Phytogeography of Ranchi, Bihar

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A concise account of the phytogeography of Ranchi District, a part of Chotanagpur Plateau is given. Seven types of phytogeographical elements are recognised. The dominant elements are : Eastern - Australian (37.7%); Indian (24.16%) and Tropical (20.83%). The temperate and Mediterranean elements are represented by only 8 species (2.22%) in the flora of Ranchi. As one proceeds upwards from 900 m, there is an increase in Geophytes (19.75%) and Therophytes (20.98%) and decrease in Phanerophytes (34.56%). The vegetation is characterised by the presence and dominance of the sal (*Shorea robusta*) forest.

Key-words—Phytogeography, Ranchi (Chotanagpur), India.

INTRODUCTION

THE district Ranchi lies between 23° 22' N, 85° 22' E latitude and longitude at an altitude of 655m above sea level. The Damodar river forms the northern boundary of the district. Subarnarkeha, Koel, Sankh, Kanchi and Kharkai are the other rivers that flow in the region. The climate is of the tropical monsoon type with an annual average rainfall of 1476 mm. The maximum temperature reaches 40°C in May, and the minimum of 7°C in December. The relative humidity is maximum in July and August (88%) and is minimum in April (39%). The soil is of various types, like sandyloam, gravel, red ferruginous, alluvial and even black sticky clay.

The earliest collection of plants in this area was made by Clarke (1898) Wood, (1902) Gamble (1936), Mooney (1944), Bressers (1951), Sinha and Ghosh (1962), Jha (1965), Kapoor (1966), Das (1972), Ghosh (1973), Maheshwari and Paul (1975). However, no phytogeographical account is available for the area understudy. The present study is undertaken in order to have a better understanding of the homogeneity of the flora.

RESULTS

The phytogeographical analysis of Ranchi District shows seven types of floristic elements (Table 1). Out of a total of 360 species reported, the eastern-Australian element (37.77%) is the dominant one in having 136 taxa. The Indian and tropical element are also well represented in the flora with 87 species (24.16%) and 75 species (20.83%) respectively. There are only 8 taxa that represent the temperate and Mediterranean elements (2.22%).

Table 1. Phytogeographical spectrum of Ranchi

Category	Number of species	Percentage
Indian	87	24.16
Eastern-Australian	136	37.77
Indo-African	10	2.77
Western Asiatic	14	3.88
General	30	8.33
Tropical	75	20.83
Temperate and Mediterranean	8	2.22
Total	360	100

The life-form spectrum of plant species in relation to the flora and elements is presented in Table 2.

Geophytes and Therophytes are dominant having 18.38% and 20.58% in the Eastern-Australian elements; Tropical (20.0, 45.33); Indian (8.04, 18.39); Western Asiatic (28.57, 21.42); Indo-African (50.0, 20.0) and Temperate and Mediterranean (12.50, 50.0). Epiphytes constitute the life-form class after this. Their percentage in these elements are : Western Asiatic (7.14); Indian (5.74); Eastern-Australian (4.41). Phanerophytes have large number of species in the general element (50%) and Indian element (45.97%). Hydrophytes are also well represented (10%) and Western Asiatic element (7.14%). Chamaephytes have greater number of species only in

Table 2. Phytogeographical elements according to life-forms

Explanation of the signs	Th = Therophyte : Ph = Phanerophyte : G = Geophyte : E = Epiphyte : HH = Hydrophyte : H = Hemicryptophyte : Ch = Chamaephyte : L = Liana : P = Parasite									
Category	Th	Ph	G	E	HH	H	Ch	L	P	Total number of species
Indian	16	40	7	5		1	5	11	2	87
%	18.39	45.97	8.04	5.74		1.14	5.74	12.64	2.29	
Eastern-Australian	28	43	25	6	3		12	19		136
%	20.58	31.61	18.38	4.41	2.20		8.82	13.97		
Indo-African	2	2	5				1			10
%	20.0	20.0	50.0				10.0			
Western Asiatic	3	4	4	1	1				1	14
%	21.42	28.57	28.57	7.14	7.14				7.14	
General	6	15	3		3		2	1		30
%	20.0	50.0	10.0		10.0		6.66	3.33		
Tropical	34	16	15	2	2	1	4		1	75
%	45.33	21.33	20.0	2.66	2.66	1.33	5.33		1.33	
Temperate and Mediterranean	4	2	1			1				8
%	50.0	25.0	12.50			12.50				
Raunkiaer's normal spectrum										
%	13.0	43.0	4.0	3.0	2.0	26.0	9.0			

