2000 Progress Report of Activities

Manhattan, Kansas Plant Materials Center

April 1, 2001

Program Overview

The Manhattan Plant Materials Center (PMC), located near Manhattan, Kansas, is owned and operated by the USDA-Natural Resources Conservation Service.

Our mission is to develop and transfer plant materials and plant technology for the conservation of natural resources. In working with a broad range of plant species, including grasses, forbs, trees, and shrubs, the program seeks to address priority needs of field offices and land managers in both public and private sectors. Emphasis is focused on using native plants as a healthy way to solve conservation problems and protect ecosystems.

The PMC service area is based on major land resource areas in Kansas, Nebraska, northern Oklahoma, and northeastern Colorado. The service area consists of an area with much diversity and is covered by five land resource regions:

- Western Great Plains Range and Irrigated
- Central Great Plains Winter Wheat and Range
- Southwestern Prairies Cotton and Forage
- Central Feed Grains and Livestock
- Eastern and Central Farming and Forest

This area, in general, was originally native grassland, dissected by a number of major streams. Elevations range from 700 to 5,000 feet where average annual precipitation rates vary from 42 inches in parts of Oklahoma and southeast Kansas to 12.7 inches at the other extreme in northeastern Colorado. Temperatures fluctuate widely and are accompanied by high winds and long periods without effective precipitation. Soils vary widely from the clay pans of southeast Kansas and northeastern Oklahoma to the loess derived silt loams of the high plains and the sandhill region of northern Nebraska. Such extremes and diversity pose challenges in our search for adapted plant materials to solve the region's problems.

Guided by the Center's Long-Range Plan, the PMC seeks solutions to the priority needs of its service area. These priorities include improved plants and technology for:

- Critical Area Erosion Control
- Erosion Control on Range and Pastureland
- Water Quality Improvement
- Controlling Erosion on Cropland
- Wildlife Habitat Improvement
- Outreach Programs

The staff works cooperatively with many federal and state agencies to achieve our goals. The PMC has evaluated, selected, and cooperatively released 30 improved plant materials for conservation use. Planting stock of these releases are provided to seed and plant producers for commercial increase and distribution.

