

MOUNT RAINIER NATIONAL PARK
Mather Memorial Parkway
2000 Annual Report Summary
Prepared by
NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER

INTRODUCTION- The Corvallis Plant Materials Center (PMC) entered into a two-year cooperative agreement with Mount Rainier National Park in 2000 to produce seed and plants for revegetation purposes on Mather Memorial Parkway (high elevation zone of Highway 410). Four grass, three sedge, two forb and one woody species shall be increased. One thousand 5X5X5.5 containerized stock of select herbaceous species shall be produced for delivery in fall 2001. The seed increase blocks, trial plots, and woody cutting block (previously established) shall continue to be maintained, seed harvested, and cutting/whips/poles prepared and delivered when requested. Seed from this agreement and in storage from previous agreements shall be shipped to Mount Rainier National Park at the conclusion of this agreement. Lastly, seed of select species shall be collected within Park boundaries in September 2001 by PMC staff and volunteers to increase the diversity of seed mixtures for this project.

ACCOMPLISHMENTS- Activities in 2000 included maintenance and harvest of seed increase blocks and trial plots, maintenance of a willow cutting block, establishment of five additional seed increase trial plots, and containerized stock production and maintenance. Seed yield from PMC increase blocks and trial plots in 2000 totaled 1.4 kg, from two grass, two sedge, and one forb species. Delivery of willow whips or cuttings was not requested. Five seed increase trial plots were established [three sedge (each 4'X10') and two grass (each 4'X25')] from transplants. Surviving containers of greenleaf fescue (*Festuca viridula*), Sitka valerian (*Valeriana sitchensis*), thick-headed sedge (*Carex pachystachya*), Merten's sedge (*Carex mertensii*), and showy sedge (*Carex spectabilis*) were transplanted into 5X5X5.5 containers; final count included 297 greenleaf fescue, 40 Sitka valerian, 122 thick-headed sedge, 129 Merten's sedge, and 139 showy sedge, for a total of 727 containers. Also, 103 tree pots (4X4X14) of Sitka valerian were produced. Finally, an additional 980 containers of greenleaf fescue and 196 containers of Sitka valerian were produced via cold-moist stratified seed to meet next year's delivery goals and compensate for any losses that might occur.

TECHNOLOGY DEVELOPMENTS- Trial plots of good to excellent stand density and vigor for thick-headed sedge, Merten's sedge, showy sedge, blue wildrye (*Elymus glaucus*), and Columbia brome (*Bromus vulgaris*) were established via transplants (containers) at the PMC. Trial plots of greenleaf fescue established via broadcast seeding and transplants in 1999 did not overwinter. Sitka valerian transplants rooted throughout the deep (tree) pots in a matter of weeks, but these plants exhibited sensitivity to nitrogen fertilization levels above 200 ppm and several periods of dieback and subsequent regrowth. Seedlings of Sitka valerian that had received a chilling period of eight weeks prior to transplanting exhibited faster regrowth, greater vigor, less sensitivity to nitrogen fertilization, and flowered. Only 40% of greenleaf fescue containers produced in 1999 overwintered, and the remaining transplants exhibited crown rot, leaf spot, and/or rust signs and symptoms throughout the growing season of 2000. However, with careful overhead and drip irrigation, treatment with contact and systemic fungicides, and lower nitrogen fertilization rates (150 ppm N on a monthly basis), the frequency and severity of disease outbreaks were reduced, and plant vigor improved. All sedge species in containers exhibited tremendous shoot and root growth under drip irrigation and fertilization with a balanced fertilizer every 3-4 weeks. These may need to be repotted or divided in spring 2001.

CORVALLIS PLANT MATERIALS CENTER
NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS, OREGON

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THE 2000 MOUNT RAINIER NATIONAL PARK ANNUAL REPORT:
MATHER MEMORIAL PARKWAY PROJECT

I. Brief Background of Project

The Corvallis Plant Materials Center (PMC) entered into a two-year cooperative agreement with Mount Rainier National Park in 2000 to produce seed and plants for revegetation purposes on Mather Memorial Parkway (high elevation zone of Highway 410). Four grass, three sedge, two forb and one woody species shall be increased. One thousand 5X5X5.5 containerized stock of select herbaceous species shall be produced for delivery in fall 2001. The seed increase blocks, trial plots, and woody cutting block (previously established) shall continue to be maintained, seed harvested, and cutting/whips/poles prepared and delivered when requested. Seed from this agreement and in storage from previous agreements shall be shipped to Mount Rainier National Park at the conclusion of this agreement. Lastly, seed of select species shall be collected within Park boundaries in September 2001 by PMC staff and volunteers to increase the diversity of seed mixtures for this project.

