

An assessment of floristic diversity of Peddagattu and Sherepally area, Nalgonda District, Telangana, India

A. Baleeshwar Reddy¹, V. Vasudeva Rao² and A. Vijaya Bhasker Reddy^{1*}

¹Department of Botany, University College of Science, Osmania University, Saifabad, Hyderabad-500 004, Telangana State, India.

²AINP on Vertebrate Pest Management, Prof. Jayashankar Telangana State Agricultural University, Rajendranagar, Hyderabad- 500030, Telangana State, India.

*Corresponding author's e-mail: avijayabhaskerreddy@gmail.com

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ABSTRACT

The main objective of this study is to assess the floristic diversity of Peddagattu and Sherepally area, a proposed site for uranium mining project, Nalgonda District, Telangana State, India. A total of 462 plant species belonging to 322 genera and 85 families were recorded, and represents 24 % of the flora of Telangana State, 90 % of the Flora of Nalgonda District and 2% of the flora of India. The species to genera ratio is 1.4 and the ratio of genera and family is 3.8. This indicates moderate to high floristic diversity of the study area. Habit wise analysis shows a comparatively higher representation of herbaceous species followed by shrubs, trees, aquatic forms and climbers. The family Poaceae is the largest followed by Fabaceae, Asteraceae, Caesalpinaceae and Euphorbiaceae.

Key-words: Floristic diversity, Nalgonda, uranium mining project

INTRODUCTION

The knowledge of the floristic composition of a plant community is a prerequisite to understand the overall structure and function of any ecosystem. Plant communities play a pivotal role in sustainable management by maintaining biodiversity and conserving the environment (Farooquee and Saxena 1996, Panda et al. 2014). Floristic study and diversity assessments are necessary to understand the present diversity status and conservation of biodiversity. Floristic study is a necessary fundamental research in tropical community ecology, modeling patterns of species diversity or understanding species distributions (Jayakumar et al. 2011, Phillips et al. 2003). Floristic studies acquire increasing importance in recent years in response to the need of developing and under developing countries to assess their plant wealth (Yogesh et al. 2014).

Over the decades forests in the peninsular India

were destroyed at an alarming rate, which was largely addressed in many tropical and subtropical countries, although the data is scarce on structure and functional dynamics of the forests (Parthasarathy et al. 1997, Reddy et al. 2007). Therefore, information on floral composition, diversity and biomass is absolutely essential in understanding the dynamics of forest ecosystem (Reddy et al. 2008a). In peninsular India, a few quantitative floristic diversity inventories are available from the forests of the Western Ghats (Ganesh et al. 1996). Eastern Ghats remains as a neglected area with very few attempts made for such studies in Eastern Ghats of Tamil Nadu and Andhra Pradesh (Kadavul et al. 1999 a & b, Jayakumar et al. 2002, Natarajan et al. 2004, Reddy et al. 2011). Keeping these points in view, in the present study an attempt has been made to assess the floristic diversity of proposed site for a uranium mining project.

STUDY AREA

Nalgonda District (16°25', 17°5' N latitude and 78° 40', 86°5' E longitude) is one of the most important districts among Telangana State for mining industries. Peddagattu and Sherepally areas are lying between 16° 25' to 17°00' N latitude and 78°40' to 79°30' E longitude (Text Figure 1). Physiographically the study area consists of flat topped hills composed of proterozoic sediments.

