.Koch                                | Araliaceae          |
| Hydrocotyle javanica Thunb.                             | Araliaceae          |
| Macropanax undulatus (Wall. ex G.Don) Seem.             | Araliaceae          |
| Schefflera hypoleuca (Kurz) Harms                       | Araliaceae          |
| Trevesia palmata (Roxb. ex Lindl.) Vis.                 | Araliaceae          |
| Areca catechu L.                                        | Areceae             |
| Borassus flabellifer L.                                 | Areceae             |
| Caryota urens L.                                        | Areceae             |
| Cocos nucifera L.                                       | Areceae             |
| Phoenix acaulis Roxb.                                   | Areceae             |
| Phoenix dactylifera L.                                  | Areceae             |
| Phoenix loureiroi Kunth                                 | Areceae             |
| Phoenix pusilla Gaertn.                                 | Areceae             |
| Phoenix sylvestris (L.) Roxb.                           | Areceae             |
| Aristolochia bracteolata Lam.                           | Aristolochiaceae    |
| Aristolochia indica L.                                  | Aristolochiaceae    |
| Aristolochia littoralis Parodi                          | Aristolochiaceae    |
| Aristolochia saccata Wall.                              | Aristolochiaceae    |
| Agave americana L.                                      | Asparagaceae        |
| Agave sisalana Perrine                                  | Asparagaceae        |
| Asparagus adscendens Roxb.                              | Asparagaceae        |
| Asparagus filicinus Buch.-Ham. ex D.Don                 | Asparagaceae        |
| Asparagus racemosus Willd.                              | Asparagaceae        |
| Chlorophytum borivilianum Santapau & R.R.Fern.          | Asparagaceae        |
| Chlorophytum breviscapum Dalzell                        | Asparagaceae        |
| Chlorophytum tuberosum (Roxb.) Baker                    | Asparagaceae        |
| Species                                | Family              | Family               |
|----------------------------------------|---------------------|----------------------|
| *Drimia indica* (Roxb.) Jessop         | Asparagaceae        |                      |
| *Furcraea foetida* (L.) Haw.           | Asparagaceae        |                      |
| *Ledebouria revoluta* (L.f.) Jessop    | Asparagaceae        |                      |
| *Muscaria commutatum* Guss.            | Asparagaceae        |                      |
| *Polygonatum cirrhifolium* (Wall.) Royle | Asparagaceae      |                      |
| *Polygonatum verticillatum* (L.) All.  | Asparagaceae        |                      |
| *Sansevieria trifasciata* Prain        | Asparagaceae        |                      |
| *Sansevieria roxburghiana* Schult. & Schult.f. | Asparagaceae    |                      |
| *Impatiens balsamina* L.               | Balsaminaceae       |                      |
| *Impatiens racemosa* DC.               | Balsaminaceae       |                      |
| *Basella alba* L.                      | Basellaceae         |                      |
| *Begonia palmata* D.Don                | Begoniaceae         |                      |
| *Berberis aristata* DC.                | Berberidaceae       |                      |
| *Berberis asiatica* Roxb. ex DC.       | Berberidaceae       |                      |
| *Berberis chitria* Buch.-Ham. ex Lindl.| Berberidaceae       |                      |
| *Berberis jaeschkeana* C.K.Schneid.    | Berberidaceae       |                      |
| *Berberis wallichiana* DC.             | Berberidaceae       |                      |
| *Mahonia napaulensis* DC.              | Berberidaceae       |                      |
| *Sinopodophyllum hexandrum* (Royle) T.S.Ying | Berberidaceae   |                      |
| *Dolichandrone falcata* (Wall. ex DC.) Seem. | Bignoniaceae      |                      |
| *Oroxylum indicum* (L.) Kurz           | Bignoniaceae        |                      |
| *Spathodea campanulata* P.Beauv.       | Bignoniaceae        |                      |
| *Stereospermum cheloides* (L.f.) DC.   | Bignoniaceae        |                      |
| *Tecoma stans* (L.) Juss. ex Kunth     | Bignoniaceae        |                      |
| *Tecomella undulata* (Sm.) Seem.       | Bignoniaceae        |                      |
| *Cochlospermum religiosum* (L.) Alston | Bignoniaceae        |                      |
| *Arnebia benthamii* (Wall. ex G.Don)   | Bignoniaceae        |                      |
| *Arnebia euchroma* (Royle) I.M.Johnst. | Bignoniaceae        |                      |
| *Coldenia procumbens* L.               | Bignoniaceae        |                      |
| *Cordia dichotoma* G.Forst.            | Bignoniaceae        |                      |
| *Cordia fragrantissima* Kurz           | Bignoniaceae        |                      |
| *Cordia grandis* Roxb.                 | Bignoniaceae        |                      |
| *Cordia macleodii* Hook.f. & Thomson   | Bignoniaceae        |                      |
| *Cordia monoica* Roxb.                 | Bignoniaceae        |                      |
| *Cordia sinensis* Lam.                 | Bignoniaceae        |                      |
| *Ehretia laevis* Roxb.                 | Bignoniaceae        |                      |
| *Ehretia microphylla* Lam.             | Bignoniaceae        |                      |
| *Heliotropium bracteatum* R.Br.        | Bignoniaceae        |                      |
| *Heliotropium indicum* L.              | Bignoniaceae        |                      |
| *Tournefortia candollei* C.B.Clarke    | Bignoniaceae        |                      |
| *Tournefortia montana* Lour.           | Bignoniaceae        |                      |
| *Trichodesma indicum* (L.) Lehm.       | Bignoniaceae        |                      |
| *Brassica juncea* (L.) Czern.          | Brassicaceae        |                      |
| *Cardamine hirsuta* L.                 | Brassicaceae        |                      |
| *Lepidium sativum* L.                  | Brassicaceae        |                      |
| *Boswellia serrata* Roxb. ex Colebr.   | Burseraceae         |                      |
| *Canarium strictum* Roxb.              | Burseraceae         |                      |
| *Commiphora caudata* (Wight & Arn.) Engl. | Burseraceae      |                      |
| Scientific Name                        | Family          |
|---------------------------------------|-----------------|
| Sarcococca pruniflora Lindl.          | Buxaceae        |
| Cereus hexagonus (L.) Mill.            | Cactaceae       |
| Cereus pterogonus Lem.                 | Cactaceae       |
| Opuntia stricta (Haw.) Haw.           | Cactaceae       |
| Mesua ferrea L.                        | Calophyllaceae  |
| Cannabis sativa L.                     | Cannabaceae     |
| Celtis australis L.                    | Cannabaceae     |
| Celtis tetrandra Roxb.                 | Cannabaceae     |
| Celtis timorensis Span.                | Cannabaceae     |
| Trema orientalis (L.) Blume            | Cannabaceae     |
| Canna indica L.                        | Cannaceae       |
| Cadaba fruticosa (L.) Druce            | Capparaceae     |
| Capparis brevispina DC.                | Capparaceae     |
| Capparis decidua (Forssk.) Edgew.      | Capparaceae     |
| Capparis divaricata Lam.               | Capparaceae     |
| Capparis sepiaria L.                   | Capparaceae     |
| Capparis spinosa L.                    | Capparaceae     |
| Capparis trifoliata Roxb.              | Capparaceae     |
| Capparis zeylanica L.                  | Capparaceae     |
| Crateva adansonii DC.                  | Capparaceae     |
| Crateva nurvala Buch.-Ham.             | Capparaceae     |
| Crateva religiosa G.Forst.             | Capparaceae     |
| Lonicera japonica Thunb.               | Caprifoliaceae  |
| Valeriana jatamansi Jones              | Caprifoliaceae  |
| Carica papaya L.                       | Caricaceae      |
| Drymaria cordata (L.) Wild. ex Schult.  | Caryophyllaceae |
| Polycarpacea aurea Wight & Arn.        | Caryophyllaceae |
| Polycarpacea corymbosa (L.) Lam.       | Caryophyllaceae |
| Casuarina equisetifolia L.             | Casuarinaceae   |
| Cassine glauca (Rottb.) Kuntze         | Celastraceae    |
| Celastrus paniculatus Wild.            | Celastraceae    |
| Euonymus lawsonii C.B.Clarke ex Prain  | Celastraceae    |
| Gymnosporia emarginata (Wild.) Thwaites | Celastraceae    |
| Gymnosporia heynanana (Roth) M.A.Lawson | Celastraceae    |
| Gymnosporia montana (Roth) Benth.      | Celastraceae    |
| Gymnosporia senegalensis (Lam.) Loes.   | Celastraceae    |
| Reissantia indica (Willd.) N.Hallé      | Celastraceae    |
| Calophyllum inophyllum L.              | CIusiaceae      |
| Cleome aspera J.Koenig ex DC.          | Cleomaceae      |
| Cleome gynandra L.                     | Cleomaceae      |
| Cleome rutidosperma var. burmannii (Wight & Arn.) Siddiqi & S.N.Dixit | Cleomaceae |
| Cleome viscosa L.                      | Cleomaceae      |
| Garcinia cowa Roxb. ex Choisy          | Clusiaceae      |
| Garcinia sopsopia (Buch.-Ham.) Mabb.    | Clusiaceae      |
| Garcinia spicata Hook.f.               | Clusiaceae      |
| Mammea suriga (Buch.-Ham. ex Roxb.) Kosterm. | Clusiaceae |
| Disporum calcaratum D.Don              | Colchicaceae    |
| Latin Name                        | Family         |
|----------------------------------|----------------|
| Disporum cantoniense (Lour.) Merr. | Colchicaceae   |
| Gloriosa superba L.              | Colchicaceae   |
| Anogeissus latifolia (Roxb. ex DC.) Wall. ex Guillem. & Perr. | Combretaceae |
| Combretum albidum G.Don           | Combretaceae   |
| Combretum album Pers.             | Combretaceae   |
| Combretum decandrum Jacq.         | Combretaceae   |
| Combretum indicum (L.) DeFilipps   | Combretaceae   |