Activities in 2000 included maintenance and harvest of seed increase blocks and trial plots, maintenance of a willow cutting block, establishment of five additional seed increase trial plots, and containerized stock production and maintenance (Table 1). Details are provided below.

II. Accessions Included in Current Agreement

Accessions included for Mather Memorial Parkway Project are listed in Table 1 (next page). All of these accessions have been described in previous Annual Reports; this report includes a summary listing along with the activities conducted by PMC staff in 2000.

Table 1. Accessions involved in Mather Memorial Parkway Project

<u>Scientific name</u>	<u>Symbol</u>	<u>Accession No.</u>	<u>Common name</u>	<u>2000 Activity¹</u>
<i>Artemisia ludoviciana</i>	ARLU	9056356	Sagewort	--
<i>Anaphalis margaritacea</i>	ANMA	9056321	Pearly everlasting	--
<i>Aster foliaceus</i>	ASFO	9056322	Leafybract Aster	--
<i>Aster ledophyllus</i>	ASLE3	9056343	Cascade Aster	--
<i>Bromus vulgaris</i>	BRVU	9056323	Columbia Brome	Pxn
<i>Carex mertensii</i>	CAME6	9056324	Merten's Sedge	Sfp Pxn
<i>Carex sp (nigricans?)</i>	CANI2	9056325	Black sedge	--
<i>Carex pachystachya</i>	CAPA14	9056326	Thick-headed sedge	Sfp Pxn
<i>Carex spectabilis</i>	CASP5	9056327	Showy sedge	Pxn
<i>Elymus glaucus</i>	ELGL	9056328	Blue wild rye	Sfp Pxn
<i>Festuca viridula</i>	FEVI	9056329	Greenleaf fescue	Pxn
<i>Luetkea pectinata</i>	LUPE	9056330	Partridgefoot	--
<i>Lupinus latifolius</i>	LULA4	9065331	Broadleaf lupine	--
<i>Phleum alpinum</i>	PHAL2	9056332	Alpine timothy	Sfp
<i>Potentilla flabellifolia</i>	POFL3	9056333	Mountain cinquefoil	Sfp
<i>Salix spp</i>	SALIX	9056340	Willow	cutting block
<i>Sorbus sitchensis</i>	SOSI2	9056334	Mountain ash	--
<i>Spirea splendens v splendens</i>	SPSPS	9056335	Spirea	--
<i>Valeriana sitchensis</i>	VASI	9056336	Sitka valarian	Pxn

¹ Activity codes: Col= collected at park (by PMC staff); Div= plant materials delivered to park; Pxn= plants grown in container production; Sfp= seed produced at PMC; Trl= propagation trials conducted

III. Field Production Activities

Seed was harvested from established stands of *Carex mertensii*, *Carex pachystachya*, *Elymus glaucus*, *Phleum alpinum*, and *Potentilla flabellifolia* (Table 2). Additional details and cultural notes are summarized in the following table.

Table 2. Seed Harvest for Mount Rainier National Park-Mather Memorial Parkway Project, at Corvallis Plant Materials Center in 2000

<u>Species</u>	<u>Production area (ac)</u>	<u>Harvest Dates</u>	<u>Method</u>	<u>Seed Yield</u>	<u>Comments</u>
BRVU	---	---	---	---	Poor stand ; removed in fall 1999
CAME6	0.03	June 16, 23	Hand	211 g	Fair stand
CAPA14	0.03	July 3, August 23	Hand	446 g	good stand
ELGL	0.13	June 29	Hand	625 g	poor stand
PHAL2	<0.01 (trial plot)	June 3, 18, 20 August 1	Hand	13 g	Fair stand
POFL3	<0.01 (trial plot)	June 5	Hand	81 g	Good stand
SALIX	0.04	--	--	--	whips of good vigor and diameter