Indo-African element (10%). Climbers are represented by 19 species in the Eastern-Australian elements (13.97%) and 11 in Indian element (12.64%). Hemicryptophytes are poorly represented in the flora of Ranchi. Only one species is found in Indian, Tropical and Temperate and Mediterranean elements.

The biological spectrum worked out for different altitudinal zones is presented in Table 3. Geophytes as well as Therophytes are usually encountered in various altitudinal zones. Lianas have the same percentage in all the three different altitudinal zones. Epiphytes occur in the altitudinal zones: 600-900 m (5.97%) and 900-1200m (4.93%). The percentage of Phanerophytes decreases as one proceeds upwards, reaching (34.56%) at 1200 m. This is confirmed by Kaul and Sarin (1976) in their study on the flora of Bhaderwah.

DISCUSSION AND CONCLUSION

The results show that most of the plants of Ranchi belong to Eastern-Australian element. This is probably due to continuity of rain forest belt connecting Malaysia with north-east India and also Malaysia and south India along with Bay of Bengal. Geophytes are higher in number in Ranchi district, because the loose, fertile upper soil horizon favours the development of the rhizomatous

Table 3. Biological spectra of various altitudinal zones in Ranchi

Altitudinal zone	No. of species	Th	HH	G	H	Ch	Ph	L	E	P
0-600 m	212	65	8	29	2	11	71	18	6	2
	%	30.66	3.77	13.67	0.94	5.18	33.49	8.49	2.83	0.94
Upto 600-900 m	67	11	1	15	1	5	23	6	4	1
	%	16.41	1.49	22.38	1.49	7.46	34.32	8.95	5.97	1.49
Upto 900-1200	81	17		16		8	28	7	4	1
	%	20.98		19.75		9.87	34.56	8.64	4.93	1.23
Raunkiaer's normal spectrum										
	%	13.0	2.0	4.0	26.0	9.0	43.0		3.0	

plants. The Therophytes are in greater proportion in the flora of Ranchi because of various anthropogenic factors operating in the region. It confirms the studies of Cain (1950) and Deschenes (1966) that over-grazing and trampling, which is so prevalent in grasslands, tend to increase the percentage of Therophytes through the introduction and spread of weedy grasses and forbes under this life-form. Hemicryptophytes which are common in the warmer parts of the temperate zone are much less in Ranchi.

List of plants from Ranchi District with their life forms, elements and occurrences at various altitudes

Eastern-South Eastern-Australian Elements

0-600m.

Geophytes

Commelina paludosa Blume
Curcuma ferruginea Roxb.
Cyperus niveus Retz.
Desmostachya cynosuroides Stapf
Dichanthium caricosum (L.) A. Camus
Eragrostis coarctata Stapf
Eulalia cumingii Comb.
Fimbristylis falcata (Vahl) Kunth
Iphigenia indica (L.) Gray
Isachne albens Trin
Iseilema prostratum L.
Pancratium verecundum W. Ait.
Scirpus grossus L.f.
Sehima nervosum (Willd.) Stapf

Therophytes

Ammania indica DC.
Artemisia japonica Thunb.
Artemisia parviflora Roxb. ex D.Don
Brachiaria distachyum Comb.
Burmannia coelestis Don
Coelachne simpliciuscula (Steud.) Benth.
Commelina suffruticosa Blume
Eleocharis retroflexa (Poir) Urb.
Eragrostis unioloides (Retz.) Nees ex Steud.
Ischaemum rugosum Salisb.
Lindernia ciliata (Colsm.) Pennell
Panicum trypheron Schult.
Perotis indica (L.) Kuntze
Pycreus diaphanus (R. & S.) H. & K.
Sporobolus pulchellus R.Br.
Wahlenbergia erecta (Roth ex R. & S.) Tuyn

