

1957

Botanical Aspects of Massard Prairie Arkansas

Ruth Armstrong

Fort Smith Junior High School

Dwight M. Moore

University of Arkansas, Fayetteville

Follow this and additional works at: <https://scholarworks.uark.edu/jaas>



Part of the [Botany Commons](#)

Recommended Citation

Armstrong, Ruth and Moore, Dwight M. (1957) "Botanical Aspects of Massard Prairie Arkansas," *Journal of the Arkansas Academy of Science*: Vol. 10, Article 10.

Available at: <https://scholarworks.uark.edu/jaas/vol10/iss1/10>

This article is available for use under the Creative Commons license: Attribution-NoDerivatives 4.0 International (CC BY-ND 4.0). Users are able to read, download, copy, print, distribute, search, link to the full texts of these articles, or use them for any other lawful purpose, without asking prior permission from the publisher or the author.

This Article is brought to you for free and open access by ScholarWorks@UARK. It has been accepted for inclusion in *Journal of the Arkansas Academy of Science* by an authorized editor of ScholarWorks@UARK. For more information, please contact scholar@uark.edu, uarepos@uark.edu.

BOTANICAL ASPECTS OF MASSARD PRAIRIE, ARKANSAS*

Ruth Armstrong
Fort Smith Junior High School
Dwight M. Moore
University of Arkansas

INTRODUCTION

Prairies have long attracted the attention of botanists, largely because of their distinctive flora. But when a prairie occurs within an area that is predominantly forested, it is likely to arouse unusual interest and pose interesting questions. Certain areas in Arkansas have been persistently covered with prairie vegetation since before the arrival of white men. Massard prairie is one such area. The present study was undertaken to obtain definite data concerning the present plant cover, that it may be used for comparison with other such areas and with descriptions made by the earliest botanists to visit the area. Climatic data are included in the hope that they may aid in accounting for the occurrence and phenology of the plants of the prairie.

HISTORICAL

The first descriptive account of the prairie areas of the Fort Smith region was given by Thomas Nuttall (1819), who was the first botanist to visit the Arkansas territory. His account of the prairies in this area was not so complete as that of Grand Prairie in southeastern Arkansas, but he did note the similarity of the vegetation. This will afford opportunity for study of changes over more than a century.

In 1856, Lesquereux described several counties including prairies and his descriptions coincide very closely with those of Nuttall.

*This paper is based on the work and thesis of the senior author as part requirement for the M.S. degree. It has been condensed and brought down to date by the junior author.

BOTANICAL ASPECTS OF MASSARD PRAIRIE, ARKANSAS

In the Geological Survey of Arkansas, 1880, Sargent presented a map of the State showing the forested and the prairie areas. This map, Plate I, was among the first to give a clear concept of the size and location of the original prairie areas of the State. Except for the fact that some of these areas have been put into cultivation, there is little apparent change in them since that time.

MASSARD PRAIRIE

The present studies were limited to a portion of a prairie in the northern part of Sebastian County, about six miles south of Fort Smith, designated locally as Massard Prairie. This prairie comprises approximately 10,360 acres and extends about six and one-half miles east and west and two to three miles north and south. It is traversed by Highway 71 in the western half and by the Fort Smith and Western Railroad paralleling the highway. This area was chosen because it is a typical prairie area that had been continuously owned and occupied by the same family for 150 years, and it was near enough to Fort Smith that frequent observations could be made.

Massard Prairie has the appearance of a basin nestled between two hills, known locally as Wolf Mountain and South Ridge, which have elevations of about 600 feet above sea level. The elevation of the prairie proper averages about 500 feet. This prairie is cut from southwest to northeast by Massard Creek, whose waters have been impounded by several earthen dams. The surface of the prairie is gently rolling and dotted with numerous small mounds which have been designated "pimple hills." These are quite prominent; sometimes there are as many as fifteen in an acre. They are approximately three to four feet in height and average twenty feet in diameter.

PROCEDURE

Studies of the vegetation were begun in the fall of 1939 and continued throughout the growing season of 1940. During the winter of 1939-40 observations of winter developments were made, and records of blossoming were kept throughout the growing season



of 1940. Before the growing season, these observations were made either at four week or two week intervals, but during the growing season they were made each week. Comparative observations were made of (1) the growth in areas frequently cut over for hay and areas not cut over; (2) the different topographical areas, such as high and low prairies, and (3) the vegetation of the "pimple hills." Specimens were collected and pressed for later identification and study. These were deposited in the University of Arkansas Herbarium.

