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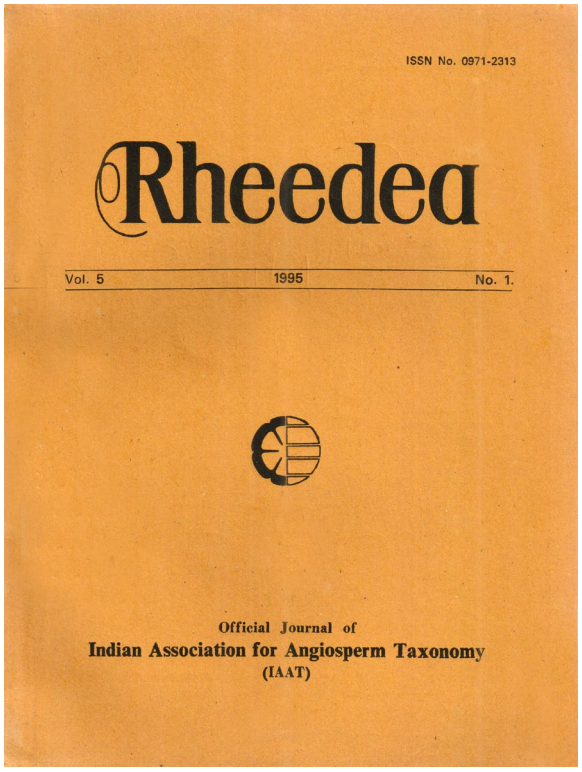
Chaturvedi A. & V.B. Diwanji



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Reassessment of phyto - geographical status of Ratlam District (M. P.)

Alka Chaturvedi

P. G. Department of Botany, Nagpur University, Nagpur - 440 010

&

V. B. Diwanji

Dewas Science College, Dewas, M. P.

Abstract

Phyto-geographical delineations by different authors vary according to the level of information available at the time. Studies carried out for smaller areas help in refining these delineations with the help of available data. An attempt has been made to reassess the status of Ratlam District, Madhya Pradesh in India in the light of detailed floristic investigations carried out the district.

INTRODUCTION

Walter (1927) and Wulff (1943) have pointed out the significance of phyto - geographical analysis for understanding and interpretation of flora. Phyto-geographical analysis and delineations of botanical provinces of India have been attempted by Clarke (1898), Hooker (1907), Chatterjee (1939) and Razi (1955) and these have been compiled by Mehr-Homji and Mishra (1973). A perusal of the maps prepared by these authors suggest wide differences in the nomenclature as well as the boundaries of delineations. Since a large part of India has still not been adequately floristically surveyed, it becomes difficult to confirm the delineations of the authors. However, as floral investigations are carried out and database for all the districts is compiled, it will be possible to revise these on the basis of new information collected.

Hooker (1855, 1907) has recognised 9 floristic provinces in the then British India (See Map 2). He placed Ratlam district at the broder of Indus Plain and Malabar. Later C. B. Clarke (1898) placed Ratlam district in 'Indian Deserta' (Map 1) and Chatterjee (1939) placed it in 'Indus Plain' (Map 3), after some minor modifications on the boundaries of floristic provinces. In the post-independent period, Razi (1955) attempted a classification of floristic provinces largely on the basis of climate, physiography and migration routes.

His boundary of two provinces, Rajwara and Malwa cuts across the Ratlam district (Map 4). Chatterjee (1962) and Puri (1960) formed a separate region for central India, but its boundaries have not been defined as the flora of the state has not been worked out thoroughly. Tiwari (1979) classified the botanical region of Madhya Pradesh on the basis of distribution of species of a single family Leguminoseae. He placed Ratlam district in 2 regions: northern side which comprise Sailana Tehsil in the Chambal-Betwa valley region which is characterised by the distribution of *Prosopis spicigera* L., *Crotalaria oblongifolia*, *C. burhia* Ham., *Alhagi pseudoalhagi* (Biob.) Desv. and *Bauhinea tomentosa* L. and the remaining portion of district comes in the south western region. This region is characterised by distribution of *Acacia suma* Buch. - Ham., *Albizzia amara* Boivin, *Cassia auriculata* L., *Parkinsonia aculeata* L. etc.

A perusal of literature thus reveals that the phyto-geographical status of Ratlam is debatable. In this paper, the information collected during floristic investigations of Ratlam district, has been utilised to evaluate the status of the district as per the divisions of Indian sub-continent mentioned earlier.

MATERIALS AND METHODS

An index map for districts of India has been used and the position of Ratlam district superimposed on the maps of Clarke, Hooker, Chatterjee and Razi after bringing all the maps to the same scale. Data collected during a floristic study of Ratlam district (Chaturvedi, 1984) has been analysed and the affinities evaluated in the light of phyto-geographical status as per earlier work done.

