

Status of *Hymenopappus scabiosaeus* L'Hr. (Asteraceae) In Illinois

William E. McClain¹ and John E. Ebinger²

¹Department of Natural Resources, 524 S. Second Street, Springfield, Illinois 62701

²Professor Emeritus of Botany, Eastern Illinois University, Charleston, Illinois 61920

ABSTRACT

The old plainsman, *Hymenopappus scabiosaeus* L'Hr. var. *scabiosaeus*, is known historically from sand prairies and open sand forests within four counties in west and east-central Illinois. Of the twenty-five populations identified by herbarium records, nine populations have been extirpated since the 1940s. This taxon is currently known from 16 populations in three counties, mostly within very localized parts of the Kankakee River Sand Area of eastern Illinois. Although some populations contain large numbers of individuals, 13 are located in disturbed, very marginal habitat such as roadsides or recently abandoned fields. Only three populations remain in natural sand savanna habitat. Population loss is expected to continue, documenting the need for greater protection, the development of disturbance management techniques, and the reintroduction of this plant into suitable dry sand prairie and dry sand savanna within its historic range.

INTRODUCTION

The old plainsman, *Hymenopappus scabiosaeus* L'Hr., is found in dry prairies and open woods from Texas to Nebraska east to Indiana, and south to South Carolina and Florida (Gleason and Cronquist 1991). Although this plant is relatively common in most of the eastern counties of Kansas and Oklahoma, it is less abundant in Illinois and Indiana where it is restricted to sand prairies and open sandy woods (Barkley 1977, Deam 1940, Mohlenbrock 1986, Swink and Wilhelm 1994). The Illinois populations are *H. scabiosaeus* var. *scabiosaeus* (Gleason and Cronquist 1991).

A member of the Asteraceae, this plant is a taprooted biennial, 30-70 cm in height that is characterized by alternate, pinnatifid to bipinnatifid leaves and light yellow to white flower heads, 7-12 mm wide, which are borne in June in an open, corymbiform inflorescence (Gleason and Cronquist 1991). First-year plants overwinter as rosettes. Second-year plants senesce rapidly following flowering and seed production, and disappear almost completely by late October.

The distribution of *H. scabiosaeus* in Illinois includes dry sand prairies and dry, sandy, open woodlands in Cass, Iroquois, Mason, and Kankakee counties (Mohlenbrock and Ladd 1978, Mohlenbrock 1986). This taxon was also reported from Massac County in southern Illinois by Mohlenbrock and Ladd (1978). Although this plant has been regarded as rare for many years, it is not a state-listed species, and no assessment has

been completed to determine its current distribution and population levels (Jones and Fuller 1955, Jones 1963, Mohlenbrock 1986). Concern increased for this plant when it was observed that all known populations were restricted to roadsides or other recently disturbed habitats. The purpose of this study was to determine the distribution, habitat, and populations of this species, and to provide recommendations for management and protection.

DESCRIPTION OF THE STUDY AREA

Populations of the old plainsman are known from the Illinois River Section of the Mississippi and Illinois River Sand Areas Division, and the Kankakee River Sand Section of the Grand Prairie Division (Schwegman et al. 1973). Both of these extensive sand areas resulted from the Kankakee Torrent approximately 15,000 years ago which deposited huge amounts of gravel and sand within these geographic regions. Subsequent wind action created a dune and swale topography, known as the Parkland Formation, that characterizes much of these areas (Willman and Frye 1970). Most of the old plainsman populations in Kankakee County are located on Oakville Fine Sand, while one Mason County population is located on Bloomfield Sand. Both of these soils have a low water holding capacity, low organic content, and are subject to blowing (Paschke 1979, Calsyn 1995). Bloomfield soil from a Mason County site consisted of about 95% sand, 4% silt, and 1% clay (Benjamin et al. 1987).

The climate of central Illinois is continental, characterized by hot summers and cold winters. July is the warmest month, and January is generally the coldest. Approximately 28 days will have a maximum temperature greater than 32° C, and approximately eight days will have a temperature of -18° C or below. The average annual precipitation in Kankakee County is 82.5 cm compared to 84.4 cm in Mason County. Most of this precipitation falls as rain from April through September. The average length of the growing season in both counties is about 170 days (Paschke 1977, Calsyn 1995).

