

VASCULAR FLORA OF HILLSIDE SEEPS IN EAST-CENTRAL ILLINOIS

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ABSTRACT: - The vascular flora of seven hillside seeps in east-central Illinois were studied during the growing season of 1977. A total of 95 species of plants were found associated with these areas, and their abundance determined. Some of the taxa found are extremely uncommon in east-central Illinois. For the most part these taxa are relict species that have northern affinities.

INTRODUCTION

Hillside seeps are relatively uncommon habitats in east-central Illinois. These areas, which are usually less than one-half acre in size, occur on hillsides and are associated with morainal deposits. They usually result from seepage water that accumulates in bands of sand and gravel that is carried to the outlet area forming a distinct seepline. The resulting seep forms a habitat in which some plants occur that are rare to this part of the state. The reason for this rare plant community is that the seep water is slightly alkaline and fairly cool (Parker and Ebinger, 1971).

One seep community in east-central Illinois was studied by Phipps and Speer (1958) who found a number of new plant records for Coles County, Illinois. This same area was studied in more detail by Parker and Ebinger (1971) who distinguished various plant communities based on shading and variation in moisture. The present study is aimed at determining the floristic composition and the abundance of the taxa at a number of these unique habitats in central Illinois. Because all of these seeps have a constant flow of slightly alkaline, cool water it was believed that many plants would be common to all areas, and that the flora would be relatively similar.

METHOD OF STUDY

Each of the seven hillside seeps was examined four times during the growing season of 1977 and the species of plants found and their abundance recorded. The abundance was decided by using the procedure outlined by Acocks (1953) in which the mean distance of a taxon was determined after a series of measurements were made between individuals of the same species. The species abundance class was then determined by using the scale at the top of Table 1. In this scale the letter "L" is used before the abundance class designation to indicate local abundance. This letter means that the species was found in one small, localized area of the seep, and its abundance in this area is indicated by the subsequent letters. Voucher specimens of

all species found are deposited in the Stover Herbarium of Eastern Illinois University (EIU) while the taxonomic nomenclature used follows that of Mohlenbrock (1975).

DESCRIPTION AND LOCATION OF SEEPS

The location of each of the hillside seeps studied is given below along with its size, the type of vegetation surrounding the seep, and the species of woody plants growing within the seep area.

Area 1. This heavily shaded seep is located on a gently sloping north-facing hillside at Walnut Point State Park in Douglas County (NW $\frac{1}{4}$ Sect. 1 R10E T14N). The seep is 196 ft long with a maximum width of 33 ft. It is surrounded by forest which is dominated by Acer saccharum Marsh., Sassafras albidum (Nutt.) Nees., Carya cordiformis (Wang.) K. Koch., Tilia americana L., and Fraxinus americana L. Woody plants found in the seep include a few small individuals of Celtis occidentalis L., Acer saccharum, Tilia americana, Cercis canadensis L., and Sambucus canadensis L.

Area 2. This heavily shaded seep is located on a gently sloping west-facing hillside about 5 miles east of Charleston in Coles County (SW $\frac{1}{4}$ Sect. 4 R10W T12N). It is 125 ft long by 16 ft wide, and is the shaded zone of the grazed marsh studied by Parker and Ebinger (1971). Many individuals of Quercus alba L. surround the area, and no woody plants are in the seep.

Area 3. This partially shaded seep is located on a gently sloping south-facing hillside near Peppermill Creek, six miles west of Ramsay in Fayette County (SE $\frac{1}{4}$ Sect. 20 R2E T8N). The seep area is about 110 ft long, has a maximum width of 26 ft and is heavily grazed. It is surrounded by scattered individuals of Quercus alba, Platanus occidentalis L., Populus deltoides Marsh., and Ulmus rubra Muhl. A few small trees of Ulmus americana L. grow in the seep.

Area 4. This partially shaded seep is located on a gently sloping southeast-facing hillside one mile northeast of Collison in Vermilion County (NW $\frac{1}{4}$ Sect. 35 R13W T21N). The seep is triangular in shape, about 75 ft long, with a maximum width of 55 ft, and drains into an extensive marshy area along Collison Creek. The west edge of the seep is shaded by a hillside forest dominated by Acer saccharum, Fraxinus americana, and Quercus rubra L. A few individuals of Salix discolor Muhl., S. nigra Marsh., and Ulmus rubra occur in the seep area.

