

Phytosociological Study of Monocots in the Grassland in Dhurdhey Lake in Saran

By
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Abstract

The Dhurdhey lake which is also considered as wetland area is situated in the Ekma block of Saran district in the status of Bihar. The Dhurdhey lake is located at 25.98°N 84.56°E and is scattered along the distance of 2.19 KM. Five sites were selected around the wetland. This study was conducted to access the diversity and phytosociology of the monocotyledonous plants in the area around the Dhurdhey lake. The plants found belong to three families Araceae, Cyperaceae, Poaceae. Many plants were identified and among those fifty plants were having presence in more than one site were reported. Among the reported plants life forms geophytes, helophytes were found to be more dominant. In the habitat moist soil species and rooted emergent hydrophytes were found to be more dominant. Poaceae family was represented 26 species among 40 identified species.

Keywords: Wetlands, Frequency, Density, Dominance, IVI, Monocotyledons

Introduction

Wetlands are one of the most valuable ecosystems and are considered as the kidney of earth, providing a number of ecosystems services besides being the repository of many specialised aquatic organisms. But on a global scale, mainly due to anthropogenic cause, wetlands are reducing, degrading and deteriorating its natural characteristics at an alarming rate in the last few decades. Wetland plants grow in soil saturated by water or in water itself.

Wetland plant habitats are extremely varied; they may be permanent or temporary, either predictable or unpredictable, fresh water or saline and running or static water. Aquatic macrophytes have considerable importance in the aquatic trophic levels as well as in the productivity of the wetland ecosystems. They are also pollution indicators of the water bodies. The Aquatic macrophytes diversity has a significant role in understanding the wetland ecosystem dynamics.

The abundance of various plants and animals makes it one of the major areas in aquatic ecosystem. Saran District of State of Bihar has wetlands of 8.07% of total geographical area of 2624 square kilometre. The aquatic vegetation of the wetlands of Saran in the post monsoon and pre monsoon are 1704 ha & 487 ha respectively as per national Atlas of Wetlands.

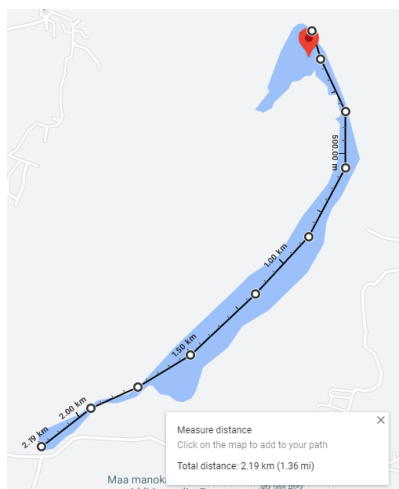
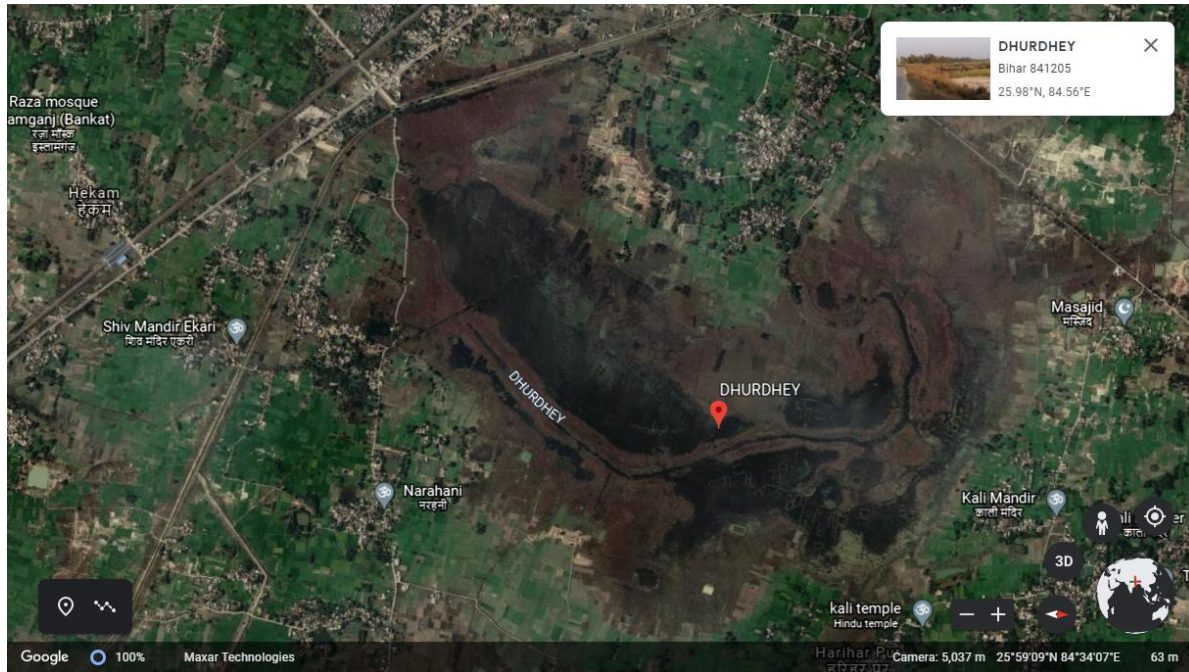
The value of wetlands and their resources have been accepted over the ages and there has been considerable international effort to conserve wetlands. Therefore, documentation of wetlands in terms of its structure and function is becoming a prerequisite for conservation of wetlands of a region. A few works have been done on the floristic diversity of wetland of Bihar. Very limited studies have been done on the aquatic flora of wetlands of the Saran district, Bihar. The present study, therefore, focuses on the phytosociological aspects of the five wetlands of Dhurdhey Lake in Saran.