Ecological data secured include records of temperature, rainfall, evaporation, and soil acidity. The effect of fires on the vegetation was noted. Information about them was secured from the farmers, railroad attorneys, and claim agents.

OBSERVATIONS

PHENOLOGY: The successions of blooms on the prairie was most striking from March until September. The low white patches of Draba caroliniana, in March, were the first to appear. Nothoscordum and Sisyrinchium were extremely abundant in April and covered several hundreds of acres. As these began to disappear in late April, the prairie presented a quilt-like pattern of patches of blue Phacelia glabra and white Arenaria patula var. robusta. Both of these were found in low moist areas. Golden patches were made by Selenia aurea and Corydalis crystallina which occurred on higher and better drained places, as the "pimple hills." The baptisias appeared in different areas -- B. leucantha in poorer soil, B. sphaerocarpa along the highway and ditches, and B. leucophaea on well-drained soil. A small group of Nemastylis coelestina with their pale violet flowers and peculiar habit of blossoming were seen. These opened about five in the afternoon, remained open for only about an hour, and then twisted and died. This is one of the many flowers first described and named by Thomas Nuttall from material found on these Arkansas prairies.

The climax of the color show came in May and June with the acres of blue Delphinium and white Penstemon on low moist areas, and pink Echinacea pallida on elevated or better-drained areas. Blue Tradescantia ohiensis and Camassia scilloides were

ARKANSAS ACADEMY OF SCIENCE

more restricted. In July, taller flowers such as Silphium laciniatum and Liatris spp., appeared. These grow in patches as large as an acre among the tall grasses, varying in size with the environmental conditions. Stillingia sylvatica, Agave virginica, and Eryngium yuccifolium were found in few areas and were very limited as to number.

August, with its lower precipitation, higher temperatures and shorter days brought out Centaurea americana, Vernonia, and nine species of Solidago. These began to bloom in midsummer and continued until frost. Another plant, very striking because of its azure blue flowers was Salvia azurea. The gay fall tints of the sassafras and sumac leaves also began to appear during August. The asters were scattered throughout the prairie and flourished until frost, and Boltonia diffusa was most abundant in the ditches.

This definite sequence of floral aspects seen on the prairie in 1940 is shown in Fig. I, which presents the periods of total and maximum blooming of forty of the more prominent and showy species. Camassia bloomed for three weeks while Verbena canadensis was in blossom for thirty. Many grasses also were quite showy by August. Andropogon gerardi, Sorghastrum nutans, Spenopholis intermedia, Bromus arvensis, Paspalum circulare, and P. capillare were conspicuous because of their height, bloom, and fruiting clusters. Sorghastrum nutans made a very striking display; Andropogon gerardi is the tallest of the grasses. The awns of Aristida purpurascens and the silky tops of Andropogon ternarius, A. virginicus and A. scoparius were as spectacular as the height and size of head in other grasses.

VEGETATION OF "PIMPLE HILLS"

When these were studied in large numbers, it was found that ligneous species were more likely on these than elsewhere, but in general there was no consistency in the vegetation on the "pimple hills." Since they tended to be dryer than lower land, some species were found on them to the exclusion of other areas.

CUTOVER AND UNCUT AREAS

Two list transects 5 m. x 1 m. were taken in an

BOTANICAL ASPECTS OF MASSARD PRAIRIE, ARKANSAS



Fig. 1. Total and Maximum Blooming Periods of Forty Species

ARKANSAS ACADEMY OF SCIENCE

area not cut for many years and another which had been regularly cut for hay. Twenty-three species were common to both areas; fifteen found in the uncut area were not found in the cut-over area, while nine species were found in the cutover area and not in the other. The plots are listed below:

