

Analysis of the Distribution of Southeastern Taxa in Seeps of Calloway County, Kentucky¹

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ABSTRACT

Analysis of the taxa found in the seeps of Calloway County, Kentucky, shows an east-west decrease in the number of southeastern taxa. The Tennessee River with its northeasterly flow through the intercoastal plain region is an avenue for the movement of southeastern taxa into the study area. The northeasterly flow of the streams provides no means for the east-west movement of those plants within the study area. The differences among the 3 geologic base layers of the seeps (Fort Payne Chert, Porters Creek Clay, and the Wilcox-Claiborne Formation) are instrumental in determining whether or not the plants are able to become established.

INTRODUCTION

From August 1973 to November 1974, the vascular plants of 6 seeps in Calloway County, Kentucky were collected and analyzed systematically (Funk and Fuller 1978). Seeps were chosen as study areas because they are located near rivers and streams, and because they represent a distinct element of the flora of the region. A seep is a marshy area at the base of a hill or rise, between the hill and the flood plain of a river or stream (Funk 1975, unpublished master's thesis, Murray State University, Murray, Kentucky). In general, the nomenclature used followed that of Gray's Manual of Botany, 8th edition (Fernald 1950).

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GEOLOGY OF THE STUDY AREA

Calloway County, Kentucky, is part of the Jackson Purchase Area that occupies the northern tip of the Gulf Embayment

and which during Cretaceous and Early Tertiary was covered by an extension of the Gulf of Mexico (McFarland 1942). The materials deposited during that period were unconsolidated clays, sands, and gravels typical of coastal plain areas (Roberts and Gildersleeve 1945).

The underlying geologic base layers in Calloway County are: Fort Payne Chert, Porters Creek Clay, and the Wilcox-Claiborne Formation (Blade 1963, Wilshire 1963 and 1964, and Wolfe 1963). Three seeps collected and analyzed are on Fort Payne Chert, 2 on Porters Creek Clay, and 1 on the Wilcox-Claiborne Formation (Funk and Fuller 1978).

Fort Payne Chert is of Mississippian Age and is calcareous and siliceous with some of the silica as chert. In Calloway County, it attains a maximum thickness of 130 m and underlies the area along the western border of the Tennessee River (Kentucky Lake) (Roberts and Gildersleeve 1945).

Porters Creek Clay is of Paleocene Age and is mainly a clay interbedded with layers of fine sand. A characteristic feature is a system of sandstone dikes that intrude into the clay (Miller 1919). The maximum thickness of the unit in Calloway County is 12 m (Roberts and Gildersleeve 1945), and it is exposed as a belt

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TABLE 1.—NUMBERS AND PERCENTAGES OF THE TOTAL OF 262 TAXA, COMPARED WITH THE NUMBERS AND PERCENTAGES OF 43 SOUTHEASTERN TAXA AND 21 EXTRANEOUS SOUTHEASTERN TAXA, COLLECTED FROM SEEPS IN 3 GEOLOGIC FORMATIONS IN CALLOWAY COUNTY, KENTUCKY

Geologic formation	Total taxa		Southeastern taxa		Extraneous southeastern taxa	
	No.	%	No.	%	No.	%
Fort Payne Chert	188	72	31	72	16	76
Porters Creek Clay	111	42	17	40	5	24
Wilcox-Claibourne	109	42	12	28	3	14
Total	262		43		21	

immediately west of the East Fork of Clarks River (Miller 1919).

The Wilcox-Claiborne Formation is of Eocene Epoch and consists of sand, clay, and lignite. The sand contains clay lenses less than a meter thick (Wilshire 1963). Iron leaching through the loess acts as a cement forming a thick basal conglomerate. In Calloway County, the combined thickness of those formations varies from 15 to 60 m (Wilshire 1963). Exposures, which are rare, are found along the east side of the West Fork of Clarks River (Roberts and Gildersleeve 1945).

