PLANT MATERIALS TODAY

A Quarterly Newsletter of the Montana-Wyoming Plant Materials Program

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This is a quarterly field office newsletter to transfer plant materials technology, services, and needs. The plant materials personnel will be featuring short articles on project results, new cultivar releases and establishment techniques, seed collection, and field planting needs, etc. All offices are encouraged to submit articles about plant material-related activities relative to plant performance, adaptation, cultural and management techniques, etc. Direct inquiries to USDA NRCS, Plant Materials Center, RR2 Box1189, Bridger, MT 59014, Phone 406-662-3579, Fax 406-662-3428 **or**; Larry Holzworth, Plant Materials Specialist, USDA NRCS Montana State Office, Federal Bldg., Rm 443, 10 East Babcock Street, Bozeman, MT 59715-4704, Phone 406-587-6838, Fax 406-587-6761.

Invasive Species Update

The Invasive Species Council accepted the National Invasive Species Management Plan January 18, 2001. The NRCS Invasive Species Committee (ISC) provided significant input into the draft plan. The plan is an outcome of President Clinton's Executive Order on Invasive Species, issued February 3, 1999. The order set up a National Invasive Species Council (NISC) to provide Invasive Species leadership. The NISC set up an advisory committee, representing stakeholders, to recommend plans and actions at local, tribal, state, regional and ecosystem based levels. The NISC advertised in the Federal Register for representative stakeholders. From 150 nominations nation-wide, approximately 30 individuals were selected to draft the National Invasive Species Management Plan (NISMP). Two members were selected from Montana: Celestine Duncan, Weed Management Services, Helena; and D. Fred Matt, Confederated Salish Kootenai Tribes of the Flathead Reservation Inter-tribal Counsel.

The Chief issued a bulletin encouraging all NRCS employees to become familiar with the NISMP. The basic strategy of invasive species management is to prevent, identify, control and restore. The plan can be found at the following web site: http://www.invasivespecies.gov.

As an associated action, the NRCS ISC is using the NISMP to develop NRCS policy. Thus far, the NRCS Invasive Species Policy will be based on the following guiding principles:

1. We will work within the parameters of the NISMP.
2. We will follow and support all state and local laws regarding invasive species.
3. We will work within the locally led process to establish local priorities.
4. In each region and state, we will participate in a multi-disciplinary approach.
5. We will incorporate invasive species control into our planning process.
6. Decisions to remove a species from the NRCS FOTG must be based on scientific evidence.
7. In the interests of long-term resource sustainability and habitat protection, we will encourage the use of native species.
8. We will participate in state rapid response teams efforts to prevent invasive species from moving into a particular ecosystem.
9. Plant Materials Centers and the National Plant Data Center will be kept intimately involved through research, planting trials and day to day conservation planning to help solve invasive species issues.
10. We will work with our partners and our own experts in order to understand Invasive Species infestation thresholds.
11. We will recognize that not every alien species is invasive and that some alien species are some of our best plants for conservation purposes.

Larry k. Holzworth

Only the Strong Survive

On a typically windy day early last March, final height, vigor, and dry mass measurements were taken on the survivors of a grueling 3-month endurance test. The test initially involved 71 contestants exposed day and night to challenging levels of heavy metals and acidic conditions. Only the tough survived, and only the toughest in good form.

These 71 individuals initially entered the test as seed of 52 grasses representing 16 species and 19 forbs representing 11 species. All the contestants trained for the event to improve their emergence and performance. The grasses prechilled for 2 weeks while the forbs prechilled anywhere from 1 month to 3 months. The chilled seeds were blindfolded and placed in 10 cm^3 Conetainers™ approximately ¼ to ½ inches deep.

Buried in the darkness the seeds had no idea what lurked in the media around them. Deserted in media imported from Anaconda, Montana, the contestants were exposed to extreme soil conditions such as a pH of 4.55 and high concentrations of metals. For example, the acid extractable concentration of arsenic was 427 ppm, cadmium 10 ppm, copper 614 ppm, lead 208 ppm, and zinc 404 ppm. According to standards accepted by the EPA, arsenic, lead, and zinc were at phytotoxic levels, as was the pH. To keep the competition fair, the Conetainers™ were randomly arranged adjacent to each other in a tray. Twenty of these randomly arranged trays were placed in the greenhouse at the BPMC.