RESULTS AND DISCUSSION

Bhattacharjee *et al.* (1982) have included Ratlam district in two bio-climatic zones. The western part of the district (Mahi catchment) is a semiarid hot zone with moderate summer water surplus and the remaining part of the district is semiarid hot with little or no summer water surplus. This makes it almost in the same climatic zone as the eastern part of Rajasthan. The soil moisture regime is ustic, i. e., with a dry winter and summer and some parts of the soil moisture control section remain dry for more than 90 cumulative days.

The influence of various elements on the flora of Ratlam district will be clear from a perusal of Table 1. The indigenous or Indian element does not form 1/4 of the flora or just that much. The western element is almost equal in percentage and show greater effect of African elements in particular. The eastern elements constitute about 17% of the flora. As the district is located in the western part of India, the difference in the topographical features and climate seem to be responsible for this. On the other hand, general elements form the biggest block (34%), but this is an amalgamation of such elements

Table 1 Phytogeographical elements of Ratlam District

Floral Elements	Blocks	Percentage Distribution	Total Percentage
1. Eastern	Indian	24.48	24.48
2. Eastern	Eastern		17.05
a) Indo Malaysian		14.30	
b) Australian		02.50	
c) Chinese		0.25	
3. Western	Western		24.36
a) Tropical African Indian		5.23	
b) African steppe		8.30	
c) N. African Indian Desert		7.58	
d) Mediterranean European		3.25	
4. General	General		34.11
a) Tropical		16 87	
b) Introduced Trop. American		6.59	
c) Indo Malaysian African		4.35	
d) Cosmopolitan		2.68	
e) Tropical and Sub-Tropical		3.62	
		100.00	100.00

which cannot be properly classified into either eastern or western block. Also it consists of introduced and cosmopolitan elements. The same situation regarding the general elements is found in the flora of adjacent districts, e. g. Indore (Solanki, 1983).

802 species of wild and naturalised plants have been recorded in Ratlam District (Chaturvedi, 1984). Of these, 61 species (7. 54 per cent) constitute the desert elements. Though the percentage of these elements is not very high, it assumes significance when compared to Bhandari's (1978) record of 21 per cent desert elements in the total flora of Indian Desert.

The analysis presented in Table 1 indicates 3 major blocks viz. (a) Indian and western block contributing nearly 50% of the flora (b) eastern block 17%, and (c) general block forming 34%.

A comparison of these floral elements with that of India (Nayar, 1977), given in Table 2 manifests significant variations. Whereas, in the Indian flora, western element is very poor (just 8%), here it is 24. 36%. Though not to same extent, but still there is preponderance of general elements as compared to that of India, in Ratlam district. The eastern element which is largest contributor of the Indian flora is represented by 17% only. Such variations are natural as there

Table 2: Comparative analysis of Phytogeographical elements of India and Ratlam District

Elements	India	Ratlam
Indian	30%	24.48%
Eastern	35%	17.05%
Western	8%	24.36%
General	26%	34.11%

Table 3: Relationship between flora of Ratlam district with that of neighbouring regions.

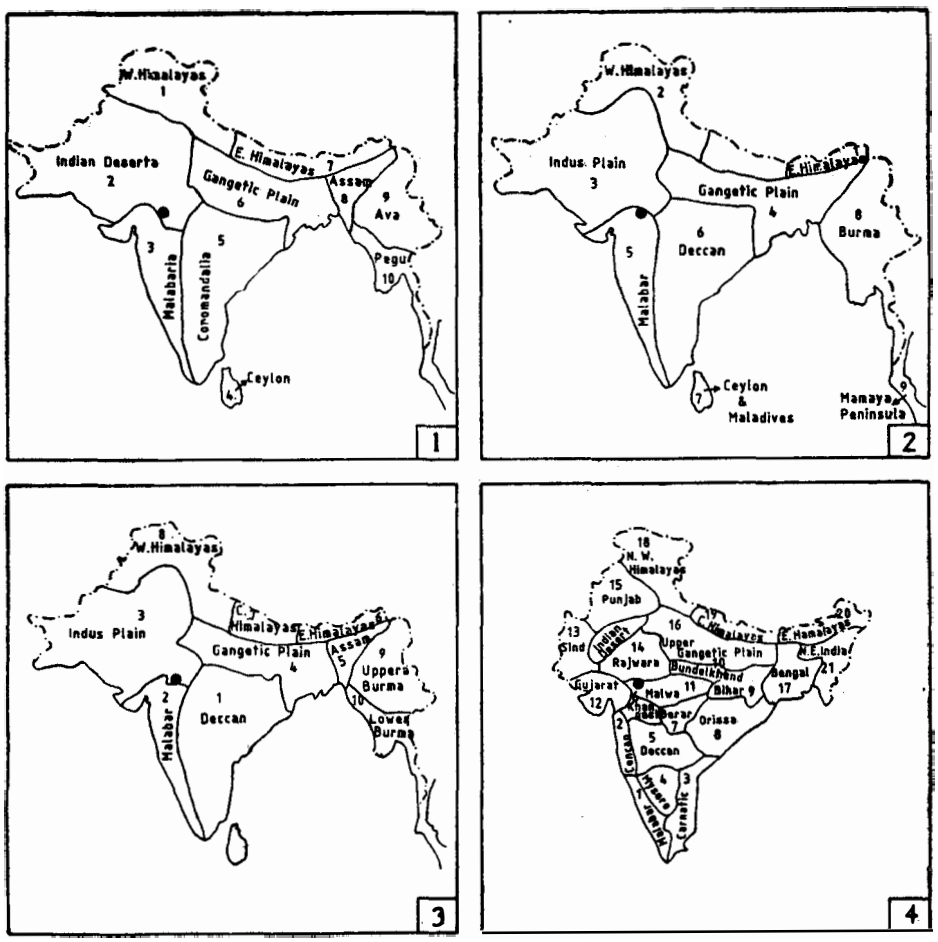
Region	No. of species (approx.)	No. of species common to Ratlam.	% of represented species in Ratlam	% of immigrant species
Bombay Presidency	3650	764	95.26	20.93
Bihar and Orissa	3730	756	94.26	20.02
Gujarat	1650	740	92.27	44.86
Upper Gangetic Plain	3550	779	90.90	21.94
Rajastan	1400	721	90.00	51.50