| Combretum ovalifolium Roxb.       | Combretaceae   |
| Getonia floribunda Roxb.          | Combretaceae   |
| Terminalia arjuna (Roxb. ex DC.) Wight & Arn. | Combretaceae |
| Terminalia bellirica (Gaertn.) Roxb. | Combretaceae |
| Terminalia catappa L.             | Combretaceae   |
| Terminalia chebula Retz.          | Combretaceae   |
| Terminalia cuneata Roth           | Combretaceae   |
| Terminalia pallida Brandis        | Combretaceae   |
| Terminalia paniculata Roth        | Combretaceae   |
| Terminalia tomentosa Wight & Arn. | Combretaceae   |
| Commelina benghalensis L.         | Commelinaceae  |
| Commelina clavata C.B.Clarke      | Commelinaceae  |
| Cyanotis axillaris (L.) D.Don ex Sweet | Commelinaceae |
| Cyanotis cristata (L.) D.Don       | Commelinaceae  |
| Murdannia pauciflora (G.Brückn.) G.Brückn. | Commelinaceae |
| Acanthospermum hispidum DC.       | Compositae     |
| Achillea millefolium L.           | Compositae     |
| Acmella calva (DC.) R.K.Jansen    | Compositae     |
| Acmella paniculata (Wall. ex DC.) R.K.Jansen | Compositae |
| Ageratina adenophora (Spreng.) R.M.King & H.Rob. | Compositae |
| Ageratum conyzoides (L.) L.       | Compositae     |
| Ainsliaea aptera DC.              | Compositae     |
| Ainsliaea latifolia (D.Don) Sch.Bip. | Compositae |
| Anaphalis contorta (D.Don) Hook.f. | Compositae     |
| Artemisia dracunculus L.          | Compositae     |
| Artemisia maritima L.             | Compositae     |
| Artemisia nilagirica (C.B.Clarke) Pamp. | Compositae |
| Artemisia roxburghiana Wall. ex Besser | Compositae |
| Artemisia vulgaris L.             | Compositae     |
| Bidens biternata (Lour.) Merr. & Sherff | Compositae |
| Bidens pilosa L.                  | Compositae     |
| Blainvillea acmella (L.) Philipson | Compositae     |
| Blumea axillaris (Lam.) DC.        | Compositae     |
| Blumea hieracifolia Hayata        | Compositae     |
| Blumea lacera (Burm.f.) DC.        | Compositae     |
| Chromolaena odorata (L.) R.M.King & H.Rob. | Compositae |
| Cirsium verutum (D.Don) Spreng.   | Compositae     |
| Common Name                  | Scientific Name                          | Family       |
|-----------------------------|------------------------------------------|--------------|
| Cirsium wallichii           | Cirsium wallichii DC.                    | Compositae   |
| Cotula anthemoides          | Cotula anthemoides L.                    | Compositae   |
| Cyanthillium albicans       | Cyanthillium albicans (DC.) H.Rob.       | Compositae   |
| Cyanthillium cinereum       | Cyanthillium cinereum (L.) H.Rob.        | Compositae   |
| Dicoma tomentosa            | Dicoma tomentosa Cass.                   | Compositae   |
| Echinops echinatus          | Echinops echinatus Roxb.                 | Compositae   |
| Eclipta prostrata           | Eclipta prostrata (L.) L.                | Compositae   |
| Elephantopus scaber         | Elephantopus scaber L.                   | Compositae   |
| Emilia sonchifolia          | Emilia sonchifolia (L.) DC. ex DC.       | Compositae   |
| Enydra fluctuans           | Enydra fluctuans DC.                     | Compositae   |
| Erigeron trilobus           | Erigeron trilobus (Decne.) Boiss.        | Compositae   |
| Eupatorium cannabinum       | Eupatorium cannabinum L.                 | Compositae   |
| Galinsoga parviflora       | Galinsoga parviflora Cav.                | Compositae   |
| Grangea maderaspatana       | Grangea maderaspatana (L.) Poir.         | Compositae   |
| Gynura cusimbu             | Gynura cusimbu (D.Don) S.Moore           | Compositae   |
| Gynura lycopersicifolia     | Gynura lycopersicifolia DC.              | Compositae   |
| Inula cuspidata             | Inula cuspidata (Wall. ex DC.) C.B.Clarke| Compositae   |
| Jurinea dolomiae           | Jurinea dolomiae Boiss.                  | Compositae   |
| Lagascea mollis             | Lagascea mollis Cav.                     | Compositae   |
| Launaea intybacea           | Launaea intybacea (Jacq.) Beauverd       | Compositae   |
| Mikania micrantha          | Mikania micrantha Kunth                  | Compositae   |
| Parthenium hysterophorus    | Parthenium hysterophorus L.              | Compositae   |
| Pentanema indicum           | Pentanema indicum (L.) Ling              | Compositae   |
| Saussurea costus            | Saussurea costus (Falc.) Lipsch.         | Compositae   |
| Sonchus oleraceus           | Sonchus oleraceus (L.) L.                | Compositae   |
| Sphaeranthus indicus        | Sphaeranthus indicus L.                  | Compositae   |
| Sphagnetica calendulacea    | Sphagnetica calendulacea (L.) Pruski     | Compositae   |
| Spilanthes acmella         | Spilanthes acmella (L.) L.               | Compositae   |
| Synedrella nodiflora       | Synedrella nodiflora (L.) Gaertn.        | Compositae   |
| Tagetes erecta             | Tagetes erecta L.                        | Compositae   |
| Taraxacum campylodes       | Taraxacum campylodes G.E.Haglund         | Compositae   |
| Tridax procumbens          | Tridax procumbens (L.) L.                | Compositae   |
| Xanthium strumarium        | Xanthium strumarium L.                   | Compositae   |
| Connarurus monocarpus      | Connarurus monocarpus L.                 | Connaraceae   |
| Argyreia cuneata           | Argyreia cuneata Ker Gawl.               | Convolvulaceae|
| Argyreia kleiniana         | Argyreia kleiniana Raizada               | Convolvulaceae|
| Argyreia nervosa           | Argyreia nervosa (Burm. f.) Bojer        | Convolvulaceae|
| Convolvulus arvensis       | Convolvulus arvensis L.                  | Convolvulaceae|
| Cuscuta hyalina            | Cuscuta hyalina Roth                     | Convolvulaceae|
| Cuscuta reflexa            | Cuscuta reflexa Roxb.                    | Convolvulaceae|
| Evolulus alsinoides        | Evolulus alsinoides (L.) L.               | Convolvulaceae|
| Evolulus nummularius       | Evolulus nummularius (L.) L.             | Convolvulaceae|
| Ipomoea aquatica           | Ipomoea aquatica Forsk.                  | Convolvulaceae|
| Ipomoea cairica            | Ipomoea cairica (L.) Sweet               | Convolvulaceae|
| Ipomoea cheirophyllea      | Ipomoea cheirophyllea O'Donnell          | Convolvulaceae|
| Ipomoea hederifolia       | Ipomoea hederifolia L.                   | Convolvulaceae|
| Ipomoea marginata          | Ipomoea marginata (Desr.) Verdc.         | Convolvulaceae|
| Ipomoea mauritiana        | Ipomoea mauritiana Jacq.                 | Convolvulaceae|
| **Ipomoea nil** (L.) Roth | Convolvulaceae |
| **Ipomoea obscura** (L.) Ker Gawl. | Convolvulaceae |
| **Ipomoea obtusata** Griseb. | Convolvulaceae |
| **Ipomoea pes-tigridis** L. | Convolvulaceae |
| **Ipomoea sumatrana** (Miq.) Ooststr. | Convolvulaceae |
| **Merremia emarginata** (Burm. f.) Hallier f. | Convolvulaceae |
| **Merremia tridentata** (L.) Hallier f. | Convolvulaceae |
| **Merremia vitifolia** (Burm. f.) Hallier f. | Convolvulaceae |
| **Operculina turpethum** (L.) Silva Manso | Convolvulaceae |
| **Rivea hypocrateriformis** Choisy | Convolvulaceae |
| **Coriaria nepalensis** Wall. | Coriariaceae |
| **Alangium salviifolium** (L.f.) Wangerin | Cornaceae |
| **Alangium chinense** (Lour.) Harms | Cornaceae |
| **Cornus capitata** Wall. | Cornaceae |
| **Cornus macrophylla** Wall. | Cornaceae |
| **Cornus oblonga** Wall. | Cornaceae |
| **Cheilocostus speciosus** (J.Koenig) | Costaceae |
| **Bryophyllum pinnatum** (Lam.) Oken | Crassulaceae |
| **Rhodiola heterodonta** (Hook. f. & Thomson) Bulb. | Crassulaceae |
| **Cayaponia laciniosa** (L.) C.Jeffrey | Cucurbitaceae |
| **Citrullus colocynthis** (L.) Schrad. | Cucurbitaceae |
| **Coccinia grandis** (L.) Voigt | Cucurbitaceae |
| **Corallocarpus epigaeus** (Rottler) Hook.f. | Cucurbitaceae |
| **Cucumis melo** L. | Cucurbitaceae |
| **Cucumis sativus** L. | Cucurbitaceae |
| **Diplocyclus palmaetus** (L.) C.Jeffrey | Cucurbitaceae |
| **Hodgsonia macrocarpa** (Blume) Cogn. | Cucurbitaceae |
| **Lagenaria sictraria** (Molina) Standl. | Cucurbitaceae |
| **Luffa cylindrica** (L.) M.Roem. | Cucurbitaceae |
| **Momordica charantia** L. | Cucurbitaceae |
| **Momordica dioica** Roxb. ex Wild. | Cucurbitaceae |
| **Mukia maderaspatana** (L.) M.Roem. | Cucurbitaceae |
| **Solena amplexicaulis** (Lam.) Gandhi | Cucurbitaceae |
| **Trichosanthes cucumerina** L. | Cucurbitaceae |
| **Trichosanthes tricuspida** Lour. | Cucurbitaceae |
| **Bulbostylis barbata** (Rottb.) C.B.Clarke | Cyperaceae |
| **Cyperus compressus** L. | Cyperaceae |
| **Cyperus difformis** L. | Cyperaceae |
| **Cyperus rotundus** L. | Cyperaceae |
| **Cyperus scariosus** R.Br. | Cyperaceae |
| **Fimbristylis aestivalis** Vahl | Cyperaceae |
| **Fimbristylis dichotoma** (L.) Vahl | Cyperaceae |
| **Hypolytrum nemorum** (Vahl) Spreng. | Cyperaceae |
| **Rhynchospora colorata** (L.) H.Pfeiff. | Cyperaceae |
| **Dillenia indica** L. | Dilleniaceae |
| **Dillenia pentagyna** Roxb. | Dilleniaceae |
| **Dioscorea alata** L. | Dioscoreaceae |
| Species                                      | Family          |
|----------------------------------------------|-----------------|
| *Dioscorea bulbifera* L.                     | Dioscoreaceae   |
| *Dioscorea deltoida* Wall. ex Griseb.        | Dioscoreaceae   |
| *Dioscorea hispida* Dennst.                  | Dioscoreaceae   |
| *Dioscorea oppositiflora* Griseb.           | Dioscoreaceae   |
| *Dioscorea pentaphylla* L.                   | Dioscoreaceae   |
| *Dioscorea pubera* Blume                     | Dioscoreaceae   |
| *Dioscorea wallichii* Hook.f.                | Dioscoreaceae   |
| *Tacca leontopetaloides* (L.) Kuntze        | Dioscoreaceae   |
| *Hopea parviflora* Bedd.                    | Dipterocarpaceae|
| *Shorea robusta* Gaertn.                     | Dipterocarpaceae|
| *Shorea roxburghii* G.Don                    | Dipterocarpaceae|
| *Shorea tumbuggaia* Roxb.                    | Dipterocarpaceae|
