CORVALLIS PLANT MATERIALS CENTER
NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS, OREGON
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THE 2006 BUREAU OF LAND MANAGEMENT ANNUAL REPORT:
Medford District

I. Brief Background of Project

The Corvallis Plant Materials Center (PMC) entered into a new agreement with the Medford District of the Bureau of Land Management (BLM) in 2004 to provide native plant materials for ecological restoration. The agreement was amended in 2006. It was agreed that the PMC would maintain seed increase fields of three grasses, three legumes, and two rushes; perform germination trials and containerized production of one legume and eight forbs; and establish seed increase fields of eight new grass accessions as well as eight new forb species. A minimum of 400 plants are to be delivered to the BLM at a time and place agreed upon by PMC and BLM staff.

Figure1. *Penstemon roezlii* seed increase field at the Corvallis Plant Materials Center, Aug 20, 2006.

II. Accessions Involved

Accessions included for the Medford District BLM in 2006 are listed in Table 1. This table also displays activities performed by PMC staff.

Table 1. Accessions involved for Medford District BLM cooperative agreement with Corvallis Plant Materials Center in 2006.

Scientific Name	Common name	Code	Accession #	Activity in 2006
Iris douglasiana	Douglas Iris	**IRDO**	9079417	trl, pxn
Juncus ensifolius	sword leaf rush	**JUEN**	9079418	trl,pxn
Penstemon roezlii	Roezl's penstemon	**PERO12**	9079419	trl, pxn, sfp
Sisyrincium bellum	western blue-eyed grass	**SIBE**	9079420	trl, pxn
Tritilia hyacinthina	white hyacinth	**TRHY3**	9079421	trl, pxn
Festuca elmeri	coast fescue	**FEEL2**	9079422	pxn, sfp
Polemonium carneum	royal Jaccob's ladder	**POCA4**	9079424	trl, pxn
Eriogonum umbellatum	sulfur-flowered buckwheat	**ERUM**	9079425	trl,pxn
Lupinus adsurgens	Drew's silky lupine	**LUAD**	9079426	pxn, sfp
Potentilla glandulosa	sticky cinquefoil	**POGL9**	9079427	trl,pxn
Bromus lavipes	woodland brome	**BRLA3**	9079393	sfp
Poa secunda	Sandberg blue grass	**POSE**	9079394	sfp
Festuca roemerii	Roemer's fescue	**FERO**	9079395	sfp
Bromus lavipes	woodland brome	**BRLA3**	9079396	sfp
Bromus carinatus	California brome	**BRCA5**	9079397	sfp
Achnatherum lemmonii	Lemmon's needlegrass	**ACLE8**	9079398	pxn
Festuca californica	California fescue	**FECA**	9079399	sfp
Cimicifuga elata	tall bugbane	**CIEL**	9079390	dlv
Darlingtonia californica	California pitcherplant	**DACA5**	9079391	trl, pxn
Festuca californica	California fescue	**FECA**	9079327	sfp
Festuca romeri	Roemer's fescue	**FERO**	9079326	sfp
Frasera umpquaensis	Umpqua green gentian	**FRUM**	9079387	trl, pxn
Juncus tenuis	poverty rush	**JUTE**	9079388	pxn
Lomatium macrocarpum	big-seeded lomatium	**LOMA3**	9079325	pxn
Lupinus albifrons	silverleaf lupine	**LUAL4**	9079322	sfp, dlv
Melica harfordii	Harford's melic	**MEHA2**	9079328	sfp
Rupertia physoides	forest scurf peas	**RUPH3**	9079323	sfp
Scirpus microcarpus	panicled bulrush	**SCMI2**	9079386	pxn
Wyithia angustifolia	California compassplant	**WYAN**	9079389	pxn
Xerophyllum tenax	common beargrass	**XETE**	9079385	trl, pxn

1- sfp= seed increase, trl= germination research trials, pxn=plant production, dlv=plant materials delivery