The study of plant community structure is called plant sociology or phytosociology. "Phytosociology" the study of aspects of communal relations of plant was coined by Paczoski and this

study is important for understanding the functioning of community. The study of plant community implies knowledge of structure and composition of the component species.

Materials and Methods

The coordinates (Latitude and Longitude) 25.98°N 84.56°E of Dhurdhey lake were identified using google earth and plants were identified. The 50 quadrat sampling of 1 Square Meter was done at five different sites along the edges of Dhurdhey Lake. In phytosociological analysis each plant has been considered as an individual plant and the plants which grow on the land in a creeping manner, each 5 cm portion of the plant having functional roots, is counted as an individual plant.



Different parameters for each species were calculated with the help of specific formulae listed below:

$$\text{Frequency} = \frac{\text{No. of quadrats in which species occurred}}{\text{Total no. of quadrats sampled}} \times 100$$

$$\text{Density} = \frac{\text{Total no. of individuals of a species in all quadrats}}{\text{Total no. of quadrats sampled}}$$

$$\text{Abundance} = \frac{\text{Total no. of individuals of a species in all quadrats}}{\text{Total no. of quadrats in which species occurred}}$$

Table 1: Floristic composition of 5 sites along the edges of Dhurdhey Lake

Sl. No.	Name of the plant species	Families	Site 1	Site 2	Site 3	Site 4	Site 5
1	<i>Alocasia cucullata</i> Schott.	Araceae	X	√	√	√	√
2	<i>Alocasia indica</i> Schott.	Araceae	X	X	√	X	√
3	<i>Arundinella bengalensis</i> (Spreng.)	Poaceae	√	X	√	√	√
4	<i>Arundu donax</i> L.	Poaceae	√	X	√	X	X
5	<i>Axonopus compressus</i> (Sw.)Beauv.	Poaceae	√	√	√	√	X
6	<i>Chrysopogon aciculatus</i> Trin.	Poaceae	X	√	√	√	X
7	<i>Coix lachrymajobi</i> L.	Poaceae	X	X	√	√	X
8	<i>Colocasia esculanta</i> (L.) Schott.	Araceae	√	√	√	√	√
9	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	√	√	√	√	√
10	<i>Cyperus articulatus</i> L.	Cyperaceae	X	X	√	√	X
11	<i>Cyperus compressus</i> L.	Cyperaceae	√	X	√	√	√
12	<i>Cyperus cyperoides</i> (L.) Kuntze.	Cyperaceae	√	X	√	√	X
13	<i>Cyperus elatus</i> L.	Cyperaceae	√	X	√	X	X
14	<i>Cyperus exaltatus</i> Retz	Cyperaceae	X	X	√	√	X
15	<i>Cyperus haspan</i> L.	Cyperaceae	√	√	X	X	X
16	<i>Cyperus rotundus</i> L.	Cyperaceae	√	√	√	√	√
17	<i>Dactylis glomerata</i> L.	Poaceae	√	X	√	X	√
18	<i>Digitaria longiflora</i> (Retz.) Pers.	Poaceae	√	√	√	√	X
19	<i>Digitaria sanguinalis</i> (L.)	Poaceae	√	X	X	√	X
20	<i>Echinochloa stagnina</i> (Rets.) P. Beauv.	Poaceae	√	√	X	X	X
21	<i>Eleocharis dulcis</i> (Burm.f.)	Cyperaceae	√	√	X	√	X
22	<i>Eleusine indica</i> (L.) Gaertn.	Poaceae	X	√	X	√	√
23	<i>Eragrostis uniloides</i> (Retz.)Nees ex steud.	Poaceae	√	X	√	√	√
24	<i>Festuca rubra</i> L.	Poaceae	√	√	√	√	X
25	<i>Fimbristylis aestivalis</i> (Retz.)	Cyperaceae	√	√	X	√	X
26	<i>Hygroryza aristata</i> Nees.	Poaceae	√	√	√	√	√