| *Vateria indica* L.                         | Dipterocarpaceae|
| *Diospyros ebenum* J.Koenig ex Retz.        | Ebenaceae       |
| *Diospyros malabarica* (Desr.) Kostel.      | Ebenaceae       |
| *Diospyros melanoxylon* Roxb.               | Ebenaceae       |
| *Diospyros montana* Roxb.                   | Ebenaceae       |
| *Diospyros pilosiuscula* G.Don               | Ebenaceae       |
| *Diospyros vera* (Lour.) A.Chev.             | Ebenaceae       |
| *Elaeagnus rhamnoides* (L.) A.Nelson        | Elaeagnaceae    |
| *Hippophae salicifolia* D.Don               | Elaeagnaceae    |
| *Elaeocarpus tuberculatus* Roxb.            | Elaeocarpaceae  |
| *Agapetes auriculata* (Griff.) Benth. & Hook.f. | Ericaceae   |
| *Agapetes variegata* (Roxb.) D.Don ex G.Don | Ericaceae       |
| *Gaultheria fragrantissima* Wall.           | Ericaceae       |
| *Lyonia ovalifolia* (Wall.) Drude           | Ericaceae       |
| *Rhododendron lepidotum* Wall. ex G. Don    | Ericaceae       |
| *Rhododendron anthropogon* D. Don           | Ericaceae       |
| *Rhododendron arboreum* Sm.                 | Ericaceae       |
| *Rhododendron campanulatum* D. Don          | Ericaceae       |
| *Erythroxylum kunthianum* Kurz               | Erythroxylaceae |
| *Erythroxylum monogynum* Roxb.              | Erythroxylaceae |
| *Acalypha alnifolia* Klei ex Willd.         | Euphorbiaceae   |
| *Acalypha fruticosa* Forssk.                | Euphorbiaceae   |
| *Acalypha indica* L.                        | Euphorbiaceae   |
| *Croton bonplandianus* Baill.               | Euphorbiaceae   |
| *Croton caudatus* Geiseler                  | Euphorbiaceae   |
| *Euphorbia antiquorum* L.                   | Euphorbiaceae   |
| *Euphorbia fusiformis* Buch.-Ham. ex D.Don  | Euphorbiaceae   |
| *Euphorbia hirta* L.                        | Euphorbiaceae   |
| *Euphorbia indica* Lam.                     | Euphorbiaceae   |
| *Euphorbia neriifolia* L.                   | Euphorbiaceae   |
| *Euphorbia pilosa* L.                       | Euphorbiaceae   |
| *Euphorbia tirucalli* L.                    | Euphorbiaceae   |
| *Euphorbia tortilis* Rottler ex Ainslie     | Euphorbiaceae   |
| *Euphorbia trigona* Mill.                   | Euphorbiaceae   |
| *Excoecaria agallocha* L.                   | Euphorbiaceae   |
| *Givotia moluccana* (L.) Sreem.             | Euphorbiaceae   |
| Scientific Name                           | Family              | Scientific Name                           | Family              |
|------------------------------------------|---------------------|------------------------------------------|---------------------|
| _Hevea brasiliensis_ (Willd. ex A.Juss.)| Euphorbiaceae       | _Geranium wallichianum_ D.Don ex Sweet   | Geraniaceae         |
| _Homonoia riparia_ Lour.                 | Euphorbiaceae       | _Aeschynanthus superbus_ C.B.Clarke       | Gesneriaceae        |
| _Jatropha curcas_ L.                     | Euphorbiaceae       | _Aeschynomene aspera_ L.                  | Gesneriaceae        |
| _Jatropha glandulifera_ Roxb.            | Euphorbiaceae       | _Corylopsis himalayana_ Griff.            | Hamamelidaceae      |
| _Jatropha gossypiifolia_ L.              | Euphorbiaceae       | _Gyrocarpus americanus_ Jacq.            | Hernandiaceae       |
| _Macaranga peltata_ (Roxb.) Müll.Arg.   | Euphorbiaceae       | _Hypericum oblongifolium_ Choisy         | Hypericaceae        |
| _Mallotus philippensis_ (Lam.) Müll.Arg. | Euphorbiaceae       | _Curculigo orchidoides_ Gaertn.          | Hypoxidaceae        |
| _Mallotus repandus_ (Willd.) Müll.Arg.   | Euphorbiaceae       | _Nothapodytes nimmoniana_ (J.Graham) Mabb.| Icacinaceae        |
| _Microstachys chamaelea_ (L.) Müll.Arg.  | Euphorbiaceae       | _Engelhardtia spicata_ Lechen ex Blume   | Juglandaceae        |
| _Ricinus communis_ L.                    | Euphorbiaceae       | _Juglans regia_ L.                        | Juglandaceae        |
| _Tragia involucrata_ L.                  | Euphorbiaceae       | _Ajuga integrifolia_ Buch.-Ham.           | Lamiaceae           |
| _Tragia plukenetii_ Radcl.-Sm.           | Euphorbiaceae       | _Anisochilus carnosus_ (L.f.) Wall.       | Lamiaceae           |
| _Quercus oblongata_ D.Don                | Fagaceae            | _Anisomeles indica_ (L.) Kuntze          | Lamiaceae           |
| _Quercus semecarpifolia_ Sm.             | Fagaceae            | _Anisomeles malabarica_ (L.) R.Br. ex Sims| Lamiaceae           |
| _Quercus serrata_ Murray                 | Fagaceae            | _Basilicum polystachyon_ (L.) Moench     | Lamiaceae           |
| _Canscora alata_ (Roth) Wall.            | Gentianaceae        | _Callicarpa arborea_ Roxb.                | Lamiaceae           |
| _Canscora diffusa_ (Vahl) R.Br. ex Roem. & Schult. | Gentianaceae        | _Callicarpa macrophylla_ Vahl             | Lamiaceae           |
| _Enicostema axillare_ (Poir. ex Lam.) A.Raynal | Gentianaceae        | _Clerodendrum chinense_ (Osbeck) Mabb.    | Lamiaceae           |
| _Gentiana kuroo Royle_                   | Gentianaceae        | _Clerodendrum cordatum_ D.Don             | Lamiaceae           |
| _Swertia angustifolia_ Buch.-Ham. ex D. Don | Gentianaceae        | _Clerodendrum infortunatum_ L.            | Lamiaceae           |
| _Swertia chirayita_ (Roxb.) Buch.-Ham. ex C.B.Clarke | Gentianaceae        | _Clerodendrum paniculatum_ L.             | Lamiaceae           |
| _Swertia cordata_ (Wall. ex G. Don) C.B. Clarke | Gentianaceae        | _Clerodendrum phlomidis_ L.f.             | Lamiaceae           |
| _Geranium mascatense_ Boiss.             | Geraniaceae         | _Clerodendrum volubile_ P.Beauv.          | Lamiaceae           |
|                                          |                     | _Colebrookea oppositifolia_ Sm.           | Lamiaceae           |
| Lamiaceae                                      | Lamiaceae                                      |
|-----------------------------------------------|-----------------------------------------------|
| Gmelina arborea Roxb.                         | Premna molliissima Roth                        |
| Gmelina asiatica L.                           |                                               |
| Hyptis suaveolens (L.) Polt.                  |                                               |
| Hyssopus officinalis L.                       |                                               |
| Lavandula bipinnata (Roth) Kuntze             |                                               |
| Leonotis nepetifolia (L.) R.Br.               |                                               |
| Leonurus sibiricus L.                         |                                               |
| Leucas aspera (Willd.) Link                   |                                               |
| Leucas billora (Vahl) Sm.                     |                                               |
| Leucas cephalotes (Roth) Spreng.              |                                               |
| Leucas lanata Benth.                          |                                               |
| Leucas zeylanica (L.) W.T.Aiton               |                                               |
| Mentha arvensis L.                            |                                               |
| Ocimum americanum L.                          |                                               |
| Ocimum basilicum L.                           |                                               |
| Ocimum gratissimum L.                         |                                               |
| Ocimum tenuiflorum L.                         |                                               |
| Origanum vulgare L.                           |                                               |
| Orthosiphon thymiflorus (Roth) Sleesen        |                                               |
| Pogostemon myosuroides (Roth) Kuntze          |                                               |
| Pogostemon parviflorus Benth.                 |                                               |
| Pogostemon purpurascens Dalzell               |                                               |
| Pogostemon quadrifolius (Benth.) F.Muell.     |                                               |
| Premna serratifolia L.                        |                                               |
| Premna tomentosa Willd.                       |                                               |
| Rotheca serrata (L.) Steane & Mabb.           |                                               |
| Salvia nubicola Wall. ex Sweet                |                                               |
| Scutellaria discolor Colebr.                  |                                               |
| Symphorema involucratum Roxb.                 |                                               |
| Symphorema polyandrum Wight                   |                                               |
| Tectona grandis L.f.                          |                                               |
| Thymus mongolicus (Ronniger) Ronniger         |                                               |
| Thymus vulgaris L.                            |                                               |
| Vitex altissima L.f.                          |                                               |
| Vitex leucopylon L.f.                         |                                               |
| Vitex negundo L.                              |                                               |
| Vitex parviflora A.Juss.                      |                                               |
| Vitex trifolia L.                             |                                               |
| Volkameria inermis L.                         |                                               |
| Actinodaphne madraspatana Bedd. ex Hook.f.    |                                               |
| Alseodaphne semecarpifolia Nees               |                                               |
