

**STUDIES IN FLORAL COMPOSITION OF JAIPUR DISTRICT (RAJASTHAN)**

By

SHIVA SHARMA

*The Herbarium, Department of Botany, University of Rajasthan, Jaipur*

Areas like Jodhpur and Mt. Abu in Rajasthan attracted the attention of pioneer workers like Brandis (1874) and King (1878). Ajmer-Merwara was toured by Duthie (1886) and the Rajputana desert (Jodhpur and Jaisalmer areas) was covered in a series of papers by Blatter and Hallberg (1918-21). However, Jaipur district, could not be selected by any of these workers. Except the inclusion of this area in the Flora of the Upper gangetic plains. (Duthie, 1903-1920), a mention of some of its plants by Parker (1918) and the enumeration of 100 forest species in the forest report of the erstwhile Jaipur state by George (1937) the area practically remained unexplored botanically. Even after 1950, when studies on the flora of Rajasthan region were promoted, Jaipur escaped the attention of botanists once again, except the ecological studies by Joshi (1957) and Verma (1967). The only publication on flora of this district is a list of common grasses of Jaipur by Gandhi *et al* (1961) which needs a thorough revision.

The present study, thus is the first report on the taxonomy and flora of this district.

**The area surveyed**

Spread over an approximate area of 14,000 km<sup>2</sup>, the district of Jaipur is situated between 75°-77° E longitudes and 26°-28° latitudes in the north-eastern part of Rajasthan. It is bisected length-wise by 76° E and across its width by 27° latitude.

Topographically, the area consists of: hilly regions, plains, depressions, rivulets and reservoirs. The Aravallis lie in the NE-SW direction in the state and traverse the district in the form of two parallel series; the Samod hillocks being the highest, altitude 864 m.

The soil on the barren hills is a loose gravel of brown coloured pebbles; that on the forested hills has an additional layer of some clay. In the plains, the soil is mainly a loamy-sandy soil covering a rather compact soil of light-grey colour, except the area around Sambher lake where the soil is saline.

There is no perennial river. However, the seasonal 'nalas' have some perennial water sources at depressions or 'bunds'.

The mercury touches the extremes, both diurnally as well as seasonally. The average annual rainfall is 63 cm, which is not inadequate, but the showers are irregular. Frequently there are dry years and the dry periods between the two successive showers may be about a month or so. Winter rains are almost nonexistent.



The present studies are in accordance with the findings of Maheshwari (1963) for the Delhi area; Blatter and Hallberg (*loc. cit.*) for the Rajputana desert, and Jain (*loc. cit.*) for the entire Rajasthan. These, however, do not conform to those for the Indian continent (Hooker, *loc. cit.*) and Saurashtra (Santapau, 1953). Families occupying sixth to tenth positions in these areas, with slight variations are as follows: *Euphorbiaceae*, *Convolvulaceae*, *Boraginaceae*, *Amaranthaceae*, *Malvaceae*, *Scrophulariaceae* and *Cucurbitaceae* (t. 2).

The main difference in the floristic composition is with the Upper-gangetic plains (Hooker, *loc. cit.*) and Saurashtra (Santapau, *loc. cit.*). Compared to these areas, *Leguminosae* exchange position with *Poaceae* in Saurashtra area; *Cyperaceae* and *Asteraceae* exchange positions in the Upper-gangetic plains; *Scrophulariaceae* which occupy fifth position in the list of Upper-gangetic plains are the last for Jaipur district; similarly *Euphorbiaceae* listed at sixth rank for the present area are the last but one in the neighbouring area of Rajputana desert (Blatter and Hallberg, *loc. cit.*).

The family *Urticaceae*, which occupy tenth position for the Indian continent (Hooker, *loc. cit.*) do not find a place in the list of first ten families for the area surveyed, and the neighbouring areas.

The larger genera in the flora are *Cyperus* (17 spp.), *Indigofera* (12 spp.), *Ipomoea* (10 spp.), *Euphorbia*, *Eragrostis*, *Tephrosia*, *Heliotropium*, *Alysicarpus* (8 spp. each), *Cassia*, *Acacia* and *Rostellularia* (6 spp. each). Inclusion of *Crotalaria* and *Grewia* (*sic* Jain, *loc. cit.*) makes the list complete for Rajasthan state. Two-third of the total number of genera (i.e. 229) are represented by single species.

