



Castilleja

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Left:
Western wheatgrass
(*Elymus smithii*; syn.
Pascopyrum smith)

Reprinted from: USDA-
NRCS PLANTS Database
/ Hitchcock, A.S. (rev. A.
Chase). 1950. *Manual of
the grasses of the
United States*. USDA
Miscellaneous
Publication No. 200.
Washington, DC.

Glad Tidings in Grass

Before we ring in the new year, it's time to ring in the old grass. Western wheatgrass (*Elymus smithii*, syn. *Pascopyrum smithii*) was decreed the State Grass of Wyoming after a little-publicized debate in the 2007 state legislature (W.S. 8-3-121). It had previously been designated the state grass in the early 1950's by a legislative resolution. All other Wyoming state emblems were ensconced in state statutes except the state grass.

Blue grama (*Bouteloua gracilis*) was a contender in this year's debate, but distribution of western wheatgrass, spanning all counties of Wyoming, swung the vote. Blue grama may have better spike-recognition, with its graceful

inflorescence that looks like a stylized smile. Western wheatgrass has a compact spike (above) that is not as readily discerned.

Outside of the competitive political arena, these two grass species are widespread associates overlapping across northern and eastern Wyoming. Western wheatgrass is a cool-season, rhizomatous grass of medium height while blue grama is a sod-forming, warm-season short grass. The productive western wheatgrass is a fitting mascot for Wyoming's ranching tradition. (*Cont. on p. 8*)

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WNPS News

Mark Your Calendars!

The 2008 Annual Meeting of the Wyoming Native Plant Society is being hosted by the Teton Chapter and will be held on Saturday and Sunday, July 12th and 13th. We hope you will take this opportunity to visit the beautiful Jackson Hole/Grand Teton National Park area and experience the great educational opportunities of this event. Please look for more detailed information and highlights of this event in the March issue of *Castilleja*. Contact Amy Taylor at ajrtaylor@hotmail.com, or 307.733.3776 with questions.

Proposed By-Laws Amendments: *IT'S BACK!!* A streamlined by-laws amendment is being proposed again. YOU are needed to get Wyoming Native Plant Society into a calendar-year operation. The proposed amendments are attached to the renewal form and ballot in this issue.

Ballot and Renewal: Please renew early in 2008 and vote in Board elections. Return the yellow insert to Wyoming Native Plant Society.

WNPS Markow Scholarship: The 2008 WNPS Markow Scholarship announcement is in this issue, open to all who are pursuing graduate research related to native plant species and vegetation in Wyoming. The deadline is February 15.

Contributors to this issue: Beth Burkhart (BB), Robert Dorn (RDD), Richard Dunne (RD2), Curtis Haderlie (CH), Bonnie Heidel (BH) and Dave Scott (DS).

Treasurer's Report: Balance as of 29 Nov 2007 - General Fund: \$1,390.68; Markow Scholarship Fund: \$1,126.00. Total Funds: \$2,516.68

Contributions: Feature articles, news, announcements, and book reviews are welcome any time of year by mail or email. The next newsletter deadline is February 18.



Photo by Curtis Haderlie

New Members: Please welcome the following new members to WNPS: Dan Doak, Laramie; Brian and Emily Elliott, Laramie; Robert Henry, Cheyenne; Natalie Kashi, Victor, ID; Martin Lenz, Montague, CA; and David Skinner, Buffalo.

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Exotics Are Conquering Natives

By Robert Dorn

In the late summer of 2005, I received fragments of an unknown plant from BKS Environmental Associates from two different coal mine sites in Campbell County, Wyoming. The fragments resembled *Bassia sieversiana* (formerly called *Kochia scoparia*) but were definitely not that species. This past summer they were able to send me a complete specimen. It immediately struck me as our next potential weed. It was not the worst possible weed, since it did not seem to have rhizomes. But it was a stout perennial with a root 12 inches long and an inch in diameter. Perennials are usually much more difficult to eradicate than annuals.

