

THE VEGETATION OF MARSHES, PONDS AND RIVER BANKS IN SHIVPURI,
MADHYA PRADESH

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ABSTRACT

The paper deals with the aquatic and semi-aquatic vegetation of Shivpuri in Madhya Pradesh. The phenology, distribution in various habitats and ecology have been given. Hydrophytic vegetation of Shivpuri has been compared with that of other investigated parts of M.P. The collection made includes 101 species in 82 genera belonging to 37 families. *Ruppia maritima* Linn. is a new record for M.P.

INTRODUCTION

Floristic, ecological and physio-anatomical studies of the hydrophytes have revealed very interesting results. Though extensive work has been done on Indian hydrophytes [Dudgeon (1920), Saxton (1924), Biswas and Calder (1937), Sayeeduddin (1939), D'Almeida (1941, 1942), Misra (1946), Ratnam and Joshi (1952), Mirashi (1954, 1957, 1958), Kachroo (1956), Pattanaik and Pattanaik (1956), Sen (1959, 1961), Sen and Chatterji (1959), Maheswari (1960), Tiwari (1960), Chavan and Sabnis (1961), Scervani (1962), Subramanyam (1962), Vyas (1964) and Unni (1967)], there is still scope for such studies on the hydrophytes in various parts of the country. In the present paper, the ecology, phenology, distribution of hydrophytes in various habitats of Shivpuri district of Madhya Pradesh along with a comparison with the other investigated parts of the State have been presented.

The present work is based on a large number of excursions made by the author at various seasons during 1965-67. Herbarium sheets are deposited in the Botany Deptt., Govt. Science College, Gwalior.

GEOGRAPHY AND CLIMATE

Shivpuri is situated between 24°14' to 25°55' N and 77°15' to 78°30' E on the Agra-Bombay Road, 120 km away, south of Gwalior. Shivpuri has a large number of lakes, tanks, ponds (both artificial and natural), streams and rivers.

The climate is monsoonic. Mean maximum and mean minimum temperatures are 48°C and 4°C respectively. The rainy season is short. Average rainfall is about 89 cm. The hot season is from April to September followed by the cold season.

HABITATS

Aquatic and marshy vegetation occupy the swamps, a number of lakes, ponds, Kho, rivers and streams. The number of water courses comes to more than 150 in Shivpuri district. Many of them are permanent, while others are temporary. The following are the important localities from where observations were made: Sidhyashwar tank, Yadav Sagar, Karbala, Bhadaiya Kundi, Chand Patha, Madhav Lake, Tunda bharkha Kho, Bhurakho, ditches, irrigation channels, many streams in the neighbourhood of the Shivpuri City and water tanks of Satanwara, Pichhore, Dinara, Karera from other parts of the district. Sindh, Parwati and Mahuar rivers support rich hydrophytic flora.

GENERAL DESCRIPTION OF VEGETATION

The banks of rivers and water courses with alluvial soil and boulders are having *Pongamia pinnata* Pierre., *Terminalia arjuna* Wt. & Arn., *Syzygium heyneanum* Wall., *Woodfordia fruticosa* Kurz. and *Vitex negundo* Linn. as woody plants along with herbaceous plants. Some of the latter *Xanthium strumarium* Linn., *Eclipta prostrata* Linn., *Enicostemma verticillatum* Engl., *Canscora diffusa* R. Br., *Limnophila indica* Druce., *Bacopa monnieri* Pennel., *Phyla nodiflora* Greene., *Polygonum glabrum* Willd., *Hydrilla verticillata* Royle, *Cyperus exaltatus* Retz., *Scirpus tuberosus* Desf., *Fimbristylis dichotoma* Vahl, *Saccharum spontaneum* Linn., *Ischaemum rugosus* Salisb. mainly constitute the vegetation of rivers of this district.