Area 5. This seep is located on an open, gently sloping northeast-facing hillside at Forest Glen Preserve in Vermilion County (NW $\frac{1}{4}$ Sect. 24 R11W T18N). It is the largest of the seep areas studied, being 220 ft long, and with a maximum width of 165 ft. The south and west edges of the seep are partially shaded by a hillside forest dominated by Acer saccharum, Quercus rubra, Q. velutina L., Tilia americana, and Carya cordiformis. Woody plants in the seep include a few individuals of Carpinus caroliniana Walt., Hydrangea arborescens L., Rosa multiflora Thunb., Salix discolor, Sambucus canadensis, Ulmus americana, and U. rubra.

Area 6. This seep is located on an open, relatively steep, east-facing

hillside near Peppermill Creek, six miles west of Ramsey in Fayette County (SW $\frac{1}{4}$ Sect. 20 R2E T8N). The seep is about 92 ft long, 44 ft wide, and is surrounded by a grazed pasture with a few scattered trees of Gleditsia triacanthos L., Juglans nigra L., and Ulmus rubra. A few small individuals of Salix interior Rowlee., Ulmus americana, and U. rubra occur in the seep.

Area 7. This seep is located on an open, gently sloping northwest-facing hillside about five miles east of Charleston in Coles County (SW $\frac{1}{4}$ Sect. 4 R10W T12N). It is about 201 ft long, has a maximum width of 81 ft, and is the high, open zone of the diverse marsh area studied by Parker and Ebinger (1971). To the southeast of the seep is a steep hillside dominated by Acer saccharum, Quercus rubra, Carya ovata (Mill.) K. Koch., and Ostrya virginiana (Mill.) K. Koch. Numerous individuals of Salix discolor are found in the seep along with scattered specimens of S. rigida Muhl., and Ulmus americana, and one clump of Toxicodendron vernix (L.) Kuntze.

RESULTS AND DISCUSSION

A total of 95 species of herbaceous vascular plants were found in the seep areas. These taxa along with their abundance classes in the seven seeps are included in Tabel 1. In this table the abundance class of the 68 most important species is listed for each seep in which the taxon was found. In a note at the end of Table 1 the 27 taxa that were observed in very low abundance are listed.

Of the species listed in Table 1, eight were found in all of the seeps examined while nine others occurred in all but one of the seep areas. Of these species Glyceria striata, Impatiens biflora, and Pilea pumila usually occur in the higher abundance classes and commonly are the dominant vegetation. The remaining species of this group, though observed in nearly all of the seeps, are in the low abundance classes, being scattered, or in localized areas. Though these taxa occur in the lower abundance classes, they form an important component of the seep community. Also, a few of these species are rarely encountered in east-central Illinois, being restricted to this type of habitat. Included in this group are Caltha palustris, Pedicularis lanceolata, and Solidago patula.

Most of the other species listed in Table 1, though not found in most of the seeps, are fairly common throughout the state, and would be expected in this type of habitat. Six of the taxa, however, are rarely encountered in east-central Illinois (Mohlenbrock and Ladd, 1978). For the most part these taxa are relict species that have northern affinities. Included in this group are Aster puniceus var. lucidulus, Campanula aparinoides, Carex bebbii, C. bromoidea, Solidago riddellii, and Symplocarpus foetidus.

The vascular flora of the seep communities has some similarity because the dominant species are usually the same, and the presence of relict species that are common to many of the seep areas. Of the species found, however, many occur in only one or two of the areas studied. Thirty eight of the species listed in Table 1 were found at only one of

the seeps while 17 others occurred at only two seeps. The large number of species that occurred at only a few seep areas is probably a reflection of chance dissemination, degree of disturbance in and around the seeps, and differences in habitat caused by shading, and the degree and exposure of the slope.

One interesting seep not included in the study occurs at the base of Windfall Prairie at the edge of the Vermilion River in Vermilion County (NW $\frac{1}{4}$ Sect. 8 R12W T20N). This seep, which is found near the base of a steep, eroded cliff contains many relict plant species. Some of the more important species found are Bromus kalmii Gray., Cirsium muticum Michx., Lysimachia quadriflora, Oxypolis rigidior, Parnassia glauca Raf., Pedicularis lanceolata, Solidago patula, and S. riddellii.