MATERIAL AND METHODS

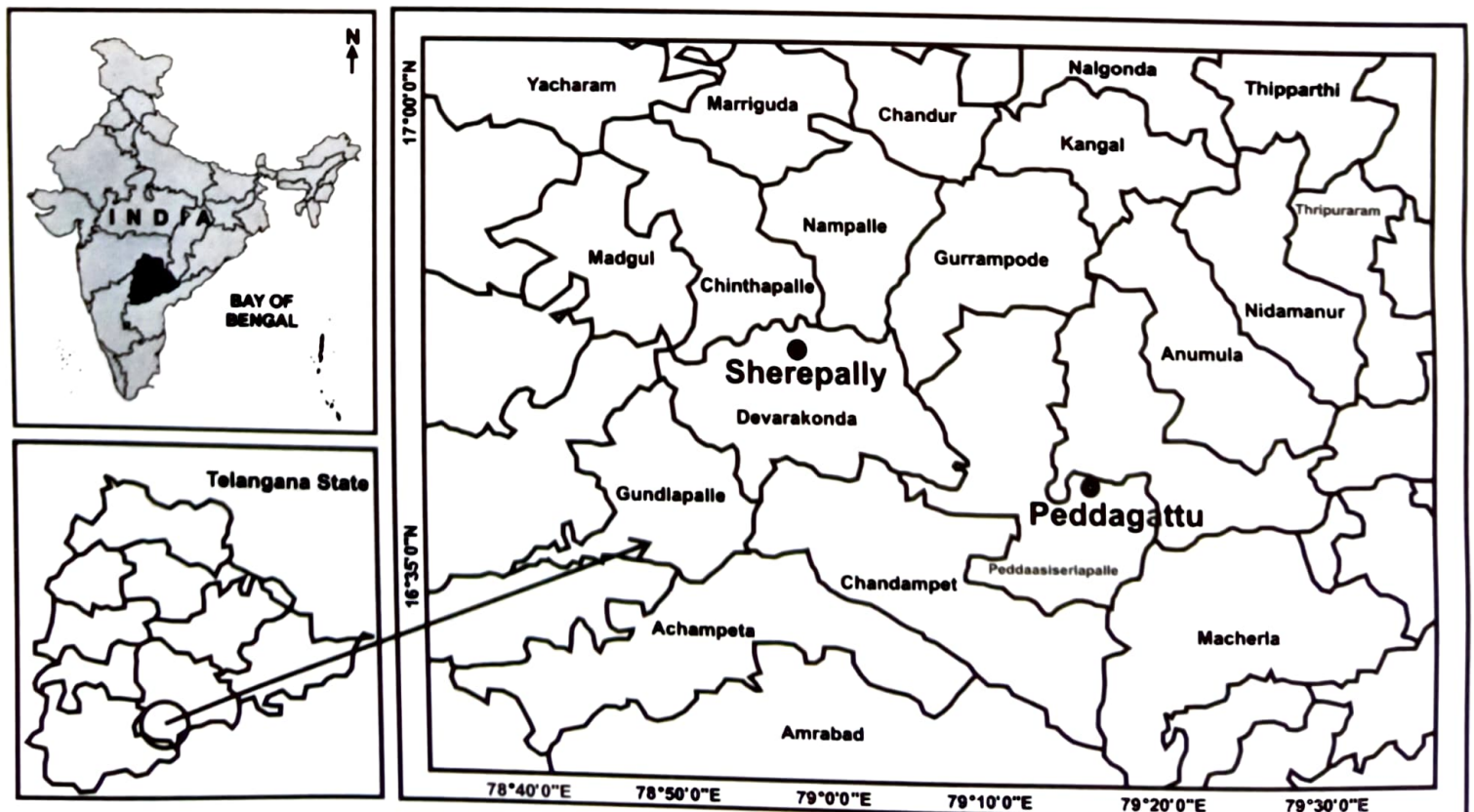
Field works were carried out from 2010 to 2013 to assess the vegetation. Specimen collections were made from different types of habitats like open land, agricultural lands, rocky hills, scrub forest, and wetlands. All the plants were identified from the key vegetative and reproductive features by using the regional floras viz. the flora of the Presidency of Madras (Gamble & Fischer 1915-1935), The flora of the Presidency of Bombay (Cook. 1901-1908), flora of Andhra Pradesh (Pullaiah et al. 1997 a, b and c), flora of Nalgonda District (Rao et al. 2001), flora of Guntur District (Pullaiah et al. 2000) and flora of Telangana State

(Pullaiah 2015). The collected specimens were pressed and deposited at Deccan regional center, Botanical Survey of India (BSI), Hyderabad (BSI/DRC/14-15/ Tech./1030; L.No. 173/AINPAO/BRNS/BSI. Dated: 14.03.2014).