A marshy and aquatic flora is recognizable in the neighbourhood of permanent and temporary ponds. *Azolla pinnata* R. Br., *Lemna perpusilla* Torrey,

Ceratophyllum demersum Linn., *Utricularia inflexa* Forsk. var. *stellaris* (Linn. f.) P. Taylor, *Nymphaea stellata* Willd., *Nymphoides cristatum* Ktze., *Hydrilla verticillata* Royle, *Ottelia alismoides* Pers., *Vallisneria spiralis* Linn. and *Potamogeton crispus* Linn. are common true hydrophytic species. *Aeschynomene indica* Linn., *Smithia conferta* Sm., *Ammannia baccifera* Linn., *Jussiaea perennis* Brenan., *Centella asiatica* Urban., *Ageratum conyzoides* Linn., *Gnaphalium pulvinatum* Delile., *Caesulia axillaris* Roxb., *Hoppea dichotoma* Willd., *Mazus japonicus* Ktze., *Limnophila indica* Druce., *Bacopa monnieri* Pennel., *Mimulus strictus* Benth., *Asteracantha longifolia* Nees., *Justicia quinqueangularis* Koen. ex Roxb., *Phyla nodiflora* Greene., *Alternanthera sessilis* R. Br., *Rumex dentatus* Linn., *Commelina hasskarlii* Cl., *Typha angustata* Bory. & Chaub., *Cyperus difformis* Linn., *C. rotundus* Linn., *C. exaltatus* Retz., *Fimbristylis quinqueangularis* Kunth., *F. dichotoma* (L.) Vahl, *Scirpus roylei* Parker., *S. tuberosus* Desf., *Paspalidium flavidum* Camus., *Leptochloa panicea* Ohwi. are common species of marshes, wet lands and shallow water.

ECOLOGICAL CLASSIFICATION

Aquatic plants occur in various conditions such as floating on water; either free floating or anchored, submerged and emergent which are flaring on the margins and with little depth of water or even on wet lands near water. Accordingly, the hydrophytes of Shivpuri can be classified under the following life-forms:

(1) *Fixed floating hydrophytes*: They are in contact with soil, water and air. Examples from this group are, *Nymphaea stellata* Willd., *Nymphoides cristatum* Kuntze and *Marsilea quadrifolia* Linn.

(2) *Fixed submerged hydrophytes*: Generally vegetative parts of such hydrophytes are in contact with soil and water but their flowers are raised to or slightly above the surface of water. *Hydrilla verticillata* Royle, *Ottelia alismoides* Pers., *Vallisneria spiralis* Linn., *Potamogeton crispus* Linn., *Chara coralline* Willd. and *Nitella* spp. are among such hydrophytes.

(3) *Free floating hydrophytes*: These are in contact with air and water. Such hydrophytes are represented by some planktons like *Spirogyra* spp., *Hydrodictyon* spp. and vascular plants like *Azolla pinnata* R. Br., *Trapa bispinosa* Roxb., *Lemna perpusilla* Torrey and *Wolffia arrhiza* Wimm.

(4) *Free submerged hydrophytes*: They are in

contact with water only. They are rootless. *Ceratophyllum demersum* Linn., *Utricularia inflexa* Forsk. var. *stellaris* (Linn. f.) P. Taylor are representatives of this type. They form a pure community.

(5) *Emergent amphibious hydrophytes*: Roots, the lower part of stem, and even in some cases lower leaves of such hydrophytes are submerged under water. *Aeschynomene indica* Linn., *Caesulia axillaris* Roxb., *Limnophila indica* Linn., *Asteracantha longifolia* Nees, *Polygonum glabrum* Willd., *Commelina hasskarlii* Cl., *Cyperus alopecuroides* Rottb., *C. exaltatus* Retz., *Scirpus tuberosus* Desf., *Ischaemum rugosum* Salisb., *Vetiveria zizanioides* Nash. are common characteristic species of this group.

(6) *Marshy amphibious hydrophytes*: This group of hydrophytes occurs on soft, wet mud or in shallow water forming reed swamp vegetation. Some plants of this group thrive well even after the substratum is considerably dried. *Smithia conferta* Sm., *Jussiaea perennis* Brenan., *Eclipta prostrata* Linn., *Hoppea dichotoma* Willd., *Bacopa monnieri* Pennell., *Veronica anagallis-aquatica* Linn., *Mimulus strictus* Benth., *Phyla nodiflora* Greene., *Alternanthera sessilis* Br., *Eragrostis unioides* Nees are common species of this group.