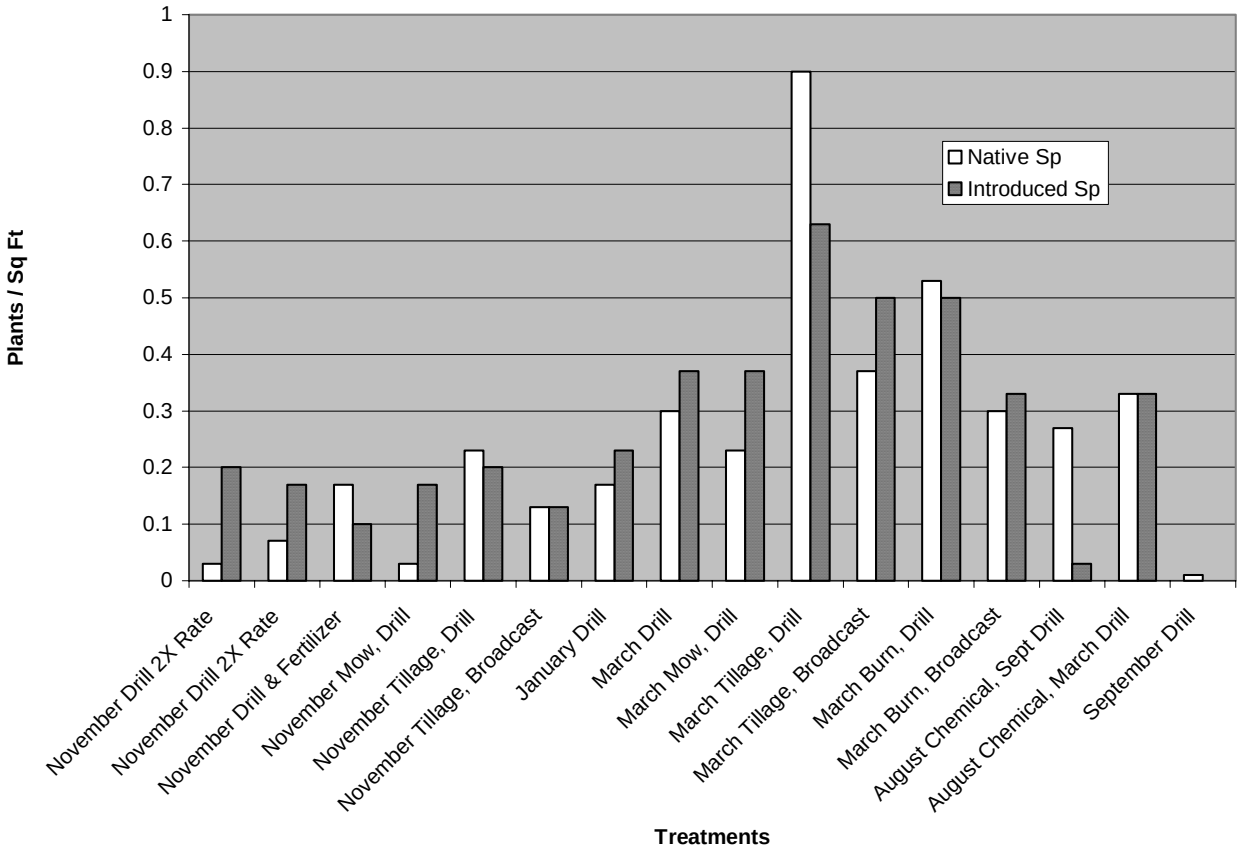
Enhancement of Conservation Reserve Program (CRP) Lands with Native and Introduced Forbs and Legumes

CRP lands may be eligible for re-enrollment depending on a number of environmental factors. An environmental factor that will increase the number of quality points awarded to each CRP offer is the agreement for interseeding of broadleaf species (native and introduced forbs and legumes) into established stands. The purpose of the interseeding or enhancement is to provide greater wildlife benefits from the standpoint of improved plant species diversity. Little information is currently available regarding the best methods for successful enhancement seedings. This study evaluates the effectiveness of preplanting stand treatments and planting methods on the establishment of native and introduced forb and legume species in existing stands of native CRP.

Sixteen different preplanting stand treatments were installed in November 1997. The different treatments consisted of no treatment (control), mowing, tillage, burning, and chemical spraying. The planting methods consisted of drilling and broadcast seeding at two different time periods, spring and fall.

Plant species density was determined across the different treatment plots during June 2000 (Figure 1). Observations indicated an overall decrease in introduced plant species density compared to the previous year. Differences of introduced species densities among the treatments were similar to those in 1999. The native

Figure 1. Plant species density X treatments for 2000



species densities were generally greater compared to those from the previous year. Differences of native species among the treatments were more pronounced than in 1999. Results from this study will be summarized in 2001. Recommendations for the enhancement of existing stands of CRP land with forbs and legumes will be provided for in a Plant Materials Technical Note scheduled for distribution in 2001.

Controlling Shoreline Erosion with Bioengineering Techniques at Cheney Reservoir State Park, Cheney, Kansas

Cheney Reservoir has experienced significant shoreline erosion since its construction. Shoreline erosion is a significant issue and concern at a number of locations where extensive facilities have already been developed and in areas where additional facilities are being planned. Structural measures, such as riprap, have been used and are effective in protecting the shoreline. However, cost, aesthetics, and safety concerns of these structural measures have necessitated looking at other options. In more recent years, the application of nonstructural methods utilizing vegetation in conjunction with applied engineering has gained in recognition and application. The erosion occurring at Cheney presents unique challenges due to the shallow soils over shale bedrock, the high degree of wind/wave erosion forces working on the fragile shoreline, and the harsh growing environment for plants. This study will evaluate various bioengineering techniques and plant materials, which will lead to the development of alternatives to control shoreline erosion.

