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Plant Diversity of North-Eastern Uttar Pradesh, India: Species Distribution and Depletion Pattern During the Last Five Decades

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ABSTRACT

The landscape of north-eastern Uttar Pradesh is a mosaic of several land uses and vegetation types. A detailed survey of the area reported 1057 plant species belonging to 563 genera and 119 families during 1960s. The gradual rarefaction and eventual local extinction of plant species of different habits have been viewed in the light of perceived changes in the local climatic conditions during the last few decades.

The estimate showed consistent decrease in the occurrence of species during the last 5 decades which together amount to about 15.70% of the total species content. Amongst the four vegetation types, the highest depletion occurred in grassland followed by forest, wasteland and old-fields in that order. As regards the generic depletion, about 62 monotypic and 4 polytypic genera out of the total 563 genera, recorded around 1960, were lost during the past five decades. A number of species which showed rare occurrences in 1960s, gradually became very rare and most of these species locally disappeared by 2014. During the past five decades, the region of north-eastern Uttar Pradesh experienced intense land-use and associated disturbances such as deforestation, intense grazing, trampling etc. that appear to have severely affected the existence of several plant species. The species richness of a disturbed site depends on the differential responses of its species to such disturbances.

The ongoing loss and fragmentation of habitats of natural forests and grasslands, therefore, pushed a number of monotypic genera towards rarity during the last five decades. These taxa are: *Abrus, Asparagus, Calamus, Clitoria, Gloriosa, Narvelia* and *Oxystelma*. A major share of herbaceous as well as woody plant species depleted during 1980s -1990s. This period coincided with the major changes in the pattern of temperature and rainfall. Severe changes in habitat conditions resulted into the loss of specialist species and rise of a number of opportunist species. Several shrubby species such as *Helicteres jamaicensis, Mahonia nepalensis, Nitraria schoberi, Opuntia dillenii*, *Phlogacanthus curviflorus, Psoralea drupacea*, *Securinega virosa, Thyrsostachys oliveri* and *Toddalia aculeata* also got severely depleted and became locally extinct by 2000s. During recent years, much of these communities or habitats shrank fast due to expansion of agricultural fields. The number of lianas and vines, however, did not dwindle as fast. Several exotics recently took over the indigenous species and showed natural aggregation at places.

Sincere efforts are required for conservation of habitat of herbaceous and woody plants in order to ensure the perpetuity of regional bio-resource and their sustained utilization for food, fodder, fuel, medicine etc.

Key Words: Vegetational Landscape of Terai; Decadal Change; Land Use; Population Pressure; Environmental Change

INTRODUCTION

Species diversity characterizes ecological associations such as communities and usually begins with distinguishing the species and their groupings over different habitats across the landscape. Biodiversity is essential for the ecosystem function and stability and provides priceless services to human life (Ehrlich and Wilson

1991, Tilman 2000, Ives and Carpenter 2007). The most basic idea is species-richness, and its account in space and time provides fundamental data in ecology and biogeography. Every species is important in maintaining the intricate balance of the ecosystem because extinction of one species often leads to the extinction of other dependent species (Gilbert 1980, Daily et al. 1993). Many studies describe how plants are lost at various geographical scales (Ehrlich and Ehrlich 1981, Ratcliffe, 1984 and Hodgson, 1986) and local scales (Drayton and Prymack 1996, Preston et al. 2003, Sodhi et al. 2008, Raman and Prasad 2010). Forests, especially tropical ones, play a critical role in the maintenance of planet's homoeostasis but these are currently disappearing at alarming rate (May and Stumpf 2000). As much as 33 million hectares of forest was cleared in India and a large area was converted into plantation forests during the most intense colonial exploitation of timber resources, from 1850-1920 (Williams 2002).

Habitat fragmentation, environmental degradation through pollution, the invasion of exotic species, over-exploitation and climate change are considered to be the major threats to biodiversity worldwide (Diamond 1989, Pimm and Ravan 2000, Jacquemyn et al. 2012). Forest fragmentation involves the creation of habitat edges and the edge effects generally have a negative impact on the biotic and the physical environment (Felton et al. 2003). Small forest fragments have a greater edge to area ratio and are intrinsically more susceptible to colonization of species from surrounding human dominated habitats (Janzen 1986). The alterations of microclimatic conditions and biological interactions can increase plant mortality and species loss in such edges ((Didham and Lawton 1999, Laurance et al. 2000) as compared to the interior of continuous forests (Donoso et al. 2003, Harper et al. 2005). Many of the exotic weeds benefit from edge environments and exert substantial pressures, including competition, on the range of native species (Ries et al. 2004, Fischer et al. 2006). Some studies have shown large declines in biodiversity in areas that are heavily invaded by introduced plants, leading some to conclude that such invasive species are one of the most important threats to biodiversity next only to habitat destruction (Wilcove et al. 1998, IUCN 2000, Pauchard and Shea 2006).

The future threats to biodiversity have been identified as land-use pressures, climate change and shifts in the atmospheric CO_2 exchange and nitrogen decomposition (Sala et al. 2000) among others. While researchers predict the future scenarios of biodiversity loss, current scenarios lead to future prospects (Sala et al. 2000). Changes in global climate comprise disturbances that are affecting the composition of ecological community (Prichard et al. 2000, Schulze et al. 2002, Flannery 2005).

In India, Sagar and Singh (2004) observed local anthropogenic pressure as major cause for the depletion of local plant species in a tropical dry deciduous forest. Raman and Prasad (2010) studied 200-year change in plant species composition of Madras city and recorded a loss of 33 species. The north-eastern Terai, Uttar Pradesh repersent a few important ecoregions of the world, and is well known for its unique biodiversity and high productivity (Johnsingh et al. 2004). The region has undergone severe alterations due to the expansion of agricultural land, the replacement of natural forests with commercial plantations and urbanization. The fragmentation and degradation has caused local extinction of several species (Johnsingh et al. 2004). The general structure and composition of Terai vegetation is quite well known (Panigrahi et al. 1969). Pandey and Shukla (2003) assessed the species composition, and conservation status of managed and degraded sal (*Shorea robusta* Gaertn. f.) forests and the regeneration pattern of various woody species in the region (Pandey and Shukla 1999, 2001).

The increasing agricultural practices and expansion of urban area have paved the way for small to very large patches of grassland vegetation which are largely under-explored except for a few scattered studies on population interaction and productivity of selected species (Asthana 1975, Dwivedi 1978). Some information is available on the impact of varying degree of grazing, trampling and clipping pressure on the diversity of grassland species (Tripathi and Shukla 2007, Srivastava, 2015, Srivastava and Shukla 2016). Recently, general phytosociological characteristics and effect of disturbance on species diversity of regional grassland vegetation of north-eastern U.P. has been observed by Srivastava et al. (2015) and reviewed by Shukla (2009).

The present paper analyses the occurrence and disappearance of plant species during the last five decades across the landscape of north-eastern Uttar Pradesh. The distribution of the plant species of north-eastern U.P. has been traced across the world vegetation and the nature of species distribution has been categorized according to Good (1974). It attempts to relate the various forms of natural and anthropogenic activities including forestry practices with the survival of a number of indigenous plant species which were quite

abundant around 1950s. The pattern of loss of species, genera and families of regional vegetation has been compared with that of India and the world. The analysis is based on primary as well as some secondary data. The information obtained on the pattern of changes in the occurrence and disappearance of various species may suggest some devises to check any further erosion of plant species from this region.

STUDY AREA

The plains of north-eastern U.P. cover 16 districts of eastern Uttar Pradesh (Figure 1) and the region abounds in agricultural fields and grassy landscapes, heavily traversed by rivers, rivulets, nullahs, lakes and ponds. Though the climatic conditions favour forest as climax vegetation but recurrent and severe disturbances in the form of grazing, trampling and burning has arrested the ecological succession since long over most part of the land area except those covered by forests. The abandoned arable lands also develop into natural grasslands as a result of secondary succession and tend to be stable under the influence of biotic disturbances such as fire, grazing and clipping practices. The grassland vegetation of north-eastern Uttar Pradesh is bordered by Nepal in the north and Bihar state of India in the east. The regional plain slopes gently from North-West to South-East. The landscape presents a mosaic of plant communities with varying amount of grasses and forbs of contrasting life-forms.

Climate

The climate of the region is typically tropical monsoonal with three distinct seasons i.e., summer (March to mid-June), monsoon (mid-June to mid October) and winter (mid-October to February). The total average annual rainfall is about 1704 mm for the entire study region with 91% occurring during the wet summer or rainy season. The rest 9% occurs in the form of occasional showers from November to May. The number of rainy days per year is 51±3.2 and the annual mean of relative humidity is about 87% in the morning and 74% in the evening. For most part of the year, the area is practically dry but without any significant water crisis. The eastern Terai plains receive better rainfall for longer period and, therefore, possess much richer plant biodiversity as compared to western and southern districts of the state. Mean maximum temperature during wet summer, winter and dry summer season is 23.3°, 23.71°, and 36.23°C and mean minimum temperature is 23.9°, 10.34° and 21.28°C respectively (based on climatic data for 2012-2014).

Soil

The region touches bhabhar tract bordering the foot hills of Shivalik range and mostly has alluvial soil formed by the deposition of silt carried by seasonal floods. The soil of this region is a part of trans-Sarju Plain and comprises Gangetic alluvium brought down by rivers like Ghaghara, Rapti, Rohin and Gandak from the Himalayas

Figure 1. Map of Eastern Uttar Pradesh showing the 11 study districts. Inset map of India shows the position of Uttar Pradesh.

in the north. The texture is sandy loam and the soil reaction is near neutral. In the northern area there are a few elevated mounds, locally called *Dhus*, which range in size from a few hundred meters to 4-5 km and have brown sandy soil. The mounds are clearly a sloppy undulation of large deposits of brown sandy soil formed by local geographic alterations since antiquity.

Vegetation

The growing season extends from mid-June to mid-September when most plants attain peak biomass followed by their reproductive phase. Majority of the species of community enter into flowering and fruiting. Many annuals complete their life cycle and decay by the end of October, dispersing their seeds on the immediate ground where they remain dormant until the next rainy season at least. The shoots of the perennial species dry out during winter. In some cases, however, tillers may appear from the underground rhizome after occasional winter rains caused by retreating monsoon. Seasonal changes in the environmental constraints of these areas may lead to differences in plant community structure and dynamics.

METHODS

Data Sources

The study of the regional flora, started towards the end of the nineteenth century, resulted in several exhaustive floristic records (Bentham and Hooker 1862-1883, Brandis 1874, Duthie 1903-1929, Kanjilal 1933). The studies on floristics of north-eastern Uttar Pradesh were started during 1960s with the establishment of Botany Department of Gorakhpur University. A fairly large herbarium with several thousand specimens of local flora was established in this department largely with the inspiration and efforts of Professors K.S. Bhargava, S.N. Dixit, S.K. Singh and their associates. Several phyto-sociological and ethnobotanical studies also contributed towards the knowledge of the species pool present in this region. The data on species loss during the last five consecutive decades, from 1960s to the first decade of current century, are based on the records of various regional flora and herbarium. In spite of the British rule and exploitation of timber, there was enough area under good forest cover which provided suitable niches for the multitude of plant species which characterized the natural vegetation and plant diversity of this region. The floristic works of Duthie (1903-1929) and Kanjilal (1933) made only casual references to the plants of this region (Srivastava 1976). The listing of species present during different decades starting from 1960s is based on the following floral studies:

Floristic Studies of 1960s

Floristic works of Siddiqui (1969) and Singh (1969) formed a basis for the existing species richness in the 1960s decade. Siddiqui (1969) studied three forest reserves *viz.* Bhilampur, Ramgarh and Tilkonia of Gorakhpur forest division. Singh (1969) studied forest flora of Nichlaul. In addition, several papers contributed information to the floristics of this period (Dixit et al. 1966, 1968, Panigrahi and Saran 1967, Gupta 1969, Siddiqui and Dixit 1969, Singh and Dixit 1969).

Floristic Studies of 1970s

Ali (1975), Ansari (1977), Mishra (1978), Srivastava (1971) and Srivastava (1976) documented plant species at that time with special reference to taxonomical and some phytosociological studies. The first three of them worked on forest flora of Lachhmipur, Madhaulia and Chowk forest, respectively. Srivastava (1971) listed plants of Gorakhpur under the title, *Flora Gorakh-purensis*. Some floristic works of Singh and Singh (1979), Singh and Dixit (1971, 1972) and Srivastava and Dixit (1972) have also been considered.

Floristic Studies of 1980s

This decade was most floristically surveyed with reference to land cover. Srivastava (1981) surveyed the Gorakhpur district and Singh (1988) did so for Bahraich district. Their floristic records formed the base for information on plant species existing during that decade.

Floristic Studies of 1990s:

As record indicates, this decade along with 2000s was more specialized with reference to phytosociological study. Gupta (1991) and Mishra (1993) worked on forest communities of the region. Similarly, the grassland communities were studied by Tripathi (1999). The bio-systematic study of Srivastava (1990) is informative for the plant species of Euphorbiaceae family. The work of Shukla and his associates (Gupta and Shukla 1991, Pandey and Shukla 1999) was useful for documenting the species existing during this decade.

