2015 National Native Seed Conference

Native Plant Materials Development, Production & Use in Habitat Restoration

Program & Schedule of Activities

Santa Fe, New Mexico
April 13 - 16, 2015

Institute for Applied Ecology

Drs. Johnson, Jensen, Jones, and Staub from the Forage and Range Research Laboratory (FRRL) attended the 2015 Native Seed Conference in Santa Fe NM on April 13-16. The conference was entitled, “Native plant materials development, production, and use in habitat restoration”. The goal of the conference was to connect research, industry, land management, and restoration professionals, providing the premier opportunity to develop relationships and share information about the collection, research, and development, production, and use of native plant materials. FRRL scientists represented the USDA, ARS on panel discussions (Jensen) and in presentation of original research (Jones, Johnson, and Staub; see abstracts).

Conference Schedule

MONDAY	
8:00AM-5:00PM	**Field Trip: Los Lunas Plant Materials Center** – *Meet in Zia Ballroom C at 8:00am*
8:30AM-5:00PM	**Field Trip: Fire Management and Fire Rehabilitation** – *Meet in Zia Ballroom C at 8:30am*
9:00AM-5:00PM	**Field Trip: Pueblo of Santa Ana Native Plant Nursery and Bosque Restoration** – *Meet in Zia Ballroom C at 9:00am*
1:00PM-5:00PM	**Field Trip: Leonora Curtin Wetland Preserve** – *Meet in Zia Ballroom C at 1:00pm*
7:00PM-9:00PM	**Welcome Reception, Anasazi Ballroom. Featured speaker: Thor Hansen,** *The Triumph of Seeds*

TUESDAY AM			
	ANASAZI BALLROOM		
8:00	**Rob Fiegener** Welcome & Introduction		
8:10	**Peggy Olwell & Kay Havens** National Seed Strategy		
8:50	**Ken Parker** Native Plant Policy		
9:30-10:00	***break***		
	ANASAZI SOUTH	**ZIA BALLROOM**	**ANASAZI NORTH**
10:00	**National Seed Strategy Workshop** *Peggy Olwell & contributors to the National Seed Strategy*	**Collecting crop wild relatives: an emerging priority** *Stephanie Greene*	
10:20		**Establishing a Regional Seed Bank in the Mid-Atlantic: Accomplishments and Challenges** *Clara Holmes*	
10:40		**Implementation of a Colombian tropical high mountain conservation seed bank: limitations and challenges** *Laura Victoria Perez-Martinez*	
11:00		**Catching the Wave -Timing, Synchronicity and Collaboration Get Seed Storage Moving in Hawaii** *Margaret Clark and Sheri S. Mann*	
11:20		**Seed Collection in Southeast Arizona National Parks** *Steve Buckley*	
11:40-1:10	***Lunch (on your own)***		

TUESDAY PM			
	ANASAZI SOUTH	**ZIA BALLROOM**	**ANASAZI NORTH**
1:10	**Managing seed quality through the collection and storage phase** *David Merritt*	**Lessons Learned from a Native Seed Increase Program in Boulder, Colorado** *Claire De Leo*	**Plant Community Creation** *David Thomson*
1:30	**The necessity of understanding seed dormancy to improve large-scale biodiverse restoration efforts** *Todd E. Erickson*	**You reap what you sow: five years of native seed farming in Orange County, California** *Jutta C. Burger*	**Analysis of phenology relationships to evaluate temporal niche occupation and inform plant materials selection to restore ecological functions.** *Daniel Mummey*
1:50	**Developing a systems model to forecast and manage dryland restoration outcomes** *Jeremy James*	**Optimizing *Heteropogon contortus* seed harvest timing through sequential harvesting and characterization of flowering tillers** *Orville C. Baldos*	**Choosing plants for pollinators - research on ecological functioning of pollinator habitat restorations can inform native plant materials development.** *Kimiora Ward*
2:10	**Seed enhancement technologies for restoring native plants in the Great Basin** *Matthew Madsen*	**Selection of Native Grass/Forb Species bio-types for Restoration–Spatial Scale Significance from the Field Unit to the Landscape** *Douglas Kendig*	**Bee Flat Canyon: A case study in producing functionally diverse seed mixes using locally sourced plant material** *Matthew Garrambone*
2:30	**Restoration without borders: Can seed enhancement technologies transfer across global arid systems?** *Olga A. Kildisheva*	**DIY Equipment Projects at the Seed Nursery** *Jenella Hodel*	**Managing Restored Wetland Prairies for Native Diversity and Resistance to Invasion: An Experiment Comparing Burning, Grazing, Haying and Mowing as Management Treatments** *Thomas N. Kaye*
2:50-3:20	***break***		
3:20-5:00	**The Right Seed at the Right Time: Issues of Scale in Native Seed Production** *Moderators: Pat Miller & Rob Fiegener* *Panelists: Andrea Kramer, Bill Agnew, Brad St.Clair, Dustin Terrell, Kevin Jensen, Mark Mustoe, Troy Wood*		**Workshop: Seed cleaning and handling equipment** *Bob Karrfalt and Kelly Schultz*
5:15-7:00	**Poster & Exhibit Session**		

