

Occurrence of East Himalayan floral elements in the Eastern Ghats of Andhra Pradesh: VI. Euphorbiaceae (*sensu lato*)

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Abstract

Of the 132 wild and naturalized taxa (131 species) of Euphorbiaceae *sensu lato* recorded from the Eastern Ghats of Andhra Pradesh, 78 species are found in Eastern Himalayan region of India. Of the 79 taxa, 34 are found throughout the Eastern Ghats of Andhra Pradesh, 12 with single district distribution, 9 with two districts distribution and remaining with random distribution. All the taxa are systematically enumerated with updated nomenclature with their distribution pattern in the Eastern Ghats districts of Andhra Pradesh.

Key words: Euphorbiaceae, Eastern Himalaya, Eastern Ghats, Andhra Pradesh, Distribution.

INTRODUCTION

The Eastern Ghats, the Warm Spot of Biodiversity in Peninsular India are an assemblage of discontinuous hill ranges, distributed in four southern and Eastern states of India: Orissa, Andhra Pradesh, Karnataka and Tamilnadu. 60 % of those are lying in Andhra Pradesh. In Andhra Pradesh, the Ghats lies between 13°32' – 18° 20' N Latitude and 78° 30' – 84°08' E Longitude. Eastern Himalaya, a part of the Himalaya Biodiversity Hotspots, is situated between Central Nepal to Myanmar in the East encompassing south-east Tibet, North Bengal, Bhutan and North-East India. The Eastern Himalaya in India covers Arunachal Pradesh, Sikkim and Darjeeling hills of West Bengal. Relevant information on both the regions has been presented in earlier papers of this series (Rao *et al* 2009 a & b; Rao *et al* 2010a & b) and Singh (1971).

Euphorbiaceae Jussieu, *nom. cons.*, the Spurge family is the sixth largest family of flowering plants (Govaerts *et al* 2000). Angiosperm Phylogeny Group classification (APG III, 2009) splited Euphorbiaceae (*sensu lato*) into Euphorbiaceae, Phyllanthaceae, Picrodendraceae and Putranjivaceae which are represented by 218 genera and 5735 species; 59 genera and 1745 species; 24 genera and 80 species; and 3 genera and 210 species respectively. In India, Euphorbiaceae *sensu lato* are represented by 70 genera and 407 species (Balakrishnan & Chakraborty 2007).

Euphorbiaceae are mostly monoecious herbs, shrubs, and trees, sometimes succulent cactus-like. This family occurs mainly in the tropics and the majority of them are in the Indo-Malayan region, however many species of *Euphorbia* are found in non-tropical areas in Mediterranean Basin, Middle East, South Africa and Southern USA.

METHODOLOGY

In four of our earlier papers in the series (Rao *et al* 2009a, b, 2010a, b) we covered grasses, orchids, sedges and other monocots of Eastern Himalayas of India found in the Eastern Ghats of Andhra Pradesh. In the present communication, we focused on Euphorbiaceae *sensu lato*. Current data on Euphorbiaceae pertaining to Eastern Ghats is based on our team studies in the past two decades and with reference to specimens deposited in different regional and national herbaria. We also consulted relevant literature pertaining to the Euphorbiaceae of Eastern Ghats of Andhra Pradesh: Gamble (1921); Rao *et al* (1986, 1999); Rao & Harasreeramulu (1986); Ellis (1990); Venkataraju & Pullaiah (1995); Lakshminarayana *et al.* (1997); Pullaiah & Rani (1999); Venkaiah (2004); Suryanarayana & Rao (2007); Balakrishnan & Chakraborty (2007); Madhava Chetty *et al.* (2008); Pullaiah & Karuppusamy (2008); Subba Rao & Kumari (2008); Reddy *et al.* (2008); and Narayanaswamy (2012). With respect to Euphorbiaceae of Eastern Himalaya of India, we followed primarily Balakrishnan & Chakraborty (2007) and also Hara (1966, 1971), Ohashi (1975), Hara *et al.* (1982), Mehra *et al.* (1983), Rao & Hajra (1986), Kaul & Haridasan (1987); Grierson & Long (1987), Mukherjee (1988), Baishya *et al.* (2002), Giri *et al.* (2008), Das & Ghosh (2011).

Voucher specimens cited in the paper are the deposits of S.K. University Herbarium, Anantapur (SKU), unless otherwise mentioned. All the plant names are updated following the Plant List (2010).

