



United States Department of Agriculture

**Great Basin
Plant Materials Center**
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2016 Annual Progress Report of Activities

January 2017

Who We Are

The Great Basin Plant Materials Center (GBPMC) is one of 25 Plant Materials Centers (PMC) operated by the USDA-Natural Resources Conservation Service (NRCS). Each PMC is strategically located in an ecologically distinct area, creating a network of PMCs uniquely positioned to address local, regional, and national natural resource concerns. Our objective is to evaluate plants and vegetative technologies to support NRCS conservation programs and practices. The GBPMC is specifically tasked with resource concerns in the Great Basin, with a focus on rangeland restoration, soil health, and water conservation.



Figure 1: The GBPMC Greenhouse

The GBPMC opened in 2006 and is the newest PMC in the nation. We are located in a cold desert in the rain shadow of the Sierra Nevada Mountains where we receive about five inches of annual precipitation, mostly in the winter. We manage 84 flood irrigated acres, 36 non-irrigated acres, and an occasional off-center field trial.

Staffing Changes



Dr. Eric Eldredge Retirement

After 7 years managing the GBPMC, Dr. Eric Eldredge has decided to retire. Eric started with the NRCS in 2008 and has been the PMC Manager for most of this center's existence. He oversaw the development of the GBPMC, including center improvements such as the greenhouse, equipment shed, and necessary field equipment. He brought with him an expertise in study design and a passion for scientific inquiry. Thank you Eric for all you have done. You will be greatly missed.

Figure 2: Dr. Eric Eldredge standing under 'Tropic Sunn' Sunn Hemp.

Interim GBPMC Manager



We would like to thank John Reilley for being the Interim GBPMC Manager from June-August. John is the Manager at the Kika de la Garza Plant Materials Center in Texas and took the detail to assist with our manager transition. Though he was only here a short time, his expertise and experience was essential for maintaining a smooth transition between managers. Thank you John.

Figure 3: John Reilley, Manager of the Kika de la Garza Plant Materials Center



New GBPMC Manager

Please join us in welcoming Christopher Bernau as the new Manager of the GBPMC. Christopher was hired as our Rangeland Management Specialist in January 2016. He served as the acting Plant Materials Center (PMC) manager as Dr. Eldredge left and then became manager at the beginning of the fiscal year. Christopher is excited about this new position and looks forward to working with everyone.

Figure 4: Christopher Bernau, Manager of the GBPMC

Plant Releases

Agricultural Research Service: ‘Fanny’ Searl’s Prairie Clover



Figure 5: ‘Fanny’ Searl’s Prairie Clover in row fabric at the GBPMC.

[Introducing the release of ‘Fanny’, a Searl’s Prairie Clover \(*Dalea searlsiae*\)](#). This planting was part of a collaborative project headed by the USDA-Agricultural Research Service (ARS) in Logan, Utah, to develop a legume for commercial release. The source seed was collected in 2005 in Patterson Pass in MLRA28A, just south of Ely, Nevada. In 2012, 980 greenhouse grown plugs were planted in protective row fabric and evaluated for growth, survival, and seed production. ARS was able to release ‘Fanny’ in November 2015 and it will be available from commercial providers in the near future.

The benefits of ‘Fanny’ is that it is a forb, a legume, a great pollinator plant, good forage for wildlife and livestock, and was collected in Nevada. These characteristics make ‘Fanny’ potentially useful to any seed mix for conservation, pollinator planting, or restoration in Nevada.

GBPMC Studies

Commercial Variety Trial

The commercial variety trial is a study evaluating 40 commercially available bunch grass varieties for survival in a cold desert with low annual precipitation. In 2016, a spring and fall trial were planted in sandy soil at the GBPMC. Both trials are non-irrigated with four replications in a randomized complete block design. The fall trial was accompanied with a non-replicated greenhouse established seedling demonstration trial.



Figure 6: Mat Humphrey planting greenhouse plugs of 40 bunchgrass varieties.