(7) *Wet land hydrophytes*: Slightly away from the margins of rivers, ponds, lakes, there are number of such plants. *Pongamia pinnata* Pierre., *Terminalia arjuna* Wt. & Arn., *Syzygium heyneanum* Wall., *Woodfordia fruticosa* Kurz., *Vitex negundo* Linn. are common woody plants of river basins. *Portulaca oleracea* Linn., *Corchorus trilocularis* Linn., *Ageratum conyzoides* Linn., *Gnaphalium indicum* Linn., *Xanthium strumarium* L., *Eclipta prostrata* Linn., *Phyla nodiflora* Greene., *Alternanthera sessilis* Br., *Cyperus difformis* Linn., *Fimbristylis dichotoma* Vahl, *Apluda aristata* Linn., *Vetiveria zizanioides* Nash. are some of the characteristic species of this habitat.

TABLE I: Showing number of families, genera and species of Pteridophytes and Angiosperms

	Pteridophytes		Angiosperms
	Hydropteridinae	Dicots.	Monocots.
Families	1	29	7
Genera	2	56	24
Species	3	62	36

DISCUSSION

The present study indicates that in Shivpuri, hygrophilous vegetation is rich in composition. Woody hydrophytic elements are fairly common along water-courses within this area. Distribution of the plants viz., *Nymphaea*, *Biophytum*, *Smithia*, *Centella*, *Cirsium*, *Mimulus*, *Vitex*, *Ottelia*, *Ruppia* is restricted to one or more habitats.

Comparison of hydrophytic vegetation of Shivpuri with that of other investigated parts (Raipur, Jabalpur and Khandwa) of Madhya Pradesh reveals the following facts:

1. The vegetation of this area shows similarity to a great extent with that of other investigated parts in having:

- (i) Similar general character of vegetation.
- (ii) Compositae, Scrophulariaceae, Cyperaceae and Gramineae as dominant families.
- (iii) *Ammannia*, *Caesulia*, *Eclipta*, *Nymphoides*, *Limnophila*, *Bacopa*, *Asteracantha*, *Phyla*, *Alternanthera*, *Lemna* and *Scirpus* as widely distributed genera.

2. *Biophytum*, *Smithia*, *Cirsium*, *Mimulus*, *Vitex*, *Ruppia* have been reported only from Shivpuri.

3. Floristic composition of the aquatic and marsh vegetation of Shivpuri resembles that of investigated parts of Khandwa, Raipur and Jabalpur districts to the extent of 52, 42 and 35% respectively of plants reported.

As far as is known, *Ruppia maritima* Linn. is a new record for M.P.

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*Not seen in original.

TABLE II : Showing habit and flowering period of species and their distribution in various habitats of Shivpuri