RESULTS AND DISCUSSION

The present floristic diversity in Peddagattu and Sherepally area resulted in the collection of 462 species of flowering plants and covering a total area of 4,781.35 km². Of the total 462 species, dicotyledons were represented by 373 species belonging to 258 genera under 71 families and Monocotyledons by 89 species belonging to 64 genera and 14 families. Habit wise analysis shows a comparatively higher representation of herbaceous species (238) followed by shrubs (100 species), trees (89 species), aquatic forms (23 species) and climbers (12 species).

The magnitude of the species diversity is clear when it is compared with that of other regional and surrounding floras. The total number of 462 species belonging to 322 genera and 85 families were recorded from the study area represent nearly 24 % of the flora



Text Figure 1. Location map of the study area

of Telangana State (1945 taxa), 90 % of the flora of Nalgonda District (511 taxa), 52% of the flora of Guntur District (891 taxa), 44% of the Mahabubnagar District (1042 taxa), 30% of the Nallamalai District (1541 taxa) and 2% of the flora of India (17,000 taxa) (Table 1). The species to genera ratio is 2.4 in flora of Telangana State, 1.5 in flora of Nalgonda District and 1:4 in the present study. The ratio of genera and family in the present study is 3:7, in flora of Nalgonda District 3:3 and in flora of Telangana State 5:4. This indicates moderate to higher taxonomic diversity of vegetational aspects.

were poorly represented in the study area. Out of the 89 species recorded, 73 species belong to the above three families comprising 82%. Similarly, among the dicots Fabaceae, Caesalpiniaceae, Asteraceae, Euphorbiaceae, Acanthaceae, Malvaceae, Mimosaceae and Convolvulaceae constitute about 42% of the total number of species.

The top ten families recorded in present study area in order of their species richness and order of dominance compared with that flora of Nalgonda District (Rao et al. 2001), flora of the Presidency of Madras (Gamble and Fischer 1915- 1935), flora of

Table 1. Comparison of the flora of Peddagattu and Sherepally areas with the other regional floras.

S. No	Name of the Flora	Number of taxa	Number of genera	Number of families	Area (km ²)
1	Flora of Telangana State (Pullaiah, 2015)	1945	794	147	1,14,840
2	Flora of Nalgonda District (Rao et al.2001)	511	334	101	14,200
3	Flora of Nagarjunakonda Valley (Thothathri et al. 1964)	251	156	45	285
4	Flora of Guntur District (Pullaiah et al. 2000)	891	495	132	11,400
5	Flora of Nallamalais (Reddy et al. 2008b)	1541	778	144	6,740
6	Flora of Nizambad District (Pullaiah et al. 1994)	700	439	123	7,956
7	Peddagattu and Sherepally (Present study)	462	322	85	4,781.35

All the top ten families recorded in the flora of Nalgonda District (Rao et al. 2001), flora of the Presidency of Madras (Gamble and Fisher 1915-1935), flora of India (Jain 1989), the flora of British India (Hooker, 1872-97) are also well represented in Peddagattu and Sherepally area except Orchidaceae and Utricaceae. Poaceae with 54 species with 37 genera was the largest family followed by Fabaceae with 32 species with 20 genera, Asteraceae and Caesalpiniaceae (21 species each) are the third largest family. Among the rest of the families Euphorbiaceae has 19 species (9 genera) followed by Acanthaceae 18 species (11 genera), Mimosaceae 15 species (8 genera), Malvaceae 14 species (8 genera), Convolvulaceae 14 species (5 genera) and Cyperaceae 13 species (6 genera) were recorded during the study period. Among the 85 families, 23 dicots and 8 monocot families were represented by single species. Except Poaceae, and Cyperaceae the monocots in general