Plants chosen were grasses commonly used in rangeland restoration such as Sandberg bluegrass, crested wheatgrass, bottlebrush squirreltail, and Indian ricegrass. The development of these varieties was extensive and took place in surrounding Plant Materials Centers. Since development was conducted outside of Nevada, it is important to determine if any of these grasses are particularly adapted to our desert environments. Data collection in the study will include germination, biomass, and seed production.

Preliminary results indicate low germination and low success in the spring trial. The planting occurred on April 19 and received 0.7 inches of rain on May 7th, 0.21 inches on May 24th, then received no recordable

precipitation until October 16th. It is likely that the low precipitation limited plant survival. However, we may see some germination over the winter.

The fall trial was planted on October 27th, ten days after a 0.8 inch precipitation event and the morning before another 0.45 inches.



Figure 7: *Poa secunda* planted in row fabric

Forest Service *Poa secunda*

The US-Forest Service *Poa secunda* trial is a continuation of an older collaborative study between the USFS and GBPMC. In 2010, the Humboldt-Toiyabe National Forest collected seeds of 190 maternal plants from 38 locations. These were planted in a garden trial at the GBPMC. Initial survival was low, but two accessions (#10 and #14) appeared to perform better than varieties ‘High Plains’ and ‘Opportunity’. Seeds of the superior performing *Poa* were collected and subsequent generations were planted over the next few years.

The trial has two objectives: 1) produce seeds for a future rangeland trial and 2) evaluate performance against five *Poa* varieties; ‘Opportunity’, ‘Service’, ‘High Plains’, ‘Sherman’, and ‘Canbar’.

On September 7th 2016, seeds were planted in containers and grown in a greenhouse for 83 days. Plugs were planted in plastic row fabric on November 29th; 91 plugs of #10, 97 plugs of #14, and 14 plugs of each variety. Both biomass and seed production will be evaluated over the next year.

One additional note is that the *Poa secunda* took longer than expected to reach a size suitable for transplant. Early to mid-August would have been a better date to initiate greenhouse development.



Figure 8: *Poa secunda* greenhouse plug ready for transplant

Cover Crops



Figure 9: Cover crop trial with 60 varieties.

Cover crops continue to be a key component of the National Soil Health Initiative. The benefits of cover crops include reduced erosion, increased organic matter, increased water holding capacity, improved soil structure, organic tilling such as with radishes, and nitrogen fixing with legumes.

The National Cover Crop trial is currently conducted at multiple PMCs across the nation. Our participation in the study and has expanded with the planting 60 varieties of cover crops (Appendix

A) as opposed to last year's 34 varieties. This trial will be non-irrigated, replicated four times in a randomized complete block design.

Emergence data 28 days after planting found greater than 90% germination for all black oats, all cereal rye except 'Guardian', and all daikon radishes except 'Groundhog'. Winter pea, hairy vetch, and crimson clover results were variable, but all performed better than 65%, with the exception of 'AU sunup' crimson clover which had no emergence. Red clover performed relatively poor with most varieties between 30-60% germination. Red clover varieties 'Dynamite' and 'Wildcat' were exceptions with 90% and 65-80% germination respectively. Finally, Balansa clover performed the weakest of all the cover crops, with almost no germination for both 'Fixation' and 'Frontier' (Figure 10).

Data collecting will continue on the cover crops for winter survival, herbivory, insect damage, biomass, and flowering time.