Field Production Activities for 2000- General

All grass and sedge seed increase fields received three applications of Tilt and Bravo fungicides in April/early May for rust control. All established plots were fertilized in September 1999 with 25 lbs/ac nitrogen (N), and in February 2000 with 50 lbs/ac N plus 15 lbs/ac Sulfur (S). Weed control was primarily performed by rototilling and swiping with Roundup between rows when possible, spraying borders with Roundup, and hand-hoeing and roguing. Sedge fields were irrigated throughout the growing season to improve seed yields. Grass and sedge fields were mowed, and the residue was baled and/or removed as necessary following seed harvest. A preemergent herbicide (Surflan) was applied between rows in sedge plots in October.

The willow cutting block was hand-hoed periodically. No irrigation of this block was necessary during the growing season of 2000.

Establishment of Seed Increase Trial Plots

Both 4'X20' plots of FEVI planted in fall 1999 exhibited no surviving plants by May 2000. FEVI does not tolerate saturated, poorly drained soils, particularly during its

dormant period. To compensate for the loss of both of these plots, five additional seed increase trial plots [three sedge (each 4'X10') and two grass (each 4'X25')] were established from transplants (conetainers). Details are provided below:

- species included BRVU, ELGL, CAME6, CAPA14, and CASP5
- produced transplants from seed, under outdoor conditions (see production notes in section V)
- moved conetainers outdoors in mid May to acclimate
- soil was sprayed with Roundup and tilled
- transplanted plugs by hand on June 7, 2000; grass plugs were transplanted on 6" centers, and sedge plugs were transplanted on 12" centers
- added aged compost (1" layer) followed by bark mulch (2" layer) after planting to improve fertility, control weeds, and conserve moisture
- irrigated plots with soaker hose as necessary during growing season to promote establishment
- fertilized plots in September w/ 25 lbs/ac nitrogen
- sprayed borders with Roundup as necessary for weed control
- as of October, trial plots exhibited good to excellent stand density and vigor

IV. Propagation and Seed Viability/Germination Trials

No formal propagation or seed viability/germination trials were conducted.

V. Container Plant Production and Delivery

Tranplanting and Maintenance of FEVI, VASI, CAME6, CAPA14, and CASP5

Surviving conetainers of FEVI, VASI, CAME6, CAPA14, and CASP5 produced in 1999 were transplanted into larger containers in early spring 2000 (prior to mid-March.) All sedge species exhibited 100% survival; VASI, 70%; but only 40% of FEVI conetainers overwintered. It appeared that crown and/or root rot was the primary cause of mortality among these seedlings. Transplanted seedlings were maintained throughout the rest of 2000; cultural details are provided below:

FEVI and VASI—

All FEVI conetainers (297) were transplanted into 5X5x5.5 containers, but 103 VASI were transplanted into tree pots (4X4X14). Media used was Sunshine Mix #4 (a special peat-based soil-less mix having higher air capacity and faster drainage) amended with a slow-release fertilizer and micronutrients. These containers were placed in a greenhouse set at moderate temperatures (70°F day/55°F night). The remaining 40 conetainers of VASI were placed in the cooler (34-36°F) for eight weeks prior to transplanting into the 5X5X5.5 containers. (Tree pots were originally requested for all five species, but NPS personnel determined that the shallower pots were desired for this project, just after the majority of the VASI were transplanted.) After transplanting, each species was fertilized

with Excel (15-5-5) (200 ppm N), followed by two separate applications of foliar fertilizer (Coron), over a three-month period, to stimulate rapid, vigorous growth. Both species were irrigated overhead until early June. At that time, these containers were moved to the shadehouse for the summer and drip irrigated. Thereafter, a balanced (20-20-20) fertilizer was applied on a monthly basis (150 ppm N) to October. A systemic fungicide (Subdue) was applied in February, April, and October to prevent/control crown and root rot. Containers of FEVI were also treated with additional fungicides (Safer and Daconil) every 3-4 weeks from March to October to prevent/control leaf spot and rust. FEVI and VASI containers were trimmed and placed in the cooler in early November for several weeks to induce winter dormancy and minimize outbreaks of crown/root rot.