III. Experimental Propagation

Informal germination trials were set up for production of the eight new forbs in this agreement. Cold-moist stratification trials were set up in the spring of 2006. These trials were set up as production trials rather than a formal laboratory germination evaluation since the intent is to produce vigorous seedlings under normal greenhouse propagation conditions. Seeds of each species were sown into Ray Leach stubby cone-tainers filled with moistened media (Sunshine #1 a special peat-based soil-less mix) amended with

micronutrients and slow release fertilizer. Seeds were lightly covered with fine vermiculite, and the flats were placed in polyethylene bags and moved into the walk-in cooler (36-38^{o} F). Flats were removed after 45 or 90 days and placed outside in a lath house. Most seedlings emerged within two weeks and grew vigorously.

Table 2. Treatments That Produced the Highest Germination per Species at the Corvallis Plant Materials Center in 2006.

Species	Code	Optimum treatment	Germ	Notes
Scirpus microcarpus	**SCMI2**	45 days c/m stratification	70%	Surface sow, needs light
Xerophyllum tenax	**XETE**	120 days c/m stratification	67%	Needs light, alternating temps
Frasera umpquaensis	**FRUM**	90 days c/m stratification	40%	seedlings damped off
Juncus ensifolius	**JUEF**	45 days c/m stratification	42%	Surface sow, needs light
Darlingtonia californica	**DACA5**	90 days c/m stratification	88%	planted into peat moss, needs light
Iris douglasiana	**IRDO**	80 days c/m stratification	25%	may need to be frozen during stratification
Penstemon roezlii	**PERO12**	80 days c/m stratification	85%	Needs light, alternating temps
Sisyrincium bellum	**SIBE**	none found	0%	Needs light, alternating temps
Tritilia hyacinthina	**TRHY3**	90 days c/m stratification	93%	Needs light, alternating temps
Festuca elmeri	**FEEL2**	14 days c/m stratification	99%	
Polemonium carneum	**POCA4**	80 days c/m stratification	65%	Needs light, alternating temps
Eriogonum umbellatum	**ERUM**	80 days c/m stratification	92%	Needs light, alternating temps
Lupinus adsurgens	**LUAD**	scarification	78%	inoculate with rhizobium
Potentilla glandulosa	**POGL9**	80 days c/m stratification	45%	Needs light, alternating temps

IV. Field Seed Increase

Most of the seed provided by the BLM needed a finer cleaning to blow out chaff and weed seeds. Informal germination tests were performed on most of the seed lots prior to

planting. All new grass fields, except *Achnatherum lemmonii*, were seeded into fields on October 11, 2005 using a six-row Planet Jr. seeder equipped with a carbon banding unit. *Achnatherum lemmonii*, *Eriogonum umbellatum*, *Potentilla glandulosa*, *Polemonium carneum*, and *Penstemon roezlii* were seeded using a single-row belt seeder. Rows were then sprayed with a thin strip of carbon slurry using a backpack sprayer. All fields were sprayed with Diuron (a non-selective, pre-emergent herbicide) after sowing. Fall rains began the day after seeding and spraying were completed so no fall irrigation was needed. However, the rain was heavy, lasting for 30 days and caused severe damping off in the *Festuca elmeri* field and damaged some plants in the *Bromus lavipes*-(Sprignette) and *Festuca roemerii*- (RoundTop) fields.

Table 3. Seeding rates and field sizes sown on October 11, 2005, at the Corvallis Plant Materials Center for the Medford BLM district.