SPECIES IN BOTH AREAS

- | | |
|-----------------------------------|-------------------------------------|
| 1. <i>Asclepias viridiflora</i> | 14. <i>Oxalis violacea</i> |
| 2. <i>Aster ericoides</i> | 15. <i>Parthenium integrifolium</i> |
| 3. <i>Baptisia leucantha</i> | 16. <i>Penstemon tubiflorus</i> |
| 4. <i>Boltonia diffusa</i> | 17. <i>Ptilimnium capillare</i> |
| 5. <i>Echinacea pallida</i> | 18. <i>Ranunculus fascicularis</i> |
| 6. <i>Camassia scilloides</i> | 19. <i>Rudbeckia hirta</i> |
| 7. <i>Centaurea americana</i> | 20. <i>Shrankia nuttallii</i> |
| 8. <i>Corydalis crystallina</i> | 21. <i>Solidago radula</i> |
| 9. <i>Delphinium carolinianum</i> | 22. <i>Tradescantia ohioensis</i> |
| 10. <i>Helianthus hirsutus</i> | 23. <i>Verbena canadensis</i> |
| 11. <i>Helianthus mollis</i> | |
| 12. <i>Hydrolea ovata</i> | |
| 13. <i>Liatris pycnotachya</i> | |

SPECIES IN UNCUT AREA
NOT IN CUTOVER

1. *Apocynum cannabinum*
2. *Aster hemisphericus*
3. *Baptisia leucophaea*
4. *Bidens trichosperma*
5. *Cirsium discolor*
6. *Helianthus angustifolius*
7. *Oenothera biennis*
8. *Penstemon arkansanus*
9. *Pluchea camphorata*
10. *Rhus copallina*
11. *Silphium integrifolium*
12. *Silphium laciniatum*
13. *Solidago altissima*
14. *Stillingia sylvatica*
15. *Vernonia missurica*

SPECIES IN CUTOVER AREA
NOT IN UNCUT

1. *Arenaria patula*
2. *Camassia scilloides*
3. *Ceanothus americana*
4. *Neptunia lutea*
5. *Phacelia glabra*
6. *Rhus toxicodendron*
7. *Sabatia campestris*
8. *Spiranthes tuberosa*
9. *Spiranthes praecox*

CLIMATIC: Although observations were made on temperature, rainfall, evaporation, and pH values of the soil, they will not be discussed fully in this paper. Temperatures and rainfall thruout the growing season of 1940 are listed in Table I, and evaporation data are omitted. pH values are given below. 1939 was a very dry summer with temperatures above average, while rainfall was below average, but 1940 was more nearly average in both areas. This resulted in a very representative show of blossoms for 1940. In 1939-40 the five drilled wells which range from 15 - 1330 feet deep, were dry for five months, but ponds impounded in Massard Creek maintained a good supply of water.

EDAPHIC: The soil of Massard Prairie is composed of shale and clay. In spring it is covered with water, which does not filter down. As a result the soil is more or less marshy. The soil is cold. In the summer months it becomes hard and compact as a result of evaporation and less precipitation. It is difficult to cultivate, because of the sticky texture in spring and hardness in summer. Hardpan is found throughout the prairie at a depth of 8 - 11 inches. The "pimple hills" showed no stratification or differences in physical make-up, but because of their elevation were better drained in wet weather.

The scarcity of ground water is due to compacted shales and sandstone of low porosity. (Lesquereux, 1866). The surface water cannot percolate because of the hardpan and as a result is lost by evaporation or run-off.

The pH of the soils was studied from twenty soil tests for an idea of acidity. The range was from 6.5 to 7.2. The result reveals that the pH could hardly account for the distribution of prairie vegetation. These texts showed that acidity of the "pimple hills" was not materially different from other parts of the prairie.

In order to show possible correlation between the temperature, rainfall, length of day and number of species observed in flower each week the following table has been prepared. These data may be compared with Fig. 1.