WEDNESDAY AM			
	ANASAZI BALLROOM		
8:00	**Spatial climate trends in western vegetation: Implications for restoration** *Healy Hamilton*		
8:45	**USA National Phenology Network: Building Capacity and Data Products in Support of Conservation** *Jake Weltzin*		
	ANASAZI SOUTH	**ZIA BALLROOM**	**ANASAZI NORTH**
9:30- 10:00-	***break***		
10:00	**Advantages and Disadvantages of Cultivars in Ecological Restoration** *Kristina M. Hufford*	**Integration of the BLM Seeds of Success Program and academic partnerships to restore ecological diversity and structure of general and pollinator habitat for a rare Idaho endemic plant.** *Anne Halford*	**Seed Connoisseur Revisited** *Stanford Young*
10:20	**Predicting the effects of climate change on bunchgrass populations using common garden studies** *Francis Kilkenny*	**Native Plant Material Development in the BLM Idaho Shoshone Field Office** *Danelle Nance*	**Bridging the gap between academia and industry: using current regulations and practices to develop a certification scheme for native plant species in Europe** *Holly Abbandonato*
10.40	**Landscape genomics of Mojave Desert plants: a multivariate, spatial approach to guide restoration** *Daniel F. Shryock*	**Oregon Gulch Wildfire – Native Grass/Forb Restoration Seeding with Jackson County Community Justice** *Mason London*	**Workshop: Seed Moisture and Seed Storage** *Robert Karrfalt*
11:00	**Squirreltail populations differ greatly in establishment ability in dry, invaded field sites** *Elizabeth A. Leger*	**Sage Grouse Habitat Conservation through Prisons** *Stacy Moore*	
11:20	**Alternative methods for delineating seed transfer zones: comparisons of genetic and common garden data** *Taylor Crow*	**Growing Our Futures: Native Plant Horticulture Training** *Michael E. Keefer*	
11:40- 1:10	***Lunch (on your own)***		

