

# A Survey of Flora of field weeds of Chambal Commanded Area, (Kota), Rajasthan\*

JNDU MEHTA AND U. B. SINGH\*\*

Weeds are among the most important enemies to agricultural production and their control is recognised as a major problem in any land development programme. Early attempts in controlling weeds were mainly by mechanical means and the use of chemicals was introduced towards the end of the last century. Before taking any step to control weeds specially by means of chemicals a thorough knowledge about their taxonomy, morphology and life history must be known because of selective and differential behaviour of herbicides.

Considerable amount of work has been done on weed flora by Kenoyer (1924), Singh (1941, 1950), Tadulingam (1955), Thakur (1954). In Rajasthan, work on desert vegetation and flora of western and North Western parts has been done by King (1879), Ratnam (1951), Sankhla (1951), Shanti Swaroop (1951), Sharma (1958), Bajpai (1954) and Tomar & Mathur (1965). Yet, information regarding the flora of South Eastern region of Rajasthan is meagre (Vyas 1963). As such a survey was initiated to have a detailed account of the weed species occurring in Chambal Commanded area.

The area commanded by Chambal-River is about thousand square miles in Kota and Bundi Districts of Rajasthan, lying between 24°N to 76.8°E longitude and elevation around 750 to 800 ft. In Bundi district, tehsils which are covered are Bundi, Talera and Patan and in Kota district, Ladpura, Digod, Barod, Anta, Mangrol, Etawa and Pipalada tehsils are benefited by Irrigation either totally or partially. In area of about 7.00 lakh acres is envisaged to be given. With the introduction of irrigation rabi weeds have also been introduced which were rare in *barani* conditions. *Kharif* weeds were frequent even before commencement of irrigation.

## CLIMATE

The average rainfall is 31" which encourages profuse weed growth in *kharif* season. The rains start from 2nd week of June and continues to end of Oct., July and August are the wettest months. There may be occasional rains

---

\*Contribution of Department of Agriculture, Rajasthan, Jaipur. Work done under the scheme of River Valley Project at Irrigation Research Centre Chambal Commanded area, Kota.

\*\*Assistant Plant Physiologist and Agronomist U. N. D, P. Kota.

about 2" during December and January. With average minimum temperature upto 56°F during winters upto 105°F during summer and average humidity between 20 to 75%.

### GEOLOGY AND SOIL

The area is represented by stratified sand stone and the system of geological formation is referred to come under Vindhyan system. The area comprises alluvial deposits having gray or brown soils with or without kankar layers below 120 cm. A detailed classifications of soils have been done by Mehta (1958).

### DESCRIPTION OF WEEDS

Survey of all the ten tehsils stated above has been done at different intervals in the year 1966-67. In *kharif* the major crops grown are Jowar, Til, Maize, Groundnut, and Arhar. In *rabi*, Linseed, Wheat, Gram, Coriander, and Masur are taken. Weeds growing in these crops have been collected and identified. Some of the rare species were compared with the herbarium of National Botanical Gardens, Lucknow. The habit, habitat, flowering and fruiting time, their important morphological characters and methods of propagation have been recorded. Only Botanical name, local name, name of the crop and season in which it has been collected has been given against each weed. Morphological description has been avoided as the same is available in different flora.

#### ACANTHACEAE :

*Justicia quinqueangularis* S. Koess (Banya Bahu) v. common K. weed, Jowar, sunhemp, groundnut and Til.

*Ruellia patula* Jacq, common k. weed low lying places.

*Rungia repens* T. Anders—common K. weed Jowar rice.

#### AIZOACEAE :

*Mollugo latoides* W & A—rare k. weed.

*Trianthema portulacastrum*—(Bhabra) V. common K. weed Jowar, Til.

#### AMARANTHACEAE :

*Achyranthes aspera* Linn. (Andhi Jhara) Biennial or perennial herb, waste places, shady corners of fields.

*Aerua lanata* Juss—Rare K. weed waste places.

*A. scandens* Wall— — do —

*Alternanthera paronychiodes*—common k. weed waste places of fields.