| Cassytha filiformis L.                        |                                               |
| Cinnamomum curvifolium (Lam.) Nees            |                                               |
| Cinnamomum glanduliferum (Wall.) Meisn.       |                                               |
| Cinnamomum tamala (Buch.-Ham.) T.Nees & Eberm.|                                               |
| Cinnamomum verum J.Presl                     |                                               |
| Scientific Name                        | Family       | Scientific Name                        | Family       |
|---------------------------------------|--------------|---------------------------------------|--------------|
| Cryptocarya amygdalina Nees           | Lauraceae    | Acacia nilotica (L.) Delile            | Leguminosae  |
| Lindera latifolia Hook. f.            | Lauraceae    | Acacia polyacantha Willd.              | Leguminosae  |
| Lindera pulcherrima (Nees) Hook. f.   | Lauraceae    | Acacia sinuata (Lour.) Merr.           | Leguminosae  |
| Litsea cubeba (Lour.) Pers.           | Lauraceae    | Acacia torta (Roxb.) Craib             | Leguminosae  |
| Litsea glutinosa (Lour.) C.B.Rob.     | Lauraceae    | Adenanthera pavonina L.                | Leguminosae  |
| Litsea monopetala (Roxb.) Pers.       | Lauraceae    | Albizia amara (Roxb.) B.Boivin         | Leguminosae  |
| Litsea salicifolia (J. Roxb. ex Nees) Hook. f. | Lauraceae | Albizia chinensis (Osbeck) Merr.       | Leguminosae  |
| Machilus duthiei King                 | Lauraceae    | Albizia lebeck (L.) Benth.             | Leguminosae  |
| Machilus gamblei King ex Hook. f.     | Lauraceae    | Albizia odoratissima (L.f.) Benth.     | Leguminosae  |
| Persea gamblei (King ex Hook. f.) Kosterm. | Lauraceae | Albizia procera (Roxb.) Benth.         | Leguminosae  |
| Phoebe attenuata (Nees) Nees          | Lauraceae    | Alysicarpus monilifer (L.) DC.         | Leguminosae  |
| Barringtonia acutangula (L.) Gaertn.  | Lecythidaceae| Astragalus rhizanthus Benth.            | Leguminosae  |
| Careya arborea Roxb.                  | Lecythidaceae| Bauhinia acuminata L.                  | Leguminosae  |
| Careya herbacea Roxb.                 | Lecythidaceae| Bauhinia malabarica Roxb.              | Leguminosae  |
| Couroupita guianensis Aubl.           | Lecythidaceae| Bauhinia purpurea L.                   | Leguminosae  |
| Abrus precatorius L.                  | Leguminosae  | Bauhinia racemosa Lam.                 | Leguminosae  |
| Abrus pulchellus Thwaites             | Leguminosae  | Bauhinia vahlili Wight & Arn.          | Leguminosae  |
| Acacia caesia (L.) Wild.              | Leguminosae  | Bauhinia variegata L.                  | Leguminosae  |
| Acacia catechu (L.f.) Wild.           | Leguminosae  | Butea monosperma (Lam.) Taub.          | Leguminosae  |
| Acacia chundra (Rottler) Wild.        | Leguminosae  | Butea superba Roxb.                    | Leguminosae  |
| Acacia farnesiana (L.) Wildd.         | Leguminosae  | Caesalpinia bonduc (L.) Roxb.          | Leguminosae  |
| Acacia ferruginea DC.                 | Leguminosae  | Caesalpinia crista L.                  | Leguminosae  |
| Acacia intsia (L.) Wild.              | Leguminosae  | Caesalpinia decapetala (Roth) Alston   | Leguminosae  |
| Acacia leucophloea (Roxb.) Willd.     | Leguminosae  | Caesalpinia globulorum Bakh.f. & P.Royen | Leguminosae  |
| Species                                      | Family          | Species                                      | Family         |
|----------------------------------------------|----------------|----------------------------------------------|----------------|
| Caesalpinia pulcherrima (L.) Sw.             | Leguminosae     | Dalbergia latifolia Roxb.                    | Leguminosae    |
| Cajanus cajan (L.) Millsp.                   | Leguminosae     | Dalbergia sissoo DC.                         | Leguminosae    |
| Cajanus crassus (King) Maesen                | Leguminosae     | Delonix elata (L.) Gamble                    | Leguminosae    |
| Cajanus scarabaeoides (L.) Thouars           | Leguminosae     | Delonix regia (Hook.) Raf.                   | Leguminosae    |
| Cassia bakeriana Craib                      | Leguminosae     | Derris scandens (Roxb.) Benth.               | Leguminosae    |
| Cassia fistula L.                            | Leguminosae     | Desmodium elegans DC.                        | Leguminosae    |
| Senna montana (Roth) V.Singh                | Leguminosae     | Desmodium gangeticum (L.) DC.                | Leguminosae    |
| Centrosema coriaceum Benth.                 | Leguminosae     | Desmodium heterocarpon (L.) DC.              | Leguminosae    |
| Chamaecrista absus (L.) H.S.Irwin & Barneby  | Leguminosae     | Desmodium oojeinense (Roxb.) H.Ohashi        | Leguminosae    |
| Chamaecrista mimosoides (L.) Greene          | Leguminosae     | Desmodium scorpiurus (Sw.) Desv.             | Leguminosae    |
| Clitoria ternatea L.                         | Leguminosae     | Desmodium triforum (L.) DC.                  | Leguminosae    |
| Codariocalyx motorius (Houtt.) H.Ohashi      | Leguminosae     | Dichrostachys cinerea (L.) Wight & Arn.      | Leguminosae    |
| Crotalaria albida Roth                      | Leguminosae     | Entada gigas (L.) Fawc. & Rendle             | Leguminosae    |
| Crotalaria pallida Aiton                    | Leguminosae     | Entada phaseoloides (L.) Merr.               | Leguminosae    |
| Crotalaria prostrata Wild.                  | Leguminosae     | Entada rheedii Spreng.                       | Leguminosae    |
| Crotalaria ramosissima Roxb.                 | Leguminosae     | Eriosema himalaicum H.Ohashi                 | Leguminosae    |
| Crotalaria retusa L.                         | Leguminosae     | Erythrina stricta Roxb.                     | Leguminosae    |
| Crotalaria spectabilis Roth                 | Leguminosae     | Erythrina suberosa Roxb.                    | Leguminosae    |
| Crotalaria verrucosa L.                     | Leguminosae     | Erythrina variegata L.                       | Leguminosae    |
| Cullen corylifolium (L.) Medik.             | Leguminosae     | Flemingia macrophylla (Wild.) Merr.          | Leguminosae    |
| Dalbergia candenatensis (Dennst.) Prain      | Leguminosae     | Flemingia semialata Roxb.                   | Leguminosae    |
| Dalbergia lanceolaria L.f.                   | Leguminosae     | Flemingia strobilifera (L.) W.T.Aiton        | Leguminosae    |
| Dalbergia lanceolaria subsp. paniculata (Roxb.) Thoth | Leguminosae     | Gliricidia sepium (Jacq.) Walp.              | Leguminosae    |
|                                             |                 | Indigofera aspalathoides DC.                 | Leguminosae    |
|                                             |                 | Indigofera aspalathoides DC.                 | Leguminosae    |
| Common Name                        | Scientific Name                  | Family          |
|-----------------------------------|----------------------------------|-----------------|
| Indigofera endecaphylla Jacq. ex Poir. | *Indigofera endecaphylla* Jacq. ex Poir. | Leguminosae     |
| Indigofera hirsuta L.              | *Indigofera hirsuta* L.          | Leguminosae     |
| Indigofera linnaei Ali             | *Indigofera linnaei* Ali         | Leguminosae     |
| Indigofera mysorensis DC.          | *Indigofera mysorensis* DC.      | Leguminosae     |
| Indigofera oblongifolia Forssk.    | *Indigofera oblongifolia* Forssk. | Leguminosae     |
| Indigofera tinctoria L.            | *Indigofera tinctoria* L.        | Leguminosae     |
| Indigofera trita L.f.              | *Indigofera trita* L.f.          | Leguminosae     |
| Kingiodendron pinnatum (DC.) Harms | *Kingiodendron pinnatum* (DC.) Harms | Leguminosae     |
| Leucaena leucocephala (Lam.) de Wit| *Leucaena leucocephala* (Lam.) de Wit | Leguminosae     |
| Mimosa hamata Willd.               | *Mimosa hamata* Willd.           | Leguminosae     |
| Mimosa pudica L.                   | *Mimosa pudica* L.               | Leguminosae     |
| Mimosa rubicaulis Lam.             | *Mimosa rubicaulis* Lam.         | Leguminosae     |
| Mucuna gigantea (Willd.) DC.       | *Mucuna gigantea* (Willd.) DC.    | Leguminosae     |
| Mucuna pruriens (L.) DC.           | *Mucuna pruriens* (L.) DC.       | Leguminosae     |
| Parkia timoriana (DC.) Merr.       | *Parkia timoriana* (DC.) Merr.   | Leguminosae     |
| Peltophorum pterocarpum (DC.) K.Heyne| *Peltophorum pterocarpum* (DC.) K.Heyne | Leguminosae |
| Pithecellobium dulce (Roxb.) Benth.| *Pithecellobium dulce* (Roxb.) Benth. | Leguminosae     |
| Pongamia pinnata (L.) Pierre       | *Pongamia pinnata* (L.) Pierre   | Leguminosae     |
| Prosopis chilensis (Molina) Stuntz | *Prosopis chilensis* (Molina) Stuntz | Leguminosae     |
| Prosopis cineraria (L.) Druce      | *Prosopis cineraria* (L.) Druce  | Leguminosae     |
| Pseudarthria viscida (L.) Wight & Arn.| *Pseudarthria viscida* (L.) Wight & Arn. | Leguminosae     |
| Pterocarpus marsupium Roxb.        | *Pterocarpus marsupium* Roxb.    | Leguminosae     |
| Pterolobium hexapetalum (Roth) Santapau & Wagh | *Pterolobium hexapetalum* (Roth) Santapau & Wagh | Leguminosae |
| Pueraria phaseoloides (Roxb.) Benth.| *Pueraria phaseoloides* (Roxb.) Benth. | Leguminosae     |
| Pueraria tuberosa (Willd.) DC.     | *Pueraria tuberosa* (Willd.) DC.  | Leguminosae     |
| Rhynchosia beddomei Baker          | *Rhynchosia beddomei* Baker       | Leguminosae     |
| Rhynchosia cana (Willd.) DC.       | *Rhynchosia cana* (Willd.) DC.    | Leguminosae     |
| Rhynchosia minima (L.) DC.         | *Rhynchosia minima* (L.) DC.      | Leguminosae     |
| Saraca asoca (Roxb.) Willd.        | *Saraca asoca* (Roxb.) Willd.    | Leguminosae     |
| Saraca indica L.                   | *Saraca indica* L.               | Leguminosae     |
| Senna alata (L.) Roxb.             | *Senna alata* (L.) Roxb.         | Leguminosae     |