It was pretty clear that this plant belonged to the genus *Bassia* or *Kochia*. I thought that I might need to look at European and Asian floras to try to identify it. First I checked the regional floras that I had available and found that one of them (A Utah Flora) had a perfect description of this plant. It was called *Kochia prostrata* (now *Bassia prostrata*) and was reported as "being tried in reclamation plantings and is to be expected throughout Utah." On doing more research on the internet, I found that it had been introduced into this country in 1966 from the USSR and the cultivar 'Immigrant' (aptly named) was released by federal and state agencies in 1984 for general use. It is called "forage Kochia" and is reported to have a taproot that can reach 16 feet long. It is being pushed as "an unqualified high value, perennial, non-invasive, fire-resistant forage with the capacity to choke out invasive exotic weeds"

But how many native plants will it choke out? For every forage Kochia plant, one or more native plants will be unable to grow in that spot. Displacing native plants is the most overlooked consequence of introducing exotic plants that have the potential to naturalize. And we are now introducing exotics to try to displace other exotics that were introduced earlier! How many more exotics will be introduced to take the space that could be occupied by native plants? Alfalfa took decades to become naturalized in every county in Wyoming. It will likely be decades before forage Kochia can become as widespread, but time is on

its side. It has been documented to have spread 0.6 mile in about 10 years at one location. As more seed sources become available, the rate of spread becomes much greater.

Displacing native plants is the most overlooked consequence of introducing exotic plants that have the potential to naturalize.

When I began studying the Wyoming flora in the 1960's, there were not many exotic weeds in the state, even though there were many more in adjacent states. I thought at the time that it was because they could not survive at our higher elevations. But they only needed more time and perhaps some climatic warming. We are now being overrun by exotics.

Sand Creek in the Black Hills is the location for several rare Wyoming plants. In September of 2005 while taking some plant photographs along the stream, I noticed how many weeds were now covering the creek bottom. I stopped in a \pm 5 acre stretch and counted the number of exotic species. There were 12 that I found. I had a hard time finding 5 native species in the same stretch. An open ridge in the Bear Lodge Range that had a nice native prairie when I first visited it in the 1970's is now mostly exotic species. Our native vegetation is disappearing before our eyes. We need to stop introducing more exotics, but it may be already too late to save much of our native flora.

Major Stephen H. Long, whose expedition crossed the plains to the Colorado Rockies in 1820, characterized the plains as the Great American Desert that would be uninhabitable by settlers. He was "proved" to be wrong, but with the mining of the ground water and the proliferation of exotic vegetation, ultimately he may be right.

For more information on weeds, see the articles by Walter Fertig in *Castilleja* 18(2), May 1999. RDD



Above:
Beth Burkhart and *Geum triflorum* seed, photo by Cheryl Mayer

Black Hills Native Plant Material Program By Beth Burkhart, Black Hills NF Botanist

The Black Hills area has joined the native plant materials march and bandwagon! Congress earmarked funding under the National Fire Plan Restoration/ Rehabilitation of Burned Areas for development and use of native plant materials. The funding is awarded to projects promoting restoration and rehabilitation of sites with the use of native plant materials; reintroduction of native plant material into burned areas; or development of regional supplies of native plant materials for rehabilitation.

In 2007, proposals submitted by the Black Hills National Forest (BHNF) and the Rocky Mountain Research Station – Rapid City Lab (RMRS) received funding. The two proposals were submitted separately, but when both received funding, we met and determined that both would benefit from collaboration.

The BHNF proposal is a pilot project for restoring stands of a plant community type endemic to the Black Hills (Marriott et al. 1999) – Black Hills Montane Grasslands. The RMRS proposal is a large-scale native plant material program that would eventually include commercial partnerships and provide materials for a wide variety of rehab/restoration needs on public and private lands in the Black Hills. To highlight 2007 project accomplishments, intensive efforts were made to collect seeds from a number of selected species from diverse sites, including species components of Black Hills montane grasslands. These

seeds are being processed and will be analyzed for viability and germinability in early 2008. A set of seeds from Black Hills montane grasslands was sent to USFS Bessey Nursery for growing into plugs which will be replanted into montane grassland restoration sites in 2008. Selected species will also be sown into a newly established two-acre Native Plant Materials site in Rapid City in early spring of 2008. Their establishment, growth, and seed production will be evaluated through the 2008 growing season and beyond.

Proposals for both projects have been submitted for continued funding in 2008. Seeds collected in 2007 and plugs grown out from some of the collected seed at Bessey Nursery will be planted in up to three Black Hills Montane Grassland sites chosen for restoration, with the assistance of members of the Great Plains Native Plant Society and any other willing volunteers! Permanent plots will be installed and monitored to evaluate species' establishment and persistence. Seed from montane grassland species will also be planted at the Native Plant Materials site in Rapid City for seed production. Additional seed of montane grassland species will be collected in 2008 and more plugs produced in the winter of 2009 for additional restoration sites in future years. 2008 funds would continue the RMRS project by expanding partnerships to facilitate seed collecting and partnerships. The projects will also provide workshops on field plant identification and native seed collection. A focus of the RMRS project is to promote native plant materials for general large-scale production. The RMRS project will work on propagating native plant materials at the new Native Plant Materials site.

