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GROWTH PERFORMANCE OF 'MASON' AND OTHER SELECT CULTIVARS AND WILD ECOTYPES OF WESTERN REDOSIER DOGWOOD UNDER LOW MAINTENANCE CONDITIONS

Theresa R. Flessner
Conservation Agronomist
Plant Materials Center, Corvallis, Oregon

INTRODUCTION

Species Description

Western redosier dogwood [*Cornus stolonifera* var. *occidentalis* (T. & G.) C. L. Hitchc; synonym *Cornus sericea* L. ssp. *occidentalis* (T. & G.) (Hitchcock et. al. 1964)] is a large, loosely branched, broadleaf deciduous shrub or small tree. This western variant of redosier dogwood is native to an area from Alaska to California and east to Montana. It typically occurs on nutrient-rich, moist sites along ponds and lakeshores, in boggy areas, and on riverbanks.

Selection of 'Mason'

Mason, a cultivar of western redosier dogwood, was cooperatively released in 1992 by the U.S. Department of Agriculture, Soil Conservation Service (now the Natural Resources Conservation Service); the Oregon Agriculture Experiment Station, Corvallis, Oregon; and the Washington Agriculture Research Center, Pullman, Washington. It originated from cuttings taken from a single, wild shrub growing in Mason County, Washington. Mason was selected for its greater plant vigor, higher stem density, faster growth rate, and better foliage appearance following extensive evaluation in common garden nursery against numerous other wild clones and three cultivars. The common garden study was located at the Corvallis Plant Materials Center (PMC), Corvallis, Oregon.

Description, Adaptation, and Uses of Mason

Mason is multistemmed, upright, and moderately open, reaching 10 to 16 feet (3 to 5 meters) in height at maturity. The broadly branching, rounded crown may obtain a width of 13 feet (4 meters). Its appearance and larger size are typical of the western form of the species. Mason exhibits yellow-green to bright red stems (fall and winter), white flower clusters (spring), white berries (summer), and variable red foliage (fall). Many song and game birds eat the fruit of this species, and the twigs are browsed by deer, elk, moose, and rabbits (Elias 1980).

Mason prefers moist, moderately acid to neutral, well-drained, medium to coarse-textured soils, but will tolerate fine-textured, poorly drained, or temporarily ponded soils and seasonal wetlands if weed competition is not severe. The species grows best in sun or partial shade. Mason can be planted on upland sites if the average annual precipitation exceeds 35 inches (890 mm) or supplemental water is applied during the growing season. The heat and cold tolerance of this cultivar is not fully known. Thus, Mason is recommended for use in streambank stabilization, wildlife habitat improvement, windbreaks, screens, and naturalized landscaping in western Oregon, western Washington, and northwestern California.

Description and Uses of 'Ruby'

Another cultivar, Ruby (*Cornus sericea* ssp. *sericea*), was released by the USDA Soil Conservation Service and New York Department of Environmental Conservation in 1988. It is intended primarily for streambank stabilization and other conservation uses in the northeastern United States. Selected for its excellent ability to spread by layering (characteristic of the species), Ruby also has bright red stems and a uniform, rounded growth habit (USDA Soil Conservation Service 1989).

Ornamental Varieties of Redosier Dogwood

Because of the attractive red, yellow, or green twigs and red fall foliage of the species, there are numerous ornamental varieties that are commercially available. Cultivars with yellow stems include 'Flaviramea' = 'Aurea' = 'Lutea' and those with red stems include 'Cheyenne' (var. *coloradensis*), 'Cardinal', 'Cimmaron', 'Isanti' (a compact form), and 'Kelseyi' = 'Nana' (a dwarf form). 'Nitida', 'Elongata', and 'Elata' are cultivars with green stems. Another type recognized is 'Baileyi'. It is not a true cultivar but either a form of *Cornus sericea* or the closely related species *Cornus baileyi* (Bailey Hortorium 1976, Dirr 1983, Flint 1983). 'Sunshine' is a more recent cultivar of redosier dogwood noted for its golden variegated foliage (Grant and Grant 1990).

Study Objectives

Though susceptible to various diseases (anthracnose, septoria leaf spot, botrytis petal blight, cankers) (Bailey and Brown 1991, Sinclair et. al. 1987, Hepting 1971) and some insects (borers, dogwood club gall midge, dogwood sawfly, leaf roller, dogwood scale) (Bailey and Brown 1991, Johnson and Lyon 1991), redosier dogwood fills a valuable niche in Pacific Northwest gardens for wetter areas, massings, and border plantings (Grant and Grant 1990, Kruckeberg 1982). Thus, one objective of this study is to evaluate and compare the growth performance of Mason, Ruby, select ornamental cultivars or forms, and select accessions of wild collections (primarily from the Pacific Northwest and east of the Cascade Mountains) under long term, low maintenance, suboptimal conditions typically found in naturalized landscaping. Further evaluation and description of the ornamental characteristics of Mason will be useful in determining its suitability for windbreaks, screens or wildlife habitat improvement in residential or recreational areas or naturalized landscaping, as a second objective.