313263

51

UNIVERSITY OF ARKANSAS

ARKANSAS ACADEMY OF SCIENCE

Weeks	Mean Temp.(F.)	Rainfall (Inches)	Day Hrs.	Length Mins.	Species in Bloom
Mar.					
1	49	.3	11	40	2
2	74	3.0	11	55	4
3	55	.4	12	7	4
4	51	.7	12	23	7
Apr.					
5	68	.3	12	37	9
6	51	3.2	12	53	12
7	58	.3	13	2	15
8	59	.3	13	17	20
May					
9	64	1.2	13	33	25
10	73	.2	13	43	30
11	69	.1	13	52	32
12	69	2.2	14	2	35
13	66	.2	14	10	37
June					
14	77	.2	14	14	40
15	88	2.2	14	17	45
16	78	1.2	14	20	53
17	78	.2	14	18	55
July					
18	74	1.5	14	15	58
19	79	.2	14	10	60
20	82	.2	14	2	63
21	81	1.0	13	57	67
22	89	.2	13	42	74
Aug.					
23	86	.1	13	32	70
24	78	2.0	13	22	70
25	73	2.0	13	8	62
26	78	.2	13	00	55
27	69	2.5	12	52	45
Sept.					
28	73	T	12	27	44
29	74	T	12	7	40
30	70	.1	12	00	38
31	66	.5	11	53	31
Oct.					
32	67	T			30
33	64	T			25
34	67	T			
35	65	1.0			
36		T			

Table I

BOTANICAL ASPECTS OF MASSARD PRAIRIE, ARKANSAS

FIRES: The ecological data concerning Massard Prairie cannot be concluded without some mention of the static vegetation and the effect of fires in this area. Diamond Grove and forests on the ridges have been periodically swept by fires, but these same areas continue to be forested. One farmer relates that the worst fire during his forty years of knowledge of Massard Prairie was August 10, 1936, when approximately 7680 acres of 10,360 acres were burned over, including seven hundred of the 1100 acres of Diamond Grove farm. The year 1936 was another period of drought and the day of the fire had the highest temperature, 114° F., ever recorder in Fort Smith. There were two separate fires at this time, but no further fires from 1937 through 1940. One burned portion was on the eastern side and swept up the ridge through forest to the south. As might be expected, most of the trees were killed by the fire, and remain as skeletons. The new vegetation developing on the burned forest area was not of the prairie type, but a form of woodland similar to what had been there. The area studied most closely had not been burned over for 22 years. The sumac is not so dense or tall as that found in other places. There are no large trees in this area. For instance, trees such as cottonwood, willow, persimmon, and sassafras are shrub-like after 22 years or less of growth. Some conditions other than fire must contribute to this scarcity of trees and the poor growth of those present. Fires are not common in this area, because Massard Prairie is not burned over to improve the grass; on the contrary, the farmers take every precaution to prevent grass fires. The great areas of dry grass and the wide open space for the wind to move produce ideal conditions for great fires. The prairie fires may be a result of such conditions rather than a cause of such areas

DISCUSSION

There are various opinions as to what constitutes a prairie. Sometimes it is considered as a type of vegetation; at other times the question is raised as to whether it is not rather a region with a peculiar complex of environmental factors, which foster a certain type of vegetation. In general a prairie is considered as a region covered by a type of vegetation, predominantly grasses, and notably lacking in ligneous flora. In North America

ARKANSAS ACADEMY OF SCIENCE

the prairie is recognized as a climatic plant formation extending roughly from the Texas shore of the Gulf of Mexico northward into Canada and extending irregularly eastward into Oklahoma, Kansas, Missouri, Iowa, Illinois, and Indiana.

Prairies appear to be due in general to climatic conditions, with available moisture as one of the principal controlling factors. Lesquereux (1866) advanced such a theory. He explained that land covered by low stagnant water has for its vegetation rushes and sedges. These decompose and produce a hard, cold, impervious layer underlaid by clay or shales. Land continually covered with stagnant water cannot produce trees, because most trees, require atmospheric air for their roots and seed germination. Seeds of our common forest trees do not germinate and grow on a ground alternately covered with stagnant water and exposed to dryness for some months of the year. Massard Prairie is low and remains wet late in the spring. Rushes and sedges are found in all the lower areas. After the water has evaporated the soil is very hard and dry. It is a cold soil when wet, which is shown by the appearance of certain blooms at least two weeks later on this soil than in other nearby areas not prairie. Hardpan underlaid by a clay or shale causes the water to stand and in this way prevents the germination of seeds such as certain tree seeds. Thus Massard Prairie does have soil conditions which might interfere with favorable moisture and aeration.

Climatic conditions play their part on Massard Prairie as well as on prairies in other areas. Sampson (1921) and Transeau (1927) have shown the nature of prairies in North America and explained them largely on the basis of the rainfall/evaporation ratio. Data on these factors for Massard Prairie were not adequate for definite conclusions, but did indicate not a great difference in these factors when compared with nearby woodland. Thus the theory of Lesquereux to explain the vegetation seems most logical for Massard Prairie.