Containerized stock of FEVI exhibited fair to good vigor in October 2000 under these cultural practices, despite the recurrent attack of fungal diseases. VASI seedlings transplanted into tree pots rooted throughout these deep containers in a matter of weeks, but these plants exhibited sensitivity to nitrogen fertilization levels at 200 ppm and several periods of dieback and regrowth. VASI seedlings that had received a chilling treatment of eight weeks prior to transplanting exhibited faster regrowth, greater vigor, less sensitivity to nitrogen fertilization, and flowered.

CAREX SPECIES—

Seedlings of CAME6 (129), CAPA14 (122), and CASP5 (139) were transplanted into 5X5X5.5 pots of Sunshine Mix #1 (peat-based soil-less mix) and placed in the greenhouse. Remaining containers of sedges were used to establish seed increase trial plots (see section III). Containerized stock received one application of Excel in March and one application of Coron in May; pots were provided overhead irrigation until early June. At that time, these containers were moved to the shadehouse for the summer and drip irrigated. Daconil was applied to control/prevent leaf spot and rust in June. Plants were fertilized with 20-20-20 (150 ppm N) every 3-4 weeks from June to October. All sedge species were trimmed and placed in the lathhouse in early November for the winter. All containerized *Carex spp.* exhibited tremendous shoot and root growth under these cultural practices. These may need to be repotted or divided in spring 2001.

Seedling Production

FEVI and VASI (to replace low vigor/dead stock in spring 2001)—
On April 11, 2000 seeds of FEVI and VASI were sown directly into stubby containers of moistened seedling media (Sunshine #4, special peat-based soil-less mix). The target seeding rate was 4-6 seeds per container. Approximately 14 grams of FEVI (SNC-96; 97% purity) was used to seed ten flats (980 containers), and 3 grams of VASI (SNC-96; 70% purity) was used to seed four flats (392 containers). Seeds were lightly covered with fine vermiculite, and the flats were placed in polyethylene bags and moved into the walk-in cooler (36-38 °F). The FEVI flats were removed from the cooler after 18 weeks of cold-moist stratification; VASI flats; 23 weeks. These flats were placed in a greenhouse set at moderate temperatures (70 °F day/ 55 °F night).

Good emergence (55% for FEVI and 50% for VASI) was noted for both species within four weeks. Seedlings having at least one pair of true leaves were transplanted into “blank” conetainers. As a result, 980 containers of FEVI and 196 conetainers of VASI were produced. Seedlings were fertilized once with a starter fertilizer (9-45-15) and twice with 20-20-20 (150 ppm N, two weeks apart) to encourage excellent root and shoot growth. Conetainers of FEVI were treated with Daconil and Subdue in early and late October, respectively, to prevent/control leaf spot, rust, and crown/root rot. Conetainers of both species were placed in the cooler in early November for several weeks to induce winter dormancy and minimize outbreaks of crown/root rot.

BRVU and ELGL (for establishment of seed increase trial plots)--
On April 18, 2000, seeds of BRVU and ELGL were sown directly into stubby conetainers of moistened seedling media Sunshine #1 (peat-based soil-less mix) amended with a slow-release fertilizer and micronutrients. Target seeding rate was 3-4 seeds per conetainer. Approximately 10 grams of BRVU (SNC-96) and 5 grams of ELGL (SNC-96) was used to seed five flats (490 conetainers) for each species. Seeds were lightly covered with fine vermiculite, and the flats were placed in the shadehouse. Excellent emergence (greater than 85%) was noted for both species within two weeks. Seedlings having at least one pair of true leaves were transplanted into “blank” conetainers. As a result, 490 conetainers of each species were produced. Seedlings were fertilized with 9-45-15 initially, followed by one application of Excel to encourage excellent root and shoot growth. These seedlings were used to establish trial seed increase plots in early June (see section III).

Maintenance of Excess Stock and Delivery Notes

Excess stock of POFL3 (9 1-gal containers) were retained in the lathhouse over winter with good survival. Overwintered plants were re-potted and held in the shadehouse over summer.

Delivery of dormant willow whips or cutting was not requested. Delivery of 1000 containerized stock originally scheduled for spring or fall 2000 was postponed to fall 2001 to accommodate a delayed planting schedule. Containerized stock production needs and delivery targets will continue to be negotiated in advance, as necessary to allow adequate time for individual species and meet revegetation needs of the project.