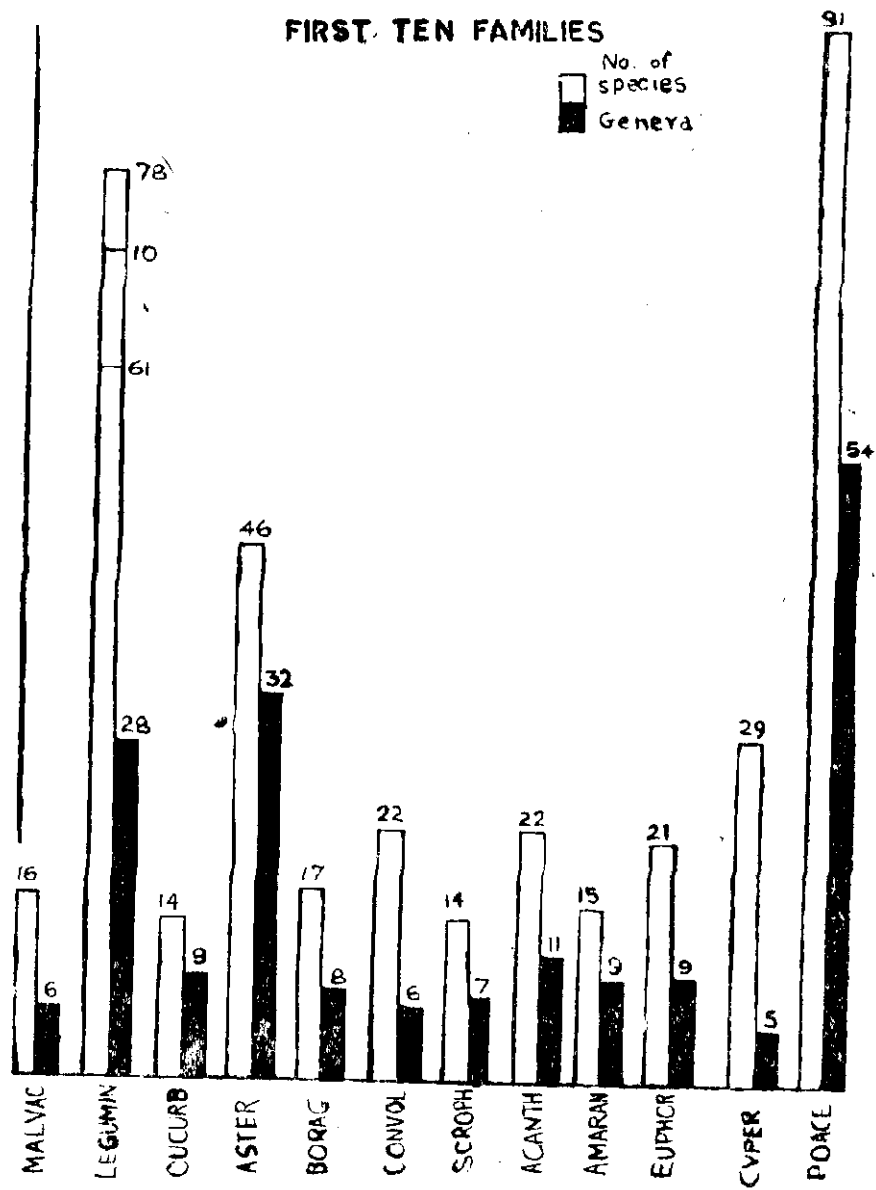
Considering the number of genera, the families can be arranged in the following sequence: *Poaceae* (54); *Asteraceae* (32); *Leguminosae* (28); *Acanthaceae* (11); *Euphorbiaceae*, *Amaranthaceae*, *Cucurbitaceae* (9 each); *Boraginaceae* (8); *Scrophulariaceae* (7); *Convolvulaceae* and *Malvaceae* (6 each) and *Cyperaceae* (5). The first four positions are true for Rajasthan state (Jain, *loc. cit.*).

The ratio between monocots and dicots comes to 1 : 3 at the level of species and genera, and 1 : 5 at the family level. Except for the ratio at the generic level, which is 1 : 4, these figures also hold good for the Rajasthan state.