The phenology may be explained as a result of combined conditions of temperature, moisture, and relative length of day and night as described by Garner and Allard, 1920.

A complete list of plants found on Massard prairie follows:

BOTANICAL ASPECTS OF MASSARD PRAIRIE, ARKANSAS

TAXONOMIC LIST OF PLANTS OF MASSARD PRAIRIE¹

Typhaceae	Cyperus strigosus L.	Rubiaceae	Corydalis crystallina Engelm.
Typha latifolia L.	Eleocharis obtusa (Willd.) Schultes.	Cruciferae	Arabis virginica (L.) Fernald
Gramineae	Fimbristylis validii (Lam.) Link.		Cercollis bursa-pastoris (L.) Medic.
Agrostis alba L.	Rynchospora corniculata (Lam.) Gray.		Draba brachycarpa Nutt.
Agrostis elliptica Schultes.	Scirpus lineatus Michx.		Draba reptans (Lam.) Fern.
Agrostis hyemalis (Walt.) BSP.	Cowbellinaceae		Lepidium virginicum L.
Andropogon gerardi Vitman.	Tridacenia ohioensis Raf.		Salvia aurea Nutt.
Andropogon scoparius Michx.	Juncaceae		Sisymbrium officinale (L.) Scop.
Andropogon ternarius Michx.	Juncus acuminatus Michx.	Rosaceae	Potentilla canadensis L.
Andropogon virginicus L.	Juncus biflorus Ell.		Rosa carolina L.
Aristida dichotoma Michx.	Juncus brachycarpus Engelm.		Rosa carolina var. villosa (Best.) Rehd.
Aristida longepedica Poir.	Juncus interior Wiegand.		Rosa setigera Michx.
Aristida oligantha Michx.	Liliaceae		Rubus villosus, Alt.
Aristida purpurascens Poir.	Allium canadense L.	Leguminosae	Amorpha fruticosa L.
Aspalathus curtiperula (Michx.), Torr.	Canassia scilloides (Raf.) Cory		Apoc americana Medic.
Bromus arvensis L.	Nothocordun bivalve (L.) Britton.		Astragalus distortus T. & G.
Danthonia spicata (L.) Beauv.	Smilax bona-nox L.		Baptisia leucantha T. & G.
Digitaria sanguinalis (L.) Scop.	Amaryllidaceae		Baptisia leucophaea Nutt.
Echinochloa crusgalli (L.) Beauv.	Agave virginica L.		Baptisia sphaerocarpa Nutt.
Elymus virginicus glaberrimus L.	Rhynchospora hirsuta (L.) Coville.		Cassia chamaecrista L.
Eragrostis frankii (Michx.) Hay, & Lall.) Steud.	Ericaceae		Crotalaria sagittalis L.
Eragrostis hirsuta (Michx.) Nees.	Nemastylis coelestina Nutt.		Dysmanthus illinoensis (Michx.) Moench.
Eragrostis pectinacea (Michx.) Nees.	Sisyrinchium albidum Raf.		Desmodium sessilifolium (Torr.) T. & G.
Festuca octoflora Walt.	Ochridaceae		Galactia voluvidis (L.) BSP.
Leptaloea bogartii (Schultes) Chase.	Calopogon pulchellus (Salisb.) R. Br.		Gleditsia triacanthos L.
Panicum agrostoides Spreng.	Spiranthes praecox (Walt.) Wats. & Coult.		Lathyrus pusillus Ell.
Panicum capillare L.	Spiranthes tuberosa Raf.		Lespedeza capitata Michx.
Panicum diantemiflorum Michx.	Salicaceae		Lespedeza intermedia Wats.
Panicum hians Hitchcock.	Populus deltoides Marsh.		Lespedeza prunifera Michx.
Panicum muhlenbergii Ascha.	Salix nigra Marsh.		Lespedeza repens (L.) Bart.
Panicum nudicollatum, Vasey	Polygonaceae		Lespedeza sturati Nutt.
Panicum scoparium Lam.	Polygonum hydroperoides (Michx.)		Lespedeza violacea (L.) Pers.
Panicum scribnerianum Nash.	Polygonum ferrugineum L.		Lespedeza virginica (L.) Britton.
Panicum sphaerocarpon Ell.	Polygonum tomentosum Michx.		Keptunia lutea (Leavenw.) Benth.
Panicum virgatum L.	Rumex acetosella L.		Psoralea bicoloroides (Walt.) Cory.
Paspalum circulare Nash.	Rumex crispus L.		Schrankia nuttallii (DC.) Standl.
Paspalum floridanum Michx.	Amaranthaceae		Strophostyles helvola (L.) Ell.
Paspalum muhlenbergii Nash.	Amaranthus spinosus L.		Strophostyles leiosperma (T. & G.) Piper.
Paspalum pubescens Michx.	Phytolaccaceae		Stylosanthes biflora (L.) BSP.
Phalaris arundinacea L. (Zeed G.)	Phytolacca americana L.		Tephrosia spicata (Walt.) T. & G.
Phalaris caroliniana Walt.	Caryophyllaceae		Tephrosia virginiana (L.) Pers.
Setaria geniculata Lam.	Arenaria patula Michx.		Trifolium duxium Smith.
Setaria viridis (L.) Beauv.	Arenaria patula var. robusta (Steud.) Maguire.		Trifolium reflexum L.
Sorghastrum nutans (L.) Nash.	Cerastium brachypodus (Erasm.) Robinson.	Linaceae	Linum sulcatum Michx.
Sorghum halepense (L.) Pers.	Cerastium viscosum L.		Linum virginicum L.
Sphenopholis hirsutissima Kydb.	Silene antirrhina L.	Orchidaceae	Orchis stricta L.
Sporobolus asper (Michx.) Kunth.	Portulacaceae		Orchis violacea L.
Sporobolus heterolepis Gray.	Claytonia virginica L.	Geraniaceae	Geranium carolinianum L.
Sporobolus vaginiflorus (Torr.) Wood.	Talinum parviflorum Nutt.		
Tridax strictus (Nutt.) Nash.	Ranunculaceae		
Cyperaceae	Anemone caroliniana Walt.		
Carex arkansana Bailey.	Dolphindium carolinianum Walt.		
Carex bairdii Bailey	Ranunculus fascicularis Muhl.		
Cyperus acuminatus Torr. and Hook.	Ranunculus pusillus Poir.		
Cyperus ovalaris (Michx.) Torr.	Menispermaceae		
Cyperus pseudovegetus Steud.	Cocculus carolinus L.		
	Lauraceae		
	Sassafras albidum (Nutt.) Nees.		

