REPORT TO THE ILLINOIS DEPARTMENT OF CONSERVATION NONGAME CHECKOFF PROGRAM

ON THE RESULTS OF INITIATING OF A MEAD'S MILKWEED RECOVERY PROGRAM IN ILLINOIS[1]

INTRODUCTION AND PROBLEM

Mead's milkweed (*Asclepias meadii*) is a rare prairie species restricted in distribution to the central United States (Woodson 1954). This plant is proposed federally threatened, and is listed as rare or endangered in all states in which it occurs (U.S. Fish and Wildlife Service 1987). Its endangerment is in response to a requirement of virgin mesic prairie conditions, the continued destruction of this habitat for agriculture, and habitat overuse by pasturing or haying that remove seed capsules and stress individual plants (McGregor 1977, Betz 1988). Mead's milkweed produces only a single terminal umbel, and usually matures only one seed pod on 15% or less of the flowering plants (Betz 1988). Although this low rate of seed production may be characteristic for this species, it is known to be related to resource limitation in some *Asclepias* (Willson and Price 1980). Other factors limiting reproduction could include loss of pollinators, or interactions between small population sizes, self incompatibility, and inbreeding. Although propagation from seed would appear to be an objective for recovery of this milkweed, it probably is self-incompatible, as are many milkweeds (*e.g.* Woodson 1954, Macior 1965). As a result, isolated plants (such as in central Illinois) may be incapable of natural reproduction. Thus, exportation or importation of pollen for crossing appears necessary for seed production to occur.

This species is exceedingly rare east of the Mississippi river, where it has been extirpated from Wisconsin and Indiana; it now occurs only in two Illinois counties (Sheviak 1981). It has been extirpated from northern Illinois, and one flowering plant has been observed at the only central Illinois (Ford Co.) station over the last three years.. Three populations of less than 20 plants occur in southern Illinois (Saline Co.). If management and research for recovery of the Illinois populations is not accelerated, the genetic material representative of the eastern range of this species may be irretrievably lost. As a result, the Illinois Nongame Checkoff Program funded initiation of a recovery program for the Ford County plants during the 1988-1989 growing seasons.

---

[1]Submitted by: Marlin L. Bowles
The Morton Arboretum
Rt. 53
Lisle, IL 60532

Robert F. Betz
Northeastern Illinois University
5500 N. St Louis Ave.
Chicago, IL 60625

PROJECT DESCRIPTION

Project objectives: The primary program objectives were to 1) manage the central Illinois population for flowering and seed production, and 2) propagate greenhouse populations of Mead's milkweed from seeds, for eventual establishment of wild populations. The maintenance of pure genetic stock from central Illinois is desirable. However, in order to avoid possible self-incompatibility and declining genetic diversity in these plants, we proposed cross pollination with plants from central and southern Illinois, or from states in the western part of the range of this species.

Project methodology: 1) In order to stimulate flowering of central Illinois plants, their prairie habitat was treated with prescribed burns in spring of 1988 & 1989. 2) Pollen for outcrossing was obtained[2] from Southern Illinois and Missouri in 1988, and from Southern Illinois and Kansas (plants grown at the Morton Arboretum) in 1989. 3) Flowering plants at Ford County were pollinated with available pollen in 1988 and 1989, while flowering plants at the Morton Arboretum were pollinated with pollen from Ford County plants. 4) Seeds produced in 1988 and 1989 were to be collected and propagated at the Morton Arboretum. 5) Seeds taken from pods collected at El Dorado Springs, Missouri in 1987 were germinated in spring 1988, and continued in propagation during 1988-1999.

RESULTS

Prescribed burning: The effects of prescribed burning on the Mead's milkweed population in Ford County were highly successful. No flowering plants had been observed at the site for several years. After the first burn in 1988, a single flowering plant appeared. After the 1989 burn, four flowering plants appeared.

Pollination: Our efforts to produce seeds by artificial pollination were unsuccessful in 1988 and 1989. In 1988, we attempted to pollinate the single flowering plant with pollen from Saline County, and from Missouri. In addition, plants at the Morton Arboretum were pollinated with pollen from Ford County. All plants failed to produce seed. We attribute these failures to inexperience with pollination procedures, the effects of heat stress on shipped pollen, and the effects of the summer drought on flowering plants. In 1989, using new equipment experience gained during 1988, we successfully inserted Kansas (Morton Arboretum) pollen in two of the Ford County plants. In addition, two plants also were observed to have already had pollen inserted under natural circumstances. However, milkweed weevils (CUCURLIONIDAE: *Rhyssematus* sp.) appear to have caused the loss of all apparent pollinations by cutting off and toppling the inflorescences on all plants. These insects were observed on the Ford County plants, and also appear to have caused similar damage to the Kansas plants growing at the Morton Arboretum.