RESULTS AND DISCUSSION

Of the 79 taxa (78 species) common to Eastern Ghats of Andhra Pradesh and Eastern Himalayas in India, 34 species are found throughout the Eastern Ghats of Andhra Pradesh. Nine species have restricted distribution in Visakhapatnam district: *Alchornea mollis*, *Bridelia glauca*, *B. tomentosa*, *Drypetes assamica*, *Glochidion ellipticum*, *Macaranga indica*, *Phyllanthus airyshawii*, *Sauropus compressus* and *Triadica cochinchinensis*. *Bischofia javanica*, *Plukenetia corniculata* are restricted to East Godavari district and *Suregada multiflora* found only in the Ghats of Srikakulam district. Nine taxa are recorded from two districts: *Acalypha brachystachya* from Prakasam and Vishakapatnam; *Antidesma bunius*, *A. montanum*, *Glochidion zeylanicum var. tomentosum* from East Godavari and Vishakapatnam; *Croton persimilis* in Srilakulam and Vishakapatnam; *Euphorbia fusiformis* from Chittoor and Kurnool; *Euphorbia lacei* from Anantapur and Kurnool; *Euphorbia prostrata* from Kurnool and Vishakapatnam; *Putranjiva roxburghii* from Chittoor and Kadapa; *Euphorbia umbellata* and *Lasiococca comberi* from Chittoor and Vishakapatnam. Remaining 21 species are with random distribution. Of the 79 taxa, *Euphorbia fusiformis* and *Phyllanthus lawii* are endemic to India. All the taxa are systematically enumerated with updated nomenclature along with their distribution pattern in the Eastern Ghats districts of Andhra Pradesh in the Table 1.

Table 1. Euphorbiaceae of Eastern Himalayas found in the Eastern Ghats of Andhra Pradesh [Abbreviations. **APG Families:** Eu – Euphorbiaceae (s.s.); Ph - Phyllanthaceae; Pu - Putranjivaceae **Districts:** Rayalaseema (ATP: Anantapur; CTR: Chittoor; KDP: Kadapa; KNL: Kurnool) Telangana (MBNR: Mahaboobnagar; KMM: Khammam) Coastal Andhra, North (EG: East Godavari; KSN: Krishna; SKLM: Srikakulam; VSKP: Visakhapatnam; VJN: Vizayanagaram; WG: West Godavari) South (GNT: Guntur; NLR: Nellore; PKSM: Prakasam]

Name of the species	APG Fam.	Habit	Distribution in Eastern Ghats of AP (Districts)	Repr. Spec.
<i>Acalypha brachystachya</i> Hornemann	Eu	Herb	PKSM, VSKP	871 (MH)
<i>Acalypha ciliata</i> Forsskal	Eu	Under-shrub	Rayalaseema, EG, KSN, PKSM, WG	43426
<i>Acalypha indica</i> Linnaeus	Eu	Herb	Throughout	36737
<i>Acalypha lanceolata</i> Willdenow	Eu	Under-shrub	Throughout	20029
<i>Alchornea mollis</i> Johannes Müller Argoviensis	Eu	Shrub	VSKP	47345 (MH)
<i>Antidesma acidum</i> Retzius	Ph	Small tree	Throughout	30259
<i>Antidesma bunius</i> Sprengel	Ph	Small tree	EG, VSKP	20770 (BLAT)
<i>Antidesma ghaesembilla</i> Gaertner	Ph	Small tree	Rayalaseema, North Coastal	30363
<i>Antidesma montanum</i> Blume [= <i>A. menasu</i> (Tulasne) Johannes Müller Argoviensis]	Ph	Tree	EG, VSKP	19647
<i>Baliospermum solanifolium</i> (J. Burman) Suresh [= <i>B. montanum</i> (Willdenow) Johannes Müller Argoviensis]	Eu	Herb/ Under-shrub	KMM, KNL, North Coastal	30229
<i>Bischofia javanica</i> Blume	Ph	Tree	EG	30281
<i>Breynia retusa</i> (Dennstaedt) Alston	Ph	Shrub	Throughout	30251
<i>Breynia vitis-idaea</i> (N.L. Burman) Fischer [= <i>Melanthesa rhamnoides</i> Retzius]	Ph	Shrub	Throughout	26488
<i>Bridelia glauca</i> Blume [= <i>B. pubescens</i> Kurz]	Ph	Tree	VSKP	22647 (MH)
<i>Bridelia retusa</i> (Linnaeus) A. Jussieu (= <i>B. retusa</i> Sprengel; <i>B. airy-shawii</i> Ping-Tao Li.; <i>B. cinerascens</i> Gehrman ; <i>B. crenulata</i> Roxburgh]	Ph	Tree	Throughout	38641
<i>Bridelia stipularis</i> (Linnaeus) Blume	Ph	Shrub	North Coastal	21806
<i>Bridelia tomentosa</i> Blume	Ph	Small tree	VSKP	68641