Floristic Studies of 2000s

The data used for this decade are based on the floristic works of Pandey (2000), Singh (2005), Tripathi (2004) and Yadav (2006) and also on the basis of publications of Pandey and Shukla (2001, 2003, 2005), Tripathi and Shukla (2007) and Shukla (2009). Pandey (2000) surveyed perennial legumes in the plantation forest of northeast U.P. Similar work was made by Tripathi (2004) but only on grassland communities of the study site. Singh (2005) documented the diversity of the members of Asteraceae family in eastern Terai region with special reference to ethnobotanical importance. Yadav (2006) pointed out the pattern of species-area and species-abundance relationship within plant communities of different terrestrial habitat of the region. These floristic records were consulted to extract information on plant species content.

Additionally, the information about plant species was also gathered from the herbarium notes, submitted to Botany Department of this University. Further, the methods for assessment of plant biodiversity employed by R.P. Shukla and his earlier associates were also considered for sampling and standardization of species status of various life forms. The survey during the last half century, showed diverse communities but without any noticeable territorial differences in the morphological features of their constituent species.

B. Data Authentication

For each period, data were standardized by correcting most common species names, authority names and any amalgamation due to synonyms with the help of publication such as Hooker (1872-1897), Duthie 1903-1929) and (Srivastava 1976). Flora of neighbouring countries was also consulted for authentication of species and their distribution. Species content of the terrestrial vegetation were accounted right from 1960s. Truly aquatic plant species were, however, avoided but all the rooted semi-aquatics which could grow and reproduce fairly well after zero water-logging, were also considered as terrestrial (Srivastava 1976). While assigning habit categories, herbaceous climbers were included under herbs, undershrubs as shrubs and undertrees as trees. Woody vines were grouped as liana. The names of families are largely in accordance with the widely accepted classification system of Bentham and Hooker (1862-1883) but several changes and split up families proposed by Hutchinson (1959) have also been included.

C. **Land Use Change**

Data set was compiled from various secondary sources. It includes information on population growth, urbanization, and land-use pattern. Most of the demographic and socioeconomic data were taken from census publications (Registrar General of India) for different time periods under study. The land use classification data are compiled from various reports of the governmental and nongovernmental sources basically from the office of Statistics and Economics section, Planning Department, Government of Uttar Pradesh.

The land use data in north-eastern Uttar Pradesh begins at the village level. The land utilization or land use statistics formed part of the agricultural statistics (from Ministry of Agriculture). The Ministry of Food and Agriculture recommended a nine-fold land-use classification and also recommended standard concepts and definitions for all the states to follow for better comparability and comprehension. Prior to this, land-use statistics was collected and available in five categories: (i) forests, (ii) area not available for cultivation, (iii) other uncultivated land excluding current fallows; (iv) fallow land and (v) net area sown. However, currently, the nine categories of land-use are recognised. These are: 1. Forests, 2. Area under non-agricultural uses, 3. Barren and uncultivable land, 4. Permanent pastures and other grazing lands, 5. Miscellaneous tree crops and groves, not included in net area sown, 6. Cultivable wasteland, 7. Fallow lands, other than current fallows, 8. Current fallows, and 9. Net area sown

These land use categories, however, were grouped into three major categories:

1. *Forest* = Forest +Area under bush, forest and garden;
2. *Old field* =Present fallow land + other fallow land + Land put to non- agriculture use; and

Grassland = Barren cultivable waste land + Barren and un-cultivable land+ Pastures

The climatological data for last five decades was taken from the Indian Meteorological Department (IMD), for various district stations. All statistical analysis was carried out using PAST (Paleontological Statistics) software version 2.17.

RESULTS

Regional Angiospermic Flora During 1960s

A detailed ecological reconnaissance of the area was undertaken to study the flora of north-eastern Uttar

Pradesh. A total of 1057 plant species under 563 genera and 119 families were found to occur during 1960s. Of the total 119 families, 86.6% families represented dicot species and 13.4% monocot species. The species composition as per the habit type was 17.2% (trees), 14.6% (shrubs), 6.1% (liana), 5.4% (vines) and 56.7% (herbs). The vegetation during this decade was dominated by shrubs and herbs. The woody and herbaceous vegetation was quite dense due to good soil moisture and infrequent disturbance generally of low magnitudes.

A total of 119 plant families represented within the terrestrial vegetation of north-eastern U.P. of which 42.02% families were predominantly tropical, 6.72 temperate, 5.04% discontinuous, 6.88% endemic, 2.52% anomalous and 37.82% were cosmopolitan in their distribution. 378 out of 563 genera, documented during 1960s, were monotypic. The percent number of genera in various natural distribution categories (cf. Good 1974) was 9.95% (cosmopolitan to sub-cosmopolitan), 9.41% (pan-tropical), 1.77% (temperate), 17.23% (discontinuous), 1.6% (endemic), and 2.31% (wide). No record of specified distribution could be found for the rest 57.73% of the genera which occurred during 1960s (Supplementary Table 1).

Table 1. The range of species in various genera since 1960s.

Range of Number of Species	Number of Genera
35	1
10-16	11
5-9	22
2-4	151
1 (Monotypic)	378

The grassland vegetation harboured much greater number of species than forests or wastelands. The five major families showed major share of plant species: Leguminaceae was represented by 130 species, Poaceae and Cyperaceae each by 173 species, Asteraceae by 91 species and Euphorbiaceae by 39 species across the regional vegetation. The range of species per genus was wide (Table 1). A single genus *Cyperus* represented 32 species in this region. 11 genera, i.e., *Abutilon, Blumea, Crotalaria, Desmodium, Eragrostis, Ficus, Fimbristylis, Ipomoea, Lindernia, Polygonum* and *Senna* represented ten to sixteen species each. The genera such as *Alysicarpus, Amaranthus, Acacia, Bauhinia, Bambusa, Commelina, Digitaria, Dioscorea, Euphorbia, Heliotropium, Indigofera, Leucas, Ocimum, Oldenlandia, Panicum, Phyllanthus, Scirpus, Sida, Solanum*, *Terminalia, Vernonia,* and *Zizyphus* represented five to nine species each. There were 378 monotypic genera, represented by only one species in the region.

Table 2. Decadal change in area (ha) under different landuse (terrestrial vegetation) of NE Uttar Pradesh

Land Use Pattern	Years		
	1991-92	2001-02	2011-12
Forest	509,799	277,710	288,427
Old-Fields	968,948	549,253	570,486
Grassland	162,731	83,334	62,489
Land Use Area	1641,478	910,297	921,402
Net sown Area	5695,929	2453,903	2399,555
Total area	7337,407	3364,202	3320,957

Causes and Extent of Depletion

Land-use Change

Land use changes and population over the 20th century and first decades of 21st century are considerable. The decadal changes in land use pattern of various categories have been shown in Table 2. Regression analysis showed negative correlation between area and time interval (Figure 2). The area of old-field and forest vegetation decreased during 1990s. It, however, shows increasing

Table 3. Total plant species content and the changes in species richness and species depletion since 1960s

Decades	Addition of species	Species richness	Depleted species
1960s	23*	1057	No record
1970s	8**	1065	39
1980s	9***	1035	49
1990s	-	986	33
2000s	-	953	37
2010s	1****	917	8

Reported by * Siddiqii 1960; ** Srivastava 1976; *** Srivastava 1986; **** Srivastava et al. 2015

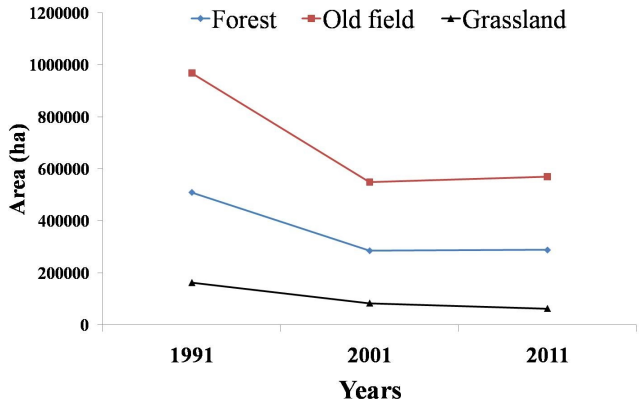

Figure 2. Decline in the area (ha) of various terrestrial vegetation types of north-eastern Uttar Pradesh during 1991 to 2011.

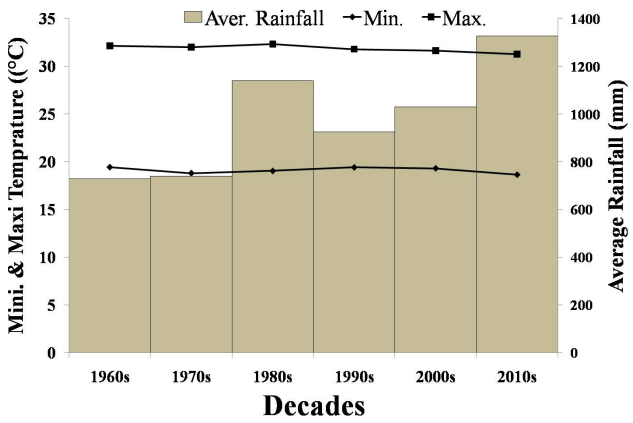

Figure 4. Decadal change in minimum and maximum temperature and average annual rainfall (Based on data from IMD).

trend during the last decade (2001-09). The area of grassland vegetation also decreased consistently. The population of north-eastern Uttar Pradesh increased from 18.27 million (1981) to 33.79 million (2011), while the urban population grew more rapidly during 1980s to1990s in comparison to rural population (Figure 3).

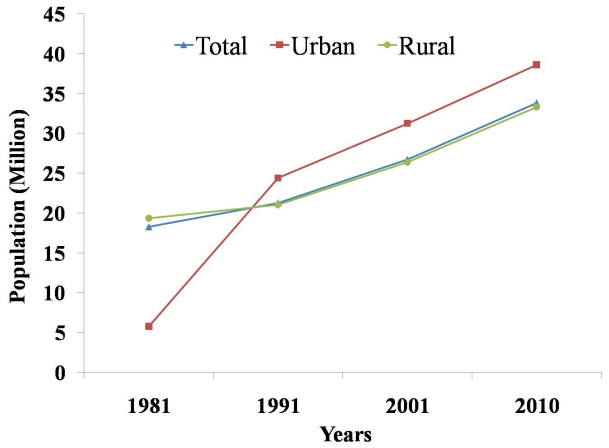

Figure 3. Decadal change in total, urban and rural population of north-eastern Uttar Pradesh.

Climatic Change

The temporal changes in temperature and rainfall for the last five decades of north-eastern Uttar Pradesh are shown in Figure 4. The maximum temperature increased slightly during 1980s and further decreased during the last two decades. The minimum temperature increased in 1990s. The maximum rainfall was observed during 1980s. It decreased slightly in 1990s and increased in 2000s.

In the beginning, around 1960s, the total terrestrial plant species were around 1057 but showed consistent decrease in their occurrences during the last 5 decades. It clearly indicates a marked change in the richness of plant species within vegetational landscape of the region (Table 3). During the analysis of records, a few species were noticed for the first time by various workers in different decades (Supplementary Table 2). Maximum new records were found in 1960s than 1980s. For two decades (1990s and 2000s) there is no report of a new record. Only one species, *Solanum sisymbriifolium* was reported in last decade.

A total of 166 species, 66 genera and 8 families were depleted during the past five decades. Of these, dicotyledons share 130 and monocot 36 species. Over the whole span of the study, this represents a decrease by 15.70% during the last 50 years. In all the taxa, the maximum number of species was depleted during 1980s (Table 4). After the decadal depletion, the resultant changes in floristic richness are shown in Table 5.

A total of 563 genera were recorded during 1960s. The current survey of the vegetational landscape of the region and allied literature indicate that about 62 monotypic and 4 polytypic genera were lost during the past five decades and only 503 (342 monotypic and 161 polytypic) genera are still present. The number of monotypic genera was quite greater than that of polytypic genera. However, the number of species depleted gradually during the past five consecutive decades was much greater under monotypic genera than that of polytypic ones. 15 genera, namely *Dipteracanthus, Geodorum, Agrimonia, Braya, Brugmansis, Bulbophyllum, Clarkia, Cymbidium, Erycibe, Eschscholzia, Hyptianthera, Lespedeza, Melaleuca, Prunella,*

Table 4. Number of disappearing species under various taxa during the last five decades.

Taxa	Total number of species recorded during						Total species still present	Total species depleted
	1960s	1970s	1980s	1990s	2000s	2010s		
Dicot	840	28	40	28	26	8	731	130
Monocot	217	11	9	5	11	-	178	36
Species	1057	39	49	33	37	8	909	166
Genera	563	12	12	11	21	4	503	60
Family	119	-	1	2	3	2	112	8

Table 5. General floristic characteristics across the terrestrial vegetation during last five decades.