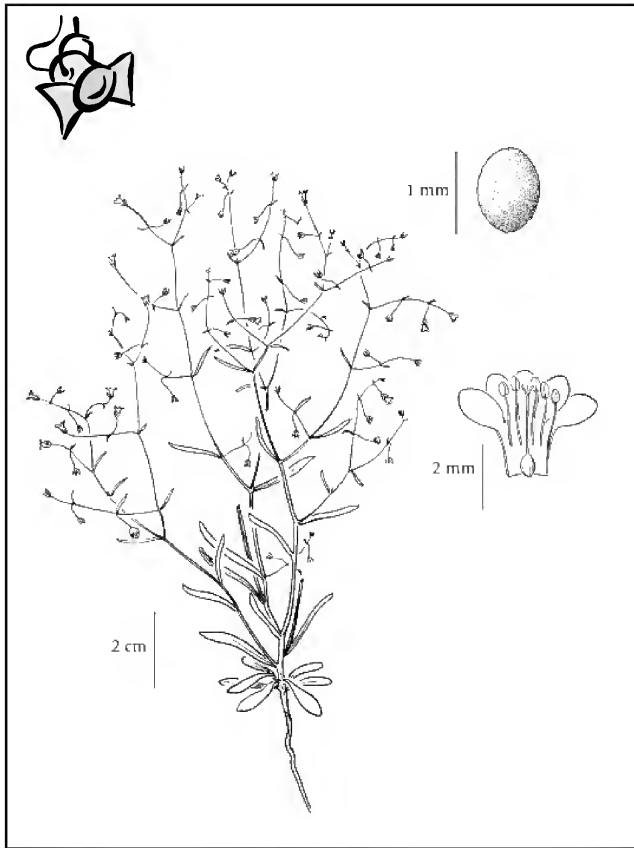
The BHNF and RMRS projects form a powerful combination because the montane grassland project has a small-scale scope that will be able to show specific benefit to vegetation management on the ground on BHNF, while the RMRS project has a large-scale scope that facilitates completing the montane grassland project while meeting many other revegetation needs on public and private lands in the Black Hills. BB

Literature Cited:

Marriott, H. J., D. Faber-Langendoen, A. McAdams, D. Stutzman, B. Burkhart. 1999. The Black Hills community inventory: final report. Minneapolis, MN: The Nature Conservancy, Midwest Conservation Science Center.

Grass in perspective, from an address by John James Ingalls, the year before being elected to the U.S. Senate in Kansas
"Grass is the forgiveness of nature--her constant benediction. Fields trampled with battle, saturated with blood, torn with the ruts of cannon, grow green again with grass, and carnage is forgotten. ... Beleaguered by the sullen hosts of winter, it withdraws into the impregnable fortress of its subterranean vitality, and emerges upon the first solicitation of Spring...¹."

¹ John James Ingalls (1872), reprinted in "The Yearbook of Agriculture 1948", USDA Washington, DC.



Above: *Lathrocasis tenerrima*, by Jeanne Janish. From: Hitchcock, C.L., A. Cronquist, and M. Ownbey. 1959. Vascular Plants of the Pacific Northwest, Vol. 4. Posted at eFlora of British Columbia.

Spotlight on *Lathrocasis tenerrima*

By Dave Scott

Western and central Wyoming delimit the eastern range limits of *Lathrocasis tenerrima* (slender gilia), an interesting and often overlooked species of the Phlox family (Polemoniaceae). Plants are inconspicuous annuals growing on porous soils and dry slopes at mid elevations, and are often only seen in small and sparse populations. Individuals are usually less than 30 cm tall and, even in full flower, can be overlooked when you are standing right over them. Some would call the tiny flowers “precious” or “cute”, but we’ll just stick to the facts; the flowers are usually less than 3 mm in length.