*A. sessilis* Br. — do —

---

N. B. Symbols used for Very — V Local names have been  
 Rabi — R given within brackets  
 Kharif — K wherever available.

*Amaranthus gracilis*—common k. weed, all kharif crops.

*A. spinosus* Linn. (Choulai) common k. weed, jowar.

*A. viridis* Linn. (Choulai) common k. weed, jowar.

*Celosia argentea* Linn. (Murgi Ka Phool) V. common k. weed, Jowar, Groundnut, Til and paddy.

*Digera muricata* Mart. (Kaningera) K. weed. V. common in Jowar, Groundnut:

#### ASCLEPIADACEAE :

*Calotropis procera* Br. (AK) Perennial weed, found on road sides and waste places of fields.

#### BORAGINACEAE :

*Trichodesma sedgwickienum* Banerjee. K. weed, found in waste places and Jowar fields.

#### CAESALPINOIDEAE :

*Cassia obtusifolia* Linn. (Ponwadya) V. common k. weed, found in waste places and fallow fields.

*C. occidentalis* Linn. — do —

*Sesbenia aculeata* (wild Dhancha) K. weed, Jowar.

#### CAPPARIDACEAE :

*Capparis aphylla* Roth. (Kair or Karil) Perennial, found in drier portion and waste lands in the fields:

#### CARYOPHYLLACEAE :

*Saponaria vaccaria* Linn. common R. weed in Opium and wheat fields.

*Spergula arvensis* Linn. (Pittappra) common R. weed, wheat.

#### CHENOPODIACEAE :

*Chenopodium album* Linn.—(Bathua) v. common in all rabi crops.

*C. murale* Linn. (Bhabra) — do —

#### COMMELINACEAE :

*Cyanotis cucullata* Kunth (Mirza) very common K. weed, Jowar and Groundnut fields.

*Commelina benghalensis* Linn. (Bokna Kankowa) — do —

*C. forskah* Vahl. — do —

*Commelina attenuata* Koen.—common, K. weed. All crops

#### COMPOSITAE :

*Caesulia axillaris* Roxb. (Telya Kan) V. common k. weed. Found in paddy fields and along channel banks.

*Cnicus arvensis* Hoffm.—common R. weed. Gram, Barley and wheat fields.

*Blumea amplexans* DC.—Common R. Weed. Linseed, Gram Mustard and Arhar.

- B. lacera* DC.—Common R. Weed. Linseed, Gram, Mustard and Arhar.  
*B. membranacea* — do —  
*Eclipta prostrata* Linn. (Safed Bhangra) v. common K. weed. All crops.  
*Erigeron asteroides* Roxb. common k. weed. Waste places around fields.  
*E. linifolius* Willd.—K. weed found in waste lands and field channels.  
*Gnaphalium indicum* Linn. Rare weed.  
*G. luteoalbum* Linn. Rare weed.  
*Goniocaulon glabrum* Cass. - do -  
*Grangea maderaspatana* Poir - do -  
*Launea asplenifolia* Hook F. (Jangli Gobhi) common R. weed. All crops.  
*L. nudicaulis* Hook F. - do -  
*Pluchea lanceolata* Oliv—common R weed. Gram, Linseed. All crops.  
*Sonchus arvensis* Linn. - do - All crops.  
*S. oleraceus* Linn. - do -  
*Tridax procumbens* Linn. common k, weed, found in abundance in waste lands, fields, paths and Arhar fields.  
*Vernonia conyzoides* DC.—K. weed Jowar and Maize.  
*V. cinerea* Less.—(Jhurjhuri) - do -  
*Vicoa indica* Trin. (Sundal) common k. weed, sugarcane, Jowar groundnut and Til.  
*Xanthium strumarium* Linn. (Adha Sishi) K. weed V. common in waste places.