Taxa	Total no. of species recorded during					
	1960s	1970s	1980s	1990s	2000s	2010s
A. **Groups:**						
Dicot	840	819	786	785	173	731
Monocot	217	207	200	195	184	178
B. **Number:**						
Species	1057	1026	986	953	916	909
Genera	563	551	539	528	507	503
Family	119	120	119	117	114	112
C. **Ratios**:						
Species / Genera	1.87	1.86	1.82	1.80	1.81	1.81
Species / Family	8.88	8.55	8.29	8.15	8.04	8.12
Genera / Family	4.73	4.59	4.52	4.51	4.44	4.49
D**. Number of Monotypic vs. Polytypic Taxa:**						
Monotypic genera	378	374	367	362	343	342
Polytypic genera	185	177	172	166	164	161
Monotypic families	31	32	32	32	30	31
Polytypic families	88	88	87	85	84	81

and *Teucrium* depleted during 1970s. Among these genera, the first two genera had two species each i.e. *Dipteracanthus patulus*, *D. polyspermus* and *Geodorum densiflorum*, *G. dilatatum.* 14 monotypic genera i.e. *Anotis, Balanites, Blepharis, Browallia, Cercestis, Cyathula, Firmiana, Geissaspsis, Jacque-montia, Oberonia, Ochna, Senecio, Stachytarpheta* and *Swertia* disappeared during 1980s. 12 species such as *Justicia, Aphanamixis, Carpinum, Dysophylla, Litho-carpus, Mahonia, Melothria, Nitraria, Paullinia, Phlogacanthus, Photinia* and *Rivea* disappeared during 1990s. Further, 25 monotypic genera depleted during the last two decades. Of all the genera, 12 most species-rich genera suffered maximum depletion. The species-rich genus, *Cyperus* lost several species but it was very low as compared to other species-rich genera. The genus *Abutilon* showed maximum depletion during 1980s (Supplementary Table 3).The temporal changes in the number of species of some species-rich genera during last five decades is shown in Supplementary Table 4.

A total of 119 families were found to occur during 1960s. The number reduced to 112 families by the end of lost decade (2010s). Among these families, 31 were monotypic and 88 families showed more than one species during 1960s. The analysis indicates that the 8 monotypic families were lost during the past few

decades. In 1970s, the number of monotypic family however, increased due to addition of a new family, Passifloraceae. The maximum number of families got depleted during 2000s and minimum in 1980s. The families such as Betulaceae and Fagaceae and Ericaceae and Stylidaceae disappeared during 1990s and 2010s respectively (Supplementary Table 5). During the past five decades, a total of 166 species under 59 families disappeared from the region (Supplementary Table 6).

The six dominant families were quite species-rich and possessed much greater number of species and genera. Poaceae was most widespread family represented by 103 species and 54 genera followed by Papilionaceae by 93 species and 36 genera, Asteraceae by 91 species and 53 genera, Cyperaceae, by 70 species and 7 genera, Euphorbiaceae by 39 species and 21 genera Scrophulariceae by 33 species and 18 genera during 1960s and Poaceae was represented by 89 species and 54 genera followed by Papilionaceae by 80 species and 32 genera, Asteraceae by 86 species and 52 genera, Cyperaceae, by 59 species and 7 genera, Euphorbiaceae by 36 species and 19 genera Scrophulariceae by 29 species and 17 genera during 2010s of the region. The two families, Poaceae and Papilionaceae of the regional vegetation suffered maximum species (14 in each) depletion followed by Cyperaceae (13 species). Scrophulariaceae, Caesalpinaceae and Asteraceae families were represented by two species each and 12 families, Asteraceae and Euphorbiaceae by five species each and the last family Scrophulariceae by only 4 species. The five families, namely Araliaceae, Berberidaceae, Lobaliaceae, Simaroubaceae and Zygophyllaceae lost 50% of their species content during past five decades. Four families, Lobaliaceae, Martyniaceae, Sphenocleaceae and Zygophyllaceae were monotypic with single species, viz., *Lobalia alsinoides, Martynia annua, Sphenoclea zeylanica and Tribulus terrestris* this region have become very rare. The temporal change in number of species and genera during last five decades has been shown in Supplementary Table 7.

Further, depletion trends were noticed in relation to the growth form of the species. The species depletion was maximum for herbs followed by shrubs, trees, lianas and vines in that order during the past five decades (Table 6). Several of the herbaceous plant species such as *Andrographis echioides, Blepharis molluginifolia, Cyathula tomentosa, Blumea procera, Senecio linifolius, Cynoglossum furcatum, Cyperus alusinoides, C. hyalinus*, *C. substramineus, C. teneriffe*, *Fimbristylis albicans, F. thomsonii, Phyllanthus scarbifolius, Swertia purpurascens, Leucas linifolia, Plectranthus coesta, Abutilon astaticum, A. auritum*, *A. avicennae, A. fruticosum, A. ramosum, Oberonia falcata, Alysicarpus glumaceous, Geissaspsis cristata*, *Indigofera glabra, Eragrostis coromandelina, Panicum javanicum, Anotiscalycina, Lindernia nummularifolia, Sutera dissecta, Browallia viscosa, Pouzolzia pentandra* and *Stachytarpheta indica* vanished by 1980s. The species of shrubs and lianas showed maximum depletion during 2000s. A significant number of tree species, e.g. *Carpinum caroliniana, Lithocarpus viridis*, *Litsaea lanugenosa, Careya illinoensis, Aphanamixis polystachya*, *Syzygium cerasoides* and *Photinia serratifolia* disappeared by 1990s while, vines like *Ipomoea calycina*, *I. campanulata*, *I. reniformis* and *Porana grandiflora* lost during 1970s. The maximum number of species (49) disappeared during 1980s followed by 39 species in 1970s, 37 species in 2000s, 33 species in 1990s and 8 species in 2010s. The temporal changes in species richness of different growth forms are shown in Table 7.

Table 6. The number of species of different habits depleted/lost during the last five decades.

Habit	Initial Total No. of species disappearing in different decades						No. of species depleted	No.of species present
	1960s	1970s	1980s	1990s	2000s	2010s		
Herbs	630	25	33	13	14	4	89	553
Vines	52	4	2	2	-	-	8	46
Lianas	80	3	3	3	4	-	13	69
Shrubs	122	1	5	7	13	3	29	94
Trees	173	6	6	8	6	1	27	149
Total	1057	39	49	33	37	8	166	909

Table 7. Temporal changes in the richness of species of different habits during the last five decades

Habit	1960s	1970s	1980s	1990s	2000s	2010s
Herbs	630	613	584	571	557	553
Vines	52	49	48	46	46	46
Lianas	80	76	76	73	69	69
Shrubs	122	121	116	109	96	94
Trees	173	167	162	154	148	147
Total	1057	1026	986	953	916	909

Table 9. Temporal changes in the number of species within different habitats during the last five decades

Vegetation types	Decadal change in number of Species					
	1960s	1970s	1980s	1990s	2000s	2010s
Grassland	632	614	588	571	554	552
Old-fields	429	424	414	406	394	394
Wasteland	490	482	464	444	426	421
Forest	459	438	422	404	380	376

The status of plant species around 1960s and the change in their number after a lapse of five decades i.e. by 2014 was different for the four vegetation types (Table 8). The highest depletion occurred in grassland (94 species) followed by forest (89 species), wasteland (81 species) and old-fields (49). Much greater number of species got lost during 1980s in three vegetation types except forest. The species depletion was maximum for forest species during 1970s than 2000s. A few species such as *Phlogacanthus curviflorus*, *Mahonia nepalensis*, *Opuntia brassilensis, Helicteres jamaicensis*, *Grewia sapida* and *Nitraria schoberi* which were found in transition zones of two vegetation types disappeared from the region. Changes in the richness of species during last five decades under different vegetation types are shown in Table 9.

DISCUSSION

Species richness is the simplest way to describe community and regional species diversity (Magurran 1988). Quantifying species richness is important, not only for basic comparisons among sites but also for addressing the saturation level of local communities colonized from regional source pools (Cornell 1999). The land use change and habitat fragmentation have been identified as the most important processes that affect species richness and community composition (Van der Veken et al. 2004, Rodríguez-Loinaz et al. 2012). The primary result shows that the long-term rate of extinction could largely be predicted by their initial abundance and gradual rarefaction. During the past five decades, the region of north-eastern Uttar Pradesh experienced intense land-use and associated disturbances such as deforestation, intense grazing, trampling etc. that appear to have severely affected the existence of several plant species (Anonymous 2012). Land-use change, leading to habitat deterioration and fragmentation at various spatial scales, has been identified as a major cause to declining biodiversity (Eriksson and Ehrlén 2001, Loreau et al. 2001, Balmford et al. 2005). A number of species which showed rare occurrences in 1960s, gradually became very rare and most of these species locally disappeared by 2014.

While many species respond to changes in land use instantly, other's response may be delayed. The changed conditions gradually mitigate their persistent occurrence (Tilman et al. 1994, Hanski and Ovaskainen 2002). Thus, a critical issue to understanding patterns of plant distri-

Table 8. Number of species depleted under different vegetation/habitats types during last five decades.

Vegetation types	Initial Total	No. of species disappearing in different decades					Total no. of	Total no.of
	1960s	1970s	1980s	1990s	2000s	2010s	species depleted	species present
Grassland	632	25	33	16	17	3	94	552
Old-fields	429	12	16	8	12	1	49	394
Wasteland	490	14	24	20	18	5	81	421
Forest	459	22	21	18	24	4	89	376

bution is not only to assess the effects of spatial structure but also to include a temporal scale of the plant species' response to ongoing landscape transformation (Eriksson and Ehrlén 2001, Foster 2002, Helm et al . 2006).

Our results suggest that frequent and fluctuating disturbances acting simultaneously with multiple impacts were responsible for striking differences in the number of species among four vegetation types. The recurrent human intervention for the collection of fuelwood, fodder, litter, and minor forest products, as well as grazing, browsing and trampling, can substantially fragment species habitats (Pandey and Shukla 1999). Therefore, the species richness of disturbed sites depends on the differential responses of species content to such disturbances, some species may tolerate the disturbances and may still continue, while others may face local extinction (Sagar et al. 2003, Srivastava and Shukla 2016). The ongoing loss and fragmentation of habitats of natural forests and grasslands, therefore, confound to form major threats to the continuity of many wild plants (Ihse and Lindahl 2000, Peterken and Game 1984).

In the region of north-eastern Uttar Pradesh about 70% area of the landscape is under direct human use for agriculture and settlements (Chitale and Behera 2014). Over the last five decades, high population growth associated agricultural expansion and changing socio-economic aspirations are some of the crucial challenges that impinge on the management of the forested landscape in the region (Johnsingh et al. 2004). During the last five decades, a number of monotypic genera of the vegetational landscape have been pushed towards rarity. These species are: *Abrus, Asparagus, Calamus, Clitoria, Gloriosa, Naravelia* and *Oxystelma*. They are vulnerable because their small, isolated and very localized wild populations suffer sudden decline due to catastrophic environmental changes (Cunningham and Saigo 1999). Barbault and Sastrapradja (1995) opined that the species with small population size are highly vulnerable. The more severe the environmental impact, the higher will be the rate of local extinction of such species populations.

Among the local communities, cultural processes and practices also caused fast shrinkage of the flora of this region. The *tharoos,* the oldest tribal inhabitants living in eastern districts of UP and the *taungyas* who were engaged in growing sal plantations introduced by the British after clear felling of the natural forests were also instrumental in affecting regional plant diversity. The zone is also known for highest density of human population in the world. The most important agent of change in the spatial patterns of much of biodiversity is the size, growth rate and resource demands of the human population of the region (Vitousek et al. 1997, Sala et al. 2000).

Accelerated increase in human population size and resource demand during the past 50 years may be held responsible for the present biodiversity crisis. It has been emphasized that the ongoing habitat loss and fragmentation of ancient forests and grasslands, therefore, forms a major threat for many plants (Ihse and Lindahl 2000). Agricultural intensification by a simplification of cropping systems, the application of pesticides and fertilizers and drainage or irrigation reduces the diversity of weed species (Stoate et al. 2001). The fragmentation-related extinction is accelerated by the deleterious effects of human disturbance during and after deforestation causing the reduced population size, increased edge effects, changes in community structure and the immigration of exotic species. The species and populations of remaining habitats decline drastically. In order to prevent local extinctions and to recreate a traditional landscape structure, restoration of these habitats has received increased attention in recent decades (Walker et al. 2004, Lindborg 2006).

Natural disturbances determine the forest dynamics and affect the tree diversity on local and regional scales (Pickett and White 1985, Sheil 1999), while anthropogenic disturbances contribute in regulating the regeneration dynamics and the structure and floristic composition of tropical ecosystem (Horn 1991). The present results clearly indicate a marked change in the species richness of various habit groups since 1960s. Most of the herbaceous as well as woody plant species depleted during 1980s to 1990s. This period coincides with the major changes in the pattern of temperature and rainfall. Severe changes in habitat conditions resulted into the loss of specialist species and rise of a number of several opportunist species. The population of some wasteland species such as *Helicteres jamaicensis*, *Lobelia pyramidalis* and *Phlogacanthus curviflorus* showed a conspicuous decline during the last decades of twentieth century and gradually became untraceable or locally extinct by the end of first decades of 21st century. Such changes were more dramatic in wasteland communities as they turned to scrub due to severe disturbances (Fuller 1987, Green 1990).