cannot possibly be any district in India which conforms to the same percentage as shown by India. These comparisons only highlight the tremendous variations observed in small district level floras, and the manifestations of such diversities is the basic purpose of these comparisons.

A perusal of Table 3 shows the degree of similarities of the flora of Ratlam with that of Bombay (95.26%) followed by Bihar (95.26%) and Madras (93. 26%). Rajasthan and the upper Gangetic Plain have the same percentage of similarity with that of Ratlam.

A comparative study of vegetation of Ratlam district with surrounding regions shows that except for the Upper Gangetic Plain, in the remaining regions only four families, viz. Poaceae, Asteraceae, Euphorbiaceae and Leguminoseae [Sensu lato] are common with this district. On phyto-geographical basis, therefore the inclusion of this district in the upper Gangetic Plain seems to be quite sound.

Comparison of immigrants from the surrounding states, however, seems more logical. Other territories being very large, comprising several thousand



● Location of Ratlam District

Map Floristic Provinces in India. 1. After C. B. Clarke (1898). 2. After J. D. Hooker (1907), 3. After Chatterjee (1939). 4. After Razi (1955).

elements, the percentage of common plants within these states and the district under consideration is bound to be very high. But the high percentage of the immigrants from Rajasthan is significant. Western and north-western boundaries of this district are adjoining the state of Rajasthan. On a small scale, similarities exist between the flora of Jodhpur, Jaisalmer and Barmer district of Rajasthan and Ratlam. Therefore, the percentage of immigrants (51.50%) is quite understandable.

This study also reveals some noteworthy plants. Ratlam is outside Peninsular India, but it shows the presence of some of those plants which are recorded as endemic to Peninsular India, *e. g. Gantelbua urens* Bremek. and *Carvia callosa* (Nees) Bremek. are herbaceous and shrubby elements, while tree species common to these two regions are species of *Syzygium* Gaertn., *Grewia* Linn., *Diospyros* Linn., *Drypetes* Vahl, *Dalbergia* Linn. f,. *Mallotus* Lour., *Phyllanthus* Linn., *Ficus* Linn., *Miliusa* Lesch. etc.

Similarly, plants occurring in the Western and Eastern ghats (Subba Rao and Kumari, 1981) and also in Ratlam district are: *Baliospermum montanum* (Willd.) Muell.-Arg., *Boerhavia chinensis* (Linn.) Asch. & Sche., *Ceropegia hirsuta* Wt. & Arn., *Chlorophytum laxum* R. Br., *Cynoglossum meeboldii* Brand, *Cyanotis arachnoides* Cl., *Ficus amplissima Sm.*, *Rostellularia procumbens* (Linn.) Nees, *Limnophyton obtusifolium* (Linn,) Miq., *Merremia aegyptiaca* (Linn.) Urban, *Micromeria biflora* Benth., *Syzygium heyneanum* (Duthie) Wall., *Tacca leontopetaloides* (Linn.) O. Ktze and *Tripogon bromoides* Roem. et Schult