Lathrocasis tenerrima was transferred from the genus *Gilia* where it now represents the only species in *Lathrocasis* (Porter and Johnson 2000; Dorn 2003). This taxon has been somewhat elusive to taxonomists set on teasing out its best

classification. Asa Gray described *Gilia tenerrima* in 1870 but its unique characters became apparent when considered against other *Gilia* in later studies of the group. DNA analysis in the mid-nineties finally provided additional support to traditional classifications that this species should be split out of *Gilia* (Johnson and Soltis 1995). An in-depth study by Johnson and others shortly thereafter cemented the indication that a new genus be constructed for this species. *Lathrocasis tenerrima* is now closely allied with *Gilia*, *Navarretia*, *Collomia*, and *Allophyllum* in the Phlox family (Porter and Johnson 2000). There are no single distinguishing characters but a combination of nearly entire leaves, downward curved pedicels, and stamens attached near the middle of the corolla tube set *Lathrocasis* apart from *Gilia* and other close relatives.

This glandular annual does have an interesting story surrounding the selection of its type locality as well. It was first vouchered in 1869 by Sereno Watson in the vicinity of present day Evanston, WY. Johnson and Weese (2000) provide a detailed analysis of the type specimens and locality. Essentially, the specimen labels and taxon description indicate the types were collected in “Utah, on hills above Bear River, near Evanston.” The Utah/Wyoming border had just been delineated slightly west of Evanston just a year prior to Watson’s collection. He referred to this general area as Utah though it had recently been named Wyoming. Watson’s collecting routes from the geological exploration on which he was working in 1869 were however, shown on maps from the report of that expedition (Watson 1871). The report shows two collecting routes on hills above the Bear River near Evanston. The first is a mere 1.5 miles from the town in present-day Wyoming, and the other about 22 air miles from Evanston, but in present-day Utah. Considering these maps, chances are that the first collecting route was the one referred to in the species description and labels. Johnson and Weese corroborate this idea that the type locality most likely was in Wyoming (2000).

Lathrocasis tenerrima has gone largely unnoticed in years past but its populations not quite so sparse that it is considered rare. Wyoming counties where it is common are Fremont, Lincoln, Park, Sublette, and Teton, though it does occur in the state beyond these areas. This spotlight serves as an encouragement to get out (*cont. on next page*)

and find new populations of this interesting wildflower. For this species, Mae West had it right when she was quoted "It is better to be looked over, than overlooked."_ DS

Literature Cited:

- Dorn, R. 2003. Redrawing the Phlox Family tree. *Castilleja* 22(1): 3.
- Johnson, L.A. and D.E. Soltis. 1995. Phylogenetic inference in Saxifragaceae sensu stricto and *Gilia* (Polemoniaceae) using matK sequences. *Ann. Missouri Bot. Gard.* 82(2): 149-175.
- Johnson, L.A. and T. L. Weese. 2000. Geographic distribution, morphological and molecular characterization, and relationships of *Lathrocasis tenerrima* (Polemoniaceae). *West. N. Amer. Nat.* 60(4): 355-373.
- Porter, J.M. and L.A. Johnson. 2000. A phylogenetic classification of Polemoniaceae. *Aliso.* 19(1): 51-91.
- Watson, S. 1871. Vol. V, Botany in United States Geological Exploration of the Fortieth Parallel. Government Printing Office, Washington.

Announcements

Book Still Available

Flowers of Wyoming's Big Horn Mountains and Big Horn Basin, 1987, by Earl R. Jensen, is available by order from: earljensen@tctwest.net. This guide has keys and descriptions for many species of north-central Wyoming from Montana to Casper; partially illustrated (paperback); for \$25.00 + postage.

Revegetation Recommendations from a Native Plant Society Perspective

After the 2003 wildfire in the San Diego area, the local chapter of the California Native Plant Society developed recommendations for revegetating, fire-wise landscaping, scientific research, etc. You can view the various CNPS policies and other docs at: <http://www.cnpssd.org/fire/index.html>.

Revegetation Reference Still Available

The U.S. Forest Service publication: "Genetically appropriate choices for plant materials to maintain genetic diversity," by Deborah Rogers and Arlee Montavalo (2004) is still available and posted at: <http://www.fs.fed.us/r2/publications/botany/plantgenetics>. It was reviewed in *Castilleja* March 2005.