Vital signs such as height, vigor, and dry mass were collected and statistically analyzed using Duncan's Multiple Range Test. Dry mass data were subsequently dropped as no significant differences were found between the poor gaunt and withered entries. The top Duncan grouping that demonstrated a significant difference in height, a.k.a. the big boys, included redtop 9076266, firecracker penstemon 'Richfield Select', redtop 9081619, rush species 9081884, redtop 9076276, tufted hairgrass 9076280,

needle-and-thread grass 9078688, Rocky Mountain penstemon 'Bandera', and slender wheatgrass 'Highlander'.

Duncan's most vigorous group included only slender wheatgrass Highlander and redtop 9076266. Going down into the next tier of buffed individuals, the second grouping included tufted hairgrass 9076280, redtop 9076276, Baltic rush 9081622, tufted hairgrass 9076290, Rocky Mountain penstemon Bandera, firecracker penstemon Richfield Select, redtop 9081619, fuzzy-tongued penstemon 9081631, and needle-and-thread grass 9078688.

From a pure seedling survival stand point, entries with a survival rate above 80% included slender wheatgrass 'San Luis', slender wheatgrass 'Revenue', basin wildrye 9081625, basin wildrye 9081627, slender wheatgrass 'Pryor', basin wildrye 'Magnar', redtop 9076266, firecracker penstemon Richfield Select, slender wheatgrass 9081620, basin wildrye 9081624, western wheatgrass 'Rosana', and bluebunch wheatgrass 9081636.

Prizes were awarded to redtop, tufted hairgrass, slender wheatgrass, Baltic rush, Rocky Mountain penstemon, and firecracker penstemon for combined vigor and height performance. For sheer survival skills, slender wheatgrass and basin wildrye earned honorable mention. This fall, top performers and others will compete in a 3-year field test in the Anaconda hinterlands.

Leslie Marty

Northern Plains Trees and Shrubs under Stress

Reports of woody plant stress in Montana and Wyoming are high this year, many cases the result of two years of below average precipitation. Drought damage is often noted on conifer species first because the symptoms are dramatic. With conifers, needles turn a brown, bronze, or purplish color before falling off sometime the following year. In some cases, an entire branch loses its needles and dies within a relatively short period of time. Although the new flush of growth in the spring is often healthy, it may become chlorotic (yellow) if drought conditions prevail over the growing season. Damage tends to be greatest on plants in exposed locations, but this varies widely with the species; individual plant; variation in soil depth, texture, and chemistry; and other factors. Recent transplants are particularly sensitive because their root systems have not developed fully. Deciduous plants usually demonstrate tip dieback, a condition characterized by the death of the tip of branches some distance from their terminal end. Even though drought induced stress is high this year, don't assume that the cause of your needle discoloration or tip dieback is necessarily from a lack of moisture. Drought symptoms can mimic those of fungal or bacterial diseases, so it may be necessary to consult with an Extension plant pathologist or arborist to determine the true cause of your plant woes.

Fortunately, there are several things that can be done over the course of the year to reduce drought damage. Supplemental irrigation, particularly in areas experiencing below average precipitation, is an obvious first step. A slow, deep saturation of the rooting zone is best. In the Northern Plains, we recommend supplemental irrigation of woodies, when needed, up until mid-August. At that time, the rule of thumb is to turn off the water until after the plants go dormant in order to facilitate proper hardening-off prior to winter. The theory is that excessive supplemental water "pushes" luxuriant growth that cannot acclimate properly prior to winter resulting in tip and leader die-back the next spring. **If plants are under severe mid-summer drought stress, continue watering through the summer months**, reducing water as temperatures moderate. Begin fall watering of woody plants after dormancy and continue until the ground freezes. Plants, even deciduous species, lose moisture all winter. A good reservoir of soil moisture in the fall is critical for proper over-wintering of trees and shrubs in the northern Plains. A combination of fall watering and the use of anti-transpirants (anti-desiccants) works particularly well. Anti-transpirants are latex or waxy emulsions sprayed on the foliage to reduce evapotranspirational losses from plants.

There are water conservation practices that reduce drought stress as well. Mulching the base of trees with 2 to 4 inches of clean, bark mulch reduces evaporative losses from the soil and keeps the soil:root environment cool. In a windbreak situation, control water thirsty weeds and sod forming grasses with mechanical and chemical treatment. In windy, dry areas, use tree shades or shingles on the south and west sides of exposed plants to reduce seedling desiccation. The same principle can be applied to larger landscape plants by mounting shade cloth or burlap onto a frame situated on the windward side of the plant. Allow enough space between the plant and the shade to provide some direct lighting, especially if the species is shade intolerant. Never wrap the plant in screening, especially sheets of plastic or other nonporous material. Wrapping plants can lead to heat build-up or conditions favoring fungal infection.