Phanerophytes

Aerva sanguinolenta (L.) Blume
Amoora roxburghiana Miq.
Buddleia asiatica Lour.
Clerodendrum philippinum Sch.
Crotalaria laburnifolia L.
Diospyros malabarica (Desr.) Kostel.
Diospyros montana Roxb.
Diospyros phllippensis (Derr.)
Eranthemum capense L.
Ficus virens Ait.
Glochidion lanceolarium Dalz.
Lannea coromandelica (Houttt.) Meve.
Leea macrophylla Roxh. ex Hornem.
Murdannia japonica (Thunb.) Faden
Phyllanthus pendulus Roxb.
Reinwardtia indica Dum.
Rorippa montana Wall.
Sacciolepis interrupta (Willd.) Stapf
Tectona grandis L.f.
Trema orientalis (L.) Blume
Trichilia connaroides (W.&A.) Bent.
Wahlenbergia hirsuta (Edgew.) Tuyn
Xyris pauciflora Willd.
Ziziphus rotundifolia Lamk.

Epiphytes

Cymbidium aloifolium (L.) Swartz
Oberonia falconeri Hook.
Pholidota pallida Lindl.
Rhynchostylis retusa (L.) Blume

Hydrophytes

Caesulia axillaris Roxb.
Hygrorhiza aristata (Retz.) Neews ex W. & A.

Chamaephytes

Allmania nodiflora (L.) R. Br. ex Wt.
Habenaria commelinifolia (Roxb.)Wall. ex Lindl.
Habenaria reniformis Hk.f.
Heliotropium strigosum Willd.
Justicia japonica Thunb.
Justicia quinqueangularis Koenig ex Roxb.
Lavandula bipinnata (Roth) Kuntze
Pecteilis triflora (D.Don) Tang & Wang

Lianas

Ampelocissus tomentosa (Roth) Planch.
Capparis zeylanica L.
Centranthera indica (L.) Gamble
Centranthera tranquebarica (Spreng.) Merr.
Cissus quadrangula L.
Dendrophthoe falcata (L.f.) Etting.
Ipomoea sinensis (Derr.)Choisy
Merremia hederacea (Burm.f.)Hallier f.
Pandorea jasminoides (Lindl.)K. Schum.
Striga angustifolia (Don) Sald.
Trichosanthes tricuspidata Lour.
Ventilago denticulata Willd.
Zeuxing nervosa Wall.

Up to 600-900 m

Geophytes

Arundinella bengalensis (Spreng) Druce
Dioscorea pentaphylla L.
Pycnocyclea glauca Lindl.
Themeda arundinacea (Roxb.) Ridley

Therophytes

Anisochilus carnosus (L.f.) Wall.
Eleocharis congesta D.Don
Limnophila chinensis (Osb.) Merill
Panicum notatum Retz.
Pouzolzia zeylanica (L.) Benn.
Sporobolus indicus (L.) R. Br. var. diander (Retz.) Jov. & Gued.

Phanerophytes

Buddlela officinalis Maxim.
Butea monosperma (Lam.) Taub.
Erythrina orientalis (L.) Murr.
Grewia disperma Rottb.
Isachne globosa (Thunb.) Kuntze
Lobelia alsinoides Lam.
Mimulus gracilis R.Br.
Phyllanthus rheedii Wight
Plectranthus japonicus (Burm.f.) Koidz.
Rhinacanthus nasuta (L.) Kurz

Epihyte

Acampe praemorsa (Roxb.) Blatt. & Mc Cann

Hydrophyte

Floscopa scandens Lour.

Chamaephyte

Ochna obtusata DC. var. pumila (Buch.-Ham. ex D. Don) Kanis

Lianas

Argyreia setosa (Roxb.) Choisy
Paederia scandens (Lour.)Merr.

Up to 900-1200 m

Geophytes

Arisamea tortuosum (Wall.) Schott
Bothriochloa parviflora (R.Br.)Ohwi
Capillipedium assimile (Steud.) A.Camus
Colocasia fallax Schott
Eulophia dabia (D.Don) Hochr.
Globba racemosa Smith
Peristylus goodyeroides (D.Don) Lindl.