2008 High Altitude Revegetation Workshop

Date: March 5-6, 2008

Location: Fort Collins, Colorado

The 18th High Altitude Revegetation Workshop will be held on March 5-6, 2008, at the Hilton Hotel in Fort Collins, Colorado. For more than 30 years, interested people from the environmental restoration industry, academia and regulatory agencies have gathered at the biennial workshops to learn about new techniques, products and methods for solving revegetation problems. The High Altitude Revegetation Committee is a Colorado State University group of professionals involved in reclamation and restoration activities, organizing these Workshops to educate and to foster the exchange of ideas and interaction among participants. The topics to be emphasized at the 2008 Workshop are:

- Bark Beetle Epidemic
- Wetlands Restoration
- Restoration Case Studies
- Restoration of Highly Disturbed Sites
- Wildfire Protection & Forest Management near Cities
- Reclamation of Oil and Gas Developments

Commercial exhibitors will be provided with booth space. For more information on exhibiting, contact Mark Phillips (303-665-2618) or Ed Spence (720-544-2869, edward.spence@co.usda.gov).

A workshop brochure with the final agenda, registration form and other details will be mailed in December if you are on the mailing list. To be added, please contact Gary Thor (970-484-4999, garythor@colostate.edu).

Conservation Directory Updated and Posted

The 2007 Conservation Directory prepared by the Center for Plant Conservation is now available online, posted at: http://www.centerforplantconservation.org/CPCDirectory/CPC_DIR_Find.asp .

Corrections and updates to the Wyoming contacts should be sent to: Jo Meyerkord [Jo.Meyerkord@mobot.org].

Practicing Safe Seed²

By Richard Dunne



Maximizing seed establishment begins before seed is purchased. Selecting the right seed mix, writing clear specifications and choosing the

appropriate application methods with reasonable time-lines should be finished before you go to bid.

It may seem odd to deal with weeds in early planning stages, however, some weed control is frequently required long before any seed is planted. Weed control on your site will hinge on three factors: Weed seeds already in your soils, weeds seeds entering from external inputs such as seed and mulch and most importantly, the level of competitive growth created by the species selected for planting. The pre-existence of common weeds such as kochia or Russian thistle will not usually compromise seeding results unless present in very high numbers, whereas the presence of just a few spotted knapweed plants may require pre-treating the soil for weed control. If you can, check growth on your site from previous years to ascertain the types of weeds and their abundance. If nothing is growing on site, find out why before going any further. Absence of growth may indicate soil toxicity.

Creating vigorous growth requires selecting the right seed for soil, climate, aspect and goals each unique project. Avoid "one size fits all" solutions that claim to do well in different soil types or elevations. In formulating a seed mix, soil conditions and climate should drive all other decisions. Check soil types, soil depth, nature of the substrate, aspect of the land, slope, drainage, temperature extremes, precipitation and seasonal distribution, snow cover and elevation. If that seems like too much, find what's already growing there and use that as a basis for a seed mix.

Once an "ideal" seed mix is selected, go to the market place and see if the seed is available in the quantities envisioned within your required time frame. To select species and cultivars for a project, special attention should be devoted the adaptability of seed for your site. Some species, such as cool season grasses, are often broadly adaptive to elevation, climate and soil type; whereas many species of forbs and shrubs are extremely narrow in their adaptive range to both climate and soil type. Do not try to force poorly adapted seeds into projects. Find out before you go to bid if adaptive species are available in the seed market. If not, either drop that species from your mix or undertake a collection of seed from a locally adapted ecotype. Be wary of depending on a very scarce seed unless you are prepared to purchase it immediately or unless the vendor will hold it for you.

Ambiguity or conflicts in every part of the seeding process should be resolved before any contracts are let. Here is an all-too-frequent scenario which compromises revegetation results: *A designer, engineer or consultant specifies an impossible species or quantity in a seed mix and sends it out to bid. Contractors or vendors, knowing the species is unavailable bid that species cheap expecting that an inexpensive substitute will be allowed in the end. Then, two days before the seeding, the contractor calls the engineer, complains that the seed isn't available but smooth brome or annual ryegrass will do just as well. Any ambiguity in any contract tends to favor the least conscientious fulfillment of that contract.*

A common factor in such scenarios is lack of communication between designers and implementers and the two most common reasons for lack of communication are professional chauvinism and lack of experience. This is just one example of many that I could use to illustrate a basic theme that frequent and comprehensive communication between designers, vendors and applicators creates realistic goals, clear expectations and rigorous oversight. The following discussion can be used to create a check list of what should be discussed before going to bid, what should be included in a seed bid and what oversight tools exist to verify proper implementation. (*Cont. on next page*).