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Table 1.-- The abundance classes for the dominant species of vascular plants in seven hillside marshes located in East-central Illinois. For an explanation of the abundance class symbols see note above species list.

Symbol	Meaning	Distance	ABUNDANCE CLASSES OF AREAS						
			Walnut Point State Park (shaded)	Charleston Marsh (shaded)	Peppermill Creek (partial shade)	Collison Marsh (partial shade)	Forest Glen Preserve (sunny)	Peppermill Creek (sunny)	Charleston Marsh (sunny)
VA	Very Abundant	0-3 in. apart	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A	Abundant	3-6 in. "							
VC	Very Common	½-1 ft. "							
C	Common	1-1½ ft. "							
VF	Very Frequent	1½-2 ft. "							
F	Frequent	2-3 ft. "							
F-	Less Frequent	3-6 ft. "							
FF	Fairly Frequent	6-12 ft. "							
FO	Fairly Occasional	12-30 ft. "							
O	Occasional	30-50 ft. "							
L	Indicates local abundance								
SPECIES ¹			(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Acalypha rhomboidea</i> Raf.			-	LVF	O	-	-	-	-
<i>Agrostis alba</i> L. var. <i>alba</i>			-	FF	F-	O	F	F	F
<i>Apios americana</i> Medic.			-	-	-	-	F-	-	VC
<i>Arisaema triphyllum</i> (L.) Schott.			FO	-	-	-	O	-	-
<i>Asclepias incarnata</i> L.			-	-	O	-	O	F-	O
<i>Aster lateriflorus</i> (L.) Britt.			O	F-	FF	LC	FF	FF	F-
<i>Aster puniceus</i> L. var. <i>lucidulus</i> Gray.			-	-	-	-	FF	-	F
<i>Aster simplex</i> Willd.			LC	-	-	LC	LA	-	LF-
<i>Bidens cernua</i> L.			-	-	FF	O	LA	O	LA
<i>Bidens frondosa</i> L.			-	F	FF	-	-	LC	-
<i>Boehmeria cylindrica</i> (L.) Sw.			LF	-	-	-	FO	-	FO
<i>Caltha palustris</i> L.			LF-	O	FO	O	F	FO	VC
<i>Campanula aparinoides</i> Pursh.			-	-	-	-	LA	-	-
<i>Carex brevior</i> (Dewey) Mack.			-	LVC	-	-	-	-	-
<i>Carex granularis</i> Muhl. var. <i>granularis</i>			-	FO	O	-	-	-	O
<i>Carex hyalinolepis</i> Steud.			-	-	-	-	F	-	LC
<i>Carex hystricina</i> Muhl.			-	-	-	O	-	-	LC
<i>Carex lanuginosa</i> Michx.			-	O	O	-	-	-	O
<i>Carex lurida</i> Wahlenb.			-	VF	F-	F	F-	FF	F-
<i>Carex rosea</i> Schk.			O	-	-	-	-	-	LF
<i>Carex sparganioides</i> Muhl.			O	FO	-	F-	O	O	FF
<i>Carex stipata</i> Muhl. var. <i>stipata</i>			-	-	-	-	FO	-	-
<i>Carex stricta</i> Lam.			-	-	-	-	LF-	-	-
<i>Carex trichocarpa</i> Muhl.			-	-	-	F-	-	-	-
<i>Carex vulpinoidea</i> Michx.			-	F-	O	-	O	O	-
<i>Chelone glabra</i> L.			LVF	-	-	FO	-	FO	FO
<i>Cinna arundinacea</i> L.			LC	-	F	F	LF	-	-
<i>Cryptotaenia canadensis</i> (L.) DC.			F-	O	O	O	O	-	-
<i>Cyperus strigosus</i> L.			-	-	O	-	O	LC	-
<i>Eleocharis erythropoda</i> Steud.			-	-	-	-	-	LA	-
<i>Epilobium coloratum</i> Muhl.			-	FF	O	FF	O	O	FF
<i>Equisetum arvense</i> L.			-	FF	O	VC	O	F-	F-
<i>Eupatorium coelestinum</i> L.			-	FO	FO	-	FO	-	FO
<i>Eupatorium fistulosum</i> Barratt.			-	O	-	-	-	-	F-
<i>Eupatorium perfoliatum</i> L.			-	F	F	O	O	F-	F-
<i>Eupatorium rugosum</i> Houtt.			O	O	-	-	LC	-	-
<i>Galium aparine</i> L.			O	-	-	FF	VF	FF	-