India (Jain 1989) and the flora of British India (Hooker 1872-97), showed that many of the families are also well represented in the present study area, but the ranks have shown slight variation in occurrence. Poaceae, which forms the largest family in flora of India (Jain 1989), takes the first position in the present study area, whereas, in flora of the Presidency of Madras, the flora of Guntur and Nalgonda districts this family is represented as second largest family. Fabaceae, which forms the third largest family in the flora of India (Jain 1989) takes the second position in the order of dominance in the present study area, whereas, in the flora of Nalgonda District, the flora of Guntur and the flora of the Presidency of Madras it occupied the first position. Asteraceae and Caesalpiniaceae are the third largest families in the study area, but in the flora of the Presidency of Madras and the flora of Nalgonda, Asteraceae and Caesalpiniaceae are listed under seventh and fifth position, respectively, whereas, in the

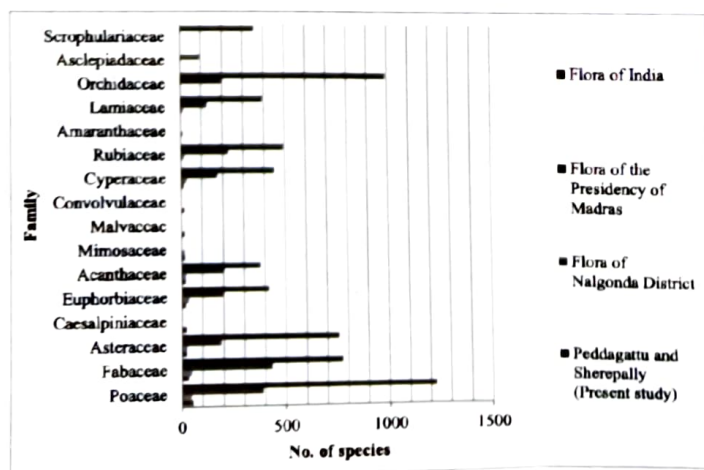
flora of India and the flora of Guntur these families were recorded in fourth and sixth positions, respectively. Euphorbiaceae occupied the third position in the flora of Guntur and Nalgonda districts and fifth in the flora of the Presidency of Madras, the flora of British India and in the present study area. Acanthaceae is the sixth largest family in the flora of British India and flora of Nalgonda District, it remains in the same position in the present study area, whereas, in the flora of the Presidency of Madras and the flora of Guntur District, it is the fourth largest family. Malvaceae forms the ninth largest family in flora of Guntur District and it remains in the seventh position in the present study area. Mimosaceae, the eighth largest family in the flora of Nalgonda District, remains in eighth position in the present study area. Convolvulaceae forms the seventh largest family in the

flora of Guntur District and it is listed in the ninth position in the present study area, while Cyperaceae, the eighth largest family in the flora of British India and flora of the Presidency of Madras, fourth in the flora of Nalgonda District, fifth in the flora of Guntur District, sixth in the flora of India, is tenth in position in the present study area (Table 2 and Text Figure 2).

Of the total 322 genera recorded, there are ten dominant genera containing 5 or more number of species, which includes genus *Cleome* with 7 species (*Cleome aspera* J.Koenig ex DC., *Cleome chelidonii* L.f., *Cleome felina* L.f, *Cleome gynandra* L., *Cleome monophylla* L., *Cleome viscosa* L. and *Cleome viscosa* var. *nagarjunakondensis* Sundararagh.), genus *Crotalaria* with 7 species (*Crotalaria bifaria*

Table 2. Relative abundance of the top ten families in Peddagattu and Sherepally area, Flora of Nalgonda District, Flora of the Presidency of Madras, Flora of India and Flora of British India.