Because the physical and chemical nature of the soil is generally determined

or at least influenced by the bedrock material, an apparent correlation exists between the flora of the region and the geologic material underlying it (McInteer 1941). The soil type of the seeps on the Porters Creek Clay area is Hymon loam, while the soil type of the seeps on the Fort Payne Chert and the Wilcox-Claiborne areas is Waverly silt loam (Leighty et al. 1945). A difference in the Waverly silt loam of those areas is the presence of the cherty limestone in the Fort Payne Chert area which helps to produce the most fertile soils in the county (Leighty et al. 1945).

TABLE 2.—THE EXTRANEOUS SOUTHEASTERN TAXA AND THEIR OCCURRENCE IN THE 3 GEOLOGIC BASE LAYERS IN CALLOWAY COUNTY, KENTUKY. SYMBOLS: FPC = FORT PAYNE CHERT, PCC = PORTER CREEK CLAY, W-C = WILCOX-CLAIBORNE FORMATION

Taxa	FPC	PCC	W-C
<i>Aronia arbutifolia</i> (L.) Ell.	x		
<i>Asclepias perennis</i> Walt.		x	
<i>Aster vimineus</i> Lam.			x
<i>Bartonia paniculata</i> (Michx.) Muhl.	x		
<i>Carex flaccosperma</i> Dew.	x		
<i>Eryngium prostratum</i> Nutt.	x		
<i>Eupatorium capillifolium</i> (Lam.) Small	x		
<i>Hypericum densiflorum</i> Pursh	x		
<i>Itea virginica</i> L.	x		
<i>Lobelia puberula</i> Michx.	x		
<i>Polygonum arifolium</i> L.	x		
<i>Polygonum opelousanum</i> Riddell	x		x
<i>Quercus falcata</i> Michx.		x	x
<i>Quercus falcata</i> var. <i>pagodaefolia</i> Ell.		x	
<i>Rhynchospora corniculata</i> (Lam.) Gray	x		
<i>Sagittaria engelmanniana</i> J. G. Sm.	x		
<i>Spigelia marilandica</i> L.		x	
<i>Trisetum pensylvanicum</i> (L.) Beauv.	x		
<i>Uniola laxa</i> (L.) BSP.	x		
<i>Viburnum nudum</i> L.	x	x	
<i>Woodwardia areolata</i> (L.) Moore	x		

RESULTS AND DISCUSSION

Of the 262 taxa collected in the seeps of Calloway County, 188 were found in the seeps on the Fort Payne Chert, 111 were in the seeps on the Porters Creek Clay, and 109 were in the seep on the Wilcox-Claiborne Formation (Table 1). The 43 taxa with southeastern distribution represented 16 percent of all the taxa collected. Of the southeastern taxa, 31 (72%) were found on Fort Payne Chert, 17 (40%) were on Porters Creek Clay, and 12 (28%) were on the Wilcox-Claiborne Formation.

Extraneous southeastern taxa made up 8 percent of the total taxa collected. The percentage of those taxa in relation to the number collected on each geologic unit decreased from 8 percent on the Fort Payne Chert, to 5 percent on the Porters Creek Clay, to 3 percent on the Wilcox-Claiborne Formation. Of the 21 extraneous southeastern taxa (Table 2), 16 (76%) were found on Fort Payne Chert, 5 (24%) were on Porters Creek Clay, and 3 (14%) were on Wilcox-Claiborne Formation.

CONCLUSIONS

The results of the floristic survey of the seeps of Calloway County, Kentucky show a definite decrease in the east-west distribution of southeastern and extraneous southeastern taxa. The northwesterly flow of the Tennessee River through the intercoastal plains of southeastern United States is an avenue for the movement of those taxa into the study area. The high fertility of the soils in the area adjacent to the Tennessee River is instrumental in the establishment of the rela-

tively high percentage of southeastern plants. The east-west movement of those plants is limited in the study area, since the streams flow in the northeasterly instead of a westerly direction. Whether or not the southeastern taxa that do enter the region become established is influenced by the soil and geologic base layer present.

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