¹The nomenclature follows the eighth edition of Gray's Manual in the majority of the list; Hitchcock and Chase was used for the grasses, and other authors when necessary.

ARKANSAS ACADEMY OF SCIENCE

<p> Polygalaceae <i>Polygala sanguinea</i> L. Euphorbiaceae <i>Acalypha virginica</i> L. <i>Croton capitatus</i> Michx. <i>Croton glandulosus</i> L. <i>Croton monanthogynus</i> Michx. <i>Crotonoecis elliptica</i> Willd. <i>Euphorbia corollata</i> L. <i>Euphorbia dentata</i> Michx. <i>Euphorbia maculata</i> L. <i>Euphorbia supina</i> Raf. <i>Stillingia spavulosa</i> L. <i>Tragia urticifolia</i> Michx. Anacardiaceae <i>Rhus copallina</i> L. <i>Rhus glabra</i> L. <i>Rhus toxicodendron</i> L. Rhamnaceae <i>Ceanothus americanus</i> L. Hypericaceae <i>Hypericum drummondii</i> (Greene) Hook f. & G. Passifloraceae <i>Passiflora incarnata</i> L. <i>Passiflora lutea</i> L. Lythraceae <i>Lythrum alatum</i> Pursh. <i>Rotala ramosa</i> (L.) Koehne. Melastomaceae <i>Rhexia virginica</i> L. Onagraceae <i>Gaura biennis</i> L. <i>Justicia decurrens</i> (Walt.) DC. <i>Ludwigia alternifolia</i> L. <i>Ludwigia glandulosa</i> Walt. <i>Ludwigia palustris</i> L. <i>Cemetera biennis</i> L. <i>Cemetera laciniata</i> Hill. <i>Cemetera linifolia</i> Nutt. Umbelliferae <i>Chaerophyllum procumbens</i> (L.) Arnott. <i>Cicuta maculata</i> L. <i>Cynoscladus pinnatus</i> DC. <i>Eryngium yuccifolium</i> Michx. <i>Polygala verticillata</i> DC. <i>Ptilimnium capillosum</i> (Michx.) Raf. <i>Spergularia inornata</i> (Nutt.) Math. & Const. Torilis japonica (Nutt.) DC. Primulaceae <i>Dodecatheon meadia</i> L. Zonaceae <i>Dioscorea virginiana</i> L. Gleceaceae <i>Fraxinea pseudotrandaca</i> var. <i>subintegrifolia</i> (Walt.) Fern. Gentianaceae <i>Sabatia campestris</i> Nutt. Apocynaceae <i>Apocynum cannabinum</i> L. Asclepiadaceae <i>Asclepias longifolia</i> Michx. <i>Asclepias viridiflora</i> Raf. <i>Asclepias tuberosa</i> L. <i>Asclepias inornata</i> L. <i>Asclepiodora viridis</i> (Walt.) Gray. Convolvulaceae <i>Cuscuta cuspidata</i> Engelm. </p>	<p> <i>Cuscuta groenovi</i> Willd. <i>Cuscuta indecora</i> Choisy. Polémoniaceae <i>Phlox pilosa</i> L. Hydrophyllaceae <i>Hydroclea ovata</i> Nutt. <i>Passalis glabra</i> Nutt. Boraginaceae <i>Lithospermum arvense</i> L. <i>Lithospermum incisum</i> Lehm. <i>Hypoxis varus</i> Nutt. Verbenaceae <i>Verbena canadensis</i> L. <i>Verbena simplex</i> Lehm. Labiatae <i>Isanthus brachiatus</i> L., BSP <i>Physotegia virginiana</i> L. <i>Physotegia</i> Benth. <i>Pycnanthemum flexuosum</i> Walt. BSP <i>Salvia azurea</i> var. <i>grandiflora</i> Lam. Benth. <i>Taurium canadense</i> L. Solanaceae <i>Datura stramonium</i> L. <i>Physalis heterophylla</i> Nees. <i>Physalis pusilla</i> Nutt. <i>Physalis virginiana</i> Mill. <i>Solanum carolinense</i> L. <i>Solanum rostratum</i> Dunal. Scrophulariaceae <i>Bacopa acuminata</i> (Walt.) Robinson. <i>Castilleja coccinea</i> (L.) Spreng. <i>Gerardia