Species/Ac	Amount seeded	Germ	Approximate seeding rate[1]	Seeds/lb
Festuca elmeri				
0.08 acres or			13 lbs/acre (bulk)	
18 184' rows			12 lbs/acre (PLS)	
12" btwn rows	480g	94%	66 PSL/ft-row	216,000
Bromus lavipes				
0.5 acres or			9 lbs/acre (bulk)	
120 180' rows			0.36 lbs/acre (PLS)	
12" btwn rows	2000g	4%	< 1PLS/ft-row	94,400
Poa secunda				
0.5 acres or			1 lbs/acre (bulk)	
120 181' rows			0.7 lbs/acre (PLS)	
12" btwn rows	200g	70%	12 PLS/ft-row	1,006,700
Festuca roemerii				
0.25 acres or			4 lbs/acre (bulk)	
84 130' rows			3.5 lbs/acre (PLS)	
12" btwn rows	339g	87%	16 PLS/ft-row	271,300
Bromus lavipes				
0.25 acres or			10 lbs/acre (bulk)	
60 184' rows			9 lbs/acre (PLS)	
12" btwn rows	1165g	92%	20 PLS/ft-row	92,800
Bromus carinatus				
0.4 acres or			11 lbs/acre (bulk)	
96 180' rows			8 lbs/acre (PLS)	
12" btwn rows	1957g	74%	9 PLS/ft-row	50,000
Festuca californica				
0.2 acres or			3.5 lbs/acre (bulk)	
72 130' rows			3.3 lbs/acre (PLS)	
12" btwn rows	294g	94%	7 PLS/ft-row	110,000
Penstemon roezlii				
0.02 acres or			2 lbs/acre (bulk)	
4 181' rows			1.7 lbs/acre (PLS)	
16" btwn rows	16g	85%	42 PLS/ft-row	873,000

Species/Ac	Amount seeded	Germ	Approximate seeding rate[1]	Seeds/lb
Polemonium carneum				
0.015 acres or			5 lbs/acre (bulk)	
3 181' rows			3.3 lbs/acre (PLS)	
16" btwn rows	32g	65%	28 PLS/ft-row	216,000
Eriogonum umbellatum				
0.015 acres or			12 lbs/acre (bulk)	
3 181' rows			11 lbs/acre (PLS)	
16" btwn rows	87g	92%	46 PLS/ft-row	110,600
Achnatherum lemmonii				
0.02 acres or			14 lbs/acre (bulk)	
6 130' rows			9 lbs/acre (PLS)	
16' btwn rows	12g	69%	46 PLS/ft-row	127,000
Potentilla glandulosa				
0.08 acres or			1 lbs/acre (bulk)	
18 181' rows			.45 lbs/acre (PLS)	
16" btwn rows	39g	45%	60 PLS/ft-row	2,268,000

Achnatherum lemmonii seedlings began to emerge in January. The fields were inundated with water and the seedlings were sometimes completely under standing water. Survival was moderate, but after the water receded in February more seedlings emerged. The field was rated as good. Transplants were also grown in cone-tainers to fill in gaps in the field. *Eriogonum umbellatum*, *Potentilla glandulosa*, *Penstemon roezlii*, and *Polemonium carneum* seedlings did not emerge until March and continued to emerge through May. All fields looked very good, considering they were under water for weeks at a time in December and January, except *P. glandulosa*. Rows of *P. glandulosa* were only about 10% full, but individual plants were very vigorous.

Containerized plants of *Scirpus microcarpus* and *Juncus tenuis* that were produced in 2005 were transplanted into a constructed wetland pond for seed increase. Transplanting occurred on January 14, 2006. After planting, four days of freezing temperatures occurred, followed by a month of rain. The level of water in the pond was over three feet deep. The water control system could not pump out all the water due to flooding and high water tables. Most of the transplants did not survive. More plants were grown in the summer and will be transplanted in the spring of 2007. Transplants of *Lupinus adsurgens*, *Rupertia physoides*, and *Festuca elmeri* were grown in the fall of 2005 and transplanted into seed increase fields on March 13, 2006. Mulch was applied to *L. adsurgens* and *F. elmeri* plots to retain moisture in summer and suppress weeds.

Figures 2 and 3: *Eriogonum umbellatum* seedlings (left) and *Polemonium carneum (*right) at the Corvallis Plant Materials Center, May 25, 2006.