Sl. No.	Name of Species	Habit	Flowering period	Distribution in different habitats								
				a	b	c	d	e	f	g	h	i
1.	<i>Marsilea quadrifolia</i> Linn.	Fixed floating and amphibious	After rains	C	F	-	C	A	G	C	F	-
2.	<i>M. minuta</i> Linn.	" "	" "	C	-	-	-	F	F	-	-	-
3.	<i>Azolla pinnata</i> R. Br.	Free floating	Nov.-Feb.	A	A	-	A	A	C	C	-	R
4.	<i>Nymphaea stellata</i> Willd.	Fixed floating	March-May	A	-	-	-	A	A	-	-	-
5.	<i>Portulaca oleracea</i> Linn.	Prostrate wet land	Throughout the year	C	F	R	C	C	C	C	-	R
6.	<i>Corchorus trilocularis</i> Linn.	Erect wet land	Aug.-Sept.	-	R	R	-	-	F	-	R	R
7.	<i>Biophytum sensitivum</i> DC.	Wet land	After rains	-	-	F	-	-	-	F	-	-
8.	<i>Sesbania sesban</i> (Linn.) Merr.	Erect wet land	Sept.-Nov.	-	R	-	F	F	-	-	R	R
9.	<i>Pongamia pinnata</i> (L.) Pierre.	Woody wet land	Jan.-July	R	R	-	-	-	-	-	C	-
10.	<i>Aeschynomene indica</i> Linn.	Erect amphibious	Sept.-Oct.	-	R	-	-	-	R	R	-	-
11.	<i>Desmodium triflorum</i> DC.	Wet land	Aug.-Feb.	C	F	C	-	-	C	C	C	C
12.	<i>Smithia conferta</i> Sm.	Marshy amphibious	Oct.-Dec.	A	-	-	-	-	-	-	-	-
13.	<i>Cassia tora</i> Linn.	Erect wet land	Aug.-Nov.	A	R	-	A	C	C	A	C	C
14.	<i>Potentilla supina</i> Linn.	Wet land	Feb.-March	-	C	-	A	C	C	C	-	-
15.	<i>Terminalia arjuna</i> Wt. & Arn.	Woody wet land	July-Oct.	-	C	C	F	R	-	-	A	R
16.	<i>Syzygium cumini</i> (L.) Skeels.	" "	March-June.	-	C	C	C	C	C	C	R	-
17.	<i>S. heyneanum</i> Wall. ex Duthie	" "	March-Aug.	-	C	C	-	-	F	F	A	-
18.	<i>Ammannia baccifera</i> Linn.	Erect amphibious	Aug.-March.	C	C	R	C	F	A	C	-	A
19.	<i>Woodfordia fruticosa</i> (L.) Kurz.	Marshy wet land	Jan.-April.	-	F	-	-	-	-	-	-	F
20.	<i>Jussiaea repens</i> Linn.	Fixed floating or creeping	Sept.-Oct.	-	F	-	-	R	-	-	R	-
21.	<i>J. perennis</i> (L.) Brenan.	Erect marshy, amphibious	Aug.-Nov.	F	C	F	-	F	-	F	R	C
22.	<i>Trapa bispinosa</i> Roxb.	Fixed floating	Aug.-Sept.	A	F	-	A	A	A	A	-	-
23.	<i>Glinus lotoides</i> Linn.	Prostrate wet land	March-July.	R	-	-	A	A	C	C	A	A
24.	<i>Centella asiatica</i> (L.) Urban.	" "	July-March.	F	-	-	-	-	-	-	-	-
25.	<i>Oldenlandia corymbosa</i> Linn.	Erect wet land	" "	C	F	F	-	F	F	F	-	C
26.	<i>Ageratum conyzoides</i> Linn.	" "	Oct.-June	C	C	F	-	C	C	C	C	C
27.	<i>Gnaphalium indicum</i> Linn.	" "	Dec.-March	-	-	-	C	C	A	C	C	A
28.	<i>G. pulvinatum</i> Delile.	Prostrate wet land	" "	-	F	-	A	C	C	C	-	A
29.	<i>Caesulia axillaris</i> Roxb.	Erect amphibious	Sept.-Feb.	A	C	-	A	C	C	C	-	C
30.	<i>Xanthium strumarium</i> Linn.	Erect wet land	Sept.-Jan.	A	A	-	A	A	A	A	-	A
31.	<i>Eclipta prostrata</i> (L.) Linn.	Erect amphibious	Major part of the year	A	C	C	C	C	C	C	F	F
32.	<i>Cirsium arvensis</i> (L.) Scop.	Wet land	Nov.-March	-	C	-	-	-	-	-	-	-