### The habit forms

Families showing all the habit forms viz. trees, shrubs, climbers and herbs are not many; *Capparidaceae*, *Papilionaceae* and *Apocynaceae* complete the list. About 7 families... *Sterculiaceae*, *Tiliaceae*, *Sapindaceae*, *Caesalpiniaceae*, *Rubiaceae*, *Boraginaceae* and *Verbenaceae* are represented by herbs, shrubs and trees. The largest number (29) is of those families which are represented by herbs alone and except *Malvaceae*, *Leguminosae*, *Boraginaceae* and *Euphorbiaceae*, even the rest of the dominant families lack trees. Of the 28 families which include the tree species, 17 have trees exclusively. The trees are mostly found near moist places or on hills, rarely in the sandy areas. Total number of tree species is 64; of these 28 are meso-phanerophytes, and the rest micro-phanerophytes. There is not a single tall tree (Mega-phanerophyte) in this area.

Table 2



Twenty-two species belonging to 10 families occur as perennial climbers. These include 3 parasitic species of *Cuscuta* and the woody, partial parasite *Dendrophthoe falcata*. Some climbers are lianas.

Sixteen hydrophytic species are distributed over 10 families. *Lentibulariaceae* being the sole representative of insectivorous families. Helophytes, which have not been included above are more than 30 in number. Geophytes comprise 20 species, spread in 10 families. These perennate by means of modified roots, corm roots,—tuber roots,—stocks and bulbs etc. The largest percentage (46.21%) is that of therophytes.

### The floral elements

Bharucha and Meher Homji (1965) consider that the geographical elements are fundamental for an understanding of the flora, and analysis of the flora should begin with the floral elements. For their study of floral elements of semi-arid zones of India, they have selected for its precision, the classification as used by Blatter, McCann and Sabnis (1929). In the present study, the pattern used by Bharucha & Meher-Homji (*loc. cit.*) has been followed.

On comparison of the data (t. 3) from the neighbouring areas viz., Delhi, (Maheshwari, *loc. cit.*); Indus Delta (Blatter, McCann and Sabnis, *loc. cit.*) and with those of the Northern Zone of the semi-arid zones of the Indian continent (Bharucha and Meher-Homji, 1965), the following may be concluded :

- (i) The endemic element (restricted to the semi-arid zone) is comparatively little in the area under survey. The Indian element is also insignificant.
- (ii) There is considerable increase in the number of Eastern (Indo-malayan) element, which is the floral element with the highest number of species. This is an interesting observation since the general conditions of climate do not favour it. The plants, however, find refuge in moist shady niches in the area.
- (iii) The next in sequence is the tropical element from the tropics of the old world.
- (iv) Plants from the warm parts of the old world and tropical and sub-tropical countries are almost unrepresented.
- (v) Number of elements from North-African Indian desert is considerably less if compared to Sind or Northern semi-arid zones in the Indian sub-continent.

The floristic composition of the present area is a mixture of Eastern element...Indo-malayan (35%) and floral element from tropics of the Old world and Pantropical regions (31%). Except these two deviations, the remaining data conforms, more or less, to that of the northern semi-arid zones as defined by Bharucha and Meher-Homji (*loc. cit.*) and the neighbouring area, Delhi (Maheshwari, *loc. cit.*) The present data, interestingly, supports Hooker's view, as expressed in Hooker & Thomson (1855).

**Table 3**  
*Floral elements*

Floral elements	Sind (Blatt, McCann & Sabnis, 1929)	Northern semi-arid zones in Indian sub-continent Bharucha & Meher-Homji, 1965.	Jaipur District (present studies)	Delhi Maheshwari, 1963.
1. <b>Endemic elements</b> (restricted to semi-arid regions).	6	23	1	22
2. <b>Indian elements</b>	29	227	11	81
3. <b>Eastern elements</b> (Indo-malayan)	16	109	190	33
4. <b>Western elements</b>				
(a) North-African-Indian Desert	60	89	24	23
(b) North African steppe	37	53	1	17
(c) Tropical African-Indian	13	48	40	33
(d) Mediterranean	2	37	4	10
Oriental	5	18	11	—
European	1	14	13	—
5. <b>General elements</b>				
(a) <i>Tropical</i>				
Tropics of Old world and Pantropical	39	198	171	37
Tropical America	19	11	12	14
(b) <i>Warm-countries</i>				
Warm countries	22	71	12	—
Tropical & sub-tropical countries.	6	14	1	—
Warm parts of old world.	3	6	2	—
(c) Temperate element	1	30	34	8
(d) Cosmopolitan element	6	21	80	200