Table 1. (continued)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<u>Glyceria striata</u> (Lam.) Hitchcock.	O	VC	A	VC	O	A	F-
<u>Hydrophyllum appendiculatum</u> Michx.	-	-	-	-	LF-	-	-
<u>Impatiens biflora</u> Walt.	A	LVC	F	VA	A	A	LA
<u>Juncus interior</u> Wieg.	-	VF	-	-	-	-	-
<u>Laportea canadensis</u> (L.) Wedd.	C	-	-	-	FF	-	-
<u>Leersia oryzoides</u> (L.) Swartz.	-	-	-	-	-	LVC	-
<u>Leersia virginica</u> Willd.	FO	O	LC	LVC	LVC	LC	LF
<u>Lobelia siphilitica</u> L.	O	FF	O	O	O	O	FF
<u>Lysimachia nummularia</u> L.	-	-	-	VC	-	-	-
<u>Lysimachia quadriflora</u> Sims.	-	-	-	-	-	-	LVC
<u>Mimulus ringens</u> L. var. <u>ringens</u>	-	O	FF	O	F-	FF	FF
<u>Oxypolis rigidior</u> (L.) Coulter & Rose.	-	FF	-	-	-	-	FF
<u>Pedicularis lanceolata</u> Michx.	LA	FO	O	-	FF	FO	VF
<u>Pilea pumila</u> (L.) Gray.	A	VA	LC	VC	LVA	O	FF
<u>Poa pratensis</u> L.	-	FO	LVF	-	-	O	FO
<u>Polygonum hydropiper</u> L.	-	VF	O	F	O	F	F
<u>Ranunculus recurvatus</u> Poir.	-	O	FO	-	-	-	-
<u>Rumex crispus</u> L.	-	-	O	LF-	-	O	-
<u>Rumex obtusifolius</u> L.	-	-	-	O	O	FO	-
<u>Sagittaria latifolia</u> Willd.	-	-	-	LF	-	-	LF
<u>Scirpus atrovirens</u> Willd.	-	LF	-	-	O	FF	O
<u>Senecio aureus</u> L.	-	-	F	-	F-	F	-
<u>Silphium perfoliatum</u> L.	-	-	-	O	-	-	LF
<u>Solidago patula</u> Muhl.	O	F-	FF	F-	FF	F-	F-
<u>Solidago riddellii</u> Frank.	-	-	-	-	-	-	F-
<u>Symplocarpus foetidus</u> (L.) Nutt.	-	-	-	FF	F	-	-
<u>Thelypteris palustris</u> Schott.	-	-	O	-	FF	FO	-
<u>Typha latifolia</u> L.	-	-	-	O	LP-	-	LF-
<u>Urtica dioica</u> L.	LC	-	-	-	FF	-	-
<u>Verbesina alternifolia</u> (L.) Britt.	LC	-	-	O	LC	-	-
<u>Vernonia gigantea</u> (Walt.) Trel.	-	-	-	-	FF	-	-

1. Species observed in low abundance in each area and not included in the table.

Area 1. Actaea pachypoda Ell., Carex grayi Carey., Geranium maculatum L., Onoclea sensibilis L., Podophyllum peltatum L., Polygonatum commutatum (Schult.) A. Dietr., Sanicula gregaria Bickn., Uvularia grandifolia Sm.

Area 2. Geum canadense Jacq., Lippia lanceolata Michx., Prunella vulgaris L., Scirpus pendulus Muhl., Selaginella apoda (L.) Fern.

Area 3. Geum canadense Jacq., Polygonum punctatum Ell., Senecio glabellus Poir.

Area 4. Carex bebbii Olney.

Area 5. Carex bromoides Schk., Echinochloa crus-galli (L.) Beauv., Eupatorium purpureum L., Galium triflorum Michx., Glechoma hederacea L., Lysimachia ciliata L., Scrophularia marilandica L., Scutellaria lateriflora L.

Area 6. Juncus effusus L. var. solutus Fern. & Wieg., Polygonum sagittatum L.

Area 7. Ranunculus septentrionalis Poir., Selaginella apoda (L.) Fern.