Manhattan
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Shale Reclamation Project

Sediments from the exposed shale areas were causing severe damage to the rangeland below the erosive sites in Jewell County, Kansas. The rangeland area consists mainly of steep slopes with outcrops of shale bedrock. The topsoil had eroded from the site leaving only the bare gray shale exposed and eroding. The shale sites are characterized by being very acidic (PH=3.0), having low organic matter content, and low natural fertility. Finding plants that would survive and grow on these sites would be difficult.

The Plant Materials Center Staff and Field Office Personnel in Jewell County met and discussed ideas for revegetating areas of the shale sites. Initially 17 herbaceous species, with several varieties in 6 of the species, were planted at the shale site. Several woody species were also planted to determine survival on this very harsh site. A year after planting only 3 herbaceous species were found at the planting site. The evaluation of performance indicated that 'Southwind' common reed was surviving and reproducing and 'Pete' eastern gamagrass and 'Kanlow' switchgrass were struggling to survive. The following years more common reed rhizomes were planted on the site to speed up the recovery process. A larger portion of the site was fenced with an Environmental Quality Incentives Program (EQIP) Cost/Share Contract to keep cattle from grazing the palatable common reed plants. With increased coverage by the grass less and less sediment was observed exiting the site, thus allowing rangeland areas below to return to a healthy condition.

Jewell County District Conservationist Mike Waite indicated that approximately 3,700 acres in the county were involved in these erosive activities. Containing the sediment on the site is very helpful, but revegetation of the sites with a palatable grass would provide even more benefit to livestock producers. The benefits of this program will increase as more of these sites are repaired and become productive once again.

Biology and Control of Seed Smut of Switchgrass

Seed smut of switchgrass caused by *Tilletia maclaganii* is common in seed production fields of 'Blackwell' and 'Cave-In-Rock' cultivars of switchgrass in the Central US. This study is conducted cooperatively with Don Stuteville, Forage Crop Pathologist at Kansas State University. The systemic infection of switchgrass plants by fungus will cause seed yield reductions in the cultivars mentioned previously. The purpose of the study is to test the reaction of 'Kanlow', 'Pathfinder', 'Shelter', 'Summer', and other experimental lines and cultivars of switchgrass to the fungus. In conjunction with the virulence of the fungus the biology, method of infection, and potential control measures are being investigated. The fungus has had a marked reduction in seed yield in a 'Blackwell' switchgrass foundation seed production field at the Plant Center. There is concern by commercial seed producers that the fungus will be spread in seed production fields and limit their seed production. Therefore, it is imperative that we know which varieties are susceptible and what the life cycle of the fungus is in order to disrupt and potentially control the disease.

The combined total value of commercial seed production of 'Blackwell' and 'Cave-In-Rock' switchgrass varieties in 1998 was over 2.6 million dollars. A significant threat to that amount of seed production could cause economic hardship to seed producers and provide less seed of the varieties to be used in farm conservation programs.

Seed Dormancy The Uncertainty in Native Grass Seeding

Native grasses have survived in nature without any form of cultivation for thousands of years. Their ability to survive and flourish results from several protective mechanisms provided by mother nature. These protective mechanisms, however, may interfere with the speed and or uniformity of their establishment. One of these mechanisms is seed dormancy.

Seed dormancy is basically a physical or genetic characteristic that prevents the seed from germinating. The purpose of dormancy is to allow the seed to germinate and the plant to establish under favorable growing conditions. The proportion of dormant seed in native warm-season grasses depends on physical and genetic factors. Some species, even some varieties within a species, produce more dormant seed than others do.

Age of the seed has been proven to be a factor in affecting the percent of seed dormancy. Newly harvested seed will many times have more dormant seed than seed that has been stored for several months. In fact, for many native warm-season grass species, the actual germination of the seed will increase with age due to the loss of dormancy with time. For example, a seed storage study being conducted at the Manhattan Plant Materials Center has shown that 'Kaw' big bluestem had an initial germination of 63 percent that increased to 88 percent after 15 years of proper storage, 'Blackwell' switchgrass increased from 85 percent to 98 percent, 'Aldous' little bluestem increased from 70 percent up to 81 percent, and 'Osage' Indiangrass increased from 75 percent to 88 percent.

Seed dormancy can also be affected by cold, moist conditions. Germination test performed by seed laboratories have indicated that cold, moist treatments of some of the warm-season native grasses have resulted in improved germination. One example showed a variety of switchgrass not treated with cold, moist conditions had a germination of 15 percent and 70 percent dormant seed. Material from the same lot that was subjected to the cold, moist conditions had an 80 percent germination and 5 percent dormant seed. This suggest that earlier planting dates may allow mother nature to provide the treatments necessary for a higher percentage of the seed to germinate and survive the first season.

Seed dormancy does exist in native warm-season grasses, therefore the speed and or uniformity of establishment is not always predictable. Native grass plantings have in many cases been prematurely judged as failures and destroyed because of a lack of understanding of seed dormancy and the effect on timing of seedling emergence.

International Visitor

It was our pleasure to have Meredith Mitchell from the Rutherglen Research Institute in Rutherglen, Australia as a guest of the Plant Center on September 18. Meredith is the project leader for the evaluation of native grasses for low input systems at the research institute based in Victoria. With environmental constraints such as summer drought, soil acidity and low winter temperatures commonly limiting grass performance, grazers are seeking additional species options. Meredith has been involved in researching Australian native grasses for the last 12 years. She has selected lines for use in acidic, low fertility, low rainfall areas. Her research in higher rainfall areas of Southeastern Australia has focused on methods to increase grass productivity.

Her reason for visiting the United States was to learn more about perennial grain crops and harvesting of chaffy grass seed. We toured the Plant Center and looked at harvesting and cleaning equipment we utilize with our grass species. We discussed the cleaning and debearding of chaffy species.

Meredith had visited with Kansas State University researchers and will visit The Land Institute in Salina, Kansas. She will also go to Oklahoma and spend some time at the Southern Plains Range Research Station (ARS) in Woodward, OK before returning home to Australia on October 4th.

New Soil Salinity Study

The Manhattan Plant Materials Center working in cooperation with the Knox City,Texas Plant Materials Center has initiated a field study designed to find solutions to revegetating saline affected sites. The two centers will work cooperatively at two locations in Oklahoma and the Manhattan Center will have two additional sites in Kansas. The planting of salt tolerant plant species may provide an effective, economically feasible solution to returning sites to productivity. This is not the PMC's first study on salt affected soils. The Plant Materials Program in Kansas conducted a salt affected soils study in Graham County in the 1990's. This study resulted in the production of Plant Materials Technical Note KS-26 dated February 6, 2001. The technical note written by Terry Conway, Plant Materials Specialist, is titled **Plant Materials and Techniques for Brine Site Reclamation**. It can be viewed at the Plant Materials web site:
http://Plant-Materials.nrcs.usda.gov/