In the spring, *Bromus carinatus* field appeared to have herbicide damage. Plants were stunted and twisted. This damage was also noticed in an *Elymus glaucus* field on a different area of the PMC farm. It was discovered that both of these fields had a cover crop of winter wheat the previous year. Allelopathy from the wheat is the suspected cause of the stunting and twisting of the plants. The *Bromus carinatus* field also had a horrible infestation of smut. It was not machine harvested. Plants that were smut-free were harvested individually by hand.

Field notes 2006:

Weed control in the forb and legume seed increase fields was performed mainly by hand weeding and rouging. Borders were cultivated or sprayed with glyphosate. Most fields were spot-sprayed with glyphosate using a shielded backpack sprayer to control exotic bentgrasses and other rhizomatous weeds. All grass fields were sprayed with Banvel in the spring to control broadleaf weeds.

Figure 4. PMC staff harvesting a seed increase field with the moon rover.

All grass fields (only the portions that were over 1 year old) were fertilized in October 2006 with 25 lbs/ac nitrogen (N) and in February with 50 lbs/ac N plus 15 lbs/ac sulfur (S). Grass fields were burned using drip torches following harvest. In mid October, a new pre-emergent herbicide, Outlook, was applied to all fields that had been harvested in 2006. It will be evaluated in the winter and spring for effectiveness.

Weed fabric was installed between existing rows of *Rupertia physoides*. About 2" of soil was removed between the rows before weed fabric was stapled down; this created a trough to catch the seed as it falls from the plant. It was quite successful; the small field yielded almost a pound of seed. A passive seed collection method, like this, is also good for maximizing genetic diversity among the harvest. 90-100% of all seeds that the plant produced were harvested, which is almost impossible to achieve with machine harvest on crops that have very indeterminate ripening and seed that shatters easily.

Figures 5 and 6. *Rupertia physoides* seed increase field with weed fabric installed (left) and close-up of flower (above), at the Corvallis Plant Materials Center, July 15, 2006.

Two new harvesters were used this year. One, informally named the "moon rover", is a hand-built, self propelled swather. It has a conveyer belt that moves all material after it is cut and loads it into bags. Two people operate the machine with one person driving and the other helping to feed the material into bags. The machine has all the benefits of hand harvesting without the labor. Once material was bagged it was laid out on to tarps to dry and cure. It was then fed though a plot thresher, and cleaned as usual. The other harvester is a Woodward flail-vac seed stripper. It uses a high speed brush to strip seed off the heads of grasses and dry flower stalks of forbs. It is mounted like the bucket on a front end loader. The unit has proven to be effective for harvesting several species. It was moderately effective for the *Melica harfordii*. It didn't remove all of the seed, so multiple passes were needed.

Table 3. Seed harvested from seed increase fields at the Corvallis Plant Materials Center in 2005.

Species	Accession #	acres	Method	Yield	Comments
FEEL	9079422	0.08	hand	24 g	good stand, fair vigor
BRLA	9079396	0.25	moon rover	22 lbs	good stand, good vigor
FERO	9079326	0.1	hand	2 lbs	poor stand, low vigor
FECA	9079327	0.2	moon rover	34 lbs	fair stand, fair vigor
MEHA	9079328	0.2	seed stripper	6 lbs	poor stand, fair vigor
LUAL	9079322	0.1	hand	22 g	good stand, low vigor
BRCA	9079397	0.4	hand	8 lbs	excellent stand, **SMUT!!**
PERO	9079419	0.1	hand	194g	excellent stand, high vigor
RUPH	9079323	0.1	leaf blower	312 g	good stand, high vigor

V. Container Plant Production.

On December 13, 2005, seeds of each species were sown into Ray Leach stubby cone-tainers filled with moistened media (Sunshine #1 a special peat-based soil-less mix) amended with micronutrients and slow-release fertilizer and lightly covered with fine vermiculite. Seeded flats that required cold-moist stratification to break seed dormancy were placed in polyethylene bags and moved into the walk-in cooler (36-38^{o} F). Flats

Figures 4 & 5. *Festuca elmeri* (left) and *Lupinus adsurgens* (above) seed increase plots, May 25, 2006.

that did not require cold-moist stratification were placed in a shadehouse. Plants were watered overhead daily and monitored for diseases and pests. All plants produced (except *Tritilia hyacinthina*, *Xerophyllum tenax*, and *Darlingtonia californica*) will be used to expand or establish seed increase plots.