METHODS

Searches were made in herbaria (MO, EIU, ILL, ILLS, MOR, ISM, ISU, FO, F, MWI, SIU) for specimens, and the label data were recorded for each specimen found. Known locations for the old plainsman, as recorded on specimens, were visited and searches were made for plants. When plants were located, the number of flowering individuals, size of the population and habitat type were recorded. First-year plants were not counted due to their small size and associated vegetation, which made it difficult to obtain an accurate count. Associated herbaceous species were recorded for some populations and compared to Swink and Wilhelm (1994).

Searches were also made for plants in Iroquois, Kankakee, and Mason counties near known colonies to locate new populations. Although these searches were conducted mostly on state-owned land, extensive searches were made on private lands when suitable habitat was located. Specimens were collected from all colonies located by this study and deposited in the Stover-Ebinger Herbarium of Eastern Illinois University (EIU). The nomenclature for vascular plants follows Mohlenbrock (1986) and Hoffmeister (1989) for mammals.

RESULTS

A total of 60 herbarium specimens from Cass, Kankakee, Iroquois, and Mason counties were examined, including three from Cass County, 28 from Mason County, 16 from Kankakee County, and 13 from Iroquois County. No specimens from Massac County were located during the herbarium searches. Individuals familiar with the flora of southern Illinois were unaware of a population in Massac County, causing this report to be considered an error (Mohlenbrock and Ladd 1978, John E. Schwegman Pers. Com).

The earliest known collection of this plant in Illinois was in Cass County in 1842 by C. A. Geyer near the present site of Beardstown. There were two subsequent collections in Cass County by S. B. Mead in June of 1846, and E. Hall in May of 1856. There have been no subsequent collections or observations of this plant in Cass County for nearly 150 years, and the Beardstown population is presumed to be extirpated. Except for these early Cass collections and one 1850s collection from Mason County, all other collections date from the 1940s through the early 1990s.

The natural habitats for this plant, as described on herbarium label annotations, were sand barrens, open oak woods, dry sand prairie, or sand hills. Of the 60 herbarium specimens that were examined, 37 described the collection site as “sandy, open, exposed sand, sand dune, or raw dune sand.” These annotations suggest open, perhaps actively moving, sand partially covered by vegetation.

Because of the lack of specific location data on herbarium labels, it was uncertain if new populations of this plant were identified during the field studies. The 16 populations located included two in Mason County, eight in Kankakee County, and six in Iroquois County. These populations were all in open areas or on sand dunes that had visible signs of recent disturbance. Thirteen of these colonies were located along roadsides, in degraded sand prairies, or abandoned fields and pastures, making them highly vulnerable to future road improvements or land use changes.

Old plainsman populations were also very localized. The six Iroquois County populations were all present within one section in a township in the northern part of the county while the Kankakee County populations were all present along roads, mostly within the southern half of one township. The two Mason County populations were very small and separated by more than 25 km (Table 1).

Several native herbaceous sand prairie species, little bluestem (*Schizachyrium scoparium* (Michx.) Nash), erect dayflower (*Commelina erecta* L.), Ohio spiderwort (*Tradescantia ohioensis* Raf.), and sand primrose (*Oenothera rhombipetala* Nutt.) were growing with the old plainsman in an Iroquois County roadside population. Non-native taxa, thyme-leaved sandwort (*Arenaria serpyllifolia* L.) and Deptford pink (*Dianthus armeria* L.) plus the native poor man’s pepper (*Lepidium virginicum* L.) and poor Joe (*Plantago aristata* Michx.), were listed as associates at an Indiana population (Swink and Wilhelm 1994).

Only three old plainsman populations occurred in its natural habitat, dry, black oak sand savanna. These populations were in Hooper Branch Savanna Nature Preserve in Iroquois

County where prescribed fire has been used in management. They were some of the smallest populations located by the field studies (Table 1).