Three different bioengineering treatments were installed at two different sites in April 2000. The different treatments consisted of cribwalls, live

Constructed cribwalls planted with willow cuttings.

willow fascines, and coconut fiber rolls used in conjunction with live willow stakes. The adjacent, untreated areas on the two sites served as the control. Plant materials and techniques were evaluated for establishment, growth, adaptability to site conditions, and effectiveness in providing for shoreline stabilization during the summer and fall of 2000. First year results showed the installed measures of coconut rolls and cribwalls provided better protection from shoreline erosion than did the fascines. Live willow stakes performed much better than the willow fascines. Overall, survival on the willow stakes was greater than 60 percent. No sprouting occurred on any of the fascine bundles. Evaluations will continue through 2004.

Evaluation of Plant Materials for Use in Soil Bioengineering Projects

Soil bioengineering techniques are utilized to establish vegetative systems for slope, shoreline, or streambank stabilization. Plant materials that are locally available, root easily from cuttings, and are adapted to fluctuating moisture regimes play an integral role in the success of the system. The Manhattan Center has the responsibility to identify and evaluate locally available

plant materials for use in application of various soil bioengineering techniques.

Center Staff collected 30 individual cuttings of each of the following species to investigate their potential in bioengineering systems:

- Rough-leaved dogwood, *Cornus drummondii*
- Silky dogwood, *Cornus amomum*
- Black willow, *Salix nigra*
- Sandbar willow, *Salix exigua*
- Streamco willow, *Salix purpurea*
- Cottonwood, *Populus deltoides*
- False indigo, *Amorpha fruticosa*
- Buttonbush, *Cephalanthus occidentalis*

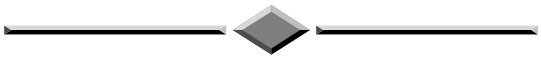
The woody cuttings were each subjected to three different preplanting treatments. One-third of the cuttings from each species was soaked in water 48 hours prior to planting, one-third was treated with rooting hormone, and the remainder served as a control. Cuttings were planted at two different slope positions within an artificial wetland cell located at the PMC.

The lower slope position was adjacent to the water within the cell and resulted in a saturated moisture condition during the experiment. The upper slope position was initially saturated at planting time, but then did not receive additional moisture other than precipitation. Final evaluation of cutting survival determined that the treatments of soaking and root hormone application had no significant effect on any of the species. However, the two different slope positions did affect the survival of some of the species being evaluated.

The three willow species and the cottonwood showed no difference in percent survival at the different moisture regimes. Silky dogwood, false indigo, and buttonbush all exhibited a higher percentage of survival at the lower slope position (more moist site).

Overall survival of the cuttings for both slope positions showed Streamco and sandbar willow at 100 percent, followed by silky dogwood and cottonwood at 93 percent, black willow at 87 percent, buttonbush at 70 percent, false indigo at 20 percent, and finally rough-leaved dogwood at only 7 percent.

Thus, it appears that with this limited evaluation study some species are definitely better suited for bioengineering projects. With restricted moisture conditions it appears that willow and cottonwood species would be the best bet for success. False indigo and rough-leaved dogwood cuttings do not appear to have great promise in bioengineering projects.



For further information on these and other studies, contact us:

Plant Materials Specialist: Terry M. Conway
USDA-NRCS, 760 South Broadway, Salina, KS 67401. Phone 785-823-4541 or e-mail at terry.conway@ks.nrcs.usda.gov

Plant Materials Center Staff
USDA-NRCS-PMC, 3800 South 20th Street, Manhattan, KS 66502. Phone: 785-539-8761
Richard L. Wynia, PMC Manager, e-mail at rich.wynia@ks.nrcs.usda.gov
John M. Row, PMC Specialist, e-mail at john.row@ks.nrcs.usda.gov