Name of the species	APG Fam.	Habit	Distribution in Eastern Ghats of AP (Districts)	Repr. Spec.
<i>Bridelia tomentosa</i> Blume	Ph	Small tree	VSKP	68641
<i>Chrozophora plicata</i> (Vahl) A. Jussieu ex Sprengal (= <i>C. prostrata</i> Dalzell var. <i>parvifolia</i> (Klotzsch ex Schweinfurth) Balakrishnan; <i>C. prostrata</i> Dalzell)	Eu	Herb	KNL, North Coastal	20100
<i>Chrozophora rottleri</i> (Geisel) A. Jussieu	Eu	Herb	Throughout	43190
<i>Cleistanthus collinus</i> (Roxburgh) Hooker f.	Ph	Small tree	Throughout	34080
<i>Croton bonplandianum</i> Baillon	Eu	Under-shrub	Throughout	35956
<i>Croton persimilis</i> Johannes Müller Argoviensis [= <i>C. roxburghii</i> Balakrishnan]	Eu	Small tree	SKLM, VSKP	83614
<i>Drypetes assamica</i> (Hooker f.) F.A. Pax & K. Hoffmann [= <i>Cyclostemon assaminus</i> Hooker f.]	Pu	Small tree	VSKP	22667
<i>Euphorbia antiquorum</i> Linnaeus	Eu	Shrub/ Small tree	Throughout	3916
<i>Euphorbia chamaesyce</i> Linnaeus	Eu	Herb	Throughout	3368
<i>Euphorbia cyathophora</i> Murray	Eu	Herb	Throughout	142
<i>Euphorbia dracunculoides</i> Lamarck	Eu	Herb	EG, NLR, WG	9004
<i>Euphorbia fusiformis</i> Buchanan-Hamilton [= <i>E. acaulis</i> Roxburgh]	Eu	Herb	Rayalaseema	29404
<i>Euphorbia heterophylla</i> Linnaeus (= <i>E. geniculata</i> Ortgies)	Eu	Herb	Throughout	38142
<i>Euphorbia heyneana</i> Sprengel [= <i>E. bombaiensis</i> Santapau]	Eu	Herb	Throughout	30308
<i>Euphorbia hirta</i> Linnaeus	Eu	Herb	Throughout	36685
<i>Euphorbia indica</i> Lamarck	Eu	Herb	Throughout	33399
<i>Euphorbia lacei</i> Craib [= <i>E. barnhartii</i> Croizat]	Eu	Shrub/ Small tree	Rayalaseema	11845
<i>Euphorbia nerifolia</i> Linnaeus [= <i>E. ligularia</i> Roxburgh]	Eu	Shrub/ Small tree	KNL, North Coastal	24414
<i>Euphorbia nivulia</i> Buchanan-Hamilton	Eu	Shrub/ Small tree	Rayalaseema, North Coastal	22564

Name of the species	APG Fam.	Habit	Distribution in Eastern Ghats of AP (Districts)	Repr. Spec.
<i>Euphorbia parviflora</i> Linnaeus	Eu	Herb	Throughout	11850
<i>Euphorbia prostrata</i> Aiton	Eu	Herb	KNL, VSKP	3368
<i>Euphorbia serpens</i> Kunth	Eu	Herb	KNL, WG	9185
<i>Euphorbia thymifolia</i> Linnaeus	Eu	Herb	Throughout	11625
<i>Euphorbia tirucalli</i> Linnaeus	Eu	Shrub/ Small tree	Throughout	29093
<i>Euphorbia tithymaloides</i> Linnaeus [= <i>Pedilanthus tithymaloides</i> (Linnaeus) Poiteau]	Eu	Shrub	Throughout	9012
<i>Euphorbia umbellata</i> (F.A. Pax) Bruyns (= <i>Synadenium grantii</i> Joseph Dalton Hooker)	Eu	Shrub	CTR, VSKP	9198
<i>Excoecaria agallocha</i> Linnaeus	Eu	Large shrub	Coastal area	28802
<i>Falconeria insignis</i> Royle [= <i>Sapium insigne</i> (Royle) Trimen]	Eu	Small Tree	CTR, KDP, NLR	29414
<i>Flueggea virosa</i> (Roxburgh ex Willdenow) Royle [= <i>Securinega</i> <i>virosa</i> (Roxburgh ex Willdenow) Baillon]	Ph	Shrub	KDP, North Coastal	4768
<i>Glochidion ellipticum</i> Wight	Ph	Small tree	VSKP	11805
<i>Glochidion heyneanum</i> (Wight & Arnott) Wight [= <i>G. velutinum</i> Wight]	Ph	Small tree	CTR, EG, KNL, VSKP	30290
<i>Glochidion zeylanicum</i> (Gaertner) A. Jussieu	Ph	Small tree	Rayalaseema, North Coastal	34161
<i>Glochidion zeylanicum</i> var. <i>tomentosum</i> (N.A. Dalzell) Trimen (= <i>G. tomentosum</i> N.A. Dalzell)	Ph	Shrub/ Small tree	EG, VSKP	19607
<i>Homonoia riparia</i> Loureiro	Eu	Shrub	Throughout	32656
<i>Jatropha curcas</i> Linnaeus	Eu	Shrub/ Small tree	Throughout	28317
<i>Jatropha gossypifolia</i> Linnaeus	Eu	Shrub	Throughout	41057
<i>Lasiococca comberi</i> Haines	Eu	Small tree	CTR, VSKP	30007
<i>Macaranga indica</i> Wight	Eu	Tree	VSKP	Subba Rao & Kumari (2008)