Table 4. Containerized Plant Production at the Corvallis PMC in 2006 for the BLM Medford District.

Code	Treatment	Amt seed used	Germ	Number produced
SCMI2	45days c/m stratification	2 g	70%	400
XETE	120 days c/m	2 g	67%	120
FRUM	90days c/m stratification	3 g	40%	0
JUEF	45days c/m stratification	1 g	42%	70
DACA5	90days c/m stratification	1 g	88%	0
IRDO	80 days c/m stratification	40 g	25%	70
PERO12	80 days c/m stratification	2 g	85%	120
SIBE	90 days c/m stratification	3 g	0%	0
TRHY3	90days c/m stratification	2 g	93%	395
FEEL2	2 weeks c/m stratification	2 g	99%	400
POCA4	80 days c/m stratification	2 g	65%	80
ERUM	80 days c/m stratification	4 g	92%	450
LUAD	Scarification	7g	78%	130
JUTE	5 weeks c/m stratification	1 g	45%	200
POGL	80 days c/m stratification	1 g	45%	135

VI. Delivery of Plant Materials.

No materials were delivered in 2006. See Appendix 1 for current seed in storage at the Corvallis Plant Materials Center.

Appendix 1

Table 5. Current seed in storage at Corvallis Plant Materials Center, January 11, 2007.

Scientific Name	Code	Accession #	Seed in storage Produced by PMC	Provided by BLM
Achnatherum lemmonii	**ACLE8**	9079398		
Bromus carinatus	**BRCA5**	9079397	621 g	2340 g
Bromus lavipes	**BRLA3**	9079393		
Bromus lavipes	**BRLA3**	9079396	22 lbs	64 g
Cimicifuga elata	**CIEL**	9079390		14 g
Darlingtonia californica	**DACA5**	9079391		6 g
Eriogonum umbellatum	**ERUM**	9079425		5 g
Festuca californica	**FECA**	9079399		836 g
Festuca californica	**FECA**	9079327	42 lbs	
Festuca elmeri	**FEEL2**	9079422	24 g	21 g
Festuca roemerii	**FERO**	9079395		803 g
Festuca romerii	**FERO**	9079326	339 g	
Frasera umpquaensis	**FRUM**	9079387		
Iris douglasiana	**IRDO**	9079417		72 g
Juncus ensifolius	**JUEN**	9079418		2 g
Juncus tenuis	**JUTE**	9079388		13 g
Lomatium macrocarpum	**LOMA3**	9079325		129 g
Lupinus adsurgens	**LUAD**	9079426	3 g	
Lupinus albifrons	**LUAL4**	9079322	29 g	
Melica harfordii	**MEHA2**	9079328	6 lbs	
Penstemon roezlii	**PERO12**	9079419	194 g	1 g
Poa secunda	**POSE**	9079394		2372 g
Polemonium carneum	**POCA4**	9079424		1 g
Potentilla glandulosa	**POGL9**	9079427		1 g
Rupertia physoides	**RUPH3**	9079323	352 g	
Scirpus microcarpus	**SCMI2**	9079386		33 g
Sisyrincium bellum	**SIBE**	9079420		8 g
Tritilia hyacinthina	**TRHY3**	9079421		8 g
Wyithia angustifolia	**WYAN**	9079389		
Xerophyllum tenax	**XETE**	9079385		226 g