The Great Basin Native Plant Selection and Increase Project Nancy Shaw, USFS Rocky Mountain Research Station, Boise, ID

THERE A DURING A SIL OF ELECTION



FEDERAL INTERAGENCY NATIVE PLANT MATERIALS DEVELOPMENT PROGRAM

USDA and USDI strategy for addressing short and long-term native plant needs

BLM GREAT BASIN RESTORATION INITIATIVE

Proactive, landscape-scale restoration program

GREAT BASIN NATIVE PLANT SELECTION AND INCREASE PROJECT

Collaborative public/private plant materials program

Native Plant Program Elements:

- Needs assessment/species selection/genecology/plant materials
 Which, from where, and how much?
 What about climate change?
- Cultural practices

For agricultural seed production

Ecological restoration

Multiple disturbances – multiple species – multiple issues

Science delivery

Where's the info?



GREAT BASIN NATIVE PLANT SELECTION AND INCREASE PROJECT:

Progress from Partnerships...







RESEARCH

SPECIES SELECTION: Seed Collection





Common garden studies



Irrigation studies



GERMPLASM

CONSERVATION



USDA

ටින

pca

ton cyaneu

Seed Need Assessments:

- Project cooperators
- Other partners
- Seed industry
- Research

Plant Materials:

Great Basin Provisional Seed Zones

Based on:

- Minimum winter temperature
- Aridity (annual heat:moisture index)
- Omernik ecoregions
- Other resources and local knowledge
- Pooled seed sources



A. Bower et al.

Ecological Genetics - Species-specific Seed Zones Evidence for adaptation –

Correlation between traits and source environments

B. St. Clair et al.: Bluebunch wheatgrass

Collect seed from many sources





Grow families in

common environments





Climate	Dry wt	Heading date	Leaf for
Annual temp	0.28	-0.36	0.
Warmest month	0.22	-0.33	0.48
Coldest month	0.37	-0.37	0.37
Temp differential	-0.31	-0.09	0.53
Precip	0.33	0.07	-0.48
Aridity	0.07	-0.36	0.58
Latitude	0.33	-0.32	0.11
Elevation	-0.20	0.37	-0.40



Measure many adaptive traits

Trait vs source environment

Species-specific Seed Zones

Grasses Basin wildrye Bluebunch wheatgrass Idaho fescue Mountain brome Saltgrass Sandberg bluegrass Squirreltail

Forbs Dusty maiden Fernleaf biscuitroot Hoary aster Royal penstemon Silverleaf phacelia Sulphur-flower buckwheat Tapertip onion

Shrubs Antelope bitterbrush Big sagebrush Fourwing saltbush



R.C. Johnson et al. (2012)

Climate Change - Dynamic Seed Zones

Present

2060



B. St. Clair et al. (2005)

WESTERN WILDLAND ENVIRONMENTAL THREAT ASSESSMENT CENTER

SEED ZONE MAPPER

Provisional Seed Zones

- Nation wide
- Regional

Empirical Seed Zones

- Maps
- Literature

Map Formats

- GeoBrowser
- Google EarthGeoBrowser
- Google Earth KML
- MXD (Arc Map)



Cultural Practices for Agricultural Seed Production



Royal penstemon average seed yields over three years in response to subsurface drip irrigation.



Seed Biology & Technology

Seed technology – maturation, collection, cleaning, storage, testing, certification

Stand Establishment

Soil requirements, seed pretreatments, equipment, seeding date, rate, depth, row spacing

Stand Maintenance

Weed control, irrigation, seed predators, insect pests, diseases, pollinators, harvest



Initial Seed Increase



Private Growers



USDA NRCS, ARS, FS Facilities

Commercial Production

Photo: J. Cane

Grasses

- Anatone bluebunch wheatgrass
- Fish Creek squirreltail
- Mt. Home Sandberg bluegrass
- Toe Jam Creek squirreltail
- Tetra Great Basin wildrye
- Needle-and-thread
- Thurber needlegrass



FOR

Seed increase

Stock seed available/commercial production

	Common Name	ECOREGION			
		CBR	NBR	SRP	
Achillea millefolium	Eagle western yarrow	V	4	4	
Agoseris heterophylla	Annual goat chicory		-		
Argemone munita	Flat-bud prickley-poppy	~			
Astragalus filipes	Basalt milkvetch		V	V	
Balsamorhiza hookeri	Hooker's balsamroot			V	
Balsamorhiza sagitatta	Arrowleaf balsamroot	~			
Chaenactis douglasii	Douglas' dusty-maiden			V	
Cleome lutea	Yellow spider flower	V			
Cleome serrulata	Rocky Mountain beeplant	V	_	_	
Crepis acuminata	Long-leaf hawk's-beard			V	
Crepis intermedia	Limestone hawk's-beard	V			
Dalea ornata	Western prairie clover	4	4	L L	
Dalea searlsiae	Searl's prairie clover				
Enceliopsis nudicaulis	Naked stem sunray	V.			
Erigeron speciosus	Aspen fleabane	V		_	
Eriogonum heracleoides	Wyeth buckwheat				
Eriogonum umbellatum	Sulphur-flower buckwheat				
Frasera ablomarginata	Desert frasera				
Helionmeris multiflora var. nevadensis	Nevada showy false goldeneye				
Ipomopsis aggregata	Scarlet skyrocket	V			
Linum kingii	King's flax	l l			
Linum lewisii	Maple Grove Lewis flax	V			