Based upon herbarium records, nine of the 25 populations identified in the herbarium searches were extirpated, mostly since the 1940s. This total includes one from Cass County, three from Mason County, and five from Kankakee County. Within Mason County, frequent mowing and cultivation has eliminated two populations, and the disappearance of the old plainsman from an open, sandy woods is likely due to fire exclusion and the dramatic invasion of garlic mustard (*Alliaria petiolata* (Bieb.) Cavara & Grande) into the herbaceous understory within the last 30 years. The causes of extirpation are unknown for the five Kankakee County populations.

Observations made during this study suggest that the old plainsman is intolerant of competition from other plants. This taxon is one of several rare sand prairie and sand savanna species, including bent milk vetch (*Astragalus distortus* Torr. & Gray), flower-of-an-hour (*Talinum rugospermum* Holz.) and poppy mallow (*Callirhoe triangulata* (Leavenw.) Gray), that are being crowded out of natural habitats. Bent milk vetch and the old plainsman are now surviving mostly on marginal, highly vulnerable sites such as roadsides or recently abandoned agricultural fields that experience periodic mowing or discing.

Prairies and savannas of Illinois have been greatly reduced since European settlement, a process that has negatively affected the populations of old plainsman and other sand prairie plants and animals (Anderson 1991). Collectively, only 57 hectares of relatively undisturbed sand prairie and 420 hectares of sand savanna remain within the sand deposits along the Illinois and Kankakee Rivers, and these remnants are small and widely separated (White 1978). The largest amounts of high quality sand savanna remaining in Illinois are within the Kankakee River Sand Area Section, the same geographic region that has the largest number (14 of 16) of the remaining old plainsman populations .

Within these remnants, fire suppression has reduced the size of prairies and converted savanna communities into closed forests, a process which would provide favorable growing conditions for garlic mustard and unfavorable habitat for the plains pocket gopher (*Geomys bursarius illinoensis* Komarek and Spencer) and the badger (*Taxidea taxus taxus* Schreber). Both of these indigenous grassland-dwelling mammals create disturbance potentially beneficial to the establishment and survival of sand prairie and savanna plants. Bare soil areas provided by gopher mounds were important establishment sites for the large-flowered penstemon (*Penstemon grandiflorus* Nutt.), an Illinois endangered species, in a Minnesota sand prairie (Davis et al. 1995).

Certain sand prairie plants, bird's foot violet (*Viola pedata* L.), pasque flower (*Anemone patens* L.), and dwarf dandelion (*Krigia virginica* (L.) Willd.), described as peripheral or ephemeral by Loucks et al. (1985), utilize small spatial openings such as gopher mounds and tend to be sparsely distributed. In a study of plants that colonized badger and pocket gopher mounds in a sand prairie in Mason County, Illinois, nine annual and biennial vascular plant taxa were present on badger or gopher mounds, but were absent on adjacent areas lacking mounds (Fulk and Ebinger 1991).

Prescribed fire has been part of the management of some state-owned sites such as Hooper Branch Savanna. However, fire alone may not provide the frequency or amount of soil disturbance necessary for the establishment and survival of these rare sand prairie plants. Currently, mowing and discing are the unintentional artificial management practices now enabling the survival of nearly all of the Illinois colonies of bent milk vetch and old plainsman.

Formal protection is recommended for the old plainsman, plus the reintroduction of this taxon into suitable habitat on state-owned lands, especially within Mason County. There is also a pressing need to devise and implement a beneficial disturbance management regime to ensure its continued survival within the sand regions of central Illinois.

