Mead's Milkweed (*Asclepias meadii* Torrey) germination, propagation, and field establishment in Kansas

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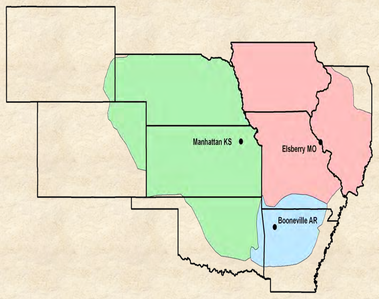
Natural Resources Conservation Service
Plant Materials Program



Introduction

Mead's milkweed (*Asclepias meadii* Torrey) was first collected by Dr. Samuel Mead, a physician-botanist, in western Illinois in 1843. A specimen of the plant was sent to John Torrey and he recognized it as a new species which he named *Asclepias meadii.* In the 1800's, Mead's milkweed appears to have had a wide distribution in the tallgrass prairie region from Indiana to northeastern Kansas south to Missouri and Illinois. With the advent of the moldboard plow and the transformation of the prairie to cultivated crops, the plant quickly disappeared from the landscape. Samuel Mead even recognized the disappearance of the plant and urged that it be preserved for future generations. Finally, in September of 1988, the U.S. Fish and Wildlife Service (USFWS) declared Mead's milkweed a federally threatened species. Today, Mead's milkweed exists in small, scattered populations with nearly 91% of the extant populations located in 24 counties in eastern Kansas and west-central Missouri. In 1996, the Kansas Biological Survey, USFWS, and the U.S. Department of Agriculture (USDA) Manhattan Plant Materials Center (PMC) began a cooperative effort to develop strategies for restoration of this federally threatened plant species.

Methods

The PMC began working on the germination protocol for Mead's milkweed with a very limited amount of seed provided by the Kansas Ecological Reserve—Rockefeller Trust Site in Jefferson County, Kansas. Studies conducted in the PMC's diurnal growth chambers focused on temperature and stratification periods. Seeds were surface-sterilized using a 10:1 distilled water to sodium hypochlorite solution for 20 minutes. Three alternating temperature regimes were utilized 10/30° C, 20/24° C, and 20/30° C plus or minus 2° C. Eight hours light and 16 hours dark were common to all three temperature regimes selected. A time zero planting was initiated and ran for 6 weeks at 20/24° C. The remainder of the seeds were placed in 3 to 4° C refrigerator between wet blotters for stratification. Seeds were periodically taken from the stratification site and placed in growth chambers for germination tests on wet blotters in 10 x 10 centimeter plastic boxes. Germination counts were conducted and plantlets were removed from germination chambers to cone-tainers containing growth media. Seedlings of Mead's milkweed were grown in the PMC greenhouse and later used in field and establishment trials on and off the PMC. In 1998, seedlings at the 4 to 8 leaf stage were transplanted to two different field settings at the PMC. One setting simulated a tallgrass prairie with competition from other plant species and the other

Methods (cont.)

a monoculture of only Mead's milkweed in a cultivated situation. Notes were taken on the survival and morphology of the plants across time. Seeds from the establishment plots were harvested when available. Eighty-six plants grown at the PMC were transplanted to the Marais des Cygnes National Wildlife Refuge (USFWS) in Linn County, Kansas, in 2009.

Figure 1. Mead's milkweed plant showing flower development in the PMC tallgrass prairie establishment plots.

Results

Table 1. Total percent germination of Mead's milkweed seed lots at 3 different diurnal growth chamber temperature settings across stratification times in weeks.

	20/24° C		10/30 ° C		20/30 ° C	
Seed Lots	**6 wk**	**8 wk**	**6 wk**	**8 wk**	**10 wk**	**12 wk**
Lot 92	100	90			40	90
Lot 129			10	10	20	
Lot 144	90	100				
Lot 158			70	80		

Table 2. The differences noted in plant morphology due to establishment site seven years post planting.

The prairie site plantings were less successful (69%) in establishment, physically smaller, and took more time to flower (seven years) and produce viable seeds.	The monoculture plantings were more successful (74%) in establishment, physically larger, and took less time to flower (two years) and produce viable seeds.
Leaf and stem average measurements in millimeters: Stem Length: 151 mm Leaf Length and Width: 37.2 and 2.0 mm	Leaf and stem average measurements in millimeters: Stem Length: 185 mm Leaf Length and Width: 53.6 and 24.6 mm

Results (cont.)

The time zero germination chambers produced zero germination of Mead's milkweed seed units after 6 weeks at 20/24° C without stratification. Placing the seed units back into cold moist stratification (3 to 4° C) for 4 weeks of treatment yielded 100% germination of the seed units. The majority of the seeds placed in the 20/24° C growth chamber germinated within 3 days. The germination time for the other growth chamber temperature setting required 1.5 to 3.5 weeks for the same level of seed germination. Plantlet growth initiated in the growth chambers could easily be moved into cone-tainers with a 96% survival rate. Survival rate of seedling in the field was based in some respect on the setting chosen. The percentage of seedling survival, at the Marais des Cygnes planting in 2011, was reported to be 72% by refuge personnel.

Figure 2. Established Mead's milkweed plant located next to wooden stake at Marais des Cygnes wildlife refuge.

Discussion

Mead's milkweed can be forced to germinate with the application of cold, moist stratification periods followed by alternating temperature regimes. Seedlings from germination chambers can be successfully transplanted to cone-tainers containing growing media and grown in a greenhouse. Transplanting seedlings to field settings can be accomplished with patience. Seed production can be achieved more quickly using a monoculture planting in a cultivated setting. Seedlings transplanted to competitive settings can be established with time, but the plants will remain in a juvenile state longer and require more time for successful sexual reproduction. Seedlings have been transplanted to a wildlife refuge and successfully established.

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