#### CONVOLVULACEAE :

- Convolvulus arvensis* Linn. (Gopi, Hirankhuri) v. common perennial weed in all K & R crops and in waste places.  
*C. microphyllus* Fuluos - do -  
*Cuscuta* sp. (Amarbel) common weed. Found in lucerne fields.  
*Evolvulus alsinoides* Linn.—Perennial weed found in open grassy places.  
*Ipomoea hederacea* (Nil) Jacq. V. common K. weed Sunhemp and sugarcane fields.  
*I. hispida* (Vahl) R & S and sch (Kaglyon ki belri) - do -  
*I. pestigrides* Linn.—K. weed found in waste places of fields.  
*Merremia emarginata* Hallier F. (Pofri, Chapti) v. common K. weed, found in all kharif crops and in waste lands.

#### CRUCIFERAE :

- Coronopus didymus* Linn.—common R. Weed. All crops.  
*Sisymbrium irio* (Jangli Sarson) - do -  
*Lapidium sativum*—R. weed.

## CUCURBITACEAE :

*Cucumis trigonus* Roxb. common K. weed, Maize Sorghum and Arhar.

*Melothria maderaspatana* (Lal Chirunki) K. weed found along drains and waste places.

*Memordica cochinchinensis* Spreng :— (Kakora) common K. weed. All Kharif crops.

## CYPERACEAE :

*Cyperus aristatus*—common k. weed, Groundnut and Paddy fields.

*C. difformis* Linn. common k. weed. paddy field and other moist places.

*C. rotundus* Linn. (Motha, Mogda) v. common perennial weed. All kharif crops and in waste places.

*Scirpus roylei*—common k. weed. paddy fields, Tanks and Marshy places.

## EUPHORBIACEAE :

*Acalypha Indica* Linn. (Kuppi) v. common k. weed Jowar and Groundnut fields.

*Chrozophora prostrata* Dalz. common k. weed, Jowar and Groundnut fields and in waste lands.

*C. retteri* A. Juss - do -

*Euphorbia decumbens* Willd—common k. weed. Found on road sides in fields.

*E. prolifera* Ham. v. common r. weed, waste places, Masur, Wheat and linseed crops.

*E. hypericifolia* Linn. common weed on road sides in the fields.

*E. dracunculoides* Lamk.—common R. weed wheat and linseed crops.

*E. pilulifera* Linn. (Badi Dudhi) v. common k. weed. In cultivated and waste lands and on roadsides in fields.

*E. microphylla* Heyne—(Chhoti Dudhi) - do -

*E. rosea*, Retz.—Perennial weed. In waste places.

*Phyllanthus niruri* Linn. (Hazar dana) V. common K. weed cultivated and waste lands in kharif season.

*P. maderaspatensis* Linn. — common k. weed, common along irrigation channels.

## FUMARIACEAE :

*Fumaria indica*—common R. weed in wheat.

## GENTIANACEAE :

*Enicostema verticillatum* Linn. Syn *E. littorale*.

## GERANIACEAE :

*Biophytum sensitivum* DC. Rare, K weed, Jowar fields.

*Oxalis corniculata* Linn.—Perennial weed v. common along water channels.

## GRAMINEAE :

*Andropogon annulatus*, Syn. *Dichanthium annulatus* Stapf. K. weed.

*Apluda mutica* var *aristata* Linn. common k. weed.

*Chionachne koengii*. Spr. Rare K. weed.

*Chloris virgata*, SW.—v. common k. weed.

*Cynodon dactylon* Linn. (Dub)—Perennial grass, common in all crops and waste lands.

*Dactyloctenium aegypticum* (willd) Beauv.

*Digitaria adscendens* Henr. Sub-sp. *adscendens* Bor var *criniformis* Henr. K. weed.

*Dinebra retroflexa* Panz. - do -

*Echinochloa colonum* (Sama ghas) v. common Perennial Weed.

*Eleusine indica* Gaertn—k. weed, waste lands in the fields.

*Eragrostis pumila*—k. weed - do -

*E. tenella* R & S. K, weed Arhar and shady places.

*Melenocenchrus royalanea* k. weed - do -

*Panicum trypheran* Schult k. weed - do -

*P. antidotale* Retz. - do -

*Setaria verticillata*, Wall—k. weed Jowar and Maize.