S. No	Peddagattu and Sherepally (Present study)		Flora of Nalgonda District (Rao et al. 2001)		Flora of the Presidency of Madras (Gamble & Fischer 1915-1935)		Flora of India (Jain 1989)		British India (Hooker 1872-1897)
	Family	No. of Species	Family	No. of Species	Family	No. of Species	Family	No. of Species	Family
1	Poaceae	54	Fabaceae	46	Leguminosae	432	Poaceae	1225	Orchidaceae
2	Fabaceae	32	Poaceae	44	Poaceae	388	Orchidaceae	990	Leguminosae
3	Asteraceae	21	Euphorbiaceae	34	Rubiaceae	226	Fabaceae	775	Gramineae
4	Caesalpiniaceae	21	Cyperaceae	25	Acanthaceae	202	Asteraceae	754	Rubiaceae
5	Euphorbiaceae	19	Asteraceae	22	Euphorbiaceae	199	Rubiaceae	495	Euphorbiaceae
6	Acanthaceae	18	Acanthaceae	19	Orchidaceae	199	Cyperaceae	449	Acanthaceae
7	Mimosaceae	15	Rubiaceae	15	Asteraceae	189	Euphorbiaceae	419	Compositae
8	Malvaceae	14	Mimosaceae	14	Cyperaceae	172	Lamiaceae	393	Cyperaceae
9	Convolvulaceae	14	Amaranthaceae	13	Lamiaceae	128	Acanthaceae	379	Labiatae
10	Cyperaceae	13	Lamiaceae	13	Asclepiadaceae	93	Scrophulariaceae	356	Urticaceae



Text Figure 2. Comparison of the dominant families in Peddagattu and Sherepally area, Flora of Nalgonda District, Flora of the Presidency of Madras and Flora of India.

L. f., *Crotalaria hebecarpa* (DC.) Rudd, *Crotalaria laburnifolia* L. *Crotalaria lunulata* Wight & Arn., *Crotalaria ramosissima* Roxb., *Crotalaria retusa* L., and *Crotalaria verrucosa* L.), genus *Ipomoea* with 7 species (*Ipomoea aquatica* Forssk., *Ipomoea carnea* Jacq., *Ipomoea hederifolia* L., *Ipomoea nil* (L.) Roth., *Ipomoea obscura* (L.) Ker. Gawl. *Ipomoea pestigridis* L. and *Ipomoea quamoclit* L.), genus *Cyperus* with 6 species (*Cyperus clarkei* T.Cooke, *Cyperus compressus* L., *Cyperus diffomis* L., *Cyperus haspan* L., *Cyperus iria* L. and *Cyperus rotundus* L.), genus *Euphorbia* with 6 species (*Euphorbia antiquorum* L., *Euphorbia caducifolia* Haines, *Euphorbia heterophylla* L.,

Euphorbia hirta L., *Euphorbia hypericifolia* L. and *Euphorbia tirucalli* L.), genus *Senna* with 6 species (*Senna auriculata* (L.) Roxb., *Senna italica* Mill., *Senna obtusifolia* (L.) H.S.Irwin & Barneby, *Senna occidentalis* (L.) Link., *Senna uniflora* (Mill.) H.S.Irwin & Barneby) and *Senna siamea* (Lam.) H.S.Irwin & Barneby), genus *Acacia* with 5 species (*Acacia auriculiformis* Benth., *Acacia ferruginea* DC., *Acacia leucophloea* (Roxb.) Willd., *Acacia nilotica* (L.) Delile and *Acacia torta* (Roxb.) Craib., genus *Eragrostis* with 5 species (*Eragrostis atrovirens* (Desf.) Trin. ex Steud., *Eragrostis ciliaris* (L.) R. Br., *Eragrostis japonica* (Thunb.) Trin., *Eragrostis tenella* (L.) Beauv. & Schult. and *Eragrostis viscosa* (Retz.) Trin., genus *Justicia* with 5 species (*Justicia adhatoda* L., *Justicia glauca* Rottler, *Justicia neesii* Ramamoorthy, *Justicia quinqueangularis* K.D. Koenig ex Roxb. and *Justicia vahlii* Roth), and genus *Polygala* with 5 species (*Polygala arvensis* Willd., *Polygala elongata* Klein ex Willd., *Polygala erioptera* DC., *Polygala javanica* Steud. and *Polygala wightiana* Wahl.) (Table 3).

The present study recorded, a total of 22 endemic plant species belonging to 20 genera and 13 families forming nearly 5% of the total species. Among these 22 taxa of flowering plants, recorded from the study area are endemic to Peninsular India, of which 3 species (*Alysicarpus mahabubn-agarensis* Ragh. Rao et al., *Cleome viscosa* var. *nagarjunakondensis* Sundararagh and *Chrysopogon velutinus* (Hook. f.)