---

[2]Provided with assistance from John Schwegman, Illinois Department of Conservation, Springfield; and Don Kurz, Missouri Department of Conservation, Jefferson City.

Propagation of seedlings: Out of 61 seeds collected from pods at El Dorado Springs, Missouri in 1987, thirty-one (51%) germinated in spring, 1988. Eight (26%) of these seedlings failed to survive. The surviving 23 plants represent thirty eight percent (38%) successful germination, and seventy four percent (74%) survival of germinated seedlings. After a winter cold treatment, these plants produced second-year stems in 1989 and continue to survive. Cultivation of these plants will allow supplementation of the existing population of Mead's milkweed at the Arboretum, and allow development of a large pool of plants for pollen donation and experimentation with propagation and cultivation.

SUMMARY AND RECOMMENDATIONS

Although efforts to artificially pollinate Mead's milkweed over the two-year period failed to produce seeds, we have demonstrated that pollen can be artificially inserted into the flower gynostegium of this species, and that this may occur naturally when flowering population size is increased to as few as four plants in natural habitat. However, natural pollination in such a small population may result in lack of seed set from self incompatibility. Based on our propagation work in 1988-89, we have also demonstrated that Mead's milkweed can be grown from seed. As a result, it is important to continue efforts to manage the Ford County population for flowering and seed production by hand pollination, and to continue propagation of plants from other seed sources.

It also now appears urgent to explore supplementary asexual methods of propagating Mead's milkweed in order to help insure survival of the Illinois plants. The primary methods could include rooting from cuttings, and tissue culture. If successful, these methods can be used to replicate the Illinois genotypes, and add to the pool of Illinois plants that can eventually be expanded by seed production. Although milkweeds may be difficult to propagate from cuttings or tissue culture (Wilson and Mahlberg 1977), attempts with some *Asclepias* or related taxa (Tiedman and Hawker 1981, Lee and Thomas 1985) have been successful under experimental conditions. Direct benefits would include an increase in knowledge about requirements for asexual propagation of related milkweeds, and the potential of producing Mead's milkweeds from cuttings or tissue culture. Long-term benefits would be the supplemental recovery of wild populations of Mead's milkweed in Illinois.

REFERENCES

Betz, R.F. 1988. Ecology of Mead's milkweed (*Asclepias meadii*). Program and Abstracts, Eleventh North American Prairie Conference. University of Nebraska at Lincoln.

Hartmann, H.T. and D.E. Kester. 1975. Plant Propagation principles and practices, 3rd edition. Prentice Hall, Englewood Cliffs, NJ.

Lee, C.W. and J. C. Thomas. 1985. Propagation of desert milkweed by shoot tip culture. HortScience 20(2):263-264.

Macior, L.W. 1965. Insect adaptation and behavior in *Asclepias* pollination. Bulletin of the Torrey Botanical Club 92:114-126.

McGregor, R.L. 1977. Rare native vascular plants of Kansas. State Biological Survey of Kansas Technical Publication No. 5.

Sheviak, C.J. 1981. Endangered and threatened plants. Pages 70-187 *in* Bowles, *et al.*, editors, Endangered and Threatened Vertebrate Animals and Vascular Plants of Illinois. Illinois Department of Conservation, Springfield, and the Natural Land Institute, Rockford, IL.

Tideman, J., and J.S. Hawker. 1982. *In vitro* propagation of latex-producing plants. Annals of Botany 49:73-279.

U.S. Fish and Wildlife Service. 1987. Mead's milkweed (*Asclepias meadii*). Endangered Species Technical Bulletin Vol. XII No. 11-12:5.

Willson, M.F. and P.W. Price. 1980. Resource limitation of fruit and seed production in some *Asclepias* species. Canadian Journal of Botany 58:2229-2233.

Wilson, K.J. and Mahlberg, P.G. 1977. Investigations of lacticifer differentiation in tissue cultures derived from *Asclepias syriaca*. Annals of Botany 41:1049-1054.

Woodson, R.E. 1954. The North American species of *Asclepias*. Annals of the Missouri Botanical Garden. 41:1-211.