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Prairie Vegetation and Environmental Factors

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PRAIRIE VEGETATION AND ENVIRONMENTAL
FACTORS

MYREL BURK

This study of the vegetation and habitat factors of a small area of prairie was begun June 25 and terminated July 18, 1927, when the grass was mowed for hay.

The region studied is located in the southwest quarter of the southeast quarter of section 6, Bennington township, Black Hawk county, Iowa. Physiographically, it is on the summit of the divide between tributaries of the Red Cedar and Wapsipinicon rivers. This small area is gently rolling and slopes toward the south. The surface soil is dark brown or black loam under which a yellow, pebbly clay is found.

As far as I have been able to learn this area has never been under plow. Its chief agricultural use has been the production of wild hay and the grazing of cattle and horses during the late fall months. It has never been pastured.

The vegetation is typical of that region. The earliest, most conspicuous species are *Caltha palustris* L., *Cardamine bulbosa* B. S. P., *Dodocatheon meadia* L., *Phlox pilosa* L., *Saxifraga pennsylvanica* L., *Castilleja coccinea* (L.) Spreng. (yellow form), and *Iris versicolor* L. *Spiranthes* sp. is usually fairly abundant in the fall.

In this study two stations were set up, one in the lowest part of the region, which, for convenience, will be termed the Low Prairie Station, and the second on the higher part, which will be called the High Prairie Station, although this is not typical high prairie. At each of these stations two atmometers were set up approximately three rods apart. Soil temperatures and soil samples were taken at each station.

In order to obtain accurate information regarding the numbers of each species present, two quadrats, one square meter in area, were made, one at the Low Prairie Station and one at the High Prairie Station. The following data were obtained:

NAME	HIGH PRAIRIE	LOW PRAIRIE ⁴
<i>Spartina cynosuroides</i> (L.) Roth.	---	450
<i>Eleocharis palustris</i> (L.) R. and S.	795	73
³ <i>Carex</i> sp.	65	391
<i>Agrostis alba</i> L.	663	64
<i>Eleocharis</i> sp.	388	10
<i>Phleum pratense</i> L.	189	1
<i>Juncus tenuis</i> Willd.	189	---
<i>Acalypha virginica</i> L.	161	34
¹ <i>Andropogon furcatus</i> Muhl.	76	---
<i>Cicuta maculata</i> L.	---	22
<i>Oxalis</i> sp.	64	---
<i>Antennaria</i> sp.	53	---
² Unidentified grass	45	---
<i>Hypoxis hirsuta</i> (L.) Coville	43	1
<i>Trifolium repens</i> L.	41	---
<i>Silphium laciniatum</i> L.	35	---
<i>Plantago</i> sp.	23	---
<i>Senecio</i> sp.	30	---
<i>Fragaria virginiana</i> var. <i>illinoensis</i> (Prince) Gray	18	---
<i>Rudbeckia hirta</i> L.	6	---
<i>Ranunculus septentrionalis</i> Poir.	---	6
<i>Monarda fistulosa</i> L.	5	---
<i>Ambrosia artemisiifolia</i> L.	5	---
<i>Viola</i> sp.	---	5
<i>Equisetum</i> (veg.)	3	5
<i>Lepachys pinnata</i> (Vent.) T. and G.	4	---
<i>Galium boreale</i> L.	3	---
<i>Lactuca</i> sp.	3	---
<i>Moehringia</i> sp.	2	---
<i>Achillea Millefolium</i> L.	2	---
<i>Andropogon virginicum</i> Ktze.	1	---
<i>Viola fimbriatula</i> Sm.	1	1
Total	2813	1063

These data show not only a difference in the number of plants in each quadrat but also the difference in the dominant species of each station. At the Low Prairie Station *Spartina cynosuroides* and *Carex* sp. are dominant and at the High Prairie Station *Agrostis alba* and *Eleocharis palustris* are dominant. The following tables show a similar difference of habitat factors of the two stations:

¹ At the time this study was made *Andropogon furcatus* was not in bloom. Later it was found that two species having hairy sheaths were present, the other being *Sorghastrum nutans*. *A. furcatus* was the more abundant.

² The grass had ripened and the seeds had been dispersed before this quadrat was made.

³ Three species of Cyperaceae, exclusive of the two species of *Eleocharis* present, were abundant. Of these only one, *Carex vulpinoidea*, was identified. All three-angled stemmed sedges were grouped as *Carex* sp.

⁴ Mosses were very abundant on the moist soil of this quadrat.

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Comparison of the Evaporation and Soil Temperatures of the Two Stations

DATE	STATION	EVAP. IN C. C.		SOIL TEMPERATURE				
		ATMOM- ETER No. 1	ATMOM- ETER No. 2	SUR- FACE	2 in.	1 ft.	2 ft.	3 ft.
June 25 to	Low Prairie	64.86	51.68	64	68	61	60	--
July 4	High Prairie	129.20	147.40	71	72	67	64	--
July 4 to	Low Prairie	56.58	32.64	80	74	66	62	58
July 11	High Prairie	136.00	73.44	80	74	68	64	62
July 11 to	Low Prairie	43.57	-----	77	73	66	64	61
July 18	High Prairie	-----	107.24	75	74	65	64	62

*Comparison of the Soils of the Two Stations*¹

DEPTH IN INCHES	LOW PRAIRIE			HIGH PRAIRIE		
	p H	HYGROSCOPIC COEFFICIENT	NITROGEN CONTENT ²	p H	HYGROSCOPIC COEFFICIENT	NITROGEN CONTENT ²
0-6	----	16.5	0.562	5.41	9.3	0.336
6-12	6.70	16.0	0.543	5.68	8.6	0.259
12-18	6.89	14.3	0.246	5.735	8.0	0.232
18-24	7.58	13.8	0.211	6.45	7.8	0.168
24-30	7.625	10.9	0.111	7.035	6.8	0.083
30-36	7.455	10.2	0.095	7.66	4.6	0.021

From these data the following conclusions may be drawn:

1. The evaporating power of the air is greater at the High Prairie Station.
2. The temperature of the soil is higher at the High Prairie Station.
3. The amount of humus is greater in the Low Prairie soil.
4. The Low Prairie soil has a greater hygroscopic coefficient than the High Prairie soil.
5. The hydrogen-ion concentration of the High Prairie soil is greater than that of the Low Prairie soil.

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¹ Lacking the apparatus necessary to obtain these data concerning the soil, the writer sent soil samples to the Botany Department of the University of Nebraska, to which she is indebted for this analysis.

² To secure total organic matter multiply above figures by 20.