*Sporobolus indicus*, Br.-k weed, Jowar fields.

*Sacchrum spontaneum* Linn. (Kans) Perennial weed in wheat crops and waste lands.

*Sorghum halepense* Wall—R. weed.

## LABIATAE :

*Leucas aspera* Spreng (Guma) V. common k. weed. All crops.

*L. cephalotes* Spreng - do -

## LILIACEAE :

*Asphodelus tenuifolius* Cav. (Pyazi) v. common R. weed. All crops.

## LYTHRACEAE :

*Ammania baccifera* Linn. (Tamnya) K. weed moist places and in paddy fields.

*A. pentandra* Roxb. (Tamnya) K. weed moist places and in paddy fields.

*Rottela densiflora*—k. weed, paddy fields.

## MALVACEAE :

*Abutilon graveolens* W & A—K. weed; found in waste places around fields.

*A. indicum* G. Don. - do -

*Hibiscus abelmoschus* Linn. (Jangli Bhindi) common k. weed Road sides and waste places in fields.

*H. ficulneus*, Linn—(Jangli Bhindi) common k. weed. Road sides and waste places in fields.

*H. panduriformis* Burm. (Kajlya) K. weed. Groundnut and Jowar fields.

*H. trionum* Linn. K. weed waste places and around fields.

*Malva rotundifolia*, Linn. R. weed, common in wheat, coriander fields.

*Malvastrum mandelianum* Linn. Garcke—(Santh) K. Weed.

*Sida acuta* Burm (Kharati) K. weed, Jowar.

*S. spinosa* Linn. (Kali Kharathi) - do -

#### MENISPERMACEAE :

*Cocculus villosus* DC. (Sanratha) Perennial weed in Arhar, Jowar and waste places.

*C. Leaeba*, DC. - do -

#### MIMOSOIDEAE :

*Mimosa pudica* Linn. (Chuimui, Lajwanti) K. weed waste lands.

#### NYCTAGINACEAE :

*Boerhavia diffusa* Linn. (Santh) common k. weed. All crops.

#### ONAGRACEAE :

*Ludwigia parviflora*, Roxb-k. weed, Rice fields and moist lands.

#### PAPAVERACEAE :

*Argemone mexicana* Linn. (Satyanashi) Perennial weed waste lands.

#### PAPILIO ACEAE :

*Alhagi camelorum* (Jawasa) Perennial, found in all alkaline patches and cultivated fields.

*Alysicarpus monilifer* DC—Perennial, waste lands.

*A. longifolius* W & A (Badi Gual) K. weed Jowar, Til, Groundnut fields.

*A. rugosus* DC.—var. Heyneanus (Choti Gual) k. weed.

*A. rugosus* var. *styracifolius*, Baker, k. weed - do -

*Chtoria ternatea* Linn. (Koyli) Perennial creeper around field boundary and hedges.

*Crotalaria prostrata* Roxb. k. weed, around cropped lands.

*Dolichos biflorus* Linn. (Bhanwar Lat Ki Phali) R weed. Coriander, wheat fields.

*Hevlardia laterbrosa* DC, Road side weed.

*Indigofera cordifolia* Heyne—k. weed. - All crops.

*I. enneasphylla*, Linn. - do -

*I. glandulosa* Willd (Jojhru) v. common k. weed. All crops.

*I. linifolia* Retz.—K. weed, along road sides and grassy places in fields.

*I. tinctoria* Linn. k. weed. - do -

*I trita* Linn. - do -

*Lathyrus sativus* Linn. (Jangli Matar) Common R. Weed wheat.

*Medicago denticulata* Willd - do -

*Melilotus alba* Lamk (safed sanji) - do -

*M. indica* All (Pilli Sanji) - do -

*Phaeolus trilobus* Ait (Jungli Moth) v. common k. weed. Along bunds and fallow fields.

*Psoralea corylifolia*, Linn. (Bapcha) v. common weed of Jowar, Til, Ground-nut fields.

*Rhynchosia minima* DC. (Teen patti) - do -

*Trigonella corniculata*, Linn.—v. common R. weed in wheat crop.