² This article was a presentation and handout by the author at the Native Plant Summit held in Bismarck, North Dakota, 1999.

All external inputs such as hay-mulch, topsoil, fill and machinery should be evaluated for contaminants. Hay-mulch is notorious for harboring noxious weed seed. Mulch should be sifted for weeds and sent to a seed lab for identification. If your fill material or mulch contains yellow star thistle it's too late to practice safe seed. Machinery should be clean before entering the site. Built up mud on vehicles harbors weed seeds and is probably one of the top three vectors for seed dispersal, (hay, animals, vehicles).

Enough time must be incorporated into the project to allow all participants to do their jobs well. Compressed time-lines are one of the most common causes of poor results. For instance, if a seed dealer orders in seed for a project but doesn't have time to inspect the seed, or replace it if necessary before delivery, your chances of receiving substandard seed increases. Allow two weeks minimum delivery time, especially if you have a difficult seed mix with many unusual species. If samples are to be sent for testing, give yourself enough time to get results back before you plant. At all stages allow time for negotiation, adjudication, or re-ordering in a worst case scenario.

Seeding dates should reflect the needs of seedling establishment. Plan your job around the needs of the seed. As a general rule of thumb your seedlings should be at least six weeks emerged before the temperature climbs into the nineties, so if you find a project running late into the spring delay seeding until fall. Seed often will stay in the ground awaiting proper conditions to germinate but if it germinates late and dies in the summer, you lose your seed bank. For cool season grasses, forbs and shrubs the optimal seeding time is usually in the fall after the soil cools below germination temperature, but before spring rains arrive. Some species are more forgiving than others, so the nature of your seed mix can influence the window of opportunity greatly; as can aspect, soil type or probability of summer rain.

As requirements for reclamation and restoration seedings continue to grow, along with the demand for local ecotypes, be aware the seed industry may only supply several of the hundreds of species that grow on your site. Many species collections originate from areas that may not be

suitable for your site or your goals. Ask reputable authorities since the capability and needs of each species vary significantly. If the job requires unusual species or large quantities, call reputable seed companies and inquire about availability, quality and suitability. If you will need seed for which supplies may be problematical, broadcast your prospective need to as many dealers as you can to let them know of your expected future demand. You may have to change your seeding date to allow for a season or two of seed collecting. If enough dealers agree that it is possible to supply species and quantities as planned then go ahead with formulating your bid package. If you discover that the seed you wish may not be available, then designate an acceptable substitution before going to bid. Specify the conditions under which the substitution will be allowed.

Ask about incompatibility of species within the seed mix. Such incompatibilities may include presence of deep seeded species with surface seeded species in the same mix, seeds that will separate from each other in a drill leaving erratic coverage, or the inclusion of expensive diminutive species with cheap aggressive species. Be wary of dealers who always have every locally endemic ecotype you want, for it is my experience that all seed companies have limitations in this area. Discuss seeding rates. Some vendors have programs which can quickly determine seeds per square foot by species which can be used to reveal imbalances in the seed mix. Rates can vary depending on seeding method, applicator proficiency and site conditions. Going to bid before these steps are completed risks a corrupted bidding process, costly delays and poor performance.

Clear specifications should exist in any solicitation. Specs must include species scientific name, rather than common name like "Goldenrod;" pure live seed rates and total quantity required. Any unusual requirements you have such as furnishing test copies, testing dates, specific origins, weed content or species prohibitions should be stated. Also include minimum acceptable purities and germs, (or TZ's); desired bag weight; Certified or not; mixed or unmixed; bag weight; palletized or not; delivery dates; testing procedures; delivery costs; (*Cont. on next page*)

and ask for any extra costs such as mixing, bag charge, sales tax or inoculation fee.

The use of Certified seed deserves consideration for any project. Certified seed is usually higher quality than uncertified. Generally, higher quality seed is cleaner, has greater germination potential, better seedling vigor, fewer weeds and better shelf life. Certified seed reduces the risk of introducing alien species and also helps establish a chain of accountability that is important in bringing out the best in vendors and contractors. In seeding specs the term "certified seed" is ambiguous and frequently misused so bids should state, "blue-tagged Certified seed," to reduce confusion. Require the blue tags be on the bags, or with a blend, require the blue tags of individual constituents be sent with the mix. Mixes cannot be certified and many hand collected species are not certified or source identified as a matter of practicality. Blue tagged certified seed status does not exist for most native shrubs, wildflowers and for many native grasses. Blue-tagged Certified seed is usually more expensive than common seed and its requirement should be evaluated on a job by job basis. For example, Certified rosana western wheatgrass frequently contains some *Bromus tectorum*, while native western wheatgrass from some areas does not.