| Senna alexandrina Mill.            | *Senna alexandrina* Mill.        | Leguminosae     |
| Senna auriculata (L.) Roxb.        | *Senna auriculata* (L.) Roxb.    | Leguminosae     |
| Senna occidentalis (L.) Link       | *Senna occidentalis* (L.) Link   | Leguminosae     |
| Senna siamea (Lam.) H.S.Irwin & Barneby | *Senna siamea* (Lam.) H.S.Irwin & Barneby | Leguminosae     |
| Senna sophora (L.) Roxb.            | *Senna sophora* (L.) Roxb.       | Leguminosae     |
| Senna tora (L.) Roxb.              | *Senna tora* (L.) Roxb.          | Leguminosae     |
| Sesbania grandiflora (L.) Pers.    | *Sesbania grandiflora* (L.) Pers. | Leguminosae     |
| Sesbania sesban (L.) Merr.         | *Sesbania sesban* (L.) Merr.     | Leguminosae     |
| Tadehagi triquetrum (L.) H.Ohashi  | *Tadehagi triquetrum* (L.) H.Ohashi | Leguminosae     |
| Tamarindus indica L.               | *Tamarindus indica* L.           | Leguminosae     |
| Tephrosia purpurea (L.) Pers.      | *Tephrosia purpurea* (L.) Pers.  | Leguminosae     |
| Tephrosia tinctoria Pers.          | *Tephrosia tinctoria* Pers.      | Leguminosae     |
| Tephrosia villosa (L.) Pers.        | *Tephrosia villosa* (L.) Pers.   | Leguminosae     |
| Teramnus labialis (L.f.) Spreng.   | *Teramnus labialis* (L.f.) Spreng. | Leguminosae     |
| Trigonella foenum-graecum L.       | *Trigonella foenum-graecum* L.   | Leguminosae     |
| Uraria lagopoidoides (L.) DC.      | *Uraria lagopoidoides* (L.) DC.  | Leguminosae     |
| Species | Family |
|---------|--------|
| *Uaria picta* (Jacq.) DC. | Leguminosae |
| *Vigna aconitifolia* (Jacq.) Marechal | Leguminosae |
| *Vigna radiata* (L.) R.Wilczek | Leguminosae |
| *Zornia diphylla* (L.) Pers. | Leguminosae |
| *Zornia gibbosa* Span. | Leguminosae |
| *Fritillaria cirrhosa* D.Don | Liliaceae |
| *Hugonia serrata* Lam. | Linaceae |
| *Reinwardtia indica* Dumort. | Linaceae |
| *Lindernia ciliata* (Colsm.) Pennell | Linderniaceae |
| *Lindernia crustacea* (L.) F.Muell. | Linderniaceae |
| *Mitreola petiolata* (J.F.Gmel.) Torr. & A.Gray | Loganiaceae |
| *Spigelia anthelmia* L. | Loganiaceae |
| *Strychnos colubrina* L. | Loganiaceae |
| *Strychnos dalzellii* C.B.Clarke | Loganiaceae |
| *Strychnos nux-vomica* L. | Loganiaceae |
| *Strychnos potatorum* L.f. | Loganiaceae |
| *Dendrophthoe falcata* (L.f.) Ettingsh. | Loranthaceae |
| *Helixanthera ligustrina* (Wall.) Danser | Loranthaceae |
| *Loranthus longiflorus* Desr. | Loranthaceae |
| *Taxillus tomentosus* Tiegh. | Loranthaceae |
| *Ammannia baccifera* L. | Lythraceae |
| *Lagerstroemia parviflora* Roxb. | Lythraceae |
| *Lagerstroemia speciosa* (L.) Pers. | Lythraceae |
| *Lawsonia inermis* L. | Lythraceae |
| *Punica granatum* L. | Lythraceae |
| *Woodfordia fruticosa* (L.) Kurz | Lythraceae |
| *Magnolia champaca* (L.) Baill. ex Pierre | Magnoliaceae |
| *Hiptage benghalensis* (L.) Kurz | Malpighiaceae |
| *Abelmoschus manihot* (L.) Medik. | Malvaceae |
| *Abroma augusta* (L.) L.f. | Malvaceae |
| *Abutilon indicum* (L.) Sweet | Malvaceae |
| *Abutilon pannosum* (G.Forst.) Schltld. | Malvaceae |
| *Bombax ceiba* L. | Malvaceae |
| *Byttneria herbacea* Roxb. | Malvaceae |
| *Ceiba pentandra* (L.) Gaertn. | Malvaceae |
| *Corchorus aescuans* L. | Malvaceae |
| *Corchorus capsularis* L. | Malvaceae |
| *Corchorus trilocularis* L. | Malvaceae |
| *Firmiana simplex* (L.) W.Wight | Malvaceae |
| *Grewia carpinifolia* Juss. | Malvaceae |
| *Grewia flavescens* Juss. | Malvaceae |
| *Grewia hirsuta* Vahl | Malvaceae |
| *Grewia multiflora* Juss. | Malvaceae |
| *Grewia nervosa* (Lour.) Panigrahi | Malvaceae |
| *Grewia optiva* J.R.Drumm. ex Burret | Malvaceae |
| *Grewia tilifolia* Vahl | Malvaceae |
| *Guazuma ulmifolia* Lam. | Malvaceae |
| *Helicteres isora* L. | Malvaceae |
| Scientific Name                          | Family            |
|-----------------------------------------|-------------------|
| *Herissantia crispa* (L.) Brizicky      | Malvaceae         |
| *Hibiscus hispidissimus* Griff.         | Malvaceae         |
| *Hibiscus mutabilis* L.                 | Malvaceae         |
| *Hibiscus rosa-sinensis* L.              | Malvaceae         |
| *Hibiscus sabdariffa* L.                | Malvaceae         |
| *Hibiscus vitifolius* L.                | Malvaceae         |
| *Kleinhovia hospita* L.                 | Malvaceae         |
| *Kydia calycina* Roxb.                  | Malvaceae         |
| *Melochia corchorifolia* L.             | Malvaceae         |
| *Pavonia zeylanica* (L.) Cav.           | Malvaceae         |
| *Pterospermum acerifolium* (L.) Wild.   | Malvaceae         |
| *Pterospermum canescens* Roxb.          | Malvaceae         |
| *Pterospermum xylocarpum* (Gaertn.) Santapau & Wagh | Malvaceae |
| *Sida acuta* Burm.f.                    | Malvaceae         |
| *Sida cordata* (Burm.f.) Borss.Waalk.   | Malvaceae         |
| *Sida cordifolia* L.                    | Malvaceae         |
| *Sida rhombifolia* L.                   | Malvaceae         |
| *Sterculia coccinea* Roxb.              | Malvaceae         |
| *Sterculia guttata* Roxb. ex G.Don      | Malvaceae         |
| *Sterculia villosa* Roxb.               | Malvaceae         |
| *Thespesia lampas* (Cav.) Dalzell       | Malvaceae         |
| *Thespesia populnea* (L.) Sol. ex Corrêa| Malvaceae         |
| *Triumfetta pilosa* Roth                | Malvaceae         |
| *Triumfetta rhomboidea* Jacq.           | Malvaceae         |
| *Triumfetta rotundifolia* Lam.          | Malvaceae         |
| *Urena lobata* L.                       | Malvaceae         |
| *Waltheria indica* L.                   | Malvaceae         |
| *Manilkara hexandra* (Roxb.) Dubard     | Martyniaceae      |
| *Martynia annua* L.                     | Martyniaceae      |
| *Paris polyphylla* Sm.                  | Malanthaceae      |
| *Melastoma malabathricum* L.            | Melastomataceae   |
| *Memecylon edule* Roxb.                 | Melastomataceae   |
| *Memecylon randerianum* S.M.Almeida & M.R.Almeida | Melastomataceae |
| *Memecylon umbellatum* Burm. f.         | Melastomataceae   |
| *Osbeckia capitata* Benth. ex Naudin    | Melastomataceae   |
| *Osbeckia chinensis* L.                 | Melastomataceae   |
| *Osbeckia muralis* Naudin               | Melastomataceae   |
| *Osbeckia stellata* Buch.-Ham. ex Ker Gawl. | Melastomataceae |
| *Aglaia elaegnoidea* (A.Juss.) Benth.   | Meliaceae         |
| *Aphanamixis polystachya* (Wall.) R.Parker | Meliaceae    |
| *Azadirachta indica* A.Juss.            | Meliaceae         |
| *Chukrasia tabularis* A.Juss.           | Meliaceae         |
| *Cipadessa baccifera* (Roth) Miq.       | Meliaceae         |
| *Dysoxylum excelsum* Blume              | Meliaceae         |
| *Dysoxylum getadhora* (Buch.-Ham.) Mabb. | Meliaceae       |
| *Dysoxylum mollissimum* Blume           | Meliaceae         |
| Scientific Name                  | Family         |
|---------------------------------|----------------|
| Melia azedarach L.              | Meliaceae      |
| Naregamia alata Wight & Arn.    | Meliaceae      |
| Soymida febrifuga (Roxb.) A. Juss. | Meliaceae     |
| Toona ciliata M. Roem.           | Meliaceae      |
| Cissampelos pareira L.           | Menispermaceae |
| Cocculus hirsutus (L.) W. Theob. | Menispermaceae |
| Cyclea peltata (Lam.) Hook.f. & Thomson | Menispermaceae |
| Pachygone ovata (Poir.) Diels    | Menispermaceae |
| Pericampylus glaucus (Lam.) Merr. | Menispermaceae |
| Stephania hernandiifolia (Wild.) Walp. | Menispermaceae |
| Stephania japonica (Thunb.) Miers | Menispermaceae |
| Stephania glabra (Roxb.) Miers    | Menispermaceae |
| Tiliacora racemosa Colebr.       | Menispermaceae |
| Tinospora sinensis (Lour.) Merr.  | Menispermaceae |
| Glinus oppositifolius (L.) Aug DC. | Molluginaceae |
| Mollugo pentaphylla L.           | Molluginaceae  |
| Antiaris toxicaria Lesch.        | Moraceae       |
| Artocarpus heterophyllus Lam.    | Moraceae       |
| Artocarpus hirsutus Lam.         | Moraceae       |
| Artocarpus rigidus Blume         | Moraceae       |
| Artocarpus lacucha Buch.-Ham.    | Moraceae       |
| Ficus amplissima Sm.             | Moraceae       |
| Ficus arnottiana (Miq.) Miq.     | Moraceae       |
| Ficus auriculata Lour.           | Moraceae       |
| Ficus benghalensis L.            | Moraceae       |
| Ficus benjamina L.               | Moraceae       |
| Ficus hispida L.f.               | Moraceae       |
| Ficus microcarpa L.f.            | Moraceae       |
| Ficus mollis Vahl                | Moraceae       |
| Ficus nervosa B. Heyne ex Roth   | Moraceae       |
| Ficus palmata Forssk.            | Moraceae       |
| Ficus racemosa L.                | Moraceae       |
| Ficus religiosa L.               | Moraceae       |
| Ficus semicordata Buch.-Ham. ex Sm. | Moraceae     |
| Ficus virens Aiton               | Moraceae       |
| Morus alba L.                    | Moraceae       |
| Plecospermum spinosum Trécul     | Moraceae       |
| Streblus asper Lour.             | Moraceae       |
| Moringa concanensis Nimmo        | Moringaceae    |
| Moringa oleifera Lam.            | Moringaceae    |
| Ensete superbum (Roxb.) Cheesman | Musaceae       |
| Musa acuminata Colla             | Musaceae       |
| Musa balbisiana Colla            | Musaceae       |
| Musa × paradisiaca L.            | Musaceae       |
| Myrcia bracteata (Rich.) DC.     | Myricaceae     |
| Myrica esculenta Buch.-Ham. ex D. Don | Myricaceae |
| Knema attenuata Warb.            | Myristicaceae  |
| Knema latifolia Warb.            | Myristicaceae  |
| Scientific Name                        | Family                |
|---------------------------------------|-----------------------|
| *Myristica beddomei* King             | Myristicaceae         |
| *Myristica fragrans* Houtt.           | Myristicaceae         |
| *Myristica malabarica* Lam.           | Myristicaceae         |
| *Corymbia citriodora* (Hook.) K.D.Hill & L.A.S.Johnson | Myrtaceae |