Bor. are restricted to Andhra Pradesh and Telangana states and among them, *Cleome viscosa* var. *nagarjunakondensis* Sundararagh are exclusive to the study area.

Out of the 462 species recorded in the present study, a total of 118 exotic species belonging to 98 genera and 47 families were recorded in different habitats of the study area. The exotic flora represented in the region is predominantly of American origin, they are *Amaranthus spinosus* L., *Alternanthera pungens* Kunth, *Annona squamosa* L., *Biden pilosa* L., *Borassus flabellifer* L., *Catharanthus pusillus* (Murray) G.Don, *Chamaecrista absus* (L.) H.S.Irwin & Barneby, *Chamaecrista pumila* (Lam.) K. Larsen, *Cleome gynandra* L., *Corchoru aestuans* L., *Cynodon dactylon* (Linn.) Pers., *Cyperus difformis* L., *Cyperus iria* L., *Datura innoxia* Mill., *Dinebra retroflexa* (Vahl)Panz, *Euphorbia heterophylla* L., *Hyptis suaveolens* (L.) Poit., *Ipomoea carnea* Jacq., *Ipomoea hederifolia* L., *Lantana camara* L., *Leucaena leucocephala* (Lam.) de Wit, *Merremia aegyptia* (L.) Urb., *Ruellia tuberosa* L., *Typha domingensis* Pers.etc. Mexican elements seen in the study area are *Carica papaya* L., *Martynia annua* L., *Parkinsonia aculeata* L., *Tridax procumbens* (L.) L.. South American elements found in the study area are *Croton bonplandianum* Baill., *Eclipta prostrata* (L.) L., *Heliotropium indicum* L., *Manilkara zapota* (L.) P.Royen, *Opuntia elatior* Mill., *Passiflora foetida* L. Some Tropical African elements found in the study

Table 3. Relative abundance of top 10 genera in Peddagattu and Sherepally area, Flora of Nalgonda District and Flora of Guntur District.

S. No	Peddagattu and Sherepally (Present study)		Flora of Nalgonda District (Rao et al. 2001)		Flora of Guntur District (Pullaiah et al. 2000)	
	Genus	No. of species	Genus	No. of species	Genus	No. of species
1	<i>Cleome</i>	7	<i>Cyperus</i>	10	<i>Crotalaria</i>	17
2	<i>Crotalaria</i>	7	<i>Crotalaria</i>	7	<i>Indigofera</i>	15
3	<i>Ipomoea</i>	7	<i>Indigofera</i>	7	<i>Ipomoea</i>	13
4	<i>Cyperus</i>	6	<i>Cleome</i>	6	<i>Cyperus</i>	12
5	<i>Euphorbia</i>	6	<i>Corchorus</i>	6	<i>Cassia</i>	11
6	<i>Senna</i>	6	<i>Acacia</i>	6	<i>Acacia</i>	11
7	<i>Acacia</i>	5	<i>Chamaesyce</i>	6	<i>Grewia</i>	10
8	<i>Eragrostis</i>	5	<i>Phyllanthus</i>	6	<i>Heliotropium</i>	9
9	<i>Justicia</i>	5	<i>Fimbristylis</i>	6	<i>Phyllanthus</i>	9
10	<i>Polygala</i>	5	<i>Cassia</i>	5	<i>Commelina</i>	8

area are *Calotropis gigantea* (L.) Dryand., *Celosia argentea* L., *Corchorus tridens* L., *Indigofera linifolia* (L. f.) Retz., *Ipomoea obscura* (L.) Ker Gawl., *Leonotis nepetifolia* (L.) R.Br., *Ludwigia perennis* L.

The study clearly shows that the floristic diversity is moderate to rich, in the study area, which may be attributed to varied topography and variations in the climatic conditions in the study area. Some of the fast spreading aggressive weeds observed in the study area, especially in agricultural lands, open areas and on road ways are *Celosia argentea* L., *Parthenium hysterophorus* L., *Hyptis suaveolens* (L.) Poit. and *Lantana camara* L. We also hold the view that the successful survival of exotic species in the study area will certainly have detrimental effects on natural and agro ecosystems.

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