

# Climate-Ready Landscape Plants

## 2022-2023 University of Washington Trial Report



Investigators:

**Amelia Keyser-Gibson, Allison Fron, Miro Stuke, Arthur Hsin-Wu Hsu, and Soo-Hyung Kim\***

School of Environmental and Forest Sciences, University of Washington  
University of Washington Botanic Gardens

\*Correspondence: Soo-Hyung Kim, Professor ([soohkim@uw.edu](mailto:soohkim@uw.edu))

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## Executive Summary

During the 2022-2023 Climate Ready Landscape Plant Trials, 12 landscape plant taxa were evaluated at the Center for Urban Horticulture of the University of Washington Botanic Gardens (UW-CUH). Plants were installed in spring 2022 and irrigated amply at a maintenance level (80 % ET<sub>0</sub>) for the first summer to establish the plants before the irrigation treatments were applied. All plants were subjected to one of three deficit irrigation treatments during the second year from June to September 2023. The treatments were based on the Water Use Classification of Landscape Species (WUCOLS) categories corresponding to high (80 % ET<sub>0</sub>), moderate (50 % ET<sub>0</sub>), and low (20 % ET<sub>0</sub>) water need (Costello and Jones, 2014). All taxa tested in the trial exhibited statistically comparable ratings on overall appearance across three irrigation treatments and thus are deemed suitable for 'low' irrigation in sites similar to ours in the region. Two taxa: *Physocarpus opulifolius* 'Donna May' First Editions® Little Devil™ Ninebark and *Miscanthus sinensis* 'NCMS2B' Bandwidth™ won Blue-Ribbon awards by nature of having two months of high (≥ 4.0) overall appearance rating at the low treatment. The UW-CUH site hosted an Open House event in August 2023 where participants with various horticultural backgrounds rated one representative plant of each taxon and treatment combination on their aesthetic qualities. Participants were also surveyed at the end of the event on their favorite plant, which plants they would use professionally, and their overall impressions of the plants evaluated. Based on the Open House survey, *Vitex* 'Helen Froelich' Summertime Blues™ received the most votes as the favorite plant winning the UW People's Choice Award while *Hesperaloe parviflora* 'Straight Up Red' and *Physocarpus opulifolius* 'Donna May' First Editions® Little Devil™ Ninebark were close behind as runners-up in this year's trial.

### 2023 Blue Ribbon Award at UW

- *Physocarpus opulifolius* 'Donna May' First Editions® Little Devil™ Ninebark
- *Miscanthus sinensis* 'NCMS2B' Bandwidth™

### People's Choice Award at UW

- **Winner:** *Vitex* 'Helen Froelich' Summertime Blues™
- **Runner-ups:** *Hesperaloe parviflora* 'Straight Up Red' and *Physocarpus opulifolius* 'Donna May' First Editions® Little Devil™ Ninebark

## Results Summary

**Table 1** Mean overall appearance scores (range 1–5) for each taxon and treatment combination over the growing season from June to September 2023. An irrigation recommendation is given based on significant differences found in seasonal means between treatments. For taxa with significant treatment differences, the treatment effects are indicated by superscript letters where treatments sharing the same superscript are not different from each other. If no treatment differences are found, ‘Low’ irrigation is recommended by default. Blue font indicates taxon won a **Blue-Ribbon award** for having two months of the low treatment equal to or greater than 4 in overall appearance.

Plant	Mean Overall Appearance Rating by treatment ET <sub>0</sub> (%)			Irrigation Recommendation
	80%	50%	20%	
<i>Buxus microphylla</i> ‘Little Missy’	3.4	3.5	3.3	Low
<i>Cercis canadensis</i> <sup>1</sup>	3.5	-	3.2	Low
<i>Cercis occidentalis</i> <sup>1</sup>	3.0	-	2.7	High
<i>Cotoneaster</i> x <i>suecicus</i> ‘OSUCOT2’ Emerald Beauty™	3.4	3.1	3.2	Low
<i>Hesperaloe parviflora</i> ‘Straight Up Red’	3.8	3.5	3.5	Low
<i>Miscanthus sinensis</i> ‘NCMS2B’ Bandwidth™	3.7	3.6	3.7	Low
<i>Physocarpus opulifolius</i> ‘Monlo’ Diabolo® Ninebark	3.3	3.6	3.5	Low
<i>Physocarpus opulifolius</i> ‘Donna May’ First Editions® Little Devil™ Ninebark	3.9	4.2	3.9	Low
<i>Rhododendron</i> ‘Roblex’ PP25073 Azalea Encore® Autumn Lily®	3.0 <sup>a</sup>	2.6 <sup>b</sup>	3.0 <sup>a</sup>	Low
<i>Rhododendron</i> ‘UMNAZ 633’ First Editions® Electric Lights™ Red Azalea	3.2	3.0	3.1	Low
<i>Rosa</i> Blushing Drift® ‘Meifranjin’	3.7	3.8	3.7	Low
<i>Vitex</i> ‘Helen Froelich’ Summertime Blues™	3.8	3.7	3.5	Low

Note: <sup>1</sup>*Cercis canadensis* and *Cercis occidentalis* did not have enough replicates for a moderate (50% ET<sub>0</sub>) treatment set.

## Methods

### Plot Setup

This study was carried out at the Center for Urban Horticulture of the University of Washington Botanic Gardens (UW-CUH) in Seattle, Washington. The study site is located in USDA Hardiness Zone 9a (version 2023), American Horticultural Society Heat Zone 2 (version 1997), and Sunset Zone 5 (<https://sunsetplantcollection.com/climate-zones/zone/western-washington/>). The climate of Seattle is characterized by warm summer with dry season centered around July and August and mild winter defined by rainy season with annual precipitation of ~40 inches of which more than 75% is falling during the wet winter season (Felton, 1998). The UW-CUH site is part of a multi-state Climate Ready Landscape Plant project which spans locations in five western states: Arizona, California, Oregon, Utah, and Washington (Figure 1). This report focuses on the results from the UW-CUH site only. For reports from other sites, see: [https://ucanr.edu/sites/UCLPIT/Climate\\_Ready\\_Plant\\_Trials/](https://ucanr.edu/sites/UCLPIT/Climate_Ready_Plant_Trials/)