| *Corymbia maculata* (Hook.) K.D.Hill & L.A.S.Johnson | Myrtaceae |
| *Eucalyptus globulus* Labill.         | Myrtaceae             |
| *Eucalyptus tereticornis* Sm.         | Myrtaceae             |
| *Psidium guajava* L.                  | Myrtaceae             |
| *Syzygium alternifolium* (Wight) Walp. | Myrtaceae             |
| *Syzygium caryophyllatum* (L.) Alston | Myrtaceae             |
| *Syzygium cumini* (L.) Skeels         | Myrtaceae             |
| *Syzygium formosum* (Wall.) Masam.    | Myrtaceae             |
| *Syzygium jambos* (L.) Alston         | Myrtaceae             |
| *Syzygium salicifolium* (Wight) J.Graham | Myrtaceae           |
| *Nelumbo nucifera* Gaertn.            | Nelumbonaceae         |
| *Boerhavia diffusa* L.                | Nyctaginaceae         |
| *Mirabilis jalapa* L.                 | Nyctaginaceae         |
| *Pisonia aculeata* L.                 | Nyctaginaceae         |
| *Gomphia serrata* (Gaertn.) Kanis     | Ochnaceae             |
| *Ochna obtusata* DC.                  | Ochnaceae             |
| *Anacolosa crassipes* (Kurz) Kurz     | Olaceae               |
| *Olax acuminata* Wall. ex Benth.      | Olaceae               |
| *Olax scandens* Roxb.                 | Olaceae               |
| *Ximenia americana* L.                | Olaceae               |
| *Chionanthus zeylanicus* L.           | Oleaceae              |
| *Fraxinus micrantha* Lingelsh.        | Oleaceae              |
| *Jasminum angustifolium* (L.) Wild.   | Oleaceae              |
| *Jasminum arborescens* Roxb.          | Oleaceae              |
| *Jasminum auriculatum* Vahl           | Oleaceae              |
| *Jasminum grandiflorum* L.            | Oleaceae              |
| *Jasminum humile* L.                  | Oleaceae              |
| *Jasminum lanceolarium* Roxb.         | Oleaceae              |
| *Jasminum multiflorum* (Burm.f.) Andrews | Oleaceae             |
| *Myxopyrum smilacifolium* (Wall.) Blume | Oleaceae             |
| *Nyctanthes arbor-tristis* L.         | Oleaceae              |
| *Olea dioica* Roxb.                   | Oleaceae              |
| *Schrebera swietenioides* Roxb.       | Oleaceae              |
| *Ludwigia adscendens* (L.) H.Hara     | Onagraceae            |
| *Ludwigia hyssopifolia* (G.Don) Exell | Onagraceae            |
| *Cansjera rheedei* J.F.Gmel.          | Opiliaceae            |
| *Crepidium acuminatum* (D.Don) Szlach. | Orchidaceae          |
| *Habenaria digitatum* Lindl.          | Orchidaceae           |
| *Habenaria furcifera* Lindl.          | Orchidaceae           |
| *Habenaria marginata* Celebr.         | Orchidaceae           |
| *Habenaria grandifloriformis* Blatt. & McCann | Orchidaceae        |
| *Vanda tessellata* (Roxb.) Hook. ex G.Don | Orchidaceae          |
| *Vanda testacea* (Lindl.) Rchb.f.     | Orchidaceae           |
| Species                                                                 | Family                  |
|------------------------------------------------------------------------|-------------------------|
| *Striga angustifolia* (D. Don) C.J. Saldanha                           | Orobanchaceae           |
| *Striga asiatica* (L.) Kuntze                                         | Orobanchaceae           |
| *Biophytum reinwardtii* (Zucc.) Klotzsch                              | Oxalidaceae             |
| *Biophytum sensitivum* (L.) DC.                                        | Oxalidaceae             |
| *Oxalis corniculata* L.                                                | Oxalidaceae             |
| *Oxalis latifolia* Kunth                                               | Oxalidaceae             |
| *Pandanus odorifer* (Forssk.) Kuntze                                   | Pandanaceae             |
| *Argemone mexicana* L.                                                 | Papaveraceae            |
| *Meconopsis aculeata* Royle                                            | Papaveraceae            |
| *Passiflora foetida* L.                                                | Passifloraceae          |
| *Pedalium murex* L.                                                    | Pedaliaceae             |
| *Eurya acuminata* DC.                                                  | Pentaphylaceae          |
| *Eurya japonica* Thunb.                                                | Pentaphylaceae          |
| *Antidesma acidum* Retz.                                               | Phyllanthaceae          |
| *Aporosa octandra* (Buch.-Ham. ex D.Don) Vickery                      | Phyllanthaceae          |
| *Bischofia javanica* Blume                                             | Phyllanthaceae          |
| *Breynia retusa* (Dennst.) Alston                                     | Phyllanthaceae          |
| *Breynia vitis-idaea* (Burm.f.) C.E.C.Fisch.                           | Phyllanthaceae          |
| *Bridelia retusa* (L.) A.Juss.                                         | Phyllanthaceae          |
| *Bridelia stipularis* (L.) Blume                                      | Phyllanthaceae          |
| *Bridelia tomentosa* Blume                                             | Phyllanthaceae          |
| *Cleistanthus collinus* (Roxb.) Benth. ex Hook.f.                     | Phyllanthaceae          |
| *Embelia ribes* Burm.f.                                                | Phyllanthaceae          |
| *Embelia tsjeriam-cottam* (Roem. & Schult.) A.DC.                      | Phyllanthaceae          |
| *Flueggea leucopyrus* Wild.                                            | Phyllanthaceae          |
| *Flueggea virosa* (Roxb. ex Wild.) Royle                              | Phyllanthaceae          |
| *Glochidion ellipticum* Wight                                          | Phyllanthaceae          |
| *Glochidion heyneanum* (Wight & Arn.) Wight                            | Phyllanthaceae          |
| *Glochidion lanceolarium* (Roxb.) Voigt                                | Phyllanthaceae          |
| *Phyllanthus amarus* Schumach. & Thonn.                                | Phyllanthaceae          |
| *Phyllanthus debilis* Klein ex Wild.                                   | Phyllanthaceae          |
| *Phyllanthus emblica* L.                                               | Phyllanthaceae          |
| *Phyllanthus fraternus* G.L.Webster                                   | Phyllanthaceae          |
| *Phyllanthus maderaspatensis* L.                                       | Phyllanthaceae          |
| *Phyllanthus niruri* L.                                                | Phyllanthaceae          |
| *Phyllanthus parvifolius* Buch.-Ham. ex D.Don                           | Phyllanthaceae          |
| *Phyllanthus polyphyllus* Wild.                                        | Phyllanthaceae          |
| *Phyllanthus reticulatus* Poir.                                        | Phyllanthaceae          |
| *Phyllanthus urinaria* L.                                              | Phyllanthaceae          |
| *Phyllanthus virgatus* G.Forst.                                        | Phyllanthaceae          |
| *Peperomia tetraphylla* (G.Forst.) Hook. & Arn.                       | Piperaceae              |
| *Piper attenuatum* Buch.-Ham. ex Miq.                                  | Piperaceae              |
| *Piper betle* L.                                                       | Piperaceae              |
| *Piper griffithii* C.DC.                                               | Piperaceae              |
| *Piper longum* L.                                                      | Piperaceae              |
| *Piper nigrum* L.                                                      | Piperaceae              |
| Name                                                      | Family          |
|----------------------------------------------------------|-----------------|
| Pittosporum wightii A.K.Mukh.                           | Pittosporaceae  |
| Bacopa monnieri (L.) Wettst.                             | Plantaginaceae  |
| Limnophila indica (L.) Druce                             | Plantaginaceae  |
| Lindenbergia grandiflora (Buch.-Ham. ex D. Don) Benth.  | Plantaginaceae  |
| Picrorhiza kurrooa Royle                                 | Plantaginaceae  |
| Plantago asiatica subsp. erosa (Wall.) Z.Yu Li          | Plantaginaceae  |
| Scoparia dulcis L.                                       | Plantaginaceae  |
| Plumbago zeylanica L.                                    | Plumbaginaceae  |
| Apluda mutica L.                                         | Poaceae         |
| Aristida adscensionis L.                                 | Poaceae         |
| Bambusa bambos (L.) Voss                                 | Poaceae         |
| Chloris barbata Sw.                                      | Poaceae         |
| Chrysopogon aciculatus (Retz.) Trin.                     | Poaceae         |
| Chrysopogon zizanioides (L.) Roberty                     | Poaceae         |
| Coix lacryma-jobi L.                                     | Poaceae         |
| Cymbopogon citratus (DC.) Stapf                          | Poaceae         |
| Cymbopogon flexuosus (Nees ex Steud.) W.Watson           | Poaceae         |
| Cynodon dactylon (L.) Pers.                              | Poaceae         |
| Dactyloctenium aegyptium (L.) Wild.                      | Poaceae         |
| Dendrocalamus strictus (Roxb.) Nees                      | Poaceae         |
| Desmostachya bipinnata (L.) Stapf                         | Poaceae         |
| Echinochloa crus-galli (L.) P.Beauv.                      | Poaceae         |
| Eleusine indica (L.) Gaertn.                              | Poaceae         |
| Eragrostis nigra Nees ex Steud.                           | Poaceae         |
| Eulaliopsis binata (Retz.) C.E.Hubb.                     | Poaceae         |
| Heteropogon contortus (L.) P.Beauv. ex Roem. & Schult.   | Poaceae         |
| Imperata cylindrica (L.) Raeusch.                         | Poaceae         |
| Oryza sativa L.                                           | Poaceae         |