The regional abundance and dynamics of herbaceous species were strongly related to their life span. Annual species exhibited highly transient dynamics

from 1960s to 2014, with a sharp decrease in the number of plant species. Perennial species however, showed a much higher degree of local persistence over the study period. Our results show that depletion increased in both the herb and tree groups during 1980s to 1990s. A number of shrubby species such as *Glycyrrhiza glabra*, *Helicteres jamaicensis, Mahonia nepalensis, Nitraria schoberi, Opuntia diillenii*, *Phlogacanthus curviflorus, Psoralea drupacea*, *Securingea virosa, Thyrsostachys oliveri* and *Toddalia aculeata* also got depleted. These species were mostly transition zone species of two different vegetation types. They declined drastically and became locally extinct by 2000s. During recent years, much of these communities or habitats shrank fast due to expansion of agricultural fields. The number of lianas and climbing herb species, however, did not dwindle as fast (Srivastava 2015).

A number of species such as *Cassia absus, C. pumila, Crotalaria ferruginia, Heliotropium ovalifolium, Martynia annaua, Sphenoclea zeylanica, Tribulus terrestris* etc. have currently become very rare (Srivastava et al. 2015). A few climbers such as *Operculina turpethum* and *Thunbergia grandiflora,* once quite frequent in old field and abandoned sites, could now be noticed very occasionally, primarily due to the fast shrinkage in the area of old grasslands. The woody climbers and other plants of local wasteland and forests which have entered endangered status included *Dioscorea pentaphylla*, *Gloriosa superba* and *Rauwolfia serpentina*. A number of species such as *Ailanthus excelsa, Celastrus paniculatus, Careya herbacea, Elaeodendron roxburghii*, *Glochidion velutinum, Gmelina asiatica, Lannea coromondelica, Oroxylum indicum, Pterocarpus marsupium Terminalia bellerica* and *Wrightia tinctoria* were encountered but from one or two spots. The disturbed forest habitat was, however, quite suitable for the preponderance of those species which showed effective multiple regeneration strategy.

CONCLUSION

The demand of plant resources for food, medicine, fiber, fodder, shelter and fuel is growing with human population along with the need for economic development. Land use change is exerting pressure on natural habitats causing their fragmentation and loss. Effects of agrochemicals on wild species and eutrophication of inland water bodies due to agricultural runoff also threaten the species. The pressure on biodiversity and ecosystems services is ever increasing. In present scenario, the conservation of whole of the species pool is a difficult task but it must be attempted till their curative and medicinal importance and their role in ecosystem functions are not fully understood. Taking broad and small scale environmental variation and historical disturbance regimes into consideration, the probable measures of the change in the pattern of species diversity and the rate and reason of biodiversity loss may be made to devise mechanism for region-specific species conservation.

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Supplementary Table 1: Distributional characteristics of families and genera recorded since1960s.

Distribution	Families		Genera	
	Total Number	%.	Total Number	%.
Cosmopolitan and sub-cosmopolitan	45	37.82	56	9.95
Tropical	50	42.02	-	-
Pan -tropical	-	-	53	9.41
Temperate	8	6.72	10	1.77
Discontinuous	6	5.04	97	17.23
Endemic	7	5.88	9	1.60
Anamalous	3	2.52	-	-
Wide	-	-	13	2.31
Unspecified	-	-	325	57.73
Total	119	100	563	100

Supplementary Table 2. New species recorded by various workers during different decades

S.N.	Siddiqui, M. O. (1969) or 1960s	S.N.			Srivastava, A. K. (1981) or 1980s
1.	*Alternanthera paronychoides* Linn.	13.	*Gomphrena celosioides* Mart	1.	*Achyranthes aspera var. argentia* Hook.f,
2.	*Argemone ochroleuca* Sweet.	14.	*Hyptis suaveolens Poit*	2.	*Dioscorea oppositifolia* Linn.
3.	*Bulbostylis capillaries* Kunth.	15.	*Ipomoea fistulosa* Mart.	3.	*Emblia ribes* Burm. f.
4.	*Cassia nodosa* Ham. ex Roxb.	16.	*Laportea interrupta*	4.	*Fimbristylis albo-viridis* Clarke
5.	*Cleome rutidosperma* (Linn.) Scop	17.	*Martynia annua* Linn.	5.	*Fimbristylis tetragona* R. Br.
6.	*Crotolaria mucronata* Desv.	18.	*Nicotiana plumbaginifolia* Viv.	6.	*Grewia disperma* Rottb.
7.	*Crotolaria pusila* Ortega.	19.	*Oxalis latifolia*	7.	*Ipomoea quamoclit* Linn
8.	*Cyperus alulatus* Kern.	20.	*Polygonum minus* Huds.	8.	*Malva rotundiflora* Linn.
9.	*Cyperus cyperoides* Linn.	21.	*Polygonum pulchrum* R. Br.	9.	*Wagatea spicata* Dalz.
10.	*Dentella serpyllifolia* Wall ex. A. Shaw	22.	*Rhyncospora hookeri Boeck*		
11.	*Dysophylla stellata Benth.*	23.	*Typhonium trilobatum* (Linn.) Sch.		Srivastava, S. et al. (2015) or 2010s
12.	*Eleocharis congesta* D. Don.			1.	*Solanum sisymbrifolium* Lam.
	Srivastava, T. N. (1967) or 1970s				
1.	*Alternanthera pungens* H.B. & K.	5.	*Euphorbia geniculata* Orteg.		
2.	*Chenopodium ambrosioides Linn.*	6.	*Passiflora foetida* Linn.		
3.	*Coronopus didymus* (Linn.) Smith.	7.	*Peperomia pellucida* (Linn) H.B.K.		
4.	*Eichhornia crassipes*	8.	*Ruellia tuberosa* Linn.		

Supplementary Table 3. Pattern of depletion of genera last five decades

S.N.	Genera	No. of species reported during						Total species lost	% loss	Species still present
		1960s	1970s	1980s	1990s	2000s	2010s			
1.	*Abutilon*	12	-	9	-	-	-	9	75	3
2.	*Aconitum*	2	-	-	-	2	-	2	100	Nill
3.	*Agrimonia*	1	1	-	-	-	-	1	100	Nill
4.	*Alysicarpus*	8	-	1	-	-	-	1	12	7
5.	*Andrographis*	2	-	1	-	-	-	1	50	1
6.	*Anotis*	1	-	1	-	-	-	1	100	Nill
7.	*Aphanamixis*	1	-	-	1	-	-	1	100	Nill
8.	*Aristida*	3	1	-	1	-	-	2	66.67	1
9.	*Balanites*	1	-	1	-	-	-	1	100	Nill
10.	*Balsamodendron*	1	-	-	-	1	-	1	100	Nill
11.	*Bambusa*	8	-	-	-	5	-	5	62.5	3
12.	*Blepharis*	1	-	1	-	-	-	1	100	Nill
13.	*Blumea*	11	-	1	-	-	-	1	3.09	10
14.	*Bothriocloa*	2	-	-	1	-	-	1	50	1
15.	*Brassaiopsis*	1	-	-	-	1	-	1	100	Nill
16.	*Braya*	1	1	-	-	-	-	1	100	Nill
17.	*Bridelia*	3	-	-	-	1	-	1	33	1
18.	*Browallia*	1	-	1	-	-	-	1	100	Nill
19.	*Brugmansis*	1	1	-	-	-	-	1	100	Nill
20.	*Bulbophyllum*	1	1	-	-	-	-	1	100	Nill
21.	*Bulbostylis*	2	1	-	-	-	-	1	50	1
22.	*Carex*	3	1	-	-	-	-	1	33.33	2
23.	*Careya*	3	-	-	1	-	-	1	33.33	2
24.	*Carpinum*	1	-	-	1	-	-	1	100	Nill
25.	*Cenchrus*	3	-	-	1	-	-	1	33.33	2
26.	*Cercestis*	1	-	1	-	-	-	1	100	Nill
27.	*Clarkia*	1	1	-	-	-	-	1	100	Nill
28.	*Crateva*	2	-	1	-	-	-	1	50	1
29.	*Crotalaria*	11	1	-	-	-	-	1	9.09	10
30.	*Cyathula*	1	-	1	-	-	-	1	100	Nill
31.	*Cymbidium*	1	1	-	-	-	-	1	100	Nill
32.	*Cynoglossum*	3	-	1	-	-	-	1	33.33	2
33.	*Cyperus*	35	1	4	1	-	-	6	17.14	29
34.	*Desmodium*	10	-	1	-	-	-	1	10	9
35.	*Dialium*	1	-	-	-	1	-	1	100	Nill
36.	*Dipteracanthus*	2	2	-	-	-	-	2	100	Nill
37.	*Dysophylla*	1	-	-	1	-	-	1	100	Nill
38.	*Elytrophorus*	2	1	-	-	-	-	1	50	1
39.	*Entada*	1	-	-	-	1	-	1	100	Nill
40.	*Epidendrum*	1	-	-	-	1	-	1	100	Nill
41.	*Eragrostis*	12	1	1	-	-	-	2	16.67	10
42.	*Erycibe*	1	1	-	-	-	-	1	100	Nill
43.	*Eschscholzia*	1	1	-	-	-	-	1	100	Nill
44.	*Eugenia*	7	1	-	-	-	-	1	14.29	8
45.	*Eugenia*	3	-	1	-	-	-	1	33.33	1
46.	*Feronia*	1	-	-	-	1	-	1	100	Nill
47.	*Ficus*	11	-	-	-	1	-	1	9.09	10
48.	*Fimbristylis*.	16	1	2	-	2	-	5	31.25	13
49.	*Firmiana*	1	-	1	-	-	-	1	100	Nill
50.	*Geissaspsis*	1	-	1	-	-	-	1	100	Nill

Supplementary Table 3. (continued)

S.N.	Genera	No. of species reported during						Total species lost	% loss	Species still present
		1960s	1970s	1980s	1990s	2000s	2010s			
51.	*Gelonium*	1	-	-	-	1	-	1	100	Nill
52.	*Geodorum*	2	2	-	-	-	-	2	100	Nill
53.	*Glycyrrhiza*	1	-	-	-	1	-	1	100	Nill
54.	*Grewia*	4	-	-	1	-	-	1	25	4
55.	*Haplophragma*	2	1	-	-	-	-	1	50	1
56.	*Hedyotis*	2	1	-	-	-	-	1	50	1
57.	*Helicteres*	2	-	-	1	-	-	1	50	1
58.	*Hyptianthera*	1	1	-	-	-	-	1	100	Nill
59.	*Indigofera*	9	-	1	-	1	-	2	22.22	7
60.	*Ipomoea*	16	3	-	1	-	-	4	25	13
61.	*Jacquenmontia*	1	-	1	-	-	-	1	100	Nill
62.	*Jatropha*	3	-	-	-	1	-	1	33.33	1
63.	*Justicia*	2	1	-	1	-	-	2	100	Nill
64.	*Kigelia*	1	-	-	-	-	1	1	100	Nill
65.	*Lespedeza*	1	1	-	-	-	-	1	100	Nill
66.	*Leucas*	5	-	1	-	-	-	1	20	4
67.	*Leucopogon*	1	-	-	-	-	1	1	100	Nill
68.	*Lindernia*	12	-	1	1	-	-	2	16.67	10
69.	*Lithocarpus*	1	-	-	1	-	-	1	100	Nill
70.	*Litsaea*	3	-	-	1	-	-	1	33.33	2
71.	*Lobelia*	2	-	-	-	-	1	1	50	1
72.	*Lupinus*	1	-	-	-	1	-	1	100	Nill
73.	*Mahonia*	1	-	-	1	-	-	1	100	Nill
74.	*Marsdenia*	1	-	-	-	1	-	1	100	Nill
75.	*Melaleuca*	1	1	-	-	-	-	1	100	Nill
76.	*Melothria*	1	-	-	1	-	-	1	100	Nill
77.	*Nitraria*	1	-	-	1	-	-	1	100	Nill
78.	*Oberonia*	1	-	1	-	-	-	1	100	Nill
79.	*Ochna*	1	-	1	-	-	-	1	100	Nill
80.	*Opuntia*	3	-	-	1	-	1	2	66.67	1
81.	*Pancratiam*	1	-	-	-	1	-	1	100	Nill
82.	*Panicum*	5	-	1	-	-	-	1	20	4
83.	*Paphiopedilium*	1	-	-	-	1	-	1	100	Nill
84.	*Parkinsonia*	1	-	-	-	-	1	1	100	Nill
85.	*Paullinia*	1	-	-	1	-	-	1	100	Nill
86.	*Pentatropis*	2	-	1	-	-	-	1	50	1
87.	*Phlogacanthus*	1	-	-	1	-	-	1	100	Nill
88.	*Photinia*	1	-	-	1	-	-	1	100	Nill
89.	*Phyllanthus*	5	-	1	-	-	-	1	20	4
90.	*Picrorhiza*	1	-	-	-	1	-	1	100	Nill
91.	*Pimpinella*	1	-	-	-	1	-	1	100	Nill
92.	*Plantago*	4	1	-	-	-	-	1	25	3
93.	*Plectranthus*	4	1	1	1	-	-	3	75	1
94.	*Polygonum*	13	-	-	4	-	-	4	30.77	9
95.	*Porana*	2	1	-	-	-	-	1	50	1
96.	*Pouzolzia*	2	-	1	-	-	-	1	50	1
97.	*Premna*	2	-	1	-	-	-	1	50	1