MATERIALS AND METHODS

Plant Materials

In March and April of 1991, planting stock of seven commercially available cultivars or forms, seven accessions or wild ecotypes, and Mason were assembled. Cultivars or forms included Ruby, Baileyi, Cheyenne (var. *coloradensis*), Isanti, Kelseyi, Flaviramea, and Cardinal. Four of the accessions were obtained from the Aberdeen, Idaho PMC (A1, A2, A3, A4), and three were obtained from the Pullman, Washington PMC (P1, P2, P3). All but one of these accessions originated from the Pacific Northwest

(east of the Cascade Mountain range); one originated from North Dakota. Cultivars or forms were planted as bare-root stock (30 cm to 165 cm in height) and accessions, Mason, and Ruby were planted as tubelings (10 cubic inch conetainers, 30 cm to 45 cm in height). All plants were pruned to a uniform height (30 cm to 40 cm) on May 1, 1991.

Test Site

The planting was established April 2-18, 1991 at the Corvallis PMC on a moderately well drained silt loam soil, 0-3% slope. The test site is at an elevation of approximately 225 feet (69 meters) and receives full sunlight and an average annual precipitation of 42 inches (1067 mm). The planting or study consists of 69 plots in eight rows. Experimental design is completely random with two to five replications per cultivar, form or accession. (Twelve of the fifteen cultivars/accessions included in this trial is represented by five replications.) Replications or plots consist of four shrubs, spaced 5 feet (1.52 meters) apart; rows are 12 feet (3.66 meters) apart. A single border row (consisting of Mason) exists on each side of the study. Plants were irrigated as necessary from April through September 1991 for establishment purposes. No supplemental water was applied thereafter. 'Shadow' chewings fescue (*Festuca rubra* var. *commutata*) was established between rows as a cover crop and kept mowed. Chemical and mechanical (mowing, hoeing) means were used as needed for weed control within row. The cover crop was fertilized with 50 pounds nitrogen and 15 pounds sulfur per acre in early spring, and 50 pounds nitrogen per acre in early fall each year. No insect or disease control measures were applied.

Evaluations

Evaluations were conducted from 1991 through 1996. Performance criteria included survival, plant height and canopy width, plant vigor, stem density, date of bud break and leaf drop, flower and fruit abundance, and foliage appearance. Dates of budbreak and leaf drop were converted to Julian dates, and these were subsequently used to calculate canopy coverage (number of days plants retained leaves). Vigor, stem density, flower and fruit abundance and foliage appearance were rated visually on a scale from 1 to 9, with 1 being excellent and 9 being poor. Foliage appearance was based on relative occurrence of insect signs and disease symptoms and does not infer insect or disease resistance. All criteria were evaluated and recorded in 1992, 1994, and 1996; select criteria were recorded in 1991, 1993, and 1995. Repeated measures analysis of variance was used to detect overall differences among cultivars/accessions, and over years, for performance criteria. Univariate analysis of variance was performed on performance criteria, per year. Least significant difference test (LSD) was used to separate means at the 0.05 level of probability. Subsample variation (shrubs within plots) was not analyzed; values recorded for individual shrubs were averaged, and the resulting means were used in the analyses.

RESULTS AND DISCUSSION

Generally, plants grew and established quickly in 1991. Drought stress was significant in 1992; outbreaks of spot anthracnose and septoria leaf blight occurred in 1993, and variable levels of shoot dieback and chlorosis were noted in 1994. No additional control measures or fertilizers were applied for these diseases. Only one plant (an Isanti shrub) died during the evaluation period (in 1992); all other plants survived.

A summary of observations for all fifteen cultivars or accessions of redosier dogwood recorded in 1992, 1994, and 1996 appears in Table 1. Canopy coverage and vigor values were averaged from 1992, 1994, and 1996, as yearly values were not significantly different ($p>0.05$). Flower and fruit abundance and foliage appearance values varied significantly with year ($p<0.05$), so yearly values are indicated in Table 1. Height, canopy width, and stem density values recorded in 1996 represent the mature form and density of these plants. Thus, selection criteria included mean canopy coverage; mean flower and fruit abundance

in 1992, 1994, and 1996; overall mean vigor; mean height, canopy width, and stem density recorded in 1996; and mean foliage appearance recorded in 1992, 1994, and 1996.

Table 1. Comparative growth characteristics of select cultivars and accessions of redosier dogwood, evaluated at the Corvallis PMC (data collected in 1992, 1994, and 1996, unless otherwise noted). Definitions of table headings are as follows: CV/ACC = cultivar or accession number; CC = mean canopy coverage, in days; F/F = mean flower and/or fruit abundance rating; V = mean vigor rating; HT = mean height, in cm, in 1996; CW = mean canopy width, in cm, in 1996; SD = mean stem density rating in 1996; FA = mean foliage appearance rating. Data represent means of two to five replications or plots. Italicized headings indicate means within the column are significantly different at the 0.05 level of probability. Bold numbers are those which placed in the top 20% (highest three of fifteen values), within the column.