Name of the species	APG Fam.	Habit	Distribution in Eastern Ghats of AP (Districts)	Repr. Spec.
<i>Macaranga peltata</i> (Roxburgh) Johannes Müller Argoviensis [= <i>M. roxburghii</i> Wight]	Eu	Tree	CTR, KNL, North Coastal	30414
<i>Mallotus nudiflorus</i> (Linnaeus) Kulju & Welzen [= <i>Trewia nudiflora</i> Linnaeus var. <i>tomentosa</i> Susila & N.P. Balakrishnan; <i>T. nudiflora</i> Linnaeus]	Eu	Small tree	CTR, SKLM, VSKP, WG	30078
<i>Mallotus phillippensis</i> (Lamarck) Johannes Müller Argoviensis	Eu	Small tree	Throughout	21358
<i>Mallotus repandus</i> Johannes Müller Argoviensis	Eu	Shrub	VSKP, WG, NLR	23326
<i>Micrococca mercurialis</i> (Linnaeus) Bentham [= <i>Claoxylon mercurialis</i> (Linnaeus) Thwaites]	Eu	Herb	Throughout	11832
<i>Microstachys chamaelea</i> (Linnaeus) Johannes Müller Argoviensis, [= <i>Sebastiania chamaelea</i> (Linnaeus) Johannes Müller Argoviensis]	Eu	Herb	Throughout	21363
<i>Phyllanthus airy-shawii</i> Jean F. Brunel & J.P. Roux	Ph	Herb	VSKP	Subba Rao & Kumari (2008)
<i>Phyllanthus amarus</i> Schumacher & Thonning	Ph	Herb	Throughout	29075
<i>Phyllanthus debilis</i> Klein ex Willdenow	Ph	Herb	Throughout	21370
<i>Phyllanthus emblica</i> Linnaeus	Ph	Tree	Throughout	33436
<i>Phyllanthus fraternus</i> Webster	Ph	Herb	ATP, EG, SKLM, VJN	39611
<i>Phyllanthus lawii</i> Graham ex Johannes Müller Argoviensis	Ph	Shrub	EG, KDP, KSN	20974
<i>Phyllanthus reticulatus</i> Poiret	Ph	Shrub	Throughout	31180
<i>Phyllanthus rheedei</i> Wight [= <i>P. kozhikodanus</i> Sivarajan & Manilal]	Ph	Under-shrub	Throughout	35574
<i>Phyllanthus urinaria</i> Linnaeus	Ph	Herb	Throughout	20191
<i>Phyllanthus virgatus</i> Forster	Ph	Herb	Throughout	41038
<i>Plukenetia corniculata</i> Smith	Eu	Shrub	EG	85554
<i>Putranjiva roxburghii</i> Wallich [= <i>Drypetes roxburghii</i> (Wallich) Hurusawa]	Pu	Tree	CTR, KDP	32573

Name of the species	APG Fam.	Habit	Distribution in Eastern Ghats of AP (Districts)	Repr. Spec.
<i>Sauropus bacciformis</i> (Linnaeus) Airy Shaw	Ph	Herb	CTR, NLR, KSN	16533
<i>Sauropus compressus</i> Johannes Müller Argoviensis [= <i>S. pubescens</i> Hooker f.]	Ph	Shrub	VSKP	Subba Rao & Kumari (2008)
<i>Suregada multiflora</i> (A. Jussieu) Baillon	Eu	Small tree	SKLM	62452
<i>Synadenium grantii</i> Hooker f.	Eu	Shrub	CTR, VSKP	9198
<i>Tragia involucrata</i> Linnaeus	Eu	Herb	Throughout	36529
<i>Tragia plukenetii</i> Smith [= <i>T. cannabina</i> Linnaeus]	Eu	Herb/ Under-shrub	Throughout	30295
<i>Triadica cochinchinensis</i> Loureiro [= <i>Sapium eugenifolium</i> Buchanan-Hamilton ex Hooker f.]	Eu	Small tree	VSKP	19603

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