WEDNESDAY PM			
	ANASAZI SOUTH	**ZIA BALLROOM**	**ANASAZI NORTH**
1:10	**Simulating seed harvest with population models: How do species with different life history traits respond to seed harvest?** *Justin Meissen*	**Introduction: Native Species Conservation through Tribal Plant Materials Programs** *Melanie Gisler*	**The surprising challenges of seed reproduction in clonal wetland plants: implications for revegetation** *Karin Kettenring*
1:30	**Small things matter: Guidance for protecting genetic diversity in restoration of rare plant species** *Deborah Rogers*	**Integrating Traditional Ecological Knowledge into the Target Plant Concept: a mechanism for native plant restoration.** *Jeremy Pinto*	**Prechilling increases germination of basalt milkvetch seed** *Thomas Jones*
1:50	**How to improve the effectiveness of sampling protocols for ex situ conservation seed collections** *Sean Hoban*	**Natural Resource Conservation Service - Delivering Results for Agriculture and Conservation through Effective Vegetation.** *Bernadette Cooney*	**Promotion of Seed Germination and Seedling Performance in Selected Kuwaiti Native Plants by Extracts of Moringa Leaf, Seaweed and Yeast** *N.R. Bhat*
2:10	**Genetic risk assessment for sampling and use of native seed: the example of the UK Native Seed Hub** *Michael Way*	**Creating healthier communities through native culture and permaculture practices.** *Roxanne Swentzell*	**The effect of seed production farms: intra-cultivar differences in performance depend on storage and planting environments** *Erin Espeland*
2:30	**Restoring species diversity: Are vulnerable plant species falling through the cracks?** *Abbey White*	**Food is Our Medicine Project: Restoring culturally significant plants and maintaining traditional food ways for community health and well-being.** *Ken Parker*	**Species and population-level variation in germination strategies of cold desert forbs** *Sarah C. Barga*
2:50-3:20	***break***		
3:20	**Project Milkweed: A Collaborative Model for Native Seed Production** *Brianna Borders*	**Restoring native perennial herbs while retaining shrubs in Great Basin sagebrush communities** *Kari E. Veblen*	**Panel: Global networking to benefit native seed production: exchanging experiences and production models** *Costantino Bonomi* *Kingsley Dixon* *Giles Laverack* *Candido Galvez*
3:40	**From Pod to Prairie: Restoring Milkweed to an Agricultural Landscape** *Gregory Houseal*	**Understanding the role of resource limitation in restoration of sagebrush ecosystems invaded by cheatgrass** *Jeanne C. Chambers*	
4:00	**Wildflowers on the Range: Managing grazing lands for monarchs and other pollinators** *Anne Stine*	**Getting the Right Seed in the Warehouse: Increasing the Availability of Native Seed in the Great Basin** *Sarah Kulpa*	
4:20	**Monarch Butterfly and Pollinator Conservation in the Southwest** *Julie McIntyre*	**Improvement in colonization and seedling survival of Wyoming big sagebrush seedlings following inoculation with native arbuscular mycorrhizae** *Marcelo D. Serpe*	

4:40	**Sanctuary in the high desert: Partnering to restore Monarch butterflies and their habitat in central Oregon** *Matthew Horning*	**Increasing the Availability and Utilization of Native Plant Materials for Sage-grouse Habitat Restoration on the BLM Boise District** *Joseph Weldon*	
5:00	**Discussion**	**Advantages of utilizing native plants in fuel break planning** *Mark Williams*	

WEDNESDAY PM	
	ZIA BALLROOM
7:30-9:30	**Film Screening & Discussion: SEEDS OF TIME (77 minutes)**

THURSDAY AM			
	ANASAZI SOUTH	**ZIA BALLROOM**	**ANASAZI NORTH**
8:00	**Plants, pollinators, and policy** *Peggy Olwell*	**Collection and evaluation of Galleta grasses for restoration of Upper Eastern Mojave Desert ecosystems** *Jack E Staub*	
8:20	**The importance of rare forbs as pollinator resources in depauperate plant communities** *Kayri Havens*	**Evaluating seed transfer of southern California shrubs in the face of climate change** *Arlee M. Montalvo*	
8:40	**Using the past to inform future seed mixes for pollinator health** *A.T. Kramer*	**Utah Trefoil (*Lotus utahensis* Ottley): North American Legume for Rangeland Restoration/Revegetation in the Southern Great Basin and Colorado Plateau of the Western U.S.A.** *Douglas A. Johnson*	**Open Forum: Stewards of the Wild: What future awaits these seeds?** *Kay Evelina Lewis-Jones*
9:00	**The effect of native wildflower habitat on beneficial insects and their services** *Brett Blaauw*	**Evaluation of fitness and functional traits of Colorado Plateau blue grama grass (*Bouteloua gracilis*): implications for seed line development and transfer guidelines** *Troy Wood*	
9:20	**Evaluating the use of pollinator host plants in restoration projects** *Randy Mandel*	**Can experienced genotypes improve grassland restoration outcomes?** *Nora E. Talkington*	
9:40-10:10	***break***		