Therophytes

Fimbristylis aestivalis (Retz.)Vahl
Indocourtoisia cyperoides (Roxb.) Benn. & Raizada
Lindernia nummularifolia (D.Don) Wettst.
Rotala mexicana Cham. & Schlecht.
Sacciolepis indica (L.) Chase
Spilanthes calva DC.

Phanerophytes

Bauhinia racemosa Lam.
Glochidion velutinum Wight
Mariscus dubius (Rottb.) Fischer
Meyna laxiflora Robyns
Plectranthus mollis (Aiton) Sprengel
Setaria palmifolia (Koenig)Stapf
Stereospermum chelonoides (L.f.) DC.
Syzygium operculatum (Roxb.) Niedenzu
Zanthoxylum rhesta (Roxb.) DC.

Epiphyte

Liparis nervosa Lindl.

Chamaephytes

Disporum cantoniense (Lour.) Merr.

Justicia diffusa Willd.
Remusatia vivipara (Roxb.) Schott.

Lianas

Argyreia bella (cl.)Raizada
Atylosia volubilis (Blanco) Gamble
Ipomoea barlerioides (Choisy) Cl.
Operculina petaloidea (Choisy) Oost

Indian element
0-600 m

Geophyte

Plesmonium margartiferum (Roxb.) Schott

Therophytes

Arthraxon nudus (Steud.) Hochst
Atylosia platycarba Benth.
Centipeda minima (L.) A.Br. & Aschers
Commelina hasskarlii Clarke
Eusteralis pentagona (Cl. ex Hk. f.) Panig.
Fimbristylis tenera Roem. & Schult.
Girardinia diversifolia (Link.) Fries
Girardinia zeylanica Decaisne
Glossocardia bosvallia (L.f.) DC.
Glossocardia linearifolia Cass.
Ischaemum hirtum Hack.
Paspalidium flavidum (Retz.) A. Camus

Phanerophytes

Aglaia diepenhorstii Miq.
Anthocephalus chinensis (Lamk.) Rich. ex Walp.
Bambusa arundinacea (Retz.) Willd.
Chirita hamosa R.Br.
Clerodendrum indicum (L.) O. Kuntze
Dalbergia lanceolaria L.f.
Diospyros melanoxylon Roxb.
Erythraea massoni Sweet
Eusteralis cruciata (Benth.) Penig.
Fimbriztylis tetragona R.Br.
Haldina cordifolia (Roxb.) Ridsdale
Linociera ramiflora (Roxb.) Wall. ex G. Don
Pittosporum nepaulense (DC.) Rehder & Willson
Pterocarpus marsupium Roxb.
Sarcostemma acidum (Roxb.) Voigt
Streblus taxoides (Heyne ex Roth) Kurz
Terminalia arjuna (Roxb.)(W. & A.

Epiphyte

Pelatantheria insectifiera (Rohb. f.) Ridley

Lianas

Cryptolepis buchanani Roem. & Schult.
Evolvulus nummularius L.
Hemidesmus indicus (L.) R.Br.
Rivea hypocrateriformis (Desr.) Choisy
Rivea ornata (Roxb.) Choisy

Hemicryptophyte

Begonia picta Sm.

Parasite

Scurrula parasitica L.

Up to 600-900 m

Geophytes

Peristylus lawii Wt.
Pimpinella wallichiana (Mig.) Gandhi

Therophytes

Arthraxon ciliaris Beauv.
Limnophila repens Benth.
Neodistemon indicum (Wedd) Babu & Henry

Phanerophytes

Boehmeria platyphylla D.Don
Callicarpa arborea Roxb. ex Clarke
Clerodendron thomsonae Balf.f.
Elaeocarpus oxypyren K. & V.
Erythrina suberosa Roxb.
Ficus semicordata Buch. Ham. ex J.E. Sm.
Kydia calycina Roxb.
Premna hamiltonii Ellis
Vallaris solanacea (Roth) O. Kuntze

Epiphytes

Dendrobium fimbriatum Hook.
Dendrobium regium Prain

Chamaephytes

Anisochilus eriocephalus Beth.
Habenaria marginata Coleb.

Lianas

Ceropegia candelabrum L. ssp. tuberosa (Roxb.) Huber
Ceropegia hirsuta W. & A.
Clematis roylei Rehder
Helinus lanceolatus Brandis

Parasite

Viscum monoicum Roxb. ex DC.