Supplementary Table 3. (continued)

S.N.	Genera	No. of species reported during						Total species lost	% loss	Species still present
		1960s	1970s	1980s	1990s	2000s	2010s			
98.	*Primula*	3	-	-	-	-	1	1	33.33	2
99.	*Prunella*	1	1	-	-	-	-	1	100	Nill
100.	Psoralea	2	-	-	-	1	-	1	50	1
101.	Rheum	1	-	-	-	1	-	1	100	Nill
102.	*Rivea*	1	-	-	1	-	-	1	100	Nill
103.	*Rumex*	4	-	-	1	-	-	1	25	3
104.	*Saussurea*	2	-	-	-	-	1	1	50	1
105.	Securingea	1	-	-	-	1	-	1	100	Nill
106.	*Senecio*	1	-	1	-	-	-	1	100	Nill
107.	Simmondsia	1	-	-	-	1	-	1	100	Nill
108.	*Smilax*	3	1	-	-	-	-	1	33.33	2
109.	*Solanum*	8	-	1	-	1	-	2	25	7
110.	*Sporobolus*	2	-	-	1	-	-	1	50	1
111.	*Stachytarpheta*	1	-	1	-	-	-	1	100	Nill
112.	*Strobilanthes*	2	-	-	1	-	-	1	50	1
113.	*Stylidium*	1	-	-	-	-	1	1	100	Nill
114.	*Sutera*	2	-	1	-	-	-	1	50	1
115.	*Swertia*	1	-	1	-	-	-	1	100	Nill
116.	*Syzygium*	3	-	-	1	-	-	1	33.33	2
117.	*Tephrosia*	4	1	-	1	-	-	2	50	2
118.	*Teucrium*	1	1	-	-	-	-	1	100	Nill
119.	Thyrsostachys	1	-	-	-	1	-	1	100	Nill
120.	Toddalia	1	-	-	-	1	-	1	100	Nill
121.	*Tylophora*	2	-	1	-	-	-	1	50	1
122.	Uraria	4	-	-	-	1	-	1	25	3
123.	*Vernonia*	5	1	-	-	1	-	2	40	3
124.	Vitis	1	-	-	-	1	-	1	100	Nill
125.	*Zizyphus*	6	1	-	-	-	-	1	16.67	1

Supplementary Table 4. Decadal change in genera in terms of change in the number of species across the terrestrial vegetation of north-eastern of Uttar Pradesh.

S.N.	Genus	1960s	1970s	1980s	1990s	2000s	2010s	S.N.	Genus	1960s	1970s	1980s	1990s	2000s	2010s
1.	*Abelmoschus*	1	1	1	1	1	1	285.	*Kigelia*	1	1	1	1	1	0
2.	*Abrus*	1	1	1	1	1	1	286.	*Kirganelia*	1	1	1	1	1	1
3.	*Abutilon*	12	12	3	3	3	3	287.	*Knoxia*	1	1	1	1	1	1
4.	*Acacia*	6	6	6	6	6	6	288.	*Kydia*	1	1	1	1	1	1
5.	*Acalypha*	2	2	2	2	2	2	289.	*Lactuca*	1	1	1	1	1	1
6.	*Acanthospermum*	1	1	1	1	1	1	290.	*Lagascea*	1	1	1	1	1	1
7.	*Acanthus*	1	1	1	1	1	1	291.	*Lagerstroemia*	2	2	2	2	2	2
8.	*Achyranthes*	1	1	2	2	2	2	292.	*Laggera*	3	3	3	3	3	3
9.	*Aconitum*	2	2	2	2	0	0	293.	*Lannea*	1	1	1	1	1	1
10.	*Acrocephalus*	1	1	1	1	1	1	294.	*Lantana*	2	2	2	2	2	2
11.	*Adenostema*	1	1	1	1	1	1	295.	*Lathyrus*	3	3	3	3	3	3
12.	*Adhatoda*	1	1	1	1	1	1	296.	*Launaea*	3	3	3	3	3	3
13.	*Adina*	1	1	1	1	1	1	297.	*Lawsonia*	1	1	1	1	1	1
14.	*Aegle*	1	1	1	1	1	1	298.	*Leea*	4	4	4	4	4	4
15.	*Aerva*	3	3	3	3	3	3	299.	*Leersia*	1	1	1	1	1	1
16.	*Aeschynomene*	3	3	3	3	3	3	300.	*Leonotis*	1	1	1	1	1	1
17.	*Aganosma*	1	1	1	1	1	1	301.	*Leonurus*	1	1	1	1	1	1
18.	*Agave*	1	1	1	1	1	1	302.	*Lepidagathis*	1	1	1	1	1	1
19.	*Ageratum*	2	2	2	2	2	2	303.	*Lepidium*	2	2	2	2	2	2
20.	*Agrimonia*	1	0	0	0	0	0	304.	*Leptochloa*	2	2	2	2	2	2
21.	*Agropyron*	1	1	1	1	1	1	305.	*Lespedeza*	1	0	0	0	0	0
22.	*Ailanthus*	1	1	1	1	1	1	306.	*Leucaena*	1	1	1	1	1	1
23.	*Ajuga*	2	2	2	2	2	2	307.	*Leucas*	5	5	4	4	4	4
24.	*Alangium*	1	1	1	1	1	1	308.	*Leucopogon*	1	1	1	1	1	0
25.	*Albizia*	2	2	2	2	2	2	309.	*Limnophila*	2	2	2	2	2	2
26.	*Alloteropsis*	1	1	1	1	1	1	310.	*Lindenbergia*	3	3	3	3	3	3
27.	*Alocasia*	1	1	1	1	1	1	311.	*Lindernia*	12	12	11	10	10	10
28.	*Alstonia*	1	1	1	1	1	1	312.	*Lippia*	1	1	1	1	1	1
29.	*Alternanthera*	2	3	3	3	3	3	313.	*Lithocarpus*	1	1	1	0	0	0
30.	*Alysicarpus*	8	8	7	7	7	7	314.	*Litsaea*	3	3	3	2	2	2
31.	*Amaranthus*	5	5	5	5	5	5	315.	*Lobelia*	2	2	2	2	2	1
32.	*Ambrosia*	1	1	1	1	1	1	316.	*Lolium*	2	2	2	2	2	2
33.	*Ammania*	3	3	3	3	3	3	317.	*Ludwigia*	3	3	3	3	3	3
34.	*Amomum*	1	1	1	1	1	1	318.	*Lupinus*	1	1	1	1	0	0
35.	*Amoora*	1	1	1	1	1	1	319.	*Lysimachia*	1	1	1	1	1	1
36.	*Ampelocissus*	1	1	1	1	1	1	320.	*Macaranga*	1	1	1	1	1	1
37.	*Anagallis*	1	1	1	1	1	1	321.	*Madhuca*	1	1	1	1	1	1
38.	*Andrographis*	2	2	1	1	1	1	322.	*Mahonia*	1	1	1	0	0	0
39.	*Aneilema*	1	1	1	1	1	1	323.	*Mallotus*	1	1	1	1	1	1
40.	*Anisomeles*	1	1	1	1	1	1	324.	*Malva*	0	0	1	1	1	1
41.	*Annona*	1	1	1	1	1	1	325.	*Malvastrum*	1	1	1	1	1	1
42.	*Anogeissus*	1	1	1	1	1	1	326.	*Mangifera*	1	1	1	1	1	1
43.	*Anotis*	1	1	0	0	0	0	327.	*Manilkara*	1	1	1	1	1	1
44.	*Anthocephalus*	1	1	1	1	1	1	328.	*Marsdenia*	1	1	1	1	0	0
45.	*Antidesma*	1	1	1	1	1	1	329.	*Martynia*	1	1	1	1	1	1
46.	*Antigonon*	1	1	1	1	1	1	330.	*Mazus*	1	1	1	1	1	1
47.	*Aphanamixis*	1	1	1	0	0	0	331.	*Mecardonia*	1	1	1	1	1	1
48.	*Apluda*	1	1	1	1	1	1	332.	*Medicago*	3	3	3	3	3	3
49.	*Ardisia*	1	1	1	1	1	1	333.	*Melaleuca*	1	0	0	0	0	0
50.	*Argemone*	2	2	2	2	2	2	334.	*Melanocenchris*	1	1	1	1	1	1

Supplementary Table 4. (continued)

S.N.	Genus	1960s	1970s	1980s	1990s	2000s	2010s	S.N.	Genus	1960s	1970s	1980s	1990s	2000s	2010s
51.	*Argyreia*	2	2	2	2	2	2	335.	*Melanthesa*	1	1	1	1	1	1
52.	*Aristida*	3	2	2	1	1	1	336.	*Melilotus*	2	2	2	2	2	2
53.	*Aristolochia*	1	1	1	1	1	1	337.	*Melinis*	1	1	1	1	1	1
54.	*Arnebia*	1	1	1	1	1	1	338.	*Mella*	1	1	1	1	1	1
55.	*Artocarpus*	1	1	1	1	1	1	339.	*Melochia*	1	1	1	1	1	1
56.	*Arundinella*	1	1	1	1	1	1	340.	*Melothria*	1	1	1	0	0	0
57.	*Arundo*	1	1	1	1	1	1	341.	*Merremia*	3	3	3	3	3	3
58.	*Asparagus*	1	1	1	1	1	1	342.	*Meyna*	1	1	1	1	1	1
59.	*Asphodelus*	1	1	1	1	1	1	343.	*Mezoneurum*	1	1	1	1	1	1
60.	*Astercantha*	1	1	1	1	1	1	344.	*Mikania*	2	2	2	2	2	2
61.	*Asystaria*	1	1	1	1	1	1	345.	*Miliusa*	2	2	2	2	2	2
62.	*Atylosia*	1	1	1	1	1	1	346.	*Milletia*	2	2	2	2	2	2
63.	*Avena*	2	2	2	2	2	2	347.	*Mimosa*	2	2	2	2	2	2
64.	*Azadirachta*	1	1	1	1	1	1	348.	*Mitragyna*	1	1	1	1	1	1
65.	*Bacopa*	1	1	1	1	1	1	349.	*Moghania*	4	4	4	4	4	4
66.	*Balanites*	1	1	0	0	0	0	350.	*Mollugo*	1	1	1	1	1	1
67.	*Baliospermum*	1	1	1	1	1	1	351.	*Momordica*	1	1	1	1	1	1
68.	*Balsamodendron*	1	1	1	1	0	0	352.	*Morinda*	1	1	1	1	1	1
69.	*Bambusa*	8	8	8	8	3	3	353.	*Morus*	3	3	3	3	3	3
70.	*Barleria*	2	2	2	2	2	2	354.	*Mucuna*	1	1	1	1	1	1
71.	*Barringtonia*	1	1	1	1	1	1	355.	*Mukia*	1	1	1	1	1	1
72.	*Basella*	1	1	1	1	1	1	356.	*Myrsine*	1	1	1	1	1	1
73.	*Bauhinia*	5	5	5	5	5	5	357.	*Naravelia*	1	1	1	1	1	1
74.	*Beilschmiedia*	1	1	1	1	1	1	358.	*Nelosonia*	1	1	1	1	1	1
75.	*Benincasa*	1	1	1	1	1	1	359.	*Nepeta*	1	1	1	1	1	1
76.	*Berberis*	1	1	1	1	1	1	360.	*Nicandra*	1	1	1	1	1	1
77.	*Bergia*	1	1	1	1	1	1	361.	*Nicotiana*	1	1	1	1	1	1
78.	*Bidens*	1	1	1	1	1	1	362.	*Nitraria*	1	1	1	0	0	0
79.	*Bignonia*	1	1	1	1	1	1	363.	*Nothosaerva*	1	1	1	1	1	1
80.	*Biophytum*	1	1	1	1	1	1	364.	*Oberonia*	1	1	0	0	0	0
81.	*Biscofia*	1	1	1	1	1	1	365.	*Ochna*	1	1	0	0	0	0
82.	*Bixa*	1	1	1	1	1	1	366.	*Ocimum*	5	5	5	5	5	5
83.	*Blainvillea*	1	1	1	1	1	1	367.	*Oenanthe*	1	1	1	1	1	1
84.	*Blepharis*	1	1	0	0	0	0	368.	*Oldenlandia*	6	6	6	6	6	6
85.	*Blumea*	11	11	10	10	10	10	369.	*Operculina*	1	1	1	1	1	1
86.	*Boerhaavia*	1	1	1	1	1	1	370.	*Oplismenus*	2	2	2	2	2	2
87.	*Bombax*	2	2	2	2	2	2	371.	*Opuntia*	3	3	3	2	2	1
88.	*Borassus*	1	1	1	1	1	1	372.	*Orobanche*	1	1	1	1	1	1
89.	*Borreria*	3	3	3	3	3	3	373.	*Oroxylum*	1	1	1	1	1	1
90.	*Bothriocloa*	2	2	2	1	1	1	374.	*Orthosiphon*	1	1	1	1	1	1
91.	*Bothriospermum*	1	1	1	1	1	1	375.	*Osyris*	1	1	1	1	1	1
92.	*Brachiaria*	2	2	2	2	2	2	376.	*Ougeinia*	1	1	1	1	1	1
93.	*Brassaiopsis*	1	1	1	1	0	0	377.	*Oxalis*	3	3	3	3	3	3
94.	*Braya*	1	0	0	0	0	0	378.	*Oxystelma*	1	1	1	1	1	1
95.	*Bridelia*	3	3	3	3	2	2	379.	*Paederia*	1	1	1	1	1	1
96.	*Browallia*	1	1	0	0	0	0	380.	*Pancratiam*	1	1	1	1	0	0
97.	*Brugmansis*	1	0	0	0	0	0	381.	*Panicum*	5	5	4	4	4	4
98.	*Buddleia*	1	1	1	1	1	1	382.	*Paphiopedilium*	1	1	1	1	0	0
99.	*Bulbophyllum*	1	0	0	0	0	0	383.	*Parkinsonia*	1	1	1	1	1	0
100.	*Bulbostylis*.	2	1	1	1	1	1	384.	*Parthenium*	1	1	1	1	1	1
101.	*Butea*	2	2	2	2	2	2	385.	*Paspalidium*	1	1	1	1	1	1
102.	*Caesalpinia*	3	3	3	3	3	3	386.	*Paspalum*	2	2	2	2	2	2
103.	*Caesulia*	1	1	1	1	1	1	387.	*Passiflora*	0	1	1	1	1	1