*T. polycerata*, Linn. - do -

*Vicia hirsuta* Koch - do -

*V. sativa* Linn. - do -

*V. faba* Linn. - do -

#### PASSIFLORACEAE :

*Passiflora foetida* Linn.

#### POLYGALACEAE :

*Polygala erioptera* DC.—Rare K. weed, Jowar fields.

#### POLYGONACEAE :

*Polygonum glabrum* Willd—found in fields near river banks.

*P. plebejum* Br. var. *brevifolius*—found in waste lands.

*P. plebejum* Br. var. *effusa* - do -

*P. plebejum* *griffithi* - do -

*Rumex dentatus* Linn. Near drains and moist places.

#### PORTULACAEAE :

*Portulaca oleracea* Linn. (Lunkya) common k. weed, G. nut.

*P. quadrifida* Linn. (Chota Lunkya) - do -

#### PRIMULACEAE :

*Anagallis arvensis* Linn. (Krishna nil) common R. weed wheat fields.

#### RHAMNACEAE :

*Zizyphus mauritiana* Ham (Bare) Perennial weed waste lands.

*Z. nummularia* (Burn f.) W & A (Jharberi) — Common perennial weed of waste land and cultivated fields.

#### RUBIACEAE :

*Oldenlandia aspera*, DC—k. weed paddy fields.

*O. dichotoma* HK. f. - do -

*Borreria stricta*—Rare K. weed, Jowar fields.



## SAPINDACEAE :

*Cardiospermum helicacabum* Linn. common K. weed, Jowar fields:

## SAXIFRAGACEAE :

*Vahlia viscosa* Roxb.

## SCROPHULARIACEAE :

*Stemodia viscosa* Roxb. (Basli Rukhri) common k. weed, Jowar and groundnut fields.

*Kickxia ramossima* - do -

*Striga euphrasioides* Benth (rookhri) common k. weed, Jowar fields.

*Celsia coromandeliana* Vahl—found in fields near river bank.

*Lindenbergia urticaefolia* - do -

## SOLANACEAE :

*Datura metel* Linn. (Datura) k. weed waste places and roadsides in fields.

*Physalis minima* Linn (Jangli ras-bhari) common k. weed, found in waste places, Jowar and Til fields.

*Solanum nigrum* Linn. (Makoi) v. common k. weed found on road sides, waste lands and in cultivated fields.

*S. surattense* Burm f. (Kantali) common k. weed found on road sides, waste lands and in cultivated fields.

## TILIACEAE :

*Corchorus aestuans* Ham (Linn) Common k. weed Jowar and Groundnut:

*C. fascicularis* Lamk (Jangli jute) v. common k. weed, Jowar, Maize, Til fields.

*C. olitorius* Wall—v. common k. weed, Jowar, Maize, Til and fallow fields.

*C. tridens* Linn. K. weed — do —

*C. trilocularis* Linn. — do —

*Triumfetta bartramia*, Roxb. common weed found in waste lands.

## TYPHACEAE :

*Typha angustata* chaub (Era) V. common Perennial weed along drains and ditches.

## VERBINACEAE :

*Phyla nodiflora* Linn. (Syn. *Lippia nodiflora*) K. weed found along drains in the fields.

## ZYGOPHYLLACEAE :

*Tribulus terrestris* Linn. common k. weed found in waste lands.

## STATISTICAL SYNOPSIS

Table I. :— Weed classification in different families, genera and species.