Up to 900-1200 m

Geophytes

Eragrostis nutans (Retz.) Nees ex Steud.
Hedychium coccineum Ham.
Peucedanum dhana Buch. Ham. ex Clarke
Pimpinella bracteata Haines

Therophyte

Osbeckia truncata D.Don

Phanerophytes

Acacia lenticularis Buch.-Ham.
Artocarpus gomezianus Wall. ex Trecul
Blumeopsis flava (DC.) Gagnep.
Callicarpa macrophylla Vahl
Carissa paucinerva DC.
Combretum nannum Buch. Ham. ex D.Don
Hygrophila salicifolia (Vahl) Nees
Maesa indica (Roxb.) DC.
Pittosporum floribundum W. & A.
Premna mucronate Roxb.
Shorea robusta Gaertn.f.
Symplocos racemosa Roxb.
Zizyphus rugosa Lam.

Epiphytes

Dendrobium crepidatum Lindl.
Dendrobium herbaceum Lindl.

Chamaephytes

Habenaria furcifera Lindl.
Pulicaria angustifolia DC.
Xyris coronata Haines

Lianas

Lindenbergia muraria (Roxb. ex D.Don) Bruehl
Porana paniculata Roxb.

Tropical element
0-600 m

Geophytes

Alternanthera polygonoides (L.) R.Br. ex Roem. & Schult.
Chrysopogon lancearius Comb.
Fimbristylis hookeriane Boeck.
Mariscus squarrosus (L.) Clarke
Panicum antidotale Retz.
Schoenoplectus mucronatus (L.) Palla
Scleria levis Retz.
Zingiber capiatatum Roxb.
Zingiber rubens Roxb.

Therophytes

Abutilon indicum (L.) Sweet
Acanthospermum hispidum DC.
Aristida cumingiana Trin.
Chenopodium ambrosioides L.
Chloris virgata Sw.
Coronopus didymus (L.) Smith
Cyperus tenuispica Steud.
Diplocyclos palmatus (L.) Jeff.
Eleocharis acutangula (Roxb.)(Schult.
Eragrostis pilosa (L.) Beauv.
Euphorbia thymifolia L.
Fuirena ciliaris (L.) Roxb.
Gnaphalium luteo-album L.
Gnaphalium purpureum L.
Hedyotis herbacea L.
Hedyotis puberula (G.Don) R.Br. ex A.
Hemicarpha isolepis Nees
Hybanthus enneaspermus (L.) Muell.
Ipomoea quinata R.Br.
Lagascea mollis Cav.
Lindernia crustacea (L.) Muell.
Lindernia pusilla (Willd.) Bold.
Ocimum americanum L.
Queenslandiella hyalina (Vahl) Ballard
Schoenoplectus lateriflorus (Gmelin) Lye

Phanerophytes

Aeschynomene americana L.
Aeschynomene aspera L.
Catunaregam spinosa (Thunb.) Tiruv.
Flueggia obova ta Baill.
Kirganelia reticulata (Poir) Baill.
Polygonum barbatum L.
Sida cordata (Burm.f..) Borss.
Stachytarpheta indica (L.) Vahl
Vandellia brachiaa Comb.
Vandellia veronicaefolia Comb.

Hydrophytes

Cyperus dubius Rotttb.
Eriocaulon odwardii Fyson

Up to 600-900 m

Geophytes
Chlorophytum laxum R.Br.
Colocasia esculenta (L.) Schott
Cyperus exalttus Retz.
Dioscorea hamil tonni Hk.f.
Nervilia aragoana Gaudich

Therophyte
Fikbristylis dichotoma (L.) Vahl

Phanerophytes
Ficus virens Ait.
Leersia hexandra Sw.
Leucas martinicensis (Jacq.)R.Br.

Epiphyte
Luisia trichorhiza Blume

Chamaephytes
Dianella ensifolia (L.) DC.
Polygonum limbatum Meissn.

Hemicryptophyte
Ajura macrqssperma Wall. ex Benth.