27	<i>Hymenachne acutigluma</i> (Steud.) Gillil.	Poaceae	√	X	√	X	X
28	<i>Kyllinga brevifolia</i> Rottb.	Cyperaceae	X	X	√	X	√
29	<i>Leersia hexandra</i> Sw.	Poaceae	√	√	√	√	X
30	<i>Oplismenus composites</i> (L.) P.Beauv.	Poaceae	X	X	√	√	X
31	<i>Ottlochloa nodosa</i> Dandy	Poaceae	√	√	X	X	X
32	<i>Panicum brevifolium</i> L.	Poaceae	X	√	X	X	√
33	<i>Panicum maximum</i> Jacq.	Poaceae	√	√	√	√	√
34	<i>Paspalidium flovidium</i> A.Camus	Poaceae	√	X	X	√	X
35	<i>Paspalum compactum</i> Roth.	Poaceae	X	X	X	√	√
36	<i>Poa annua</i> L.	Poaceae	√	X	√	X	X
37	<i>Saccharum spontaneum</i> L.	Poaceae	√	X	X	√	X
38	<i>Sacciolepis indica</i> (L.) A.Shase.	Poaceae	√	√	X	X	X
39	<i>Scirpus articulatus</i> L.	Cyperaceae	√	X	√	√	√
40	<i>Vetiveria zizanioides</i> (L.) Nash.	Poaceae	X	X	√	√	X

Table 2: Frequency of different species of 5 sites along the edges of Dhurdhey Lake

Sl. No.	Name of the plant species	Families	Frequency				
			Site 1	Site 2	Site 3	Site 4	Site 5
1	<i>Alocasia cucullata</i> Schott.	Araceae	X	68	70	50	30
2	<i>Alocasia indica</i> Schott.	Araceae	X	X	54	X	12
3	<i>Arundinella bengalensis</i> (Spreng.)	Poaceae	72	X	84	78	92
4	<i>Arundu donax</i> L.	Poaceae	28	X	52	X	X
5	<i>Axonopus compressus</i> (Sw.) Beauv.	Poaceae	96	78	82	70	X
6	<i>Chrysopogon aciculatus</i> Trin.	Poaceae	X	44	90	18	X
7	<i>Coix lachrymajobi</i> L.	Poaceae	X	X	18	70	X
8	<i>Colocasia esculanta</i> (L.) Schott.	Araceae	28	92	26	46	64
9	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	96	98	96	100	96
10	<i>Cyperus articulatus</i> L.	Cyperaceae	X	X	18	70	X
11	<i>Cyperus compressus</i> L.	Cyperaceae	46	X	38	24	70
12	<i>Cyperus cyperoides</i> (L.) Kuntze.	Cyperaceae	20	X	96	50	X
13	<i>Cyperus elatus</i> L.	Cyperaceae	46	X	86	X	X
14	<i>Cyperus exaltatus</i> Retz	Cyperaceae	X	X	18	70	X
15	<i>Cyperus haspan</i> L.	Cyperaceae	50	84	X	X	X
16	<i>Cyperus rotundus</i> L.	Cyperaceae	82	78	90	74	92
17	<i>Dactylis glomerata</i> L.	Poaceae	30	X	98	X	76
18	<i>Digitaria longiflora</i> (Retz.) Pers.	Poaceae	76	64	86	54	X
19	<i>Digitaria sanguinalis</i> (L.)	Poaceae	46	X	X	70	X
20	<i>Echinochloa stagnina</i> (Rets.) P. Beauv.	Poaceae	96	64	X	X	X
21	<i>Eleocharis dulcis</i> (Burm.f.)	Cyperaceae	84	26	X	76	X
22	<i>Eleusine indica</i> (L.) Gaertn.	Poaceae	X	88	X	80	10