S. No.	Family	Genera	Species	Percentage of the total species
1.	Leguminaceae	18	31	16.49
2.	Compositae	15	22	11.70
*3.	Gramineae	17	19	10.10
4.	Euphorbiaceae	4	12	6.38
5.	Amaranthaceae	6	10	5.31
6.	Malvaceae	5	10	5.31
7.	Convolvulaceae	5	8	4.25
8.	Tiliaceae	2	6	3.19
9.	Scrophulariaceae	5	5	2.65
10.	Polygonaceae	2	5	2.65
*11.	Commelinaceae	2	4	2.12
*12.	Cyperaceae	2	4	2.12
13.	Solanaceae	3	4	2.12
14.	Acanthaceae	3	3	1.59
15.	Cruciferae	3	3	1.59
16.	Cucurbitaceae	3	3	1.59
17.	Lythraceae	2	3	1.59
18.	Rubiaceae	2	3	1.59
19.	Aizoaceae	2	2	1.59
20.	Caryophyllaceae	2	2	1.59
21.	Chenopodiaceae	1	2	1.59
22.	Geraniaceae	2	2	1.59
23.	Labiatae	1	2	1.59
24.	Menispermaceae	1	2	1.59
25.	Portulacaceae	1	2	1.59
26.	Rhamnaceae	1	2	1.59
27.	Asclepiadaceae	1	1	0.53
28.	Boraginaceae	1	1	0.53
29.	Capparidaceae	1	1	0.53
30.	Fumariaceae	1	1	0.53
31.	Gentianaceae	1	1	0.53
*32.	Liliaceae	1	1	0.53
33.	Nyctaginaceae	1	1	0.53
34.	Onagraceae	1	1	0.53
35.	Papaveraceae	1	1	0.53
36.	Passifloraceae	1	1	0.53
37.	Polygalaceae	1	1	0.53
38.	Primulaceae	1	1	0.53
39.	Sapindaceae	1	1	0.53
40.	Saxifragaceae	1	1	0.53
*41.	Typhaceae	1	1	0.53
42.	Verbinaceae	1	1	0.53
43.	Zygophyllaceae	1	1	0.53

N.B. :— Monocots have been marked with an asterisk.

**Table 2. :— Weed Distribution in Number and Percentage of Families, Genera and Species in Dicot and Monocot.**

	Dicot		Monocot		Total
	%	Number	%	Number	
Families	88.37	38	11.63	5	43
Genera	81.88	104	18.12	23	127
Species	84.57	159	15.43	29	188

Table 1 shows that except Gramineae, monocots are poorly represented. Out of a total of 29 species under monocots 19 species belong to Gramineae and rest ten belong to other four families. In case of dicots out of 159 species 31 belong to leguminaceae and rest 129 species belong to 37 different families.

Out of 43 families, 22 families are represented by one genus. Among the rest 21 families 9 have 2 genera, 4 have 3 genera, 1 have 4 genera, 3 have 5 genera, 1 have 6. The Compositeae, Gramineae, Leguminoseae are represented by 15, 17 and 18 genera respectively.

Out of 127 genera 89 are represented by 1 sp 25 by 2, 6 by 3, 4 by 4, 1 by 5, 1 by 6, 1 by 7 species. The largest genera *Euphorbia*, *Indigofera* and *Corchorous* having 7, 6 and 5 spp respectively. As far as the number of species is concerned all the genera are poorly represented.

Table 2 shows the proportions of monocot & dicot is 1:7.6 of families, 1:4.5 of genera and 1:5.4 of species.

The proportion of rabi and kharif weeds is about 1:3.

*Relationship of the flora :*

Most of weed flora resembles with flora of south India (Tadulingam) Sabins (1929) and Nair (1956) in the reports of desert of Sindh and Rajasthan and that of Chairawa, reported dominance of families Leguminasae, Compositeae and Gramineae which are also observed to hold same key position in this region.

### SUMMARY

A detailed collection of weeds in ten tehsils of Chambal Commanded Area, have been listed with a statistical synopsis in the present paper. Leguminaceae, Compositeae and Gramineae make more than 1/3 of the flora, these coupled with Euphorbiaceae and Amaranthaceae cover about fifty per cent of the flora. The remaining flora is composed of thirtyeight families. Except Gramineae monocots are poorly developed. *Euphorbia*, *Indigofera*, *Corchorous* have more than four species. Other genera are poorly represented.