Supplementary Table 4. (continued)

S.N.	Genus	1960s	1970s	1980s	1990s	2000s	2010s	S.N.	Genus	1960s	1970s	1980s	1990s	2000s	2010s
104.	*Calamus*	1	1	1	1	1	1	388.	*Paullinia*	1	1	1	0	0	0
105.	*Calanthe*	1	1	1	1	1	1	389.	*Pedalium*	1	1	1	1	1	1
106.	*Callicarpa*	1	1	1	1	1	1	390.	*Peltophorum*	1	1	1	1	1	1
107.	*Calotropis*	2	2	2	2	2	2	391.	*Pentapetes*	1	1	1	1	1	1
108.	*Campanula*	2	2	2	2	2	2	392.	*Pentatropis*	2	2	1	1	1	1
109.	*Campsis*	1	1	1	1	1	1	393.	*Peperomia*	0	1	1	1	1	1
110.	*Cannabis*	1	1	1	1	1	1	394.	*Pergularia*	1	1	1	1	1	1
111.	*Canscora*	3	3	3	3	3	3	395.	*Peristrophe*	1	1	1	1	1	1
112.	*Capparis*	1	1	1	1	1	1	396.	*Perotis*	1	1	1	1	1	1
113.	*Capsella*	1	1	1	1	1	1	397.	*Phalaris*	1	1	1	1	1	1
114.	*Cardamine*	1	1	1	1	1	1	398.	*Phlogacanthus*	1	1	1	0	0	0
115.	*Cardiospermum*	1	1	1	1	1	1	399.	*Phoenix*	1	1	1	1	1	1
116.	*Carex*	3	2	2	2	2	2	400.	*Photinia*	1	1	1	0	0	0
117.	*Careya*	3	3	3	2	2	2	401.	*Phragmites*	2	2	2	2	2	2
118.	*Carissa*	1	1	1	1	1	1	402.	*Phyla*	1	1	1	1	1	1
119.	*Carpinum*	1	1	1	0	0	0	403.	*Phyllanthus*	5	5	4	4	4	4
120.	*Carthamus*	1	1	1	1	1	1	404.	*Physalis*	3	3	3	3	3	3
121.	*Casearia*	3	3	3	3	3	3	405.	*Picrorhiza*	1	1	1	1	0	0
122.	*Cayretia*	1	1	1	1	1	1	406.	*Pimpinella*	1	1	1	1	0	0
123.	*Celastrus*	1	1	1	1	1	1	407.	*Piper*	1	1	1	1	1	1
124.	*Celosia*	2	2	2	2	2	2	408.	*Pithecellobium*	1	1	1	1	1	1
125.	*Celsia*	1	1	1	1	1	1	409.	*Plantago*	4	3	3	3	3	3
126.	*Celtis*	1	1	1	1	1	1	410.	*Plectranthus*	4	3	2	1	1	1
127.	*Cenchrus*	3	3	3	2	2	2	411.	*Plectronia*	1	1	1	1	1	1
128.	*Centaurium*	2	2	2	2	2	2	412.	*Pluchea*	2	2	2	2	2	2
129.	*Centella*	1	1	1	1	1	1	413.	*Plumbago*	1	1	1	1	1	1
130.	*Centipeda*	1	1	1	1	1	1	414.	*Pogostemon*	1	1	1	1	1	1
131.	*Cercestis*	1	1	0	0	0	0	415.	*Polyalthia*	1	1	1	1	1	1
132.	*Chenopodium*	2	3	3	3	3	3	416.	*Polycarpaea*	1	1	1	1	1	1
133.	*Chloris*	2	2	2	2	2	2	417.	*Polycarpon*	1	1	1	1	1	1
134.	*Chrozophora*	2	2	2	2	2	2	418.	*Polygala*	2	2	2	2	2	2
135.	*Chrysanthellum*	1	1	1	1	1	1	419.	*Polygonum*	13	13	13	9	9	9
136.	*Chrysopogon*	1	1	1	1	1	1	420.	*Polypogon*	1	1	1	1	1	1
137.	*Cichorium*	1	1	1	1	1	1	421.	*Pongamia*	1	1	1	1	1	1
138.	*Cirsium*	1	1	1	1	1	1	422.	*Porana*	2	1	1	1	1	1
139.	*Cissampelos*	1	1	1	1	1	1	423.	*Portulaca*	3	3	3	3	3	3
140.	*Cissus*	1	1	1	1	1	1	424.	*Potentilla*	1	1	1	1	1	1
141.	*Clarkia*	1	0	0	0	0	0	425.	*Pouzolzia*	2	2	1	1	1	1
142.	*Clausena*	1	1	1	1	1	1	426.	*Premna*	2	2	1	1	1	1
143.	*Clematis*	2	2	2	2	2	2	427.	*Primula*	3	3	3	3	3	2
144.	*Cleome*	4	4	4	4	4	4	428.	*Prosopis*	1	1	1	1	1	1
145.	*Clerodendron*	3	3	3	3	3	3	429.	*Prunella*	1	0	0	0	0	0
146.	*Clitoria*	1	1	1	1	1	1	430.	*Psoralea*	2	2	2	2	1	1
147.	*Cnidium*	1	1	1	1	1	1	431.	*Pterocarpus*	1	1	1	1	1	1
148.	*Coccinia*	1	1	1	1	1	1	432.	*Pterospermum*	1	1	1	1	1	1
149.	*Cocculus*	2	2	2	2	2	2	433.	*Pulicaria*	2	2	2	2	2	2
150.	*Cochlospermum*	1	1	1	1	1	1	434.	*Pupalia*	1	1	1	1	1	1
151.	*Coix*	1	1	1	1	1	1	435.	*Putranjiva*	1	1	1	1	1	1
152.	*Coldenia*	1	1	1	1	1	1	436.	*Ranunculus*	2	2	2	2	2	2
153.	*Colebroakia*	1	1	1	1	1	1	437.	*Rauwolfia*	2	2	2	2	2	2
154.	*Combretum*	2	2	2	2	2	2	438.	*Rheum*	1	1	1	1	0	0
155.	*Commelina*	5	5	5	5	5	5	439.	*Rhus*	2	2	2	2	2	2
156.	*Convolvulus*	2	2	2	2	2	2	440.	*Rhynchosia*	1	1	1	1	1	1

Supplementary Table 4. (continued)

S.N.	Genus	1960s	1970s	1980s	1990s	2000s	2010s	S.N.	Genus	1960s	1970s	1980s	1990s	2000s	2010s
157.	*Conyza*	4	4	4	4	4	4	441.	*Rhynchspora*	1	1	1	1	1	1
158.	*Corchorus*	4	4	4	4	4	4	442.	*Ricinus*	1	1	1	1	1	1
159.	*Cordia*	1	1	1	1	1	1	443.	*Rivea*	1	1	1	0	0	0
160.	*Coronopus*	0	1	1	1	1	1	444.	*Rorippa*	1	1	1	1	1	1
161.	*Costus*	1	1	1	1	1	1	445.	*Rosa*	1	1	1	1	1	1
162.	*Cotula*	2	2	2	2	2	2	446.	*Rottboelia*	1	1	1	1	1	1
163.	*Crataeva*	2	2	1	1	1	1	447.	*Rubia*	1	1	1	1	1	1
164.	*Crinum*	1	1	1	1	1	1	448.	*Rubus*	1	1	1	1	1	1
165.	*Crotalaria*	11	10	10	10	10	10	449.	*Ruellia*	3	4	4	4	4	4
166.	*Croton*	1	2	2	2	2	2	450.	*Rumex*	4	4	4	3	3	3
167.	*Cryptolepis*	2	2	2	2	2	2	451.	*Rungia*	2	2	2	2	2	2
168.	*Cryptostegia*	1	1	1	1	1	1	452.	*Saccharum*	2	2	2	2	2	2
169.	*Cucumis*	2	2	2	2	2	2	453.	*Sacciolepis*	2	2	2	2	2	2
170.	*Curculigo*	1	1	1	1	1	1	454.	*Salix*	1	1	1	1	1	1
171.	*Cuscuta*	2	2	2	2	2	2	455.	*Salvia*	2	2	2	2	2	2
172.	*Cyathocline*	1	1	1	1	1	1	456.	*Sanguinaria*	1	1	1	1	1	1
173.	*Cyathula*	1	1	0	0	0	0	457.	*Sapindus*	2	2	2	2	2	2
174.	*Cymbidium*	1	0	0	0	0	0	458.	*Saraca*	1	1	1	1	1	1
175.	*Cymbopogon*	1	1	1	1	1	1	459.	*Sarcococca*	1	1	1	1	1	1
176.	*Cynoctonum*	1	1	1	1	1	1	460.	*Saussurea.*	2	2	2	2	2	1
177.	*Cynodon*	1	1	1	1	1	1	461.	*Schizachyrium*	1	1	1	1	1	1
178.	*Cynoglossum*	3	3	2	2	2	2	462.	*Schleichera*	1	1	1	1	1	1
179.	*Cynotis*	1	1	1	1	1	1	463.	*Scindapsus*	1	1	1	1	1	1
180.	*Cyperus*	35	34	30	29	29	29	464.	*Scirpus*	9	9	9	9	9	9
181.	*Cyrtococcum*	1	1	1	1	1	1	465.	*Scoparia*	1	1	1	1	1	1
182.	*Dactyloctenium*	1	1	1	1	1	1	466.	*Securingea*	1	1	1	1	0	0
183.	*Dalbergia*	4	4	4	4	4	4	467.	*Semecarpus*	1	1	1	1	1	1
184.	*Datura*	3	3	3	3	3	3	468.	*Senecio*	1	1	0	0	0	0
185.	*Dendrobium*	1	1	1	1	1	1	469.	*Senna*	12	12	12	12	12	12
186.	*Dendrophthoe*	1	1	1	1	1	1	470.	*Sesbania*	2	2	2	2	2	2
187.	*Dentella*	1	1	1	1	1	1	471.	*Sesli*	1	1	1	1	1	1
188.	*Derris*	1	1	1	1	1	1	472.	*Setaria*	3	3	3	3	3	3
189.	*Desmodium*	10	10	9	9	9	9	473.	*Shorea*	1	1	1	1	1	1
190.	*Desmostachya*	1	1	1	1	1	1	474.	*Sida*	6	6	6	6	6	6
191.	*Dialium*	1	1	1	1	0	0	475.	*Siegesbeckia*	1	1	1	1	1	1
192.	*Dichanthium*	1	1	1	1	1	1	476.	*Silene*	1	1	1	1	1	1
193.	*Digera*	1	1	1	1	1	1	477.	*Simmondsia*	1	1	1	1	0	0
194.	*Digitalis*	1	1	1	1	1	1	478.	*Sisymbrium*	1	1	1	1	1	1
195.	*Digitaria*	5	5	5	5	5	5	479.	*Smilax*	3	2	2	2	2	2
196.	*Dillenia*	3	3	3	3	3	3	480.	*Solanum*	8	8	7	7	6	7
197.	*Dioscorea*	5	5	6	6	6	6	481.	*Solena*	1	1	1	1	1	1
198.	*Diospyros*	4	4	4	3	3	3	482.	*Soliva*	1	1	1	1	1	1
199.	*Diplocyclos*	1	1	1	1	1	1	483.	*Sonchus*	3	3	3	3	3	3
200.	*Dipteracanthus*	2	0	0	0	0	0	484.	*Spergula*	1	1	1	1	1	1
201.	*Dopatorium*	1	1	1	1	1	1	485.	*Spermacoce*	1	1	1	1	1	1
202.	*Dysophylla*	2	2	2	1	1	1	486.	*Sphaeranthus*	1	1	1	1	1	1
203.	*Echinochloa*	2	2	2	2	2	2	487.	*Sphenoclea*	1	1	1	1	1	1
204.	*Echinops*	1	1	1	1	1	1	488.	*Spilanthes*	3	3	3	3	3	3
205.	*Eclipta*	1	1	1	1	1	1	489.	*Spondias*	1	1	1	1	1	1
206.	*Ehretia*	1	1	1	1	1	1	490.	*Sporobolus*	2	2	2	1	1	1
207.	*Eleocharis*	4	4	4	4	4	4	491.	*Stachytarpheta*	1	1	0	0	0	0
208.	*Eleodendron*	1	1	1	1	1	1	492.	*Stellaria*	1	1	1	1	1	1
209.	*Elephantopus*	1	1	1	1	1	1	493.	*Stephania*	1	1	1	1	1	1