After seed arrives, check labels and weights for accuracy, origins and test dates. Check bags for stems, mildew or signs of dampness, tears, bugs and any other factors that could interfere with germination or flowability in seeding equipment.

If seed is to be tested, draw samples and send them to a seed lab. Be sure you know the proper method for sampling or call a State seed inspector. Seed tests measure purity, germination and weed or crop content. Standard operating procedure should include sending the seed to a lab for a noxious weed test which is inexpensive and quick. Test results should be interpreted with established tolerances in mind and an understanding of factors that could skew results. Red flags on a seed test would be absence of key species in a mix, especially the rare and expensive ones, large presence of cheap or unordered species, presence of noxious weeds, or significant deviations between advertised purity /germination and test results. Tests are intended to be

statements of probability and should be interpreted with care. If discrepancies appear on seed tests, ask vendor for an explanation before you form an opinion.

Germination requirements and protocol have not been established for many native species, particularly shrub and forbs. Consequently some seeds should not be germinated but should be submitted for a tetrazolium test instead. The TZ is quick, (a germination test may take 30 days or more), and measures the respiratory byproducts of a seed. Very hard seeded or dormant species such as snowberry or penstemon should always be Tzed. If possible, seed should be sampled and tested before mixed. If a problem arises it is much easier to pinpoint an offending seed lot and negotiate a solution than after the seed has been mixed.

Many issues in seed testing undermine the definitive results that we would all like to see on a seed test, but in spite of these issues, testing is the only way to insure compliance over the broad spectrum of vendors and contractors. Common seeds of high purity and germ tend to yield fairly uniform analysis results while trashy, uncommon seed tend to vary greatly from one test to another. Sometimes, it is much an art as a science to know what test variations are significant, but a good seed lab can help you interpret results.

Seeding failure can occur from lack of oversight of the seed applicator. Seed should usually be planted into a firm seed bed in which your shoe heel leaves no more than 1/4 inch indentation. Check seed depth as it is being place into the ground for optimal seed placement. More than one depth may be required, and the seeding contractor should have the equipment capable of planting to two depths for say, grasses and legumes. Be sure drill row orientation minimizes the threat of erosion and that amendments or straw have been properly incorporated.

Even under the best of plans applied in the best possible way, future rainfall events will determine the extent of your success or failure. So, as a last measure, consider prayer as an integral part of seeding success! RD2





continued from p. 1

Also in 2007, the two long-awaited *Flora of North America* volumes on grasses were released. Western wheatgrass is in Volume 24, along with the key to the entire Grass family (Poaceae). Volume 25 contains all tribes with warm-season grass species, like blue grama. The grass volumes were initiated prior to the *Flora of North America* (FNA) project, as sequel to Hitchcock (1950). They have features that differ from other FNA volumes. Besides the printed volumes, a grass manual with more detailed distribution maps, the illustrations and text has been posted on the web by Utah researchers, linked at: <http://hua.huh.harvard.edu/FNA/volumes.shtml>. The grass volumes also break with the FNA tradition by including species that are strictly agricultural crops. It is a fitting exception for a family of plants that feeds the world. BH

Hitchcock, A.S. (rev. A. Chase). 1950. *Manual of the grasses of the United States*. USDA Miscellaneous Publication No. 200. Washington, DC.

The Wyoming Native Plant Society is a non-profit organization established in 1981, dedicated to encouraging the appreciation and conservation of the native flora and plant communities of Wyoming. The Society promotes education and research on native plants of the state through its newsletter, field trips, and annual student scholarship award. Membership is open to individuals, families, or organizations. To join or renew, return this form to:

Wyoming Native Plant Society
P.O. Box 2500, Laramie, WY 82073

Name: _____

Address: _____

Email: _____

- \$7.50 Regular Membership
- \$15.00 Scholarship Supporting Member
(\$7.50 goes to the Markow Scholarship Fund)

Check one:

- Gift membership
- New member
- Renewing member

Renewing members, check here if this is an address change.

Wyoming Native Plant Society
P.O. Box 2500
Laramie, WY 82073