10:10	**Seeds of Success: National Program Overview** *Megan Haidet*	**Comparison of post-fire seeding techniques for big sagebrush** *Jeff Ott*	**Locally developed, native perennial bunchgrass enhancement and restoration in northcoast California grasslands** *Jennifer Wheeler*
10:30	**SOS Collectors' Perspective** *Douglas Kendig*	**Transplanting Wyoming Big Sagebrush into Northern Nevada Grass-dominated Sites** *Kent McAdoo*	**NYC's Municipally Owned Native Plant Center** *Jeremy LaPointe*
10:50	**The Secret Life of Seeds: Highlighting Successes, Challenges and Opportunities** *Kayla Herriman*	**Effects of Sowing Date on Native Plant Establishment** *Amy Bartow*	**Upper Colorado Environmental Plant Center: Four Decades of Native Plant Material Development** *Steve Parr*
11:10	**Western Regional Plant Introduction: Where SOS Meets NPGS** *Michael Cashman*	**Restoring Peatlands Using Native Seeds, Sheep Dung and Daglocks in the Falkland Islands** *Stuart W. Smith*	**Restoring the Understory: Researching, testing, developing and outplanting plant material for the new frontier.** *Marsha Holt-Kingsley*
11:30	**Successes and Challenges with SOS Samples at the National Center for Genetic Resources Preservation** *Annette Miller*	**Seeding Big Sagebrush (*Artemisia tridentata* Nutt.) in Utah** *Danny Summers*	**Evaluating Success in a Maturing Plant Materials Program** *Diane Steeck*
11:50-1:10	***Lunch (on your own)***		

THURSDAY PM			
	ANASAZI SOUTH	**ZIA BALLROOM**	**ANASAZI NORTH**
1:10	**How well do provisional seed zones pair basin wildrye seed sources to restoration sites?** *Scott Jensen*	**Seed storage behavior of Hawaii's native flora** *Marian M. Chau*	**Workshop: Ecological Restoration Concepts in Seed Mix Design** *Christine Taliga*
1:30	***Poa secunda* genetics: a comparison of local and commercial plant materials** *Alanna N. Shaw*	**Evaluating the germination response of mass separated *Rudbeckia mollis* seeds exposed to heat and aging stress** *Nicholas Genna*	
1:50	**Genetic changes associated with ex situ native plant propagation and consequences for reintroductions: case study in *Castilleja levisecta*.** *Adrienne Basey*	**Seed Longevity in the California Flora** *Evan Meyer*	
	ANASAZI SOUTH		
2:30	**Concluding Remarks** *Rob Fiegener* Key findings, lessons learned, and future directions: a conference synthesis Award Ceremony		
3:00-4:30	**Reception**		

Understanding the role of cross- vs self-pollination in genetic diversity of grasses

Kevin Jensen, ARS

With the increased emphasis to use native plant materials in range revegetation programs the use of improved native plant materials often becomes a source of controversy. Surrounding this controversy is typically the question – does selection of better performing genotypes reduces the genetic diversity within the selected native grasses? This presentation describes the difference in population structure between self- and cross-pollinated grasses and how that may affect selection within each type. As a general rule, cross-pollinating grasses have 70% of their genetic variation within a population with 30% between populations. Using AFLP, 27 and 73% of the total variation was between populations and within populations of Snake River wheatgrass (Elymus wawawaiensis J. Carlson & Barkworth), respectively. Similar trends were reported in bluebunch wheatgrass [Pseudoroegneria spicata (Pursh) Á. Löve] at 15 and 67% between and within populations, respectively. Conversely in California bromegrass [Bromus carinatus Hook. & Arn.], which is self-pollinating, 5% of the variation was within populations and 95% between populations, opposite that of cross-pollinating grasses. In general, selection for seedling establishment, traits associated with seed yield, and persistence in bluebunch and Snake River wheatgrass did not reduce the genetic diversity within the selected population when compared to the unselected population. Data suggests that the number of individuals used in the first selection cycle can influence the genetic diversity within the selected populations.