| Saccharum bengalense Retz.                               | Poaceae         |
| Saccharum officinarum L.                                  | Poaceae         |
| Setaria macrostachya Kunth                               | Poaceae         |
| Sporobolus diandrus (Retz.) P.Beauv.                      | Poaceae         |
| Themeda quadrivalvis (L.) Kuntze                          | Poaceae         |
| Polygala arvensis Wild.                                  | Polygalaceae    |
| Polygala chinesis L.                                      | Polygalaceae    |
| Polygala elongata Klein ex Wild.                          | Polygalaceae    |
| Fagopyrum acutatum (Lehm.) Mansf. ex K.Hammer            | Polygonaceae    |
| Fagopyrum esculentum Moench                              | Polygonaceae    |
| Persicaria amplexicaulis (D.Don) Ronse Decr.             | Polygonaceae    |
| Persicaria capitata (Buch.-Ham. ex D.Don) H.Gross        | Polygonaceae    |
| Persicaria chinensis (L.) H. Gross                        | Polygonaceae    |
| Persicaria glabra (Wild.) M.Gómez                         | Polygonaceae    |
| Persicaria hydropiper (L.) Delarbre                       | Polygonaceae    |
| Persicaria orientalis (L.) Spach                          | Polygonaceae    |
| Rheum webbianum Royle                                    | Polygonaceae    |
| **Rumex hastatus** D. Don | Polygonaceae |
|---------------------------|-------------|
| **Rumex nepalensis** Spreng. | Polygonaceae |
| **Rumex vesicarius** L. | Polygonaceae |
| **Anagallis arvensis** L. | Primulaceae |
| **Ardisia paniculata** Roxb. | Primulaceae |
| **Maesa indica** (Roxb.) A. DC. | Primulaceae |
| **Myrsine africana** L. | Primulaceae |
| **Myrsine semiserrata** Wall. | Primulaceae |
| **Helicia excelsa** (Roxb.) Blume | Proteaceae |
| **Drypetes sepiaria** (Wight & Arn.) Pax & K.Hoffm. | Putranjivaceae |
| **Putranjiva roxburghii** Wall. | Putranjivaceae |
| **Aconitum heterophylloides** (Brühl) Stapf | Ranunculaceae |
| **Aconitum heterophyllum** Wall. ex Royle | Ranunculaceae |
| **Aconitum villosum** Rchb. | Ranunculaceae |
| **Anemone obtusiloba** D.Don | Ranunculaceae |
| **Aquilegia fragrans** Benth. | Ranunculaceae |
| **Clematis buchananiana** DC. | Ranunculaceae |
| **Clematis gouriana** Roxb. ex DC. | Ranunculaceae |
| **Clematis heynei** M.A.Rau & al. | Ranunculaceae |
| **Nigella sativa** L. | Ranunculaceae |
| **Ranunculus arvensis** L. | Ranunculaceae |
| **Ranunculus sceleratus** L. | Ranunculaceae |
| **Thalictrum foliolosum** DC. | Ranunculaceae |
| **Gouania tiliifolia** Lam. | Rhamnaceae |
| **Scutia myrtina** (Burm.f.) Kurz | Rhamnaceae |
| **Ventilago denticulata** Willd. | Rhamnaceae |
| **Ventilago maderaspatana** Gaertn. | Rhamnaceae |
| **Ziziphus glabrata** B.Heyne ex Roth | Rhamnaceae |
| **Ziziphus jujuba** Mill. | Rhamnaceae |
| **Ziziphus nummularia** (Burm.f.) Wight & Arn. | Rhamnaceae |
| **Ziziphus oenopolia** (L.) Mill. | Rhamnaceae |
| **Ziziphus rugosa** Lam. | Rhamnaceae |
| **Ziziphus xylopyrus** (Retz.) Willd. | Rhamnaceae |
| **Carallia brachiata** (Lour.) Merr. | Rhizophoraceae |
| **Agrimonia pilosa** Ledeb. | Rosaceae |
| **Cotoneaster affinis** Lindl. | Rosaceae |
| **Cotoneaster microphyllus** Wall. ex Lindl. | Rosaceae |
| **Docynia indica** (Wall.) Decne. | Rosaceae |
| **Duchesnea indica** (Jacks.) Focke | Rosaceae |
| **Geum elatum** Wall. ex Hook.f. | Rosaceae |
| **Malus domestica** Borkh. | Rosaceae |
| **Potentilla indica** (Jacks.) Th.Wolf | Rosaceae |
| **Prunus utilis** Royle | Rosaceae |
| **Prunus campanulata** Maxim. | Rosaceae |
| **Prunus nepalensis** Ser. | Rosaceae |
| **Pyracantha crenulata** (Roxb. ex D.Don) M.Roem. | Rosaceae |
| **Pyrus pashia** Buch.-Ham. ex D.Don | Rosaceae |
| **Rubus foliosus** Weihe | Rosaceae |
| Scientific Name                                   | Family          |
|--------------------------------------------------|-----------------|
| Rubus × nobilis hort. angl. ex Regel             | Rosaceae        |
| Rubus biflorus Buch.-Ham. ex Sm.                 | Rosaceae        |
| Rubus buergeri Miq.                              | Rosaceae        |
| Rubus ellipticus Sm.                             | Rosaceae        |
| Rubus khasianus Cardot                           | Rosaceae        |
| Rubus niveus Thunb.                              | Rosaceae        |
| Benkara malabarica (Lam.) Tirveng.              | Rubiaceae       |
| Canthium coromandelicum (Burm.f.) Alston         | Rubiaceae       |
| Catunaregam spinosa (Thunb.) Tirveng.            | Rubiaceae       |
| Catunaregam spinosa (Thunb.) Tirveng.            | Rubiaceae       |
| Ceriscoides campanulata (Roxb.) Tirveng.         | Rubiaceae       |
| Chassalia curviflora (Wall.) Thwaites            | Rubiaceae       |
| Coffea benghalensis B.Heyne ex Schult.           | Rubiaceae       |
| Galium asperifolium Wall.                        | Rubiaceae       |
| Galium elegans Wall. ex Roxb.                    | Rubiaceae       |
| Galium rotundifolium L.                          | Rubiaceae       |
| Gardenia gummifera L.f.                          | Rubiaceae       |
| Gardenia latifolia Aiton                         | Rubiaceae       |
| Gardenia resinifera Roth                         | Rubiaceae       |
| Geophila repens (L.) I.M.Johnst.                 | Rubiaceae       |
| Haldina cordifolia (Roxb.) Ridsdale              | Rubiaceae       |
| Hedyotis scandens Roxb.                          | Rubiaceae       |
| Himalrandia tetrasperma (Wall. ex Roxb.)         | Rubiaceae       |
| T.Yamaz.                                         | Rubiaceae       |
| Houstonia purpurea L.                            | Rubiaceae       |
| Ixora coccinea L.                                | Rubiaceae       |
| Ixora elongata B.Heyne ex G.Don                  | Rubiaceae       |
| Ixora malabarica (Dennst.) Mabb.                 | Rubiaceae       |
| Ixora parviflora Lam.                            | Rubiaceae       |
| Ixora pavetta Andr.                              | Rubiaceae       |
| Ixora thwaitesii Hook.f.                         | Rubiaceae       |
| Meyna laxiflora Robyns                           | Rubiaceae       |
| Meyna spinosa Roxb. ex Link                      | Rubiaceae       |
| Mitragyna parvifolia var. microphylla (Kurz)     | Rubiaceae       |
| Ridsdale                                         | Rubiaceae       |
| Morinda citrifolia L.                            | Rubiaceae       |
| Morinda corea Buch.-Ham.                         | Rubiaceae       |
| Morinda umbellata L.                             | Rubiaceae       |
| Mussaenda frondosa L.                            | Rubiaceae       |
| Neolamarckia cadamba (Roxb.) Bosser              | Rubiaceae       |
| Neonauclea purpurea (Roxb.) Merr.                | Rubiaceae       |
| Oldenlandia corymbosa L.                         | Rubiaceae       |
| Oldenlandia diffusa (Willd.) Roxb.               | Rubiaceae       |
| Oldenlandia umbellata L.                         | Rubiaceae       |
| Ophi rhiza mungos L.                             | Rubiaceae       |
| Oxyceros longiflorus (Lam.) T.Yamaz.             | Rubiaceae       |
| Paederia foetida L.                              | Rubiaceae       |
| Pavetta indica L.                                | Rubiaceae       |
| Pavetta tomentosa Roxb. ex Sm. | Rubiaceae |
|---------------------------------|-----------|
| Psydrax dicoccos Gaertn.        | Rubiaceae |
| Richardia scabra L.             | Rubiaceae |
| Rubia cordifolia L.             | Rubiaceae |
| Rubia manjith Roxb. ex Fleming  | Rubiaceae |
| Saprosma ternatum (Wall.) Hook.f.| Rubiaceae |
| Spermacoce alata Aubl.          | Rubiaceae |
| Spermacoce articularis L.f.     | Rubiaceae |
| Spermacoce hispida L.           | Rubiaceae |
| Spermacoce suaveolens Roxb.     | Rubiaceae |
| Tamilnadia uliginosa (Retz.) Tirveng. & Sastre | Rubiaceae |
| Tarenna asiatica (L.) Kuntze ex K.Schum. | Rubiaceae |
| Wendlandia heynei (Schult.) Santapau & Merchant | Rubiaceae |
| Wendlandia tinctoria (Roxb.) DC. | Rubiaceae |
| Acronychia pedunculata (L.) Miq. | Rutaceae |
| Aegle marmelos (L.) Corrêa      | Rutaceae |
| Atalantia monophylla DC.        | Rutaceae |
| Atalantia racemosa Wight ex Hook.| Rutaceae |
| Boenninghausenia albiflora (Hook.) Rchb. ex Meisn. | Rutaceae |
| Chloroxylon swietenia DC.       | Rutaceae |
| Citrus aurantiifolia (Christm.) Swingle | Rutaceae |
| Citrus latipes (Swingle) Yu.Tanaka | Rutaceae |
| Citrus limon (L.) Osbeck        | Rutaceae |
| Citrus medica L.                | Rutaceae |
| Clausena dentata (Willd.) Roem. | Rutaceae |
| Clausena excavata Burm.f.       | Rutaceae |
| Glycosmis mauritiana (Lam.) Tanaka | Rutaceae |
| Glycosmis pentaphylla (Retz.) DC. | Rutaceae |
| Hesperethusa crenulata (Roxb.) M. Roem. | Rutaceae |
| Limonia acidissima Groff        | Rutaceae |
| Micromelum pubescens Blume      | Rutaceae |
| Murraya koenigii (L.) Spreng.   | Rutaceae |
| Murraya paniculata (L.) Jack    | Rutaceae |
| Naringi alata (Wall. ex Wight & Arn.) J.L.Ellis | Rutaceae |
| Pamburus missionis (Wight) Swingle | Rutaceae |
| Pleiospermium alatum (Wight & Arn.) Swingle | Rutaceae |
| Ruta graveolens L.              | Rutaceae |
| Skimmia laureola Franch.        | Rutaceae |
| Toddalia asiatica (L.) Lam.     | Rutaceae |
| Zanthoxylum armatum DC.         | Rutaceae |
| Zanthoxylum khasianum Hook. f.  | Rutaceae |
| Zanthoxylum limonella (Dennst.) Alston | Rutaceae |
| Zanthoxylum oxyphyllum Edgew.    | Rutaceae |
| Zanthoxylum rhetsa DC.          | Rutaceae |
| Casearia vareca Roxb.           | Salicaceae |
| Flacourtia indica (Burm.f.) Merr. | Salicaceae |
| Flacourtia jangomas (Lour.) Raeusch. | Salicaceae |
| Plant Name                        | Family       | Plant Name                        | Family       |
|----------------------------------|--------------|----------------------------------|--------------|
| *Flacourtia montana* J.Graham    | Salicaceae   | *Santalum album* L.              | Santalaceae  |