LITERATURE CITED

- Anderson, R. C. 1991. Illinois Prairie: A Historical Perspective. Illinois Natural History Survey Bulletin 34: 384-391.
- Barkley, T. M., Editor. 1977. Atlas of the Flora of the Great Plains. The Iowa State University Press. Ames. 600 p.
- Benjamin, P., R. C. Anderson, and A. E. Liberta. 1987. Vesicular-arbuscular mycorrhizal ecology of little bluestem across a prairie-forest gradient. Canadian Journal of Botany 67:2678-2685.
- Calsyn, D. D. 1995. Soil Survey of Mason County, Illinois. United States Department of Agriculture, Natural Resources Conservation Service, and Illinois Agricultural Experiment Station. U. S. Government Printing Office. Washington, DC. 211 p + maps.
- Davis, M. A., B. Ritchie, N. Graf, and K. Gregg. 1995. An experimental study of the effects of shade, conspecific crowding, pocket gophers, and surrounding vegetation on survivorship, growth, and reproduction in *Penstemon grandiflorus*. American Midland Naturalist 134:237-243.
- Deam, C. C. 1940. Flora of Indiana. Wm. B. Burford Printing Company. Indianapolis. 1236 p.
- Fulk, B. A., and J. E. Ebinger. 1991. Vegetation of badger (*Taxidea taxus*) and plains pocket gopher (*Geomys bursarius*) mounds in the sand areas of west-central Illinois. Erigenia 17: 26-29.
- Gleason, H. A., and A. Cronquist. 1991. Manual of the Vascular Flora of Northeastern United States and Adjacent Canada. Vol. 1. New York Botanical Garden. New York. Lxxv + 482 p.
- Hoffmeister, D. H. 1989. Mammals of Illinois. University of Illinois Press. Urbana and Chicago. 348 p.
- Jones, G. N. 1963. Flora of Illinois. University of Notre Dame Press. Notre Dame, Indiana. 401 p.
- Jones, G. N., and G. D. Fuller. 1955. Vascular Plants of Illinois. The University of Illinois Press. Urbana. 593 p.
- Loucks, O. L., M. L. Plumb-Mentjes, and D. Rogers. 1985. Gap Processes and Large-Scale Disturbances in Sand Prairies. Pages 72-83 In S. T. T. Pickett and P. S. White, Editors. The Ecology of Natural Disturbance and Patch Dynamics. Academic Press, Inc. New York.
- Mohlenbrock, R. H., and D. M. Ladd. 1978. Distribution of Illinois Vascular Plants. Southern Illinois University Press. Carbondale. vii + 282 p.
- Mohlenbrock, R. H. 1986. Guide to the Vascular Flora of Illinois, revised and enlarged edition. Southern Illinois University Press. Carbondale. viii + 507 p.
- Paschke, J. E. 1979. Soil Survey of Kankakee County, Illinois. United States Department of Agriculture, Soil Conservation Service, and University of Illinois Experiment Station. U. S. Government Printing Office. Washington, DC. 84 p+maps.
- Schwegman, J. E., G. B. Fell, M. Hutchison, W. M. Shepherd, G. Paulson, and J. White. 1973. Comprehensive plan for the Illinois Nature Preserves System. Part 2, The Natural Divisions of Illinois. Illinois Nature Preserves Commission. Rockford. 32 p + map.
- White, J. 1978. Illinois Natural Areas Inventory Technical Report. Department of Landscape Architecture. University of Illinois. Urbana-Champaign. 426 p.
- Willman, H. B., and J. C. Frye. 1970. Pleistocene stratigraphy of Illinois. Illinois State Geological Survey Bulletin No. 94. Urbana. 204 p + maps.

Table 1. Number of populations, population size, flowering plants, and habitat of *Hymenopappus scabiosaeus* in Illinois.

County		Population Size	Flowering Plants	Habitat
Iroquois	1	10m X 75 m	97	mowed roadside
	2	10m X 400m	*1000	mowed roadside
	3	20m X 500m	*1000	mowed roadside
	4	3m X 5m	6	black oak sand savanna
	5	5m X 5m	15	black oak sand savanna
	6	10m X 10m	150	black oak sand savanna
Kankakee	1	8m X 75m	36	roadside
	2	10m X 200m	245	roadside
	3	3m X 4m	26	mowed roadside
	4	10m X 50m	210	abandoned pasture
	5	50m X 75m	350	roadside
	6	25m X 55m	80	roadside
	7	10m X 45m	140	abandoned pasture
	8	40m X 60m	500	roadside
Mason	1	2m X 10m	2	mowed roadside
	2	5m X 25m	206	roadside
Total			4,096	
* Estimated population sizes				