Dr. Jensen is a Research Geneticist at the USDA-ARS-Forage and Range Research Lab; Logan, UT and has successfully combined the disciplines of cytogenetics, taxonomy, and genetics in systematically characterizing genomic and phylogenetic relationships within and among grasses in the Triticeae tribe. This technical information has contributed directly to the development and release of more than 20 grass cultivars and germplasms. These plant materials are having a major economic impact through seed and forage production and soil conservation on semi-arid rangelands and irrigated pastures.

Wednesday 1:30 – Anasazi North

Prechilling increases germination of basalt milkvetch seed

Thomas Jones, Douglas Johnson, Kevin Connors, Robert Smith, and Shaun Bushman

Few native forb plant materials are commercially available for seeding. The forb basalt milkvetch (*Astragalus filipes* Torr. ex A. Gray) has emerged as a promising restoration species candidate due to its favorable seed-production qualities, but germination in field and laboratory studies has been poor. For this experiment, 100 seeds of A. filipes NBR-1 Germplasm were either sandpaper-scarified or unscarified, either prechilled at 5oC for 3 weeks or not prechilled, and placed in a germination box on either sand or blotter paper. Germination counts were made every week for 10 weeks. This entire experiment was repeated two additional times. Germination percentages for prechilled (non-prechilled) averaged 19.2 (3.2), 22.3 (8.5), and 27.5 (15.3) at 1, 5, and 10 weeks, respectively. Thus prechilling of A. filipes seed increased both percentage germination and germination rate. The most beneficial treatment effect at 1 week was prechill, which declined over time, and sand at 10 weeks, which increased over time. At 5 weeks, the benefits of prechill, scarification, and sand were similar. In the only significant treatment interaction, sand was more beneficial without prechill than with prechill at both 5 and 10 weeks, but no interaction was seen at 1 week. A combination of prechill, scarification, and sand substrate always resulted in the highest germination. A field study at 2 locations corroborated laboratory results. Six months after spring planting, establishment of seed acid-scarified for 5 minutes and seed acid-scarified plus prechilled for 2 weeks averaged 2X and 9X greater than the untreated control, respectively.

Thursday 8:00 – Zia Ballroom

Collection and evaluation of Galleta grasses for restoration of Upper Eastern Mojave Desert ecosystems

Jack E Staub and Matthew D. Robbins*

Invasive grass-fire cycles are increasing in frequency, size and intensity in the Mojave Desert. These fires destabilize desert ecosystems such that native flora often recover slowly or not at all. Efforts to restore burned Mojave shrublands have largely been unsuccessful because of exotic weed invasion (e.g., red brome grass). Thus, there is a need to identify highly competitive, fire resilient, native flora that can be used in restoration to mitigate the adverse effects of wildfires in the Upper Eastern Mojave Desert. Therefore, a cooperative effort between the USDA ARS, state and county institutions (private and public) was initiated in 2010 to collect and evaluate native grasses and sub-shrubs for their competitiveness and fire resilience in the Beaver Dam Wash and the Red Cliffs Desert Reserve near St. George, UT. Native big galleta (BG; *Pleuraphis rigida*) and James' galleta (JG; *Pleuraphis jamesii*) collections were made in UT [BG (9), JG (25)], CO [BG (0), JG (3)], AZ [BG (15), JG (11)], NV [BG (22), JG (0)], and CA [BG (2), JG (0)]. Their genetic diversity (AFLP analysis) and their relative competitiveness (i.e., stand establishment and persistence) and fire resiliency under variable fuel loads are being assessed. Initial assessments indicate that genetic diversity exists among and between species and collection sites, and that they differ in persistence and fire resilience. Such characteristics make them attractive for pre-variety germplasm release and/or phenotypic selection that increase their competitiveness with invasive weeds and enhance their value as restoration species in the Mojave Desert.