| *Populus ciliata* Wall. ex Royle | Salicaceae   | *Viscum angulatum* B.Heyne ex DC.| Santalaceae  |
| *Salix tetrasperma* Roxb.        | Salicaceae   | *Acer oblongum* Wall. ex DC.     | Sapindaceae  |
| *Xylosma longifolia* Clos        | Salicaceae   | *Aesculus assamica* Griff.       | Sapindaceae  |
| *Azima tetracantha* Lam.         | Salvadoraceae| *Aesculus indica* (Wall. ex Cambess.) Hook. | Sapindaceae |
| *Salvadora oleoides* Decne.      | Salvadoraceae| *Allophylus cobbe* (L.) Raeusch. | Sapindaceae  |
| *Salvadora persica* L.           | Salvadoraceae| *Allophylus serratus* (Hiern) Kurz | Sapindaceae  |
| *Santalum album* L.              | Santalaceae  | *Cardiospermum corindum* L.      | Sapindaceae  |
| *Dodonaea viscosa* (L.) Jacq.    | Sapindaceae  | *Cardiospermum halacabum* L.     | Sapindaceae  |
| *Lepisanthes tetraphylla* Radlk. | Sapindaceae  | *Datura inoxia* Mill.            | Solanaceae   |
| *Sapindus attenuatus* Wall.      | Sapindaceae  | *Datura metel* L.                | Solanaceae   |
| *Sapindus emarginatus* Vahl      | Sapindaceae  | *Datura stramonium* L.           | Solanaceae   |
| *Sapindus laurifolius* Vahl      | Sapindaceae  | *Hyoscyamus niger* L.            | Solanaceae   |
| *Sapindus mukorossi* Gaertn.     | Sapindaceae  | *Nicotiana tabacum* L.           | Solanaceae   |
| *Schleicheria oleosa* (Lour.) Merr. | Sapindaceae | *Physalis minima* L.             | Solanaceae   |
| *Madhuca longifolia* (J.Koenig ex L.) J.F.Macbr. | Sapotaceae | *Physochlaina praeculta* (Decne.) Miers | Solanaceae |
| *Mimusops elengi* L.             | Sapotaceae   | *Solanum aculeatissimum* Jacq.   | Solanaceae   |
| *Houttuynia cordata* Thunb.      | Saururaceae  | *Solanum americanum* Mill.       | Solanaceae   |
| *Bergenia ciliata* (Haw.) Sternb.| Saxifragaceae| *Solanum melongena* L.           | Solanaceae   |
| *Verbascum thapsus* L.           | Scrophulariaceae| *Picrasma javanica* Blume        | Simaroubaceae |
| *Ailanthus excelsa* Roxb.        | Simaroubaceae| *Smilax aspera* L.               | Smilacaceae  |
| *Ailanthus excelsa* Roxb.        | Simaroubaceae| *Smilax ovalifolia* Roxb. ex D.Don | Smilacaceae |
| *Bergenia ciliata* (Haw.) Sternb.| Saxifragaceae| *Smilax perfoliata* Lour.        | Smilacaceae  |
| *Houttuynia cordata* Thunb.      | Saururaceae  | *Smilax zeylanica* L.            | Smilacaceae  |
| *Bergenia ciliata* (Haw.) Sternb.| Saxifragaceae| *Brugmansia suaveolens* (Willd.) Sweet | Solanaceae |
| *Smilax aspera* L.               | Smilacaceae  | *Capsicum annuum* L.             | Solanaceae   |
| *Smilax ovalifolia* Roxb. ex D.Don| Smilacaceae | *Datura inoxia* Mill.            | Solanaceae   |
| *Smilax perfoliata* Lour.        | Smilacaceae  | *Datura inoxia* Mill.            | Solanaceae   |
| *Smilax zeylanica* L.            | Smilacaceae  | *Datura metel* L.                | Solanaceae   |
| *Houttuynia cordata* Thunb.      | Saururaceae  | *Datura stramonium* L.           | Solanaceae   |
| *Bergenia ciliata* (Haw.) Sternb.| Saxifragaceae| *Hyoscyamus niger* L.            | Solanaceae   |
| *Smilax aspera* L.               | Smilacaceae  | *Nicotiana tabacum* L.           | Solanaceae   |
| *Smilax ovalifolia* Roxb. ex D.Don| Smilacaceae | *Physalis minima* L.             | Solanaceae   |
| *Smilax perfoliata* Lour.        | Smilacaceae  | *Physochlaina praeculta* (Decne.) Miers | Solanaceae |
| *Smilax zeylanica* L.            | Smilacaceae  | *Solanum aculeatissimum* Jacq.   | Solanaceae   |
| *Brugmansia suaveolens* (Willd.) Sweet | Solanaceae | *Solanum americanum* Mill.       | Solanaceae   |
| *Capsicum annuum* L.             | Solanaceae   | *Solanum melongena* L.           | Solanaceae   |
| Scientific Name | Family       | Scientific Name | Family       |
|----------------|-------------|----------------|-------------|
| *Solanum surattense* Burm.f. | Solanaceae | *Pouzolzia zeylanica* (L.) Benn. | Urticaceae |
| *Solanum torvum* Sw. | Solanaceae | *Urtica dioica* L. | Urticaceae |
| *Solanum trilobatum* L. | Solanaceae | *Duranta erecta* L. | Verbenaceae |
| *Solanum violaceum* Ortega | Solanaceae | *Lantana camara* L. | Verbenaceae |
| *Solanum virginianum* L. | Solanaceae | *Lantana indica* Roxb. | Verbenaceae |
| *Withania somnifera* (L.) Dunal | Solanaceae | *Lippia javanica* (Burm.f.) Spreng. | Verbenaceae |
| *Gomphandra coriacea* Wight | Stemonuraceae | *Phyla nodiflora* (L.) Greene | Verbenaceae |
| *Symplocos lucida* (Thunb.) Siebold & Zucc. | Symplocaceae | *Stachyphthera jamaicensis* (L.) Vahl | Verbenaceae |
| *Symplocos racemosa* Roxb. | Symplocaceae | *Hybanthus enneaspermus* (L.) F.Muell. | Violaceae |
| *Symplocos ramosissima* Wall. ex G. Don | Symplocaceae | *Hybanthus linearifolius* (Vahl) Urb. | Violaceae |
| *Camellia kisii* Wall. | Theaceae | *Viola canescens* Wall. | Violaee |
| *Schima khasiana* Dyer | Theaceae | *Viola diffusa* Bing. | Violaee |
| *Schima wallichii* Choisy | Theaceae | *Viola pilosa* Blume | Violaee |
| *Aquilaria agallocha* Roxb. | Thymelaeaceae | *Ampelocissus indica* (L.) Planch. | Vitaceae |
| *Daphne mucronata* Royle | Thymelaeaceae | *Ampelocissus latifolia* (Roxb.) Planch. | Vitaceae |
| *Daphne papyracea* Wall. ex G. Don | Thymelaeaceae | *Ampelocissus tomentosa* (B.Heyne & Roth) Planch. | Vitaceae |
| *Typha domingensis* Pers. | Typhaceae | *Cayratia pedata* (Lam.) Gagnep. | Vitaceae |
| *Holoptelea integrifolia* Planch. | Ulmaceae | *Cayratia trifolia* (L.) Domin | Vitaceae |
| *Boehmeria macrophylla* Hornem. | Urticaceae | *Cissus adnata* Roxb. | Vitaceae |
| *Boehmeria rugulosa* Wedd. | Urticaceae | *Cissus javana* DC. | Vitaceae |
| *Girardinia diversifolia* (Link) Friis | Urticaceae | *Cissus quadrangularis* L. | Vitaceae |
| *Pouzolzia hirta* Blume ex Hassk. | Urticaceae | *Cissus verticillata* (L.) Nicolson & C.E.Jarvis | Vitaceae |
| *Pouzolzia pentandra* var. wightii (Benn. & Br.) Friis & Wilmot-Dear | Urticaceae | *Cissus vitiginea* L. | Vitaceae |
| **Cissus woodrowii** (Stapf ex Cooke) Santapau | **Vitaceae** |
| **Leea asiatica** (L.) Ridsdale | **Vitaceae** |
| **Leea indica** (Burm. f.) Merr. | **Vitaceae** |
| **Leea macrophylla** Roxb. ex Hornem. | **Vitaceae** |
| **Tetrastigma leucostaphylum** (Dennst.) Alston | **Vitaceae** |
| **Aloe vera** (L.) Burm.f. | **Xanthorrhoeaceae** |
| **Alpinia galanga** (L.) Willd. | **Zingiberaceae** |
| **Curcuma amada** Roxb. | **Zingiberaceae** |
| **Curcuma angustifolia** Roxb. | **Zingiberaceae** |
| **Curcuma aromatica** Salisb. | **Zingiberaceae** |
| **Curcuma caesia** Roxb. | **Zingiberaceae** |
| **Curcuma caulina** J.Graham | **Zingiberaceae** |
| **Curcuma longa** L. | **Zingiberaceae** |
| **Kaempferia galanga** L. | **Zingiberaceae** |
| **Curcuma pseudomontana** J.Graham | **Zingiberaceae** |
| **Elettaria cardamomum** (L.) Maton | **Zingiberaceae** |
| **Globba marantina** L. | **Zingiberaceae** |
| **Hedychium spicatum** Sm. | **Zingiberaceae** |
| **Zingiber capitatum** Roxb. | **Zingiberaceae** |
| **Zingiber montanum** (J.Koenig) Link ex A.Dietr. | **Zingiberaceae** |
| **Zingiber neesanum** (J.Graham) | **Zingiberaceae** |
| **Zingiber nimmonii** (J.Graham) Dalzell | **Zingiberaceae** |
| **Zingiber officinale** Roscoe | **Zingiberaceae** |
| **Zingiber roseum** (Roxb.) Roscoe | **Zingiberaceae** |
| **Balanites aegyptiaca** (L.) Delile | **Zygophyllaceae** |
| **Tribulus pentandrus** Forssk. | **Zygophyllaceae** |
| **Tribulus terrestris** L. | **Zygophyllaceae** |
Appendix 2. Representation of plant families against seven prevalent disease categories as recorded from sacred grove studies

| Disease Category                                      | Families recorded | Species recorded | 50% of total species (no. of families) | 75% of total species (no. of families) | Top three families                        |
|------------------------------------------------------|-------------------|-----------------|---------------------------------------|----------------------------------------|------------------------------------------|
| Diseases related to the digestive system             | 64                | 170             | 85 (11)                               | 127 (26)                               | Leguminosae, Apocynaceae, Compositae     |
| Diseases related to the infections and parasitic     | 96                | 366             | 183 (11)                              | 274 (31)                               | Leguminosae, Malvaceae, Compositae       |
| attacks                                              |                   |                 |                                       |                                        |                                          |
| Diseases related to the skin and sub-cutaneous       | 68                | 153             | 76 (12)                               | 114 (29)                               | Leguminosae, Compositae, Lamiaceae       |
| tissues                                              |                   |                 |                                       |                                        |                                          |
| General health problem                               | 100               | 358             | 179 (13)                              | 268 (35)                               | Leguminosae, Compositae, Apocynaceae     |
| Diseases related to the external causes              | 105               | 324             | 162 (12)                              | 243 (38)                               | Leguminosae, Malvaceae, Lamiaceae        |
| Diseases related to the respiratory system           | 80                | 240             | 120 (11)                              | 180 (29)                               | Leguminosae, Lamiaceae, Compositae       |
| Diseases related to the genito-urinary system        | 45                | 100             | 50 (9)                                | 75 (20)                                | Leguminosae, Malvaceae, Compositae       |