These two enumerations clearly show that there are no barriers for migration of species and as such no endemic elements exist in the district. There are several noteworthy plants in Ratlam which are not reported from the adjoining districts of Ujjain (Khare, 1977) and Indore (Solanki, 1983) whose flora is known. These are *Althaea ludwigii* L., *Chloris dolichostachya*, *Chrysopogon serrulatus* Trin., *Delonix elata* (L.) Gamble, *Eriochloa fatemensis* (Hack. & Steud.) Clayton, *Glossostigma diandrum* (L.) O. Ktze., *Limonia alata* Wall. ex Wt. & Arn., *Micrococca mercurialis* Bth., *Parahyparrhenia bellariensis* (Hack.) Clayton, *Pogonatherum paniceum* (Lamk.) Hack., *Polygala bulbothrix* Dunn, *P. telophoides* Willd., *Synedrella nodiflora* (L.) Gaertn. and *Urochloa panicoides* var. *pubescencens* (Kunth.) Bor.

The indigenous or Indian elements form around 1/4 of the total flora. The dominating families are Fabaceae (23), Poaceae (29), Amaranthaceae (13), Acanthaceae (12), Asteraceae (11) and Euphorbiaceae (8). There are about 19 genera which are endemic ot India and represented by one or more species in Ratlam district. Some of these are *Andropogon* Linn., *Arthraxon* P. Beauv.,

Bothriochloa, Ktze, *Capillipedium* Stapf., *Chrysopogon* Grin., *Dichanthium* Will., *Eremopogon* (Hack.) Stapf., *Heteropogon* Pers., *Ischaemum* Linn., *Iseilema* Anderss., *Ophiuros* Gaertn., *Parahyparrhenia* A. Camus, *Pogonatherum* P. Beauv., *Pseudanthistiria* (Hack.) Hook., *Rotboellia* Linn. f., *Sehima* Forssk., *Spodiopogon* Trin., *Themeda* Forssk., and *Vetiveria* Liem-Lisane.

The following species considered endemic to central India, also occur in this district. e. g. *Amischophacellus cucullata* (Roth) R. Rao and Kamm., *Cyanotis arachnoides* C. B, Cl. var. *thwaitsii and Eriocaulon duthiei* Hook. f.

Tiwari (1979) has given an account of the phyto-geography of legumes of Madhya Pradesh. The following taxa of Fabaceae can be added to that list: *Crotalaria filipes* Benth., *C. notonii* Wt. and Arn., *Indigofera angulosa* Edgew. and *I. duthiei* Drumn ex. Naik var. *richardiana*.

Predominance of western elements over eastern elements justify to a certain extent the inclusion of this district by Clarke (1898) and Chatterjee (1939) in the 'Indian Deserta' and 'Indus Plain' respectively. Same situation has been reported from Rajasthan (Singh, 1977) and Gujarat Flora (Shah, 1978). The extent of these zones encompasses the whole of Indian desert and Ratlam falls in the extreme south eastern portion of these zones.

Singh (1977) has evaluated the phytogeographical status of Rajasthan and has concluded that Drude's conclusion (Drude, 1890) regarding the line of demarcation between the western elements and eastern or Indo-Malayan elements as starting from Gulf of Cambay northwards along the Aravallies does not explain the Rajasthan flora and that the line of demarcation should be shifted further east The same is true of Ratlam district. Ratlam should get higher percentage of Indo-Malayan flora, but it has larger proportion of the Perso-Arabic elements, hence the line of demarcation between these two elements should be shifted further east of Ratlam district.

Eastern elements dominate the vegetation of N. E. India (24—33%). Southern India, particularly the western coast, is the second zone of its concentration (23—31%). The percentage of eastern elements further decreases from 22% in north-eastern parts of central India to 17% in this region and in Rajasthan (7—18%). Eastern elements dominate the Sailana and Ratlam Tahsils of the district where rainfall, temperature and soil favour their presence.

General elements which form the biggest block (34%) consist of higher percentage of tropical elements. Dominating tropical plants come within the families, Poaceae (55) Fabaceae (42), Cyperaceae (29), Asteraceae (23)

Euphorbiaceae (16), Convolvulaceae (15) and Malvaceae (13). Temperate elements occur in small percentage, represented by Menispermaceae (1) Apiaceae (2), Potamogetonaceae (1) and Poaceae (2).

It is thus obvious that the phytogeographical status of Ratlam district is debatable. Climatically and pedologically the district conforms to the Malwa region, of which it is a part but the influence of Rajasthan, with which it shares boundaries, is also noticeable. Razi (1955) has suggested Malwa as a separate botanical province but it is difficult to justify the same in the absence of detailed investigations for the region. Solanki's (1983) analysis of Indore district and the present study of Ratlam, however, strengthens the case for Malwa as a separate botanical province. This could also be the line of demarcation between the Indo-Malayan and Perso-Arabic elements.

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