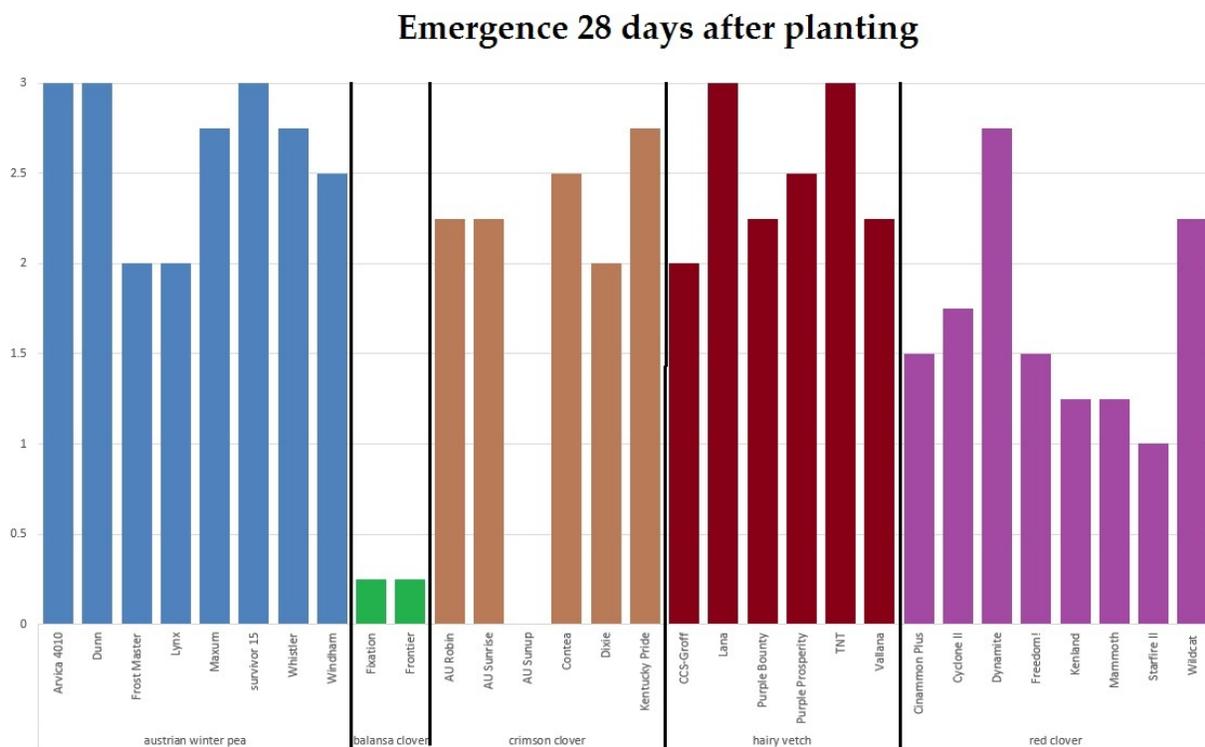


Figure 10: Emergence 28 days after planting for Austrian winter pea, Balansa clover, crimson clover, hairy vetch, and red clover.. 0=poor (<25% germination); 1=moderate (30-60% germination); 2=good (65-85% germination); 3=excellent (90-100% germination).

Appendix A: The 60 Cover Crop Varieties

Common Name	Genus species	Variety	Common Name	Genus species	Variety
Black oats	<i>Avena strigosa</i>	Cosaque Soil Saver			Aroostook Bates
Austrian winter pea	<i>Pisum sativum</i>	Arvica 4010 Dunn Frost Master Maxum Whistler Windham Lynx survivor 15	Cereal rye	<i>Secale cereale</i>	Brasetto Elbon FL 401 Guardian Hazlet Maton Maton II Merced Oklon Prima Rymin Wheeler Wintergrazer 70 Wrens abruzzi
Daikon radish	<i>Raphanus sativus</i>	Big Dog Concorde Control Defender Driller Eco-till Groundhog Lunch Nitro Tillage Graza Sodbuster Blend	Red clover	<i>Trifolium pratense</i>	Cinammon Plus Cyclone II Dynamite Freedom! Kenland Mammoth Starfire II Wildcat
Crimson clover	<i>Trifolium incarnatum</i>	AU Robin AU Sunrise AU Sunup Contea Dixie Kentucky Pride	Hairy vetch	<i>Vicia villosa</i>	CCS-Groff Lana Purple Bounty Purple Prosperity TNT Vallana
Balansa clover	<i>Trifolium michelianum</i>	Fixation Frontier			