*Digera*, *Psoralea*, *Celosia*, *Alysicarpus*, *Rungia*, *Justicia* and *Euphorbia* are very common in kharif season. Obnoxious creeping weeds of this season are *Cynotis*, *Merremia*, *Trianthema*, *Convolvulus* and *Ipomea* spp. In Rabi season *Chenopodium*, *Sonchus*, *Trigonella*, *Medicago*, and some species of *Euphorbia* are very common in this area. The only parasites found in the crops in this area are *Striga euphrasioides* and *Cuscuta* spp.

Certain crop weed associations need special mention because of their severe competition with crops and further studies are required regarding the relative losses and their extent due to such competition. Wheat crop suffers due to *Chenopodium album*, *C. murale* and *Convolvulus arvensis*, Paddy due to *Ammania baccifera*, *Rottela densiflora*, *Cyperus aristatus* and *Caesulia axillaris*. In kharif sorghum, pluses, Til, Groundnut, in general sustain a strong competition with *Digera muricata*, *Rungia repens*, *Celosia argentea*, *Echinochola colonum*, *Psoralea corylifolia*, *Merremia emarginata*, *Cyperus rotundus*, *Justicia quinqueangularis*, *Vernonia conyzoides*, *Vicoa indica* etc. These weeds are very common and under favourable conditions of good rainfall even total crop losses in some fields do occur due to these competitions. Selective association of *Cuscuta* in Lucerne, *Striga* in Jowar and *Ipomea* in sunhemp are also worth recording.

#### ACKNOWLEDGEMENT

Thanks are due to Shri T. C. Kala, Director of Agriculture, Rajasthan who took keen interest in these studies. Authors are also grateful to Shri L. B. Singh, Director, National Botanical Gardens, Lucknow who made arrangements and provided facilities for identifying some of the rare specimens.

#### REFERENCES

- Bajpai, M. R. and Verma, J. K. Weed Flora of Jobner. *Annals arid Zone*. 2(2): 69-180, (1964).
- Bakshi, T. S. The vegetation of Pilani and its neighbourhood *J. Bomb. Nat-Hist Soc.* 52 : 484-514, (1954).
- Duthie, J. F. Flora of upper Gangetic plain, (1888).
- Hooker, J. D. Flora of British India, 1-7, (1897).
- Kenoyer, L. A. Weed manual of Gwalior State, (1924).
- King, G. Sketch of the Flora Rajputana, *Indian For*, 4 : 26-36, (1879).
- Mehta, K. M. Report of Soil and crop investigation Chambal Commanded Area, Rajasthan, (:961).
- Mulay, B. N. and Ratnam, V. V. Vegetation found around about Pilani *Proc. Indian Sci. Cong.* 11 : 65, (1950).
- Nair, N. C. Flora of Chirawa *Proc. Raj. Acad. Sci.* 6 : 49-64, (1956).

- Puri, G. S. Flora of Rajasthan, Records of the B. S. I. 19 : (1), (1964).
- Ratnam, B. V. The vegetation of Lohargal *Proc. Raj. Acad. Sci.* 2 : 26-36, (1951).
- Sabnis, T. S. A note on the Ecology of the flora of Sind. *J. Indian Bot. Soc.* 8 : 263-286, (1929).
- Sankhla, K. S. Enumeration of the flowering plants of North Western Raj. *Uni. Raj. Studies Biol. Sci.* : 43-56, (1951).
- Sarup, S. A list of common plants of Jodhpur and its neighbourhood *Uni. Raj. Studies biol. Sci.* 1 : 29-35, (1951).
- Sharma, V. S. Flora of Ajmer *J. Bomb. Nat. Hist. Soc.* 55 : 129-141, (1958).
- Singh, D. N. Some common weeds of U. P., (1941).
- Singh D. N. and Chand, A. A manual of important weeds of U. P., (1950).
- Tadulingam. Weed Flora of South India, (1955).
- Thakur, C. Weed in Indian Agriculture, (1954),
- Tomar, P. S. and Mathur, O. P. A survey of common weeds in gang canal commanded area in Raj. *Indian J. Agron.* (10), (1965),
- Vyas, L. N. Vegetation of Alwar and its relationship with the North East. *Raj. vegetation J. Indian Bot. Soc.* 42, (1963).