CV/ACC	***CC***	***F/F '92***	***F/F '94***	***F/F '96***	**V**	***HT***	***CW***	***SD***	***FA '92***	***FA '94***	***FA '96***
Mason	**220**	9	**4**	**4**	**3**	**193**	**178**	6	**4**	**3**	**4**
Ruby	210	**7**	**3**	8	**4**	100	154	7	**4**	**1**	**4**
Baileyi	213	**5**	5	**6**	**3**	131	**172**	**4**	**4**	**1**	**3**
Cheyenne	218	**5**	**2**	7	**4**	119	**172**	5	**3**	**2**	**3**
Isanti	215	**2**	**2**	**6**	**5**	83	120	5	**5**	**3**	**3**
Kelseyi	208	9	9	9	6	48	94	**1**	8	6	**3**
Flaviramea	218	**2**	**2**	7	**3**	103	144	5	**5**	**2**	**3**
Cardinal	216	**2**	**2**	**3**	**4**	**158**	131	6	**4**	**3**	**3**
A1 (9007893)	**222**	9	7	8	**5**	83	104	7	**4**	4	**5**
A2 (9008382)	**222**	9	7	8	6	110	135	6	**5**	5	**5**
A3 (9031682)	210	9	6	9	6	58	69	6	**5**	4	**5**
A4 (9044827)	**219**	8	4	7	**4**	133	132	6	**4**	**3**	**5**
P1 (9023733)	210	9	6	8	**4**	**136**	**181**	**4**	8	4	6
P2 (9023739)	218	9	7	8	**5**	127	137	**2**	**4**	**3**	**4**
P3 (9023740)	**222**	8	6	9	6	118	132	6	6	5	7

Mason, Baileyi, Cheyenne, and Cardinal were the top four performers in the trial (Table 1). These accessions placed in the top 20% in at least seven of the eleven selection criteria. Individually, Mason placed in the top 20% in nine of the eleven selection criteria (Table 1). It exhibited excellent canopy coverage, very good vigor, excellent mature height and canopy width, and fair to poor stem density. Flower and fruit abundance increased from very poor in 1992 to good in 1994 and 1996. Foliage appearance was rated as good throughout the evaluation period.

Baileyi placed in the top 20% in eight of eleven criteria (Table 1). It exhibited very good vigor, excellent mature canopy width, and good stem density. Flower and fruit abundance was fair, and foliage appearance varied from excellent to good throughout the evaluation period.

Cardinal and Cheyenne placed in the top 20% in eight and seven of eleven criteria, respectively (Table 1). Cardinal consistently exhibited very good flower and fruit abundance, good vigor, and good foliage appearance, and Cheyenne exhibited good vigor and very good foliage appearance throughout the evaluation period. Cheyenne exhibited greater canopy width than height, while Cardinal is a narrower selection.

Isanti and Flaviramea placed in the top 20% in seven and six of eleven criteria, respectively (Table 1). Both cultivars exhibited good to excellent flower and fruit abundance initially but exhibited poor flower and fruit abundance in 1996. These selections, smaller in size, also exhibited fair to good vigor, fair stem density, and in 1994 and 1996, good foliage appearance.

Kelseyi, a dwarf cultivar, did not flower or fruit, exhibited poor to fair vigor, and very poor to good foliage appearance (shoot dieback occurred in 1992 and 1994) (Table 1). It exhibited the greatest stem density of all cultivars, form, or accessions involved in this trial.

Ruby placed in the top 20% in six of eleven selection criteria (Table 1). It exhibited good vigor, poor stem density, fair to excellent foliage appearance, and extremely variable flowering (very poor to good). The wild selections obtained from the Aberdeen and Pullman Plant Material Centers did not perform as well as the cultivars, primarily in terms of flower and fruit abundance and foliage appearance (Table 1).

CONCLUSIONS AND RECOMMENDATIONS

Mason performed well under long term, low maintenance, and suboptimal conditions in western Oregon, in this study. Thus, it is an excellent cultivar of western redosier dogwood to use in naturalized landscaping, and its height, canopy width, and vigor enhance its suitability for windbreaks or screens in western Oregon and Washington and northwestern California. Consistent flower and fruit abundance also make it an excellent selection for wildlife habitat improvement. Although Baileyi is native to the northeastern United States and Ontario and Cardinal originated from Minnesota, their excellent growth performance throughout this study indicates these cultivars may be considered for ornamental uses in western Oregon and western Washington. Baileyi is an excellent form to use in naturalized landscaping, windbreaks, and screens; its dense, red stems add interest to winter landscapes. Cardinal, the third best performing selection in the trial, is an excellent choice for wildlife habitat improvement, primarily, as it grew, flowered, and fruited well throughout the evaluation period. Other cultivars and accessions evaluated in this trial would be useful in different situations, depending on the desired growth characteristics or origin.

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