FORBS 🖌 = Seed	l increase 🛛 🖌 = Stoc	k seed availabl	e/commercia	al productior
		ECOREGION		
Scientific Name	Common Name	CBR	NBR	SRP
Linum subteres	Sprucemont flax	V		
Lomatium dissectum	Fernleaf biscuitroot			
Lomatium grayi	Gray's biscuitroot			
Lomatium nudicaule	Barestem biscuitroot			
Lomatium triternatum	Nineleaf biscuitroot			
Lupinus arbustus	Long-spur lupine	V	V	
Lupnius argenteus	Silver-stem lupine		le la	
Lupinus prunophilus	Hairy big leaf lupine			
Machaeranthera canescens	Hoary tansyaster			
Mentzelia albicaulis	White-stem blazing star			
Nicotiana attenuata	Coyote tobacco		N.	_
Penstemon acuminatus	Sharpleaf penstemon		V	V
Penstemon cyaneus	Blue penstemon			V
Penstemon pachyphyllus	Thickleaf beardtongue	V		
Penstemon procerus	Little flower penstemon			
Penstemon rydbergii	Rydberg's beardtongue	l l		
Penstemon speciosus	Royal penstemon			
Penstemon strictus	Rocky Mountain penstemon			
Phacelia crenulata var. corrugata	Cleftleaf wild heliotrope			
Sphaeralcea grossulariifolia	Gooseberryleaf globemallow	V		
Sphaeralcea munroana	Munro's globemallow			





WILDLAND SEEDINGS

- Autecology
- Successional status
- Interaction with invasives
- Interactions among seeded species
 - Compatibility
 - Addition of annuals
- Root growth rates
- Rapid evolution with invasives
- Resistant/resilient communities







NATIVE PLANT SEEDINGS AS A TOOL FOR POST-FIRE RESTORATION OF SAGEBRUSH SYSTEMS

- 1. Examine the ability of rangeland and minimum-till drill to establish multiple-species seedings.
- 2. Compare impacts of drills and seedings on soil, invasive annuals, and residual natives.
- 3. Assess seeding methods, dates and rates for Wyoming big sagebrush and other small-seeded species.
- 4. Utilize ES&R protocols for post-seeding monitoring.
- 5. Establish studies to assess long-term impacts of grazing on native seedings.







Rangeland drill





Minimum-till drill



Post-fire Seeding Studies



Scooby Seed Mix 2008

	Seeding Rate (PLS m ⁻²)		
Species	1X	5X	10X
Broadcast mix			
Wyoming big sagebrush	52	234	495
Rubber rabbitbrush	86	86	86
Sandberg bluegrass, Mt. Home Germplasm	100	100	100
Blue penstemon	91	91	91
Western yarrow, Eagle Germplasm	76	76	76
Total Broadcast	405	587	848
Drill mix			
Bluebunch wheatgrass, Anatone Germplasm	51	51	51
Indian ricegrass 'Rimrock'	93	93	93
Squirreltail, Toe Jam Creek Germplasm	67	67	67
Munro Globemallow	47	47	47
Sulphur-flower buckwheat	11	11	11
Total Drill	269	269	269
Total Drill + Broadcast	674	856	1117

Scooby Fire September 2008 Great Salt Lake Area (MLRA 028A) 028AY215UT, Semi-desert gravelly loam, Wyoming big sagebrush



BIOMASS BY PLANT GROUP



Saylor Creek Seeding



Feb 2011



Location: Elmore Co., ID Elevation: 1204 m Precipitation: 196 mm (7.7 in) Soil texture: Silt loam, loam, very fine sandy loam Burn: June 2010 Fall drilling and broadcasting: 27-28 Oct 2010 Winter broadcast: 15 Feb 2011 (no snow)



Saylor Creek June 2012 Rangeland drill plot





Saylor Creek July 2012 Minimum-till plot

Mountain Home Seeding



Location: Elmore Co., ID Elevation: 911 m Precipitation: 250 mm (10 in) Soil texture: Silt loams Burn: July 2007 Fall drilling and broadcasting: 29-30 Oct 2007 Winter broadcast: 18 Jan 2008 (over snow)





Mt. Home June 2012 Year 5

Science Delivery



ManualsManuscriptsPlant guides



- Websites
- Technical notes
- Videos
- Equipment

- Native seed
- Seed zones/seed transfer guidelines



- Workshops
- Symposia
- Field tours
- US and international contacts
- STUDENTS

Acknowledgments

USDI BLM Great Basin Restoration Initiative and Great Basin Native Plant Selection and Increase Project Cooperators

JFSP Cooperators:

Ann Hild and Megan Taylor, University of Wyoming, Laramie

Robert Cox, Texas Tech University, Lubbock

 Loren St. John, USDA NRCS Aberdeen Plant Materials Center, Aberdeen, ID

Mike Pellant, USDI BLM, Boise, ID

Dave Pyke, USGS, Corvallis, OR

Jim Cane and Byron Love, USDA ARS, Logan, UT

Beth Leger, University of Nevada - Reno

Beth Newingham, University of Idaho, Moscow

Amy Ganguli, New Mexico State University, Las Cruces, NM

Questions?



Thank you!