33.	<i>Amberboa ramosa</i> (Roxb.) Jafri.	Erect wet land	Major part of the year	-	-	-	-	R	R	-	-	R
34.	<i>Anagallis arvensis</i> Linn.	" "	Cold season	-	-	-	F	F	C	C	-	C
35.	<i>Hoppea dichotoma</i> Willd.	Erect amphibious	Nov.-Dec.	-	C	C	-	C	-	-	-	-
36.	<i>Enicostemma verticillatum</i> (L.) Engl.	Procumbent wet land	Aug.-Oct.	C	C	C	C	C	C	C	C	C
37.	<i>Canscora diffusa</i> R. Br.	Erect amphibious	Aug.-April.	-	-	C	-	-	-	-	F	-
38.	<i>Nymphoides cristatum</i> Ktze.	Fixed floating	Summer and Rainy season	A	F	-	A	A	-	C	-	C
39.	<i>Heliotropium supinum</i> Linn.	Prostrate wet land	Aug.-Dec.	-	F	-	F	F	F	-	-	C
40.	<i>H. strigosum</i> Willd.	Erect wet land	Rainy season	-	F	-	F	F	-	-	-	-
41.	<i>Ipomoea aquatica</i> Forsk.	Creeping, floating amphibious	" "	-	-	-	-	-	-	-	-	-
42.	<i>Merremia emarginata</i> Hal. F.	Creeping wet land	Oct.-May	F	-	-	C	C	F	-	-	-
43.	<i>Verbascum chinense</i> (L.) Sant.	Wet land.	Sept.-Nov.	-	F	-	C	F	F	F	-	F
44.	<i>Mazus japonicus</i> (T.) Ktze.	Erect amphibious	Oct.-March	F	-	-	C	C	C	C	-	C
45.	<i>Limnophila indica</i> (L.) Druce.	" "	Jan.-April	-	F	R	R	R	R	R	F	-
46.	<i>Veronica anagallis-aquatica</i> L.	" "	Rainy and Cold season	A	A	C	-	C	A	C	-	F
47.	<i>Bacopa monnieri</i> (L.) Pennel.	Repent marshy amphibious	Feb.-June	-	F	F	-	-	-	-	R	C
48.	<i>Mimulus strictus</i> Benth.	Marshy amphibious	Aug.-Dec.	A	C	F	A	A	C	-	F	F
49.	<i>Utricularia inflexa</i> Forsk.	" "	Cold season	C	-	-	-	-	-	-	-	-
50.	<i>Asteracantha longifolia</i> Nees	Free floating, submerged	Sept.-Dec.	C	A	-	-	-	-	C	-	C
51.	<i>Justicia diffusa</i> Willd.	Erect marshy wet land	Nov.-Feb.	A	C	C	A	C	C	C	F	F
52.	<i>J. quinqueangularis</i> Koehn. ex Roxb.	" "	Aug.-Feb.	F	F	F	F	F	F	F	-	F
53.	<i>Rungia repens</i> (L.) Nees	Procumbent wet land	Oct.-April	F	F	R	C	C	-	-	-	-
54.	<i>Phyla nodiflora</i> (L.) Greene.	Repent marshy amphibious	Aug.-Feb.	-	C	-	F	F	C	C	-	C
55.	<i>Vitex negundo</i> Linn.	Erect wet land	Major part of the year	A	A	C	C	C	C	F	F	C
56.	<i>Salvia plebeia</i> (L.) Greene.	" "	After rains	-	-	-	-	-	-	-	A	-
57.	<i>Alternanthera sessilis</i> R. Br.	Procumbent marshy amphibious	Nov.-March	-	-	-	-	-	-	-	-	F
58.	<i>Chenopodium album</i> Linn.	Erect wet land	Major part of the year	A	A	C	A	A	C	A	C	F
59.	<i>Polygonum plebeium</i> R. Br.	Prostrate wet land	Dec.-March	R	R	-	C	-	C	-	F	A
60.	<i>P. glabrum</i> Willd.	Erect amphibious	Sept.-March	-	R	-	C	F	C	C	-	A
61.	<i>Rumex dentatus</i> Linn.	" "	Oct.-March	C	C	F	F	F	F	C	-	-
62.	<i>Euphorbia hypericifolia</i> Linn.	Erect decumbent wet land	Jan.-May	F	-	-	C	C	-	C	-	G
			Major part of the year	F	-	-	F	F	-	F	F	F