fasciculata</i> Ell. <i>Linaria canadensis</i> (L.) Dumont. <i>Lindernia dubia</i> (L.) Pennell. <i>Pentstemon arkansanus</i> Pennell. <i>Pentstemon digitalis</i> (Sweet) Gray. <i>Pentstemon tubaeformis</i> Nutt. <i>Verbascum thapsus</i> L. Ericaceae <i>Campsis radicans</i> (L.) Seem. Acanthaceae <i>Justicia americana</i> (L.) Seem. <i>Ruellia carolinensis</i> (Walt.) Steud. Plantaginaceae <i>Plantago aristata</i> Michx. <i>Plantago virginica</i> L. Rubiaceae <i>Cephalanthus occidentalis</i> L. <i>Diodia teres</i> Walt. Caprifoliaceae <i>Synbuzicarpus orbiculatus</i> Moench. Valerianaceae <i>Valerianella radiata</i> (L.) Duff. Campanulaceae <i>Specularia leptocarpa</i> (Nutt.) Gray. <i>Specularia perfoliata</i> (L.) A. DC. Labellaceae <i>Labelis spicata</i> var. <i>leptostachya</i> (A. DC.) Mackenz. & Buch. Compositae </p>	<p> <i>Achillea millefolium</i> L. <i>Actinomeris albertifolia</i> L. DC. Ambrosiaceae <i>Ambrosia artemisiifolia</i> L. <i>Ambrosia bidentata</i> Michx. <i>Ambrosia psilostachya</i> DC. <i>Anthemis cotula</i> L. <i>Aster graciloides</i> L. <i>Aster heterosperus</i> E. J. Alex. <i>Aster patens</i> Ait. <i>Aster praealtus</i> Poir. <i>Astranthus integrifolius</i> (Michx.) Nutt. <i>Bidens Beckii</i> Torr. <i>Boltonia diffusa</i> Ell. <i>Canalis tuberosus</i> Nutt. <i>Centaurea americana</i> Nutt. <i>Chrysopsis pilosa</i> Nutt. <i>Cirsium discolor</i> (Muhl.) Spreng. <i>Coreopsis tinctoria</i> Nutt. <i>Coreopsis verticillata</i> L. <i>Echinacea pallida</i> Nutt. <i>Erigeron canadensis</i> L. <i>Erigeron philadelphicus</i> L. <i>Eupatorium perfoliatum</i> L. <i>Eupatorium serotinum</i> Michx. <i>Gaillardia lutea</i> Greene. <i>Grindelia squarrosa</i> (Pursh) Dunal. <i>Helenium nodiflorum</i> Nutt. <i>Helianthus scerrus</i> (Raf.) Rock. <i>Helianthus angustifolius</i> L. <i>Helianthus divaricatus</i> Raf. <i>Helianthus mollis</i> Lam. <i>Heterotheca subaxillaris</i> (Lam.) Brit & Rusby. <i>Hieracium longipilum</i> Torr. <i>Iva angustifolia</i> Nutt. <i>Krigia dandelion</i> (L.) Nutt. <i>Rubia superstitiosa</i> L. <i>Lactuca scariola</i> L. <i>Liatris pycnostachya</i> Michx. <i>Liatris scabra</i> (Green) K. Schum. DC. <i>Liatris squarrosa</i> Willd. <i>Pentstemon integrifolius</i> L. <i>Pluchea carolinensis</i> (L.) DC. <i>Prenanthes aspera</i> Michx. <i>Pyrrophappus carolinianus</i> (Walt.) DC. <i>Rudbeckia grandiflora</i> (D. Don) DC. <i>Rudbeckia hirta</i> L. <i>Rudbeckia subconcolorata</i> Pursh. <i>Serinia oppositifolia</i> (Raf.) Etna. <i>Silphium integrifolium</i> Michx. <i>Silphium laciniatum</i> L. <i>Solidago altissima</i> L. <i>Solidago gymnosperma</i> (Greene) Fernald. <i>Solidago missouriensis</i> Nutt. <i>Solidago nemoralis</i> Ait. <i>Solidago radia</i> Nutt. <i>Solidago rigida</i> L. <i>Solidago gigantea</i> Ait. <i>Solidago speciosa</i> Nutt. <i>Veronica baldwinii</i> Torr. <i>Veronica asarifolia</i> Raf. <i>Xanthum chinense</i> Mill. </p>
---	---	--