23	<i>Eragrostis uniloides</i> (Retz.) Nees ex Steud.	Poaceae	54	X	26	14	78
24	<i>Festuca rubra</i> L.	Poaceae	64	98	62	48	X
25	<i>Fimbristylis aestivalis</i> (Retz.)	Cyperaceae	66	10	X	28	X
26	<i>Hygroryza aristata</i> Nees.	Poaceae	74	54	62	48	26
27	<i>Hymenachne acutigluma</i> (Steud.) Gillil.	Poaceae	24	X	76	X	X
28	<i>Kyllinga brevifolia</i> Rottb.	Cyperaceae	X	X	78	X	54
29	<i>Leersia hexandra</i> Sw.	Poaceae	92	16	72	74	X
30	<i>Oplismenus compositus</i> (L.) P.Beauv.	Poaceae	X	X	18	70	X
31	<i>Ottochloa nodosa</i> Dandy	Poaceae	76	72	X	X	X
32	<i>Panicum brevifolium</i> L.	Poaceae	X	28	X	X	50
33	<i>Panicum maximum</i> Jacq.	Poaceae	96	78	94	64	20
34	<i>Paspalidium flovidium</i> A.Camus	Poaceae	26	X	X	46	X
35	<i>Paspalum compactum</i> Roth.	Poaceae	X	X	X	50	84
36	<i>Poa annua</i> L.	Poaceae	54	X	42	X	X
37	<i>Saccharum spontaneum</i> L.	Poaceae	54	X	X	82	X
38	<i>Sacciolepis indica</i> (L.) A.Shase.	Poaceae	88	54	X	X	X
39	<i>Scirpus articulatus</i> L.	Cyperaceae	88	X	30	76	84
40	<i>Vetiveria zizanioides</i> (L.) Nash.	Poaceae	X	X	18	70	X

Table 2: Density of different species of 5 sites along the edges of Dhurdhey Lake

Sl. No.	Name of the plant species	Families	Density				
			Site 1	Site 2	Site 3	Site 4	Site 5
1	<i>Alocasia cucullata</i> Schott.	Araceae	X	0.82	0.95	0.85	0.65
2	<i>Alocasia indica</i> Schott.	Araceae	X	X	0.71	X	0.72
3	<i>Arundinella bengalensis</i> (Spreng.)	Poaceae	36.43	X	68.88	30.97	49.59
4	<i>Arundu donax</i> L.	Poaceae	17.61	X	30.52	X	X
5	<i>Axonopus compressus</i> (Sw.) Beauv.	Poaceae	102.70	84.77	77.55	78.86	X
6	<i>Chrysopogon aciculatus</i> Trin.	Poaceae	X	49.14	98.62	36.25	X
7	<i>Coix lachrymajobi</i> L.	Poaceae	X	X	17.02	79.09	X
8	<i>Colocasia esculanta</i> (L.) Schott.	Araceae	43.23	19.94	5.04	8.29	6.20
9	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	143.68	185.78	91.15	112.98	119.02
10	<i>Cyperus articulatus</i> L.	Cyperaceae	X	X	19.56	66.20	X
11	<i>Cyperus compressus</i> L.	Cyperaceae	74.90	X	51.66	45.50	66.47
12	<i>Cyperus cyperoides</i> (L.) Kuntze.	Cyperaceae	21.93	X	214.92	47.48	X
13	<i>Cyperus elatus</i> L.	Cyperaceae	84.40	X	131.88	X	X
14	<i>Cyperus exaltatus</i> Retz	Cyperaceae	X	X	22.20	27.79	X
15	<i>Cyperus haspan</i> L.	Cyperaceae	24.78	159.24	X	X	X
16	<i>Cyperus rotundus</i> L.	Cyperaceae	107.90	88.12	204.16	81.09	185.28