Another problem this year resulted from unusually late and heavy snow falls this spring. Leafed out deciduous species are particularly sensitive to heavy, wet snows because their large leaf surface area intercepts the precipitation. The resulting damage is not only cosmetic but structural and physiological as well. Each broken limb represents a potential portal of entry for insects and disease. Deformed canopies are more susceptible to future breakage from snow loads and wind stress. The photosynthetic surface of the plant is typically reduced, causing the plant to rely on stored carbohydrates until the proper balance between roots and shoots is restored. Stressed plants attract predatory insects that further exacerbate the situation.

There are proactive things that can be done to reduce the damage from heavy snow including proper species selection, pruning, and maintenance. Avoid fast growing, weak wooded species like Siberian elm, silver maple, boxelder, cottonwoods, and willows and instead select relatively strong wooded species like bur oak, green ash, and linden (although every species has its limits). Prune long leggy branches and remove tight-angle "V" crotch branches. Avoid heavy hedging or topping of woody plants. The resultant flush of growth is often dense, leggy, and weak. For the very ambitious, attach a thin piece of wood or license plate to a long pole and scrape off the snow until the storm subsides (I actually know people motivated enough to do this!). Once the damage occurs, the best corrective measures are to remove dead or damaged tissue followed by good plant care to reduce stress (easy on the fertilizer!). Look out for insects and disease and water periodically as needed. It may be worth the investment to contract with a professional arborist to maintain your trees. In some cases, it's best to "cut your losses", remove severely damaged trees entirely, and start over with well-adapted species.

Joe Scianna

Chinese and Mongolian Scientists Learn about the US Germplasm System

Five Chinese and three Mongolian scientists spent from June 10 through July 1 in the USA learning about our plant germplasm system. Our germplasm system catalogues plant materials from around the world and is available to scientists for research in disease and insect resistance, hybridization for increased forage production and growth on contaminated soils, erosion control, medicinal values and advancing our knowledge in the plant sciences. The knowledge the foreign scientists gained will assist them in developing germplasm systems in their respective countries for securing seed sources for revegetating deteriorated grasslands, salinized soils, mined lands and etc. The collaborators received funding for their trip from the USDA-ARS and Foreign Agriculture Service.

The team began at Beltsville, MD, where they went to the USDA Agricultural Research Service (ARS), National Germplasm Resources Laboratory; traveled to Ft. Collins, CO, where they reviewed the USDA-ARS National Seed Storage Laboratory; then to Logan, UT, to tour the USDA-ARS Forage and Range Research Lab; on to the USDA-ARS Regional Plant Introduction Station, Pullman, WA; made stops at USDA-Natural Resources Conservation Service Plant Materials Centers' in Aberdeen, ID, Pullman, WA, Bridger, MT & Bismarck, ND. The group ended at the USDA-ARS Northern Great Plains Research Lab in Mandan, ND.

The scientists included: Drs. Gu Anlin, Grassland Research Institute & Yi Jin, Professor of plant physiologist, Inner Mongolia Agricultural University, Huhehot, Inner Mongolia; Ze Bai, Director, Sichuan Grassland Institute, Chengdu, Sichuan; He Yi, Director, Animal Nutrition Institute of Gansu Province, Lanzhou, Gansu; Han Guo Dong, Professor, Inner Mongolia Agricultural University; S. Jigjidsuren, Head, Germplasm and Seed Production Dept., and Tsogoo Damdin, Research Scientist Research Institute of Animal Husbandry, Ulaanbaatar, Mongolia. Dr. Chinburen Jigjidsuren also accompanied the group and served as the Mongolian interpreter.

Larry Holzworth

McCone County Conservation District Conservation Plant Demonstration

A 17-acre conservation plant demonstration planting was seeded during April 17-19, 2001. The McCone Conservation District (CD) received a Grazing Lands Conservation Initiative (GLCI) grant for site preparation and seed purchases. The purpose of the planting is to demonstrate the performance and adaptation of various conservation plants and cultural techniques for their successful establishment. The McCone CD owns the planting site. The site is west of Circle in MLRA 58A, Northern Rolling Hills of the Sedimentary Plains. The soils are an Alona silt loam and Cambert loams at 2500-ft. elevation and 12-13 in. mean annual precipitation. The site was planted to a demonstration in 1991. Chemical and mechanical fallow was used for the last three years to eradicate the 1991 demonstration species, weeds and to store soil moisture. A firm seedbed was prepared in early April.