#### Acknowledgements

The author is grateful to his teacher, Prof. B. Tiagi, University of Rajasthan, Jaipur for guidance and the constant keen interest; and is highly thankful to the authorities of the U.G.C., University of Rajasthan, Jaipur and B.S.I. for the facilities and assistance extended from time to time, during the period of this work.

#### SUMMARY

The present study is a report based on survey of flowering plants of Jaipur district. The flora is a curious mixture of Eastern (Indo-malayan—35%) and tropical elements (tropics of old world and pantropical regions—31%).

46% of the plants are therophytes, 18% phanerophytes, and 8% chamaephytes; hemicryptophytes are comparatively much less while geophytes and hydrophytes are much more in proportion when compared to the normal spectrum of Raunkiaer (1934).

Thirty families are monotypic, nine monogeneric, and twelve are represented by more than ten species. Family *Poaceae* tops the list, followed by *Leguminosae*, *Asteraceae*, *Cyperaceae* etc.

The ratio between the monocots and dicots comes to 1 : 3 at the species and genera level and 1 : 5 at the family level.

जिला जयपुर (राजस्थान) के पादप मंगलन का अध्ययन

लेखक शिव शर्मा

### सारांश

प्रस्तुत अध्ययन जयपुर जिले के पुष्पीय पादपों के सर्वेक्षण पर आधारित रिपोर्ट है। यहां के पेड़-पौधे पूर्वी (भारत मलयी-35 प्रतिशत) और उष्णदेशीय तत्वों (पुरानी दुनियां के कर्क और मकर रेखा के बीच और सर्व उष्णदेशीय क्षेत्र-31 प्रतिशत) का विचित्र मिश्रण हैं।

46 प्रतिशत पादप बीजातिजीवोद्भिद, 18 प्रतिशत उन्मृदोद्भिद् और 8 प्रतिशत मृदोद्भिद् हैं। तलोद्भिद् अपेक्षतया बहुत ही कम हैं और रोनकिये (1934) के सामान्य वर्णपट से तुलना करके देखने पर भूम्युद्भिद् और जलोद्भिद् अनुपात में बहुत अधिक हैं।

तीस कुलों का एक-एक प्रतिनिधि, नौ प्रजातियों का एक-एक प्रतिनिधि है तथा बारह प्रजातियों की दस से अधिक जातियां मिलती हैं। पोएसी (घास कुल) कुल की जातियां सबसे अधिक हैं जिसके पश्चात् लेग्युमिनोसी (शिमबी कुल), एस्टेरेसी (तारक कुल) और साइपेरेसी (मुस्ता कुल) आदि आते हैं।

एक बीजपत्रीय पादपों और द्विबीजपत्रीय पादपों का समनुपात जाति और प्रजाति स्तरों पर 1 : 3 तथा कुल स्तर पर 1 : 5 निकला।

Studien zur pflanze Komposition des Jaipurbezirks (Rajasthan)

SHIVA SHARMA

### ZUSAMMENFASSUNG

Die gegenwärtige Studie ist ein Bericht, der an der Übersicht der blumende Pflanzen des Jaipurbezirks basiert ist. Die Pflanzen sind eine neuglerige Mischung der östliche (Indien-Malay-35%) und tropische (die Tropen der alte Welt und alletropische Flächen-31%) Elemente.

46% Pflanzen sind Samenüberlebendepflanzen (therophytes), 18% Obergrundpflanzen (phanerophytes) und 8% Grundpflanzen (chamaephytes). Die Oberflächepflanzen (hemicryptophytes) sind sehr minder, aber die Bodenpflanzen (geophytes) und Wasserpflanzen (hydrophytes) sind sehr zahlreich, wann die zum normale Raunkiaer-Spektrum (1934) verglichen sind.