17	<i>Dactylis glomerata</i> L.	Poaceae	72.04	X	81.87	X	83.28
18	<i>Digitaria longiflora</i> (Retz.) Pers.	Poaceae	58.36	72.31	123.88	61.01	X
19	<i>Digitaria sanguinalis</i> (L.)	Poaceae	59.98	X	X	95.17	X
20	<i>Echinochloa stagnina</i> (Rets.) P. Beauv.	Poaceae	162.78	60.77	X	X	X
21	<i>Eleocharis dulcis</i> (Burm.f.)	Cyperaceae	145.90	24.69	X	85.86	X
22	<i>Eleusine indica</i> (L.) Gaertn.	Poaceae	X	177.22	X	151.66	20.16
23	<i>Eragrostis uniloides</i> (Retz.) Nees ex Steud.	Poaceae	50.74	X	48.46	26.54	29.24
24	<i>Festuca rubra</i> L.	Poaceae	14.63	38.91	60.04	53.61	X
25	<i>Fimbristylis aestivalis</i> (Retz.)	Cyperaceae	168.34	9.50	X	31.63	X
26	<i>Hygroryza aristata</i> Nees.	Poaceae	117.93	102.37	36.77	54.23	53.60
27	<i>Hymenachne acutigluma</i> (Steud.) Gillil.	Poaceae	42.68	X	161.82	X	X
28	<i>Kyllinga brevifolia</i> Rottb.	Cyperaceae	X	X	101.97	X	82.66
29	<i>Leersia hexandra</i> Sw.	Poaceae	250.82	15.19	140.86	140.28	X
30	<i>Oplismenus compositus</i> (L.) P. Beauv.	Poaceae	X	X	36.86	76.08	X
31	<i>Ottochloa nodosa</i> Dandy	Poaceae	105.47	78.25	X	X	X
32	<i>Panicum brevifolium</i> L.	Poaceae	X	26.59	X	X	42.09
33	<i>Panicum maximum</i> Jacq.	Poaceae	91.15	147.86	189.82	60.77	39.10
34	<i>Paspalidium flovidium</i> A. Camus	Poaceae	24.69	X	X	43.68	X
35	<i>Paspalum compactum</i> Roth.	Poaceae	X	X	X	19.85	150.43
36	<i>Poa annua</i> L.	Poaceae	51.27	X	110.74	X	X
37	<i>Saccharum spontaneum</i> L.	Poaceae	27.32	X	X	32.55	X
38	<i>Sacciolepis indica</i> (L.) A. Shase.	Poaceae	72.16	21.44	X	X	X
39	<i>Scirpus articulatus</i> L.	Cyperaceae	83.56	X	28.49	72.16	108.73
40	<i>Vetiveria zizanioides</i> (L.) Nash.	Poaceae	X	X	17.09	132.70	X

Table 2: Abundance of different species of 5 sites along the edges of Dhurdhey Lake

Sl. No.	Name of the plant species	Families	Abundance				
			Site 1	Site 2	Site 3	Site 4	Site 5
1	<i>Alocasia cucullata</i> Schott.	Araceae	X	1.20	1.35	1.69	2.16
2	<i>Alocasia indica</i> Schott.	Araceae	X	X	1.32	X	6.00
3	<i>Arundinella bengalensis</i> (Spreng.)	Poaceae	50.60	X	82.00	39.70	53.90
4	<i>Arundu donax</i> L.	Poaceae	62.90	X	58.70	X	X
5	<i>Axonopus compressus</i> (Sw.) Beauv.	Poaceae	106.98	108.68	94.57	112.65	X
6	<i>Chrysopogon aciculatus</i> Trin.	Poaceae	X	111.69	109.58	201.39	X
7	<i>Coix lachrymajobi</i> L.	Poaceae	X	X	94.57	112.98	X
8	<i>Colocasia esculanta</i> (L.) Schott.	Araceae	154.39	21.67	19.39	18.02	9.69
9	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	149.66	189.57	94.95	112.98	123.98
10	<i>Cyperus articulatus</i> L.	Cyperaceae	X	X	108.68	94.57	X