The NRCS Bridger PMC Truax drill was used to plant 66 individual plant entries into 15 X 50 ft. plots. The 66 entries consisted of 37 species containing 22 cool season and six warm season grasses, four leguminous forbs, two non-leguminous forbs and three shrubs. Also included were 18 different mixtures of various warm and cool season grasses with combinations of winterfat, four-winged saltbush and warm season grasses within the same drill row and in alternate rows. Tree and shrub seedlings were also included to display the various woody species adapted to McCone County for windbreaks, buffers, wildlife, etc.

The McCone CD will maintain the planting and organize tours for local landowners to learn about the new plant cultivars available for CRP, erosion control, rangeland restoration, pasture, hay, wildlife, etc.

Larry Holzworth

Meadow Bromegrass Trials Completed

Meadow bromegrass, *Bromus biebersteinii,* has many positive attributes. It is commonly recommended under irrigated conditions, or dryland in areas receiving a minimum of 15 inches precipitation, as a component in pasture and hay production. Establishment is easy, seedling vigor is good, forage production and yield is high, season of use is long, the rhizomatous growth suppresses weeds, and regrowth is excellent. What negative attribute lurks hidden that taints meadowbrome's reputation? What could possibly be wrong with including this tame grass in a conservation management plan? The answer is seed availability. The three commercial cultivars, 'Regar', Fleet', and 'Paddock', are not long term, heavy seed producers. Commonly, after two seed crops, production drastically declines and stands are removed. Certified seed can be difficult to obtain and come with a high pricetag.

Montana State University's Extension Agronomist, Dr. Dennis Cash, recognized the need to improve seed production and, in 1995, cross-pollinated and collected seed from three selected clones based on biomass re-growth and seed yield. As a result, comparative testing of forage and seed yields began in 1996 at the Bridger PMC, and at the Experiment Stations in Bozeman, Creston, and Mocassin, Montana. The Mocassin trial was dryland, while the other locations were irrigated. Randomized complete block designs were replicated four times with Regar, Fleet, and Paddock, and the three experimental lines MB1, MB2, and MB3. Plots were generally harvested once or twice over the summer and again prior to freezeup to record re-growth potential. Seed production was measured only at the irrigated locations. The trials were conducted for three to four years and were finished completely in 2000.

Results from Bozeman and Creston were not significantly different, with forage yields highest for MB2 at 6.7 and 7.9 tons/acre, respectively. Bridger's data indicated that MB2 produced a significantly greater amount of forage than the other five entries at 8.4 tons/acre. Mocassin's dryland biomass production was approximately one-third to one-half that of the irrigated sites. Seed yields at Bozeman and Creston were highest for MB1 at 399 and 336 lbs./acre, respectively. Bridger ranked MB2 highest with 686 lbs./acre. Regar produced the lowest amount of seed at each of the three sites and ranged from 103 to 235 lbs./acre.

In anticipation of cultivar selection and release, seed fields of MB1 and MB2 were established in 1999 at the Bridger PMC. The two fields have demonstrated the capability to surpass the three commercial cultivars in stand longevity. Look for more seed of meadow bromegrass to become available on the commercial market, at a potentially lower cost, in the near future.

Susan R. Winslow

Bridger's Long-Range Plan Completed

The Bridger Plant Materials Center (BPMC) State Conservationists' Advisory committee updated the BPMC Long Range Plan at their June 12th meeting. The plan is the culmination of assessing conservation problems and plant material and technology needs from every NRCS Field Office and Conservation District in Montana and Wyoming over the past three years. The Montana and Wyoming State Plant Materials Committees each developed a Long-Range Plant Materials Program (LRP) to direct plant material activities in their respective states. The Montana and Wyoming Plans were then combined to create the BPMC Long Range Plan. The 2001 Bridger PMC LRP sets future program priorities of work addressing current and emerging resource issues for both Montana and Wyoming. The PMC is continuing to work on many of the resource needs identified, but several new issues have emerged and cannot be addressed until additional employees, time and money become available. A LRP summary of needs, actions, status, and priorities is attached .

Larry Holzworth