Dr. Jack Staub is the research leader for the Forage and Range Research Laboratory whose area of research is plant breeding and plant genetics. He develops native perennial grasses for rangeland and turfgrass applications. For rangelands, he is interested in fire resilient plant materials that can be used in green strips and for restoration of disturbed landscapes in the Mojave Desert and the Great Basin regions of the western United States.

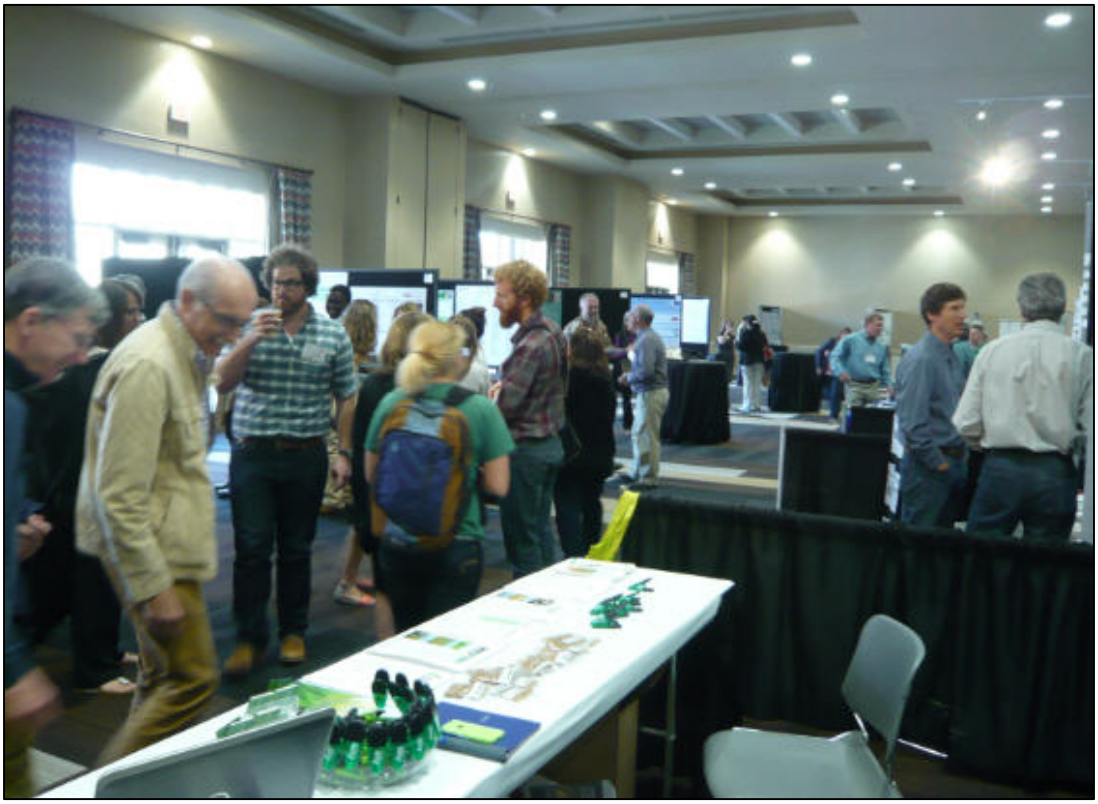
Thursday 8:40 – Zia Ballroom

Utah Trefoil (*Lotus utahensis* Ottley): North American Legume for Rangeland Restoration/ Revegetation in the Southern Great Basin and Colorado Plateau of the Western U.S.A.