11	<i>Cyperus compressus</i> L.	Cyperaceae	162.82	X	135.95	189.57	94.95
12	<i>Cyperus cyperoides</i> (L.) Kuntze.	Cyperaceae	109.66	X	223.87	94.95	X
13	<i>Cyperus elatus</i> L.	Cyperaceae	183.47	X	153.35	X	X
14	<i>Cyperus exaltatus</i> Retz	Cyperaceae	X	X	123.31	39.70	X
15	<i>Cyperus haspan</i> L.	Cyperaceae	49.55	189.57	X	X	X
16	<i>Cyperus rotundus</i> L.	Cyperaceae	131.59	112.98	226.84	109.58	201.39
17	<i>Dactylis glomerata</i> L.	Poaceae	240.14	X	83.54	X	109.58
18	<i>Digitaria longiflora</i> (Retz.) Pers.	Poaceae	76.79	112.98	144.05	112.98	X
19	<i>Digitaria sanguinalis</i> (L.)	Poaceae	130.40	X	X	135.95	X
20	<i>Echinochloa stagnina</i> (Rets.) P. Beauv.	Poaceae	169.56	94.95	X	X	X
21	<i>Eleocharis dulcis</i> (Burm.f.)	Cyperaceae	173.69	94.95	X	112.98	X
22	<i>Eleusine indica</i> (L.) Gaertn.	Poaceae	X	201.39	X	189.57	201.57
23	<i>Eragrostis uniloides</i> (Retz.) Nees ex steud.	Poaceae	93.96	X	186.38	189.57	37.48
24	<i>Festuca rubra</i> L.	Poaceae	22.87	39.70	96.85	111.69	X
25	<i>Fimbristylis aestivalis</i> (Retz.)	Cyperaceae	255.06	94.95	X	112.98	X
26	<i>Hygroryza aristata</i> Nees.	Poaceae	159.36	189.57	59.31	112.98	206.16
27	<i>Hymenachne acutigluma</i> (Steud.) Gillil.	Poaceae	177.85	X	212.92	X	X
28	<i>Kyllinga brevifolia</i> Rottb.	Cyperaceae	X	X	130.73	X	153.07
29	<i>Leersia hexandra</i> Sw.	Poaceae	272.63	94.95	195.64	189.57	X
30	<i>Oplismenus composites</i> (L.) P. Beauv.	Poaceae	X	X	204.76	108.68	X
31	<i>Ottlochloa nodosa</i> Dandy	Poaceae	138.78	108.68	X	X	X
32	<i>Panicum brevifolium</i> L.	Poaceae	X	94.95	X	X	84.18
33	<i>Panicum maximum</i> Jacq.	Poaceae	94.95	189.57	201.93	94.95	195.52
34	<i>Paspalidium flovidium</i> A. Camus	Poaceae	94.95	X	X	94.95	X
35	<i>Paspalum compactum</i> Roth.	Poaceae	X	X	X	39.70	179.09
36	<i>Poa annua</i> L.	Poaceae	94.95	X	263.67	X	X
37	<i>Saccharum spontaneum</i> L.	Poaceae	50.60	X	X	39.70	X
38	<i>Sacciolepis indica</i> (L.) A. Shase.	Poaceae	82.00	39.70	X	X	X
39	<i>Scirpus articulatus</i> L.	Cyperaceae	94.95	X	94.95	94.95	129.44
40	<i>Vetiveria zizanioides</i> (L.) Nash.	Poaceae	X	X	94.95	189.57	X

Results and Discussion

Study of the grassland adjoining the Dhurdhey Lake shows that the monocots mainly represented by the grasses belonging to Cyperaceae and Poaceae family were more abundant. The species of the Araceae are more represented by shrubs and some of them were cultivated by the adjoining farmers for staple food and fodder. The density increased of many species when the quadrants were placed near the water body for the families of Cyperaceae and Poaceae. Dhurdhey Lake which is also considered as an important water body for fishery, the abundance of many species around the water body and hydrophytes increases the oxygen level. As the data was collected during rainy season the abundance for some species was high. Some of the species of Cyperaceae and Poaceae may not be available during summer and winter.

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