Up to 900-1200 m

Geophyte
Sacciolepis myosuroides (R.Br.) Chase

Therophytes
Blumea mollis (Don) Merill
Cyperus globusus All.
Knoxia mollis R.Br.
Mecardonia procumbens (Miller) Small
Oplismenus burmanii (Retz.) Beauv.
Oplismenus compositus (L.) Beauv.
Themeda quadrivalvis (L.) Kuntze

Phanerophytes
Leucas clarkei H.F.
Vandellia stemonoides Miq.

Epiphyte
Cyanotis cristata (L.) Schult.f.

Chamaephytes
Conyza aegyptiaca (L.) Ait.
Plumbago zeylanica L.

Parasite
Striga asiatica (L.) Kuntze

General element 0-600 m

Diectomis fastigiata (Swartz) Beauv.
Hitchenia glauca Wall.

Therophytes
Blumea fistulosa (Roxb.) Kurtz
Eragrostis tremula Hochst
Inezia indica Kunth
Leptochloa filiformis (Lam.) P. Beauv.
Limnophila roxburghii D.Don

Phanerophytes
Aeschynomene americana L.
Aeschynomene mimosula L.
Aeschynomene uniflora E.Mey.
Barringtonia racemosa (L.) Roxb.
Bridelia monoica (Lour.) Merr.
Cardamine hirsuta L.
Helinus lanceolatus Brand.
Madhuca longifolia (Koen.)Mac B.
Morinda citriolia L.
Polygonum hydropiper L.
Silene conoidea L.
Wissandula periplocifolia (L.) Presl ex Thw.
Zaleya govinda (Buch.-Ham. ex D.Don) N.C. Nair

Epiphyte
Malaxis rheedii Sw.

Chamaephytes
Eryngium foetidum L.
Polygonum serrulatum Lagasc.

Hydrophytes
Blyxa auberti Rich.
Oenanthe javanica (Blume) DC.
Sagittaria guayanensis H.B.K.

Up to 600-900 m

Geophyte
Eragrostis coromandelina Trin

Up to 900-1200 m

Therophyte
Youngia japonica (L.) DC.

Phanerophytes
Commelina attenuata Koen. ex Vahl
Swertia cordata Ham.

Liana
Gymnopetalum cochinchinensis (Lour.) Kurz

Western Astatic 0-600 m

Geophytes
Pennisetum pedicelatum Trin
Pennisetum setosum Rich.

Therophytes
Mitrascame pygmaea R.Br.
Solanum spirale Roxb.

Phanerophytes
Crotalaria incana L.
Croton roxburghii Balak.
Lobelia chinensis Lour.
Spermadictyon suaveolens Roxb.

Epiphyte
Scindapsus officinalis (Roxb.) Schott

Hydrophyte
Enhydra fluctuans Lour.

Parasite
Ficus tinctoria Forst.f.

Up to 600-900 m

Geophyte
Eulophia cullenii (W.) Bl.

Therophyte
Lobelia heyniana Roem. & Schult.

Up to 900-1200 m

Geophyte
Themeda caudata (Nees)A.Camus

Indo-African element 0-600 m

Geophytes
Chryzopogon fulvus (Spreng.) Chiov.
Conyza stricta Willd.

Therophytes
Hedyotis affinis R. & S.
Sclerocarpus africanus Jacq. ex Murr.

Phanerophytes
Grewia flavescens Juss.
Laggera pterodonta (DC.) Sch.-Bip. ex Oliv

Chamaephyte
Conyza stricta Willd.

Up to 600-900 m

Geophytes
Cyperus distans L.f.
Nelsonia canescens (Lamk.) Spreng.

Up to 900-1200m

Geophytes
Bothriochloa pertusa (L.) A. Camus
Chlorophytum tuberosum Baker

Temperate and Mediterranean element 0-600 m

Therophytes
Seseli diffusum (Roxb. ex Sm.) Sant. & Wagh
Seseli indicum Wt. & Arn.

Hemicrytptophyte
Centella asiatica (L.) Urban

Up to 600-900 m

Phanerophyte
Potentilla sundaica (Bl.) Kuntze

Up to 900-1200 m

Geophyte
Carex digostachya Nees ex Hook.

Therphytes
Digitaria adscendens (H.B.K.) Henr.
Sonchus wightianus DC.

Phanerophyte
Potentilla leschenaultiana Ser.

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