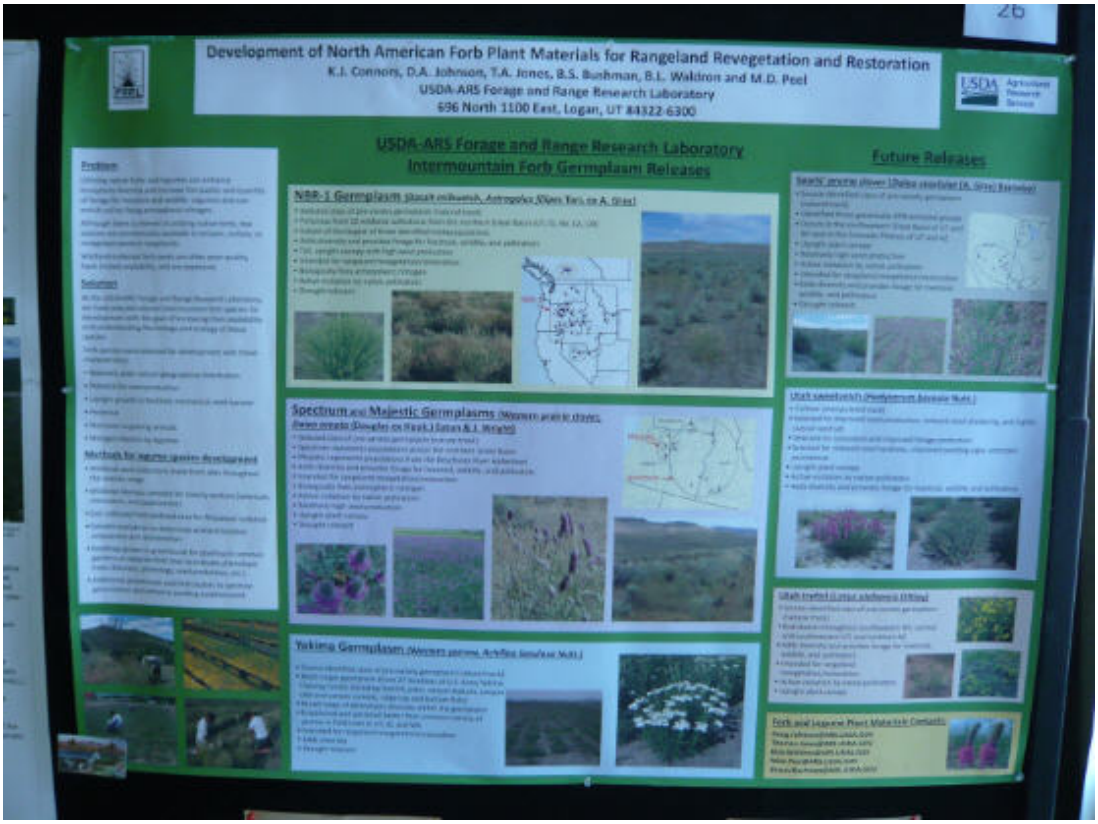
Douglas A. Johnson, J. M. Stettler, B. S. Bushman, K. J. Connors, J. W. MacAdam, and T. A. Jones*

Wildfires, weed invasion, and various land uses have created a need for revegetation/restoration of rangeland ecosystems in the Intermountain Region of the western U.S.A. These rangelands may require revegetation/restoration to improve degraded conditions, speed recovery after wildfires, minimize soil erosion, and enhance wildlife food and habitat. Legumes native to the Intermountain Region are of particular interest because they are adapted to these climatic conditions and ecosystems, have the potential to biologically fix nitrogen, and provide high-protein food for juvenile and adult sage-grouse and native pollinators. However, seeds of few North American legumes are commercially available for revegetation/restoration projects in the Intermountain Region. Utah trefoil (*Lotus utahensis* Ottley) is a legume species native to the southern Great Basin and Colorado Plateau. Seeds were collected from 19 sites throughout its distribution, plants were germinated and grown in a greenhouse, and transplants were established in common gardens at three sites in northern Utah during May 2013. Plant development, genetic diversity, morphological and physiological characteristics, and tannin content are being evaluated for each of the collections. Preliminary results have shown considerable variation in flower morphology and growth habit, and generally high tannin concentrations with a wide range in their degree of polymerization. Results from these studies will form the basis for one or more germplasm releases of Utah trefoil.

Dr. Douglas Johnson giving an oral presentation on Utah Trefoil, a new native forb species that is being assessed for its rangeland qualities.



Exhibition hall exhibit, posters, and conversations.



Scientific Poster of work at the Forage and Range Research Laboratory on the development of native forb species for rangeland restoration.