TABLE II—Cantd.

Sl. No.	Name of Species.	Habit	Flowering period	Distribution in different habitats								
				a	b	c	d	e	f	g	h	i
63.	<i>Phyllanthus maderaspatensis</i> Linn.	Erect wet land	Aug.-Oct.	R	R	—	F	F	G	C	—	C
64.	<i>Chrozophora rotleri</i> Juss.	Prostrate wet land	April.-July	—	—	—	—	—	—	—	—	A
65.	<i>Ceratophyllum demersum</i> Linn.	Free floating	Nov.-March	A	A	C	A	A	A	C	F	—
66.	<i>Hydrilla verticillata</i> (L.) Royle	Fixed submerged	Nov.-Feb.	A	—	C	—	—	—	C	—	—
67.	<i>Vallisneria spiralis</i> Linn.	" "	Sept.-Dec.	—	A	C	—	—	—	C	C	—
68.	<i>Ottelia alismoides</i> Pers.	" "	Oct.-Feb.	A	—	—	C	—	—	—	—	—
69.	<i>Commelina hasskarlii</i> Cl.	Emergent amphibious	Sept.-Nov.	A	—	—	—	—	—	—	—	F
70.	<i>C. benghalensis</i> Linn.	Wet land	Aug.-Nov.	F	F	—	—	—	F	—	F	R
71.	<i>Typha angustata</i> Bory. & Chaub.	Emergent amphibious	Oct.-May	—	A	C	—	—	—	F	—	—
72.	<i>Lemma perpusilla</i> Torrey	Free floating	"	A	A	A	C	—	C	C	—	A
73.	<i>Wolffia arrhiza</i> Wimm.	" "	"	A	C	C	—	F	—	C	—	—
74.	<i>Potamogeton perfoliatus</i> Linn.	Fixed submerged	Jan.-March	A	C	—	C	C	C	C	—	—
75.	<i>P. crispus</i> Linn.	" "	"	A	C	—	—	F	C	F	—	—
76.	<i>Ruppia maritima</i> Linn.	Fixed submerged	Jan.-March	—	C	—	—	—	—	R	—	—
77.	<i>Cyperus alopecuroides</i> Rottb.	Emergent amphibious	Sept.-Jan.	C	F	—	—	F	C	C	F	—
78.	<i>C. difformis</i> Linn.	" "	"	C	C	C	C	C	C	C	C	C
79.	<i>C. rotundus</i> Linn.	Erect marshy amphibious	"	C	C	C	C	C	C	C	C	C
80.	<i>C. exaltatus</i> Retz.	Emergent amphibious	Cold Season	F	—	C	—	—	—	—	C	—
81.	<i>C. iria</i> Linn.	" "	Aug.-April	—	—	—	—	—	—	—	—	C
82.	<i>Fimbristylis ferruginea</i> Vahl	" "	June-Oct.	F	C	C	F	—	F	C	C	—
83.	<i>F. dichotoma</i> (L.) Vahl	Marshy amphibious	Feb.-June	C	C	C	C	C	C	C	C	C
84.	<i>F. littoralis</i> Gaud.	" "	Sept.-Nov.	—	F	C	—	—	—	C	—	—
85.	<i>Scirpus articulatus</i> Linn.	Erect marshy amphibious	"	—	C	—	A	F	G	—	—	—
86.	<i>S. raylei</i> (N.) Parker	" "	"	—	C	—	C	—	F	—	—	F
87.	<i>S. tuberosus</i> Desf.	" "	March-July	—	F	—	R	—	—	C	—	—
88.	<i>Apluda aristata</i> Linn.	Erect wet land	Aug.-Feb.	—	—	—	F	C	C	F	—	C
89.	<i>Saccharum spontaneum</i> Linn.	" "	Sept.-Dec.	—	—	—	F	C	F	F	—	F
90.	<i>Imperata cylindrica</i> (L.) Beauv.	Erect marshy, amphibious	June-Oct.	—	C	—	F	C	C	C	—	—
91.	<i>Eragrostis poaeoides</i> Beauv.	Wet land	Rainy season	C	R	—	—	C	F	—	—	C
92.	<i>E. unioloides</i> Nees.	Erect marshy amphibious	Oct.-Dec.	C	—	F	—	—	—	—	—	F
93.	<i>E. pilosa</i> (L.) Beauv.	Wet land	July-Dec.	C	C	—	C	—	F	—	C	—
94.	<i>Cynodon dactylon</i> Pers.	" "	Throughout the year	C	C	C	C	C	C	C	C	A
95.	<i>Paspalidium flavidum</i> (R.) Camus	" "	Aug.-Sept.	—	—	F	C	—	C	C	—	—
96.	<i>Echinochloa colonum</i> (L.) Link.	" "	"	—	F	C	F	C	C	C	—	C
97.	<i>Leptochloa panicea</i> (R.) Ohwi	Erect amphibious	"	—	—	C	—	F	F	C	C	—
98.	<i>Aristida adscensionis</i> Linn.	Erect wet Land	"	F	F	F	R	—	—	F	C	—
99.	<i>Vetiveria zizanioides</i> (L.) Nash.	Emergent amphibious	July-Nov.	—	—	—	—	F	—	C	A	—
100.	<i>Ischaemum rugosum</i> Salisb.	" "	Oct.-Feb.	—	C	C	—	C	C	C	C	C
101.	<i>Setaria tomentosa</i> (R.) Kunth.	Erect wet land	Aug.-Feb.	—	—	—	—	—	—	—	—	C

Symbols used in text are as following : a, for Sidhyashwar and Yadav Sagar; b, for Karbala Bhadaiya Kundi, Chand patha and Madhav lakes; c, for Tunda bharkhakho & Bhurakho; d, for Satanwara; e, for Pichhore; f, for Karera; g, for Dinara; h, for Sindh river near Dhamkan and i, for wet lands, ditches and irrigation channels.

A, for abundant; C, for common; F, for frequent and R, for rare and —, for absent.