Dreißig Familien sind monotypisch, neun Familien sind monogattungig und zwölf Familien sind bei mehr als zehn Arten vertreten. Die Familie Poaceae ist an der Spitze des Verzeichnisses, und ist bei den Leguminosae, Asteraceae, Cyperaceae usw. gefolgt.

Das Verhältnis zwischen den Einsamenlappen (Monocots) und Zweilappen (Dicots) ist an der arten- und gattungsbühne 1:3 und an der familienbühne 1:5.

Etudes de la composition de flore du district de Jaipur (Rajasthan)

par SHIVA SHARMA

Résumé

Cet article rend compte des études faites sur les plantes à fleurs en district de Jaipur—La flore se constitue d'un mélange remarquable des plantes d'Orient (dont 35% Indo-Malaises) et des plantes tropicales (dont 31% sont des tropiques de l'ancien monde et des régions pantropiques).

46% des plantes sont des "therophytes", 18% des "phanerophytes" et 8% des "chamaephytes." Des hémicryptophytes sont relativement peu nombreuses alors qu'en comparaison avec le spectre normal de Raunkiaer (1934), des géophytes et des hydrophytes se trouvent en plus grande proportion.

30 familles sont monotypiques, 9 sont monogénériques et 12 familles renforment plus de 10 espèces. La famille des Poacées est la plus importante suivie de Légumineuses, Astéracées, Cyperacées etc.

Le rapport entre les monocotylédones et les dicotylédones revient à 1:3 au niveau des espèces et des genres et à 1:5 au niveau des familles.

Literature cited

1. Bharucha, P.R. & Meher-Homji, V.M. (1965).—On the Floral Elements of the Semi-arid zones of India and their ecological significance. *New Phytol.* **64**: 330-342.
2. Blatter, E. & Hallberg, E. (1918-1921).—The Flora of Indian Desert (Jodhpur & Jaisalmer). *J. Bombay nat. Hist. Soc.* **26**: 218-246, 1918; 525-551; 811-818, 1919; 968-987, 1920; **27**: 40-47; 270-279, 1920; 506-512, 1921.
3. Blatter, E., McCann, C. & Sabnis, T.S. (1927).—*The Flora of Indus Delta*. Madras (in book form, 1929).
4. Brandis, D. (1874).—*The Forest flora of north-west and Central India*. London.
5. Duthie, J.F. (1886).—*A botanical tour in Merwara (Raj), a report*. Calcutta.
6. ....(1903-1920).—*Flora of the Upper-gangetic Plain and of the adjacent Siwalik and sub-himalayan tracts*. Calcutta vol. 1-3; repr. 1952.
7. Gandhi, S.M., Bhargava, P.D. & Bhatnagar, M.P. (1961).—Grasses of Jaipur. *Proc. Nat. Acad. Sci. India* **31 B**, 2: 183-192.
8. George, H.S. (1937).—*Report on the Forest of the Jaipur state*, Jaipur.
9. Hooker, J.D. & Thomson, T. (1855).—*Flora Indica*, London.



10. Hooker, J.D. (1907) *Botany, Imperial Gazetteer of India* ed. 3, 1. 157-212.
  11. Jain, S.K. (1970).—Floral composition of Rajasthan—A review. *Bull. bot. Surv. India* 12 : 176-187.
  12. Joshi, M.C. (1957).—A comparative study of the vegetation of some areas in Jaipur Division. *J. Indian bot. Soc.*, 35 : 495-511.
  13. King, G. (1878).—*Sketch of the Flora of Rajputana*, Calcutta. repr. *Indian For.* 4 : 226-236, 1879.
  14. Maheshwari, J.K. (1963).—*The Flora of Delhi*, New Delhi.
  15. Parker, R.N. (1918).—*A Forest Flora for the Punjab with Hazara and Delhi*, Lahore.
  16. Santapau, H. (1953).—*Plants of Saurashtra*. A preliminary list. pp. 1-45, Rajkot.
  17. Sharma, S. (1974).—An enumeration of the Flora of Jaipur district in Rajasthan. *Univ. of Rajasthan Stud. in Botany* pp. 1-38, Jaipur.
  18. Verma, S.K. (1967).—Vegetation types of Jaipur. *Indian For.*, 93 : 7-17.
-