Supplementary Table 4. (continued)

S.N.	Genus	1960s	1970s	1980s	1990s	2000s	2010s	S.N.	Genus	1960s	1970s	1980s	1990s	2000s	2010s
210.	*Eleusine*	2	2	2	2	2	2	494.	*Sterculia*	1	1	1	1	1	1
211.	*Elytrophorus*	2	1	1	1	1	1	495.	*Stereospermum*	1	1	1	1	1	1
212.	*Embelia*	1	1	2	2	2	2	496.	*Streblus*	1	1	1	1	1	1
213.	*Emilia*	1	1	1	1	1	1	497.	*Striga*	1	1	1	1	1	1
214.	*Enhydra*	1	1	1	1	1	1	498.	*Strobilanthes*	2	2	2	1	1	1
215.	*Entada*	1	1	1	1	0	0	499.	*Strychnos*	1	1	1	1	1	1
216.	*Epidendrum*	1	1	1	1	0	0	500.	*Stylidium*	1	1	1	1	1	0
217.	*Epilobium*	1	1	1	1	1	1	501.	*Stylosanthes*	1	1	1	1	1	1
218.	*Eragrostis*	12	11	10	10	10	10	502.	*Sutera*	2	2	1	1	1	1
219.	*Eranthemum*	1	1	1	1	1	1	503.	*Swertia*	1	1	0	0	0	0
220.	*Erigeron*	2	2	2	2	2	2	504.	*Synedrella*	1	1	1	1	1	1
221.	*Eriochloa*	1	1	1	1	1	1	505.	*Syzygium*	3	3	3	2	2	2
222.	*Eruca*	1	1	1	1	1	1	506.	*Tamarix*	1	1	1	1	1	1
223.	*Erycibe*	1	0	0	0	0	0	507.	*Tecomaria*	1	1	1	1	1	1
224.	*Eschscholzia*	1	0	0	0	0	0	508.	*Tectona*	1	1	1	1	1	1
225.	*Eucalyptus*	2	2	2	2	2	2	509.	*Telosma*	1	1	1	1	1	1
226.	*Eugenia*	3	2	1	1	1	1	510.	*Tephrosia*	4	3	3	2	2	2
227.	*Eulaliopsis*	1	1	1	1	1	1	511.	*Teramnus*	1	1	1	1	1	1
228.	*Eupatorium*	3	3	3	3	3	3	512.	*Terminalia*	5	5	5	5	5	5
229.	*Euphorbia*	7	8	8	8	8	8	513.	*Tetrastigma*	1	1	1	1	1	1
230.	*Evolvulus*	2	2	2	2	2	2	514.	*Teucrium*	1	0	0	0	0	0
231.	*Exacum*	1	1	1	1	1	1	515.	*Themeda*	2	2	2	2	2	2
232.	*Feronia*	1	1	1	1	0	0	516.	*Thespesia*	1	1	1	1	1	1
233.	*Ficus*	11	11	11	11	10	10	517.	*Thespis*	1	1	1	1	1	1
234.	*Fimbristylis*	16	15	15	15	13	13	518.	*Thunbergia*	1	1	1	1	1	1
235.	*Firmiana*	1	1	0	0	0	0	519.	*Thyrsostachys*	1	1	1	1	0	0
236.	*Flacourtia*	2	2	2	2	2	2	520.	*Tiliacora*	1	1	1	1	1	1
237.	*Flaveria*	1	1	1	1	1	1	521.	*Tinospora*	2	2	2	2	2	2
238.	*Fragaria*	1	1	1	1	1	1	522.	*Tithonia*	1	1	1	1	1	1
239.	*Fumaria*	1	1	1	1	1	1	523.	*Toddalia*	1	1	1	1	0	0
240.	*Galinsoga*	1	1	1	1	1	1	524.	*Toona*	1	1	1	1	1	1
241.	*Garuga*	1	1	1	1	1	1	525.	*Torenia*	1	1	1	1	1	1
242.	*Geissaspsis*	1	1	0	0	0	0	526.	*Tragia*	1	1	1	1	1	1
243.	*Gelonium*	1	1	1	1	0	0	527.	*Trema*	1	1	1	1	1	1
244.	*Geodorum*	2	0	0	0	0	0	528.	*Trewia*	1	1	1	1	1	1
245.	*Geranium*	1	1	1	1	1	1	529.	*Trianthema*	1	1	1	1	1	1
246.	*Glinus*	2	2	2	2	2	2	530.	*Tribulus*	1	1	1	1	1	1
247.	*Glochidion*	3	3	3	3	3	3	531.	*Trichodesma*	1	1	1	1	1	1
248.	*Gloriosa*	1	1	1	1	1	1	532.	*Trichosanthes*	2	2	2	2	2	2
249.	*Glossocardia*	1	1	1	1	1	1	533.	*Tridax*	1	1	1	1	1	1
250.	*Glossogyne*	1	1	1	1	1	1	534.	*Triumfetta*	2	2	2	2	2	2
251.	*Glossostigma*	1	1	1	1	1	1	535.	*Tylophora*	2	2	1	1	1	1
252.	*Glycosmis*	1	1	1	1	1	1	536.	*Typhonium*	1	1	1	1	1	1
253.	*Glycyrrhiza*	1	1	1	1	0	0	537.	*Uraria*	4	4	4	4	3	3
254.	*Gmelina*	1	1	1	1	1	1	538.	*Urena*	3	3	3	3	3	3
255.	*Gnaphalium*	4	4	4	4	4	4	539.	*Urochloa*	1	1	1	1	1	1
256.	*Gomphrena*	2	2	2	2	2	2	540.	*Urtica*	1	1	1	1	1	1
257.	*Grangea*	1	1	1	1	1	1	541.	*Vaccaria*	1	1	1	1	1	1
258.	*Grewia*	4	4	5	4	4	4	542.	*Vallaris*	1	1	1	1	1	1
259.	*Hackelochloa*	1	1	1	1	1	1	543.	*Ventilago*	1	1	1	1	1	1
260.	*Haplophragma*	2	1	1	1	1	1	544.	*Verbascum*	1	1	1	1	1	1
261.	*Hedera*	1	1	1	1	1	1	545.	*Verbena*	2	2	2	2	2	2
262.	*Hedyotis*	2	1	1	1	1	1	546.	*Vernonia*	5	4	4	4	3	3

Supplementary Table 4. (continued)

S.N.	Genus	1960s	1970s	1980s	1990s	2000s	2010s	S.N.	Genus	1960s	1970s	1980s	1990s	2000s	2010s
263.	*Helicteres*	2	2	2	1	1	1	547.	*Veronica*	1	1	1	1	1	1
264.	*Heliotropium*	6	6	6	6	6	6	548.	*Vetiveria*	1	1	1	1	1	1
265.	*Hemarthria*	1	1	1	1	1	1	549.	*Vicia*	1	1	1	1	1	1
266.	*Hemidesmus*	1	1	1	1	1	1	550.	*Vicoa*	2	2	2	2	2	2
267.	*Hemigraphis*	2	2	2	2	2	2	551.	*Viola*	1	1	1	1	1	1
268.	*Hetropogon*	1	1	1	1	1	1	552.	*Vitex*	1	1	1	1	1	1
267.	*Holarrhena*	1	1	1	1	1	1	553.	*Vitis*	1	1	1	1	0	0
270.	*Holoptelea*	1	1	1	1	1	1	554.	*Volutarella*	1	1	1	1	1	1
271.	*Hygrophila*	1	1	1	1	1	1	555.	*Wagatea*	0	0	1	1	1	1
272.	*Hymenodyictyon*	1	1	1	1	1	1	556.	*Wahlenbergia*	1	1	1	1	1	1
273.	*Hyptianthera*	1	0	0	0	0	0	557.	*Wendlandia*	2	2	2	2	2	2
274.	*Hyptis*	1	1	1	1	1	1	558.	*Withania*	1	1	1	1	1	1
275.	*Ichnocarpus*	1	1	1	1	1	1	559.	*Woodfordia*	1	1	1	1	1	1
276.	*Imperata*	1	1	1	1	1	1	560.	*Wrightia*	1	1	1	1	1	1
277.	*Indigofera*	9	9	8	8	7	7	561.	*Xanthium*	1	1	1	1	1	1
278.	*Ionidium*	1	1	1	1	1	1	562.	*Xeromphis*	2	2	2	2	2	2
279.	*Ipomoea*	16	13	14	13	13	13	563.	*Xylosma*	1	1	1	1	1	1
280.	*Isachne*	2	2	2	2	2	2	564.	*Youngia*	1	1	1	1	1	1
281.	*Jacquenmontia*	1	1	0	0	0	0	565.	*Zephyranthes*	3	3	3	3	3	3
282.	*Jatropha*	3	3	3	3	2	2	566.	*Zeuxine*	1	1	1	1	1	1
283.	*Juncus*	1	1	1	1	1	1	567.	*Ziziphus*	6	5	5	5	5	5
284.	*Justicia*	2	1	1	0	0	0	568.	*Zornia*	1	1	1	1	1	1

Supplementary Table 5. The loss of monotypic families during the last five decades

S.N.	Family	1960s	1970s	1980s	1990s	2000s	2010s
1.	Ochnaceae	+	+	-	-	-	-
2.	Betulaceae	+	+	+	-	-	-
3.	Fagaceae	+	+	+	-	-	-
4.	Balsaminaceae	+	+	+	+	-	-
5.	Bambusaceae	+	+	+	+	-	-
6.	Simmondsiaceae	+	+	+	+	-	-
7.	Ericaceae	+	+	+	+	+	-
8.	Stylidaceae	+	+	+	+	+	-

Supplementary Table 6. Number of species depleted within families during the last five decades.

S.N.	Family	Total no. of Species						Depleted species	% loss of Species	Species Still Present
		1960s	1970	1980	1990	2000	2010			
1.	Acanthaceae	29	3	2	3	-	-	8	27.59	22
2.	Amaranthaceae	19	-	1	-	-	-	1	5.26	20
3.	Amaryllidaceae	5	-	-	-	1	-	1	20	4
4.	Apiaceae	5	-	-	-	1	-	1	20	4
5.	Araliaceae	2	-	-	-	1	-	1	50	1
6.	Asclepiadaceae	14	-	2	-	1	-	3	21.43	11
7.	Asteraceae	91	1	2	-	1	1	5	5.5	86
8.	Balsaminaceae	1	-	-	-	1	-	1	100	Nill
9.	Bambusaceae	1	-	-	-	1	-	1	100	Nill
10.	Berberidaceae	2	-	-	1	-	-	1	50	1
11.	Betulaceae	1	-	-	1	-	-	1	100	Nill
12.	Bignoniaceae	8	1	-	-	-	1	2	25	6
13.	Boraginaceae	13	-	1	-	-	-	1	7.69	12
14.	Cactaceae	3	-	-	1	-	1	2	66.67	1
15.	Caesalpinaceae	23	-	-	-	1	1	2	8.7	6
16.	Capparidaceae	7	-	1	-	-	-	1	14.29	22
17.	Convolvulaceae	31	5	1	2	-	-	8	25.81	24
18.	Cucurbitaceae	11	-		1	-	-	1	9.09	10
19.	Cyperaceae	70	4	6	1	2	-	13	18.57	59
20.	Ericaceae	1	-	-	-	-	1	1	100	Nill
21.	Euphorbiaceae	39	-	1	-	4	-	5	12.85	36
22.	Fagaceae	1	-	-	1	-	-	1	100	Nill
23.	Gentianaceae	7	-	1	-	-	-	1	14.29	6
24.	Lamiaceae	29	3	2	1	-	-	6	20.69	23
25.	Lauraceae	4	-	-	1	-	-	1	25	3
26.	Lecythiadaceae	4	-	-	1	-	-	1	25	3
27.	Lobaliaceae	2	-	-	-	-	1	1	50	1
28.	Malvaceae	26	-	9	-	-	-	9	34.62	18
29.	Meliaceae	4	-	-	1	-	-	1	25	4
30.	Mimosaceae	14	-	-	-	1	-	1	7.14	13
31.	Moraceae	16	-	-	-	1	-	1	6.25	15
32.	Myrtaceae	9	2	1	1	-	-	4	44.44	5
33.	Ochnaceae	1	-	1	-	-	-	1	100	Nill
34.	Onagraceae	5	1	-	-	-	-	1	20	4
35.	Orchidaceae	9	4	1	-	2	-	7	77.78	3
36.	Papaveraceae	4	1	-	-	-	-	1	25	3
37.	Papilionaceae	93	4	4	1	5	-	14	15.05	80
38.	Plantaginaceae	4	1	-	-	-	-	1	25	3
39.	Poaceae	103	3	2	4	5	-	14	13.59	89
40.	Polygonaceae	19	-	-	5	1	-	6	31.58	13
41.	Primulaceae	5	-	-	-	-	1	1	20	4
42.	Ranunculaceae	7	-	-	-	2	-	2	28.57	5
43.	Rhamnaceae	7	1	-	-	-	-	1	14.29	6
44.	Rosaceae	6	1	-	1	-	-	2	33.33	4
45.	Rubiaceae	28	2	1	-	-	-	3	10.71	25
46.	Rutaceae	5	-	-	-	2	-	2	40	3
47.	Sapindaceae	5	-	-	1	-	-	1	20	4
48.	Scrophulariaceae	33	-	2	1	1	-	4	12.12	29
49.	Simaroubaceae	2	-	1	-	-	-	1	50	1