This gives a total of 296 plants, including 61 composites, 47 grasses, and 30 legumes.

BOTANICAL ASPECTS OF MASSARD PRAIRIE, ARKANSAS

LITERATURE CITED

- Fernald, M. L. 1950. Gray's Manual of botany. 8th ed. Amer. Book Co.
- Garner, W. W. and H. A. Allard. 1920. Effect of the relative length of day and night and other factors of the environment on growth and reproduction in plants. Jour. Agri. Res. 18:553-606.
- Gleason, Henry A. 1952. The new Britton & Brown Illustrated flora of the northeastern U. S. and adjacent Canada. Vols. I, II and III. New York Bot. Gard.
- Hitchcock, A. S. and Agnes Chase. 1951. Manual of the grasses of the U.S. Dept. of Agri. Misc. Publ. No. 200.
- Lesquereux, Leo. 1860. Botanical and paleontological report of the geological state survey. Rep. 2nd Geol. Surv. of Ark., pp. 295-349.
- Lesquereux, Leo. 1866. On the origin and formation of prairies. Geol. Surv. of Ill. 1:9-10 and 238-254.
- Nuttall, Thomas. 1819. Travels into the Arkansas territory.
- Nuttall, Thomas. 1834. Collections toward a flora of the territory of Arkansas. Proc. Amer. Phila. Soc. (New Ser.). 2:139-202. Phila. 1837.
- Sampson, Homer C. 1921. An ecological survey of the prairie vegetation of Illinois. Bul. Ills. St. Natl. Hist. Sur. 13:523-577.
- Sargent, Charles S. 1880. Forest trees of North Amer. Tenth Census of the U.S. Vol. IX. G.P.O. Wash.
- Transeau, Edgar Nelson. 1927. General botany. World Book Co. Yonkers-on-Hudson, N. Y.