Supplementary Table 6. (continued)

S.N.	Family	Total no. of Species						Depleted species	% loss of Species	Species Still Present
		1960s	1970	1980	1990	2000	2010			
50.	Simmondsiaceae	1	-	-	-	1	-	1	100	Nill
51.	Smilaceae	3	1	-	-	-	-	1	33.33	2
52.	Solanaceae	19	1	2	-	1	-	4	21.05	16
53.	Sterculiaceae	5	-	1	1	-	-	2	40	3
54.	Stylidiaceae	1	-	-	-	-	1	1	100	Nill
55.	Tiliaceae	11	-	-	1	-	-	1	9.09	10
56.	Urticaceae	3	-	1	-	-	-	1	33.33	2
57.	Verbenaceae	17	-	2	1	-	-	3	17.65	15
58.	Vitaceae	6	-	1	-	1	-	2	33.33	4
59.	Zygophyllaceae	2	-	-	1	-	-	1	50	1

Supplementary Table7. Change in sum total number of species and genera within families during the last five decades.

S.N.	Family	1960s		1970s		1980s		1990s		2000s		2010s	
		Genera	Species	Genera	Species	Genera	Species	Genera	Species	Genera	Species	Genera	Species
1.	Acanthaceae	20	29	19	27	18	25	16	22	16	22	16	22
2.	Agavaceae	1	1	1	1	1	1	1	1	1	1	1	1
3.	Aizoaceae	1	1	1	1	1	1	1	1	1	1	1	1
4.	Amaranthaceae	10	19	10	20	9	20	9	20	9	20	9	20
5.	Amaryllidaceae	3	5	3	5	3	5	3	5	2	4	2	4
6.	Anacardiaceae	5	6	5	6	5	6	5	6	5	6	5	6
7.	Annonaceae	3	4	3	4	3	4	3	4	3	4	3	4
8.	Apiaceae	5	5	5	5	5	5	5	5	4	4	4	4
9.	Apocynaceae	8	9	8	9	8	9	8	9	8	9	9	11
10.	Araceae	3	3	3	3	3	3	3	3	3	3	3	3
11.	Araliaceae	2	2	2	2	2	2	2	2	1	1	1	1
12.	Arecaceae	3	3	3	3	3	3	3	3	3	3	3	3
13.	Aristolochiaceae	1	1	1	1	1	1	1	1	1	1	1	1
14.	Asclepiadaceae	10	14	10	14	10	12	10	12	9	11	9	11
15.	Asteraceae	53	91	53	90	52	88	52	88	52	87	52	86
16.	Balsaminaceae	1	1	1	1	1	1	1	1	-	-	-	-
17.	Bambusaceae	1	1	1	1	1	1	1	1	-	-	-	-
18.	Basellaceae	1	1	1	1	1	1	1	1	1	1	1	1
19.	Berberidaceae	2	2	2	2	2	2	1	1	1	1	1	1
20.	Betulaceae	1	1	1	1	1	1	-	-	-	-	-	-
21.	Bignoniaceae	7	8	7	7	7	7	7	7	7	7	6	6
22.	Bixaceae	2	2	2	2	2	2	2	2	2	2	2	2
23.	Bombaceae	1	2	1	2	1	2	1	2	1	2	1	2
24.	Boraginaceae	6	13	6	13	6	12	6	12	6	12	6	12
25.	Brassicaceae	6	7	7	8	7	8	7	8	7	8	7	8
26.	Buddleiaceae	1	1	1	1	1	1	1	1	1	1	1	1
27.	Buxaceae	1	1	1	1	1	1	1	1	1	1	1	1
28.	Cactaceae	1	3	1	3	1	3	1	2	1	2	1	1
29.	Caesalpinaceae	6	23	6	23	7	24	7	24	6	23	4	22
30.	Campanulaceae	2	3	2	3	2	3	2	3	2	3	2	3
31.	Cannabinaceae	1	1	1	1	1	1	1	1	1	1	1	1
32.	Capparidaceae	3	7	3	7	3	6	3	6	3	6	3	6
33.	Caryophyllaceae	6	6	6	6	6	6	6	6	6	6	6	6
34.	Celastraceae	2	2	2	2	2	2	2	2	2	2	2	2
35.	Chenopodiaceae	1	2	1	3	1	3	1	3	1	3	1	3
36.	Combretaceae	3	8	3	8	3	8	3	8	3	8	3	8
37.	Commelinaceae	3	7	3	7	2	6	3	7	3	7	3	7
38.	Convolvulaceae	10	31	9	26	8	26	7	24	7	24	7	24
39.	Cornaceae	1	1	1	1	1	1	1	1	1	1	1	1
40.	Cucurbitaceae	9	11	9	11	9	11	8	10	8	10	8	10
41.	Cuscutaceae	1	2	1	2	1	2	1	2	1	2	1	2
42.	Cyperaceae	7	70	7	66	8	63	7	61	7	59	7	59
43.	Dilleniaceae	1	3	1	3	1	3	1	3	1	3	1	3
44.	Dioscoreaceae	1	5	1	5	1	6	1	6	1	6	1	6
45.	Dipterocarpacea	1	1	1	1	1	1	1	1	1	1	1	1
46.	Ebenaceae	1	4	1	4	1	4	1	3	1	3	1	3
47.	Ehretiaceae	2	2	2	2	2	2	2	2	2	2	2	2
48.	Elatinaceae	1	1	1	1	1	1	1	1	1	1	1	1
49.	Ericaceae	1	1	1	1	1	1	1	1	1	1	-	-

Supplementary Table 7. (continued)

S.N.	Family	1960s		1970s		1980s		1990s		2000s		2010s	
		Genera	Species	Genera	Species	Genera	Species	Genera	Species	Genera	Species	Genera	Species
50.	Euphorbiaceae	21	39	21	41	21	40	21	40	19	36	19	36
51.	Fagaceae	1	1	1	1	1	1	-	-	-	-	-	-
52.	Flacourtiaceae	2	3	2	3	2	3	2	3	2	3	2	3
53.	Fumariaceae	1	1	1	1	1	1	1	1	1	1	1	1
54.	Gentianaceae	4	7	4	7	3	6	3	6	3	6	3	6
55.	Geraniaceae	1	1	1	1	1	1	1	1	1	1	1	1
56.	Hypoxidaceae	1	1	1	1	1	1	1	1	1	1	1	1
57.	Juncaceae	1	1	1	1	1	1	1	1	1	1	1	1
58.	Lamiaceae	16	29	14	26	14	24	14	23	14	23	14	23
59.	Lauraceae	2	4	2	4	2	4	2	3	2	3	2	3
60.	Lecythidaceae	2	4	2	4	2	4	2	3	2	3	2	3
61.	Leeaceae	1	4	1	4	1	4	1	4	1	4	1	4
62.	Liliaceae	3	3	3	3	3	3	3	3	3	3	3	3
63.	Lobaliaceae	1	2	1	2	1	2	1	2	1	2	1	1
64.	Loganiaceae	2	2	2	2	2	2	2	2	2	2	2	2
65.	Loranthaceae	1	1	1	1	1	1	1	1	1	1	1	1
66.	Lythraceae	4	7	7	4	7	4	7	4	7	4	7	4 7
67.	Malvaceae	8	26	8	26	9	18	9	18	9	18	9	18
68.	Martyniaceae	1	1	1	1	1	1	1	1	1	1	1	1
69.	Meliaceae	4	4	4	4	4	4	3	3	3	3	3	3
70.	Menispermaceae	5	7	5	7	5	7	5	7	5	7	5	7
71.	Mimocaceae	7	14	7	14	7	14	7	14	6	13	6	13
72.	Molluginaceae	2	3	2	3	2	3	2	3	2	3	2	3
73.	Moraceae	4	16	4	16	4	16	4	16	4	15	4	15
74.	Myrsinaceae	3	3	3	3	3	4	3	4	3	4	3	4
75.	Myrtaceae	4	9	3	7	3	6	3	5	3	5	3	5
76.	Nyctanginaceae	1	1	1	1	1	1	1	1	1	1	1	1
77.	Ochnaceae	1	1	1	1	-	-	-	-	-	-	-	-
78.	Onagaraceae	3	5	2	4	2	4	2	4	2	4	2	4
79.	Orchidaceae	9	10	6	6	5	5	5	5	3	3	3	3
80.	Orobanchaceae	1	1	1	1	1	1	1	1	1	1	1	1
81.	Oxalidaceae	3	5	2	4	2	4	2	4	2	4	2	4
82.	Papaveraceae	3	4	2	3	2	3	2	3	2	3	2	3
83.	Papilionaceae	36	93	35	90	33	85	33	84	31	79	32	80
84.	Passiflraceae	+	+	1	1	1	1	1	1	1	1	1	1
85.	Pedaliaceae	1	1	1	1	1	1	1	1	1	1	1	1
86.	Piperaceae	1	1	2	2	2	2	2	2	2	2	2	2
87.	Plantaginaceae	1	4	1	3	1	3	2	4	1	3	1	3
88.	Plumbaginaceae	1	1	1	1	1	1	1	1	1	1	1	1
89.	Poaceae	54	103	54	100	54	98	54	94	54	89	54	89
90.	Polygalaceae	1	2	1	2	1	2	1	2	1	2	1	2
91.	Polygonaceae	4	19	4	19	4	19	4	14	3	13	3	13
92.	Portulacaceae	1	3	1	3	1	3	1	3	1	3	1	3
93.	Primulaceae	3	5	3	5	3	5	3	5	3	5	3	4
94.	Ranunculaceae	4	7	4	7	4	7	4	7	3	5	3	5
95.	Rhamnaceae	2	7	2	6	2	6	2	6	2	6	2	6
96.	Rosaceae	6	6	5	5	5	5	4	4	4	4	4	4
97.	Rubiaceae	18	28	17	26	16	25	16	25	16	25	16	25
98.	Rutaceae	5	5	5	5	5	5	5	5	3	3	3	3
99.	Salicaceae	1	1	1	1	1	1	1	1	1	1	1	1
100.	Samydaceae	1	3	1	3	1	3	1	3	1	3	1	3

Supplementary Table 7. (continued)

S.N.	Family	1960s		1970s		1980s		1990s		2000s		2010s	
		Genera	Species	Genera	Species	Genera	Species	Genera	Species	Genera	Species	Genera	Species
101.	Santalaceae	2	2	2	2	2	2	2	2	2	2	2	2
102.	Sapindaceae	4	5	4	5	4	5	3	4	3	4	3	4
103.	Sapotaceae	2	2	2	2	2	2	2	2	2	2	2	2
104.	Scrophulariaceae	18	33	18	33	18	31	18	30	17	29	17	29
105.	Simaroubaceae	2	2	2	2	1	1	1	1	1	1	1	1
106.	Simmondsiaceae	1	1	1	1	1	1	1	1	-	-	-	-
107.	Smilaceae	1	3	1	2	1	2	1	2	1	2	1	2
108.	Solanaceae	8	19	7	18	6	16	6	16	6	15	6	16
109.	Sphenoclaceae	1	1	1	1	1	1	1	1	1	1	1	1
110.	Sterculiaceae	4	5	4	5	4	5	4	4	4	4	3	3
111.	Stylidiaceae	1	1	1	1	1	1	1	1	1	1	-	-
112.	Tamaricaceae	1	1	1	1	1	1	1	1	1	1	1	1
113.	Tiliaceae	4	11	4	11	4	12	4	11	4	11	3	10
114.	Ulmaceae	3	3	3	3	3	3	3	3	3	3	3	3
115.	Urticaceae	2	3	2	3	2	2	2	2	2	2	2	2
116.	Verbenaceae	12	17	12	17	11	15	11	15	11	15	11	15
117.	Violaceae	2	2	2	2	2	2	2	2	2	2	2	2
118.	Vitaceae	6	6	6	6	5	5	5	5	4	4	4	4
119.	Zingiberaceae	2	2	2	2	2	2	2	2	2	2	2	2
120.	Zygophyllaceae	2	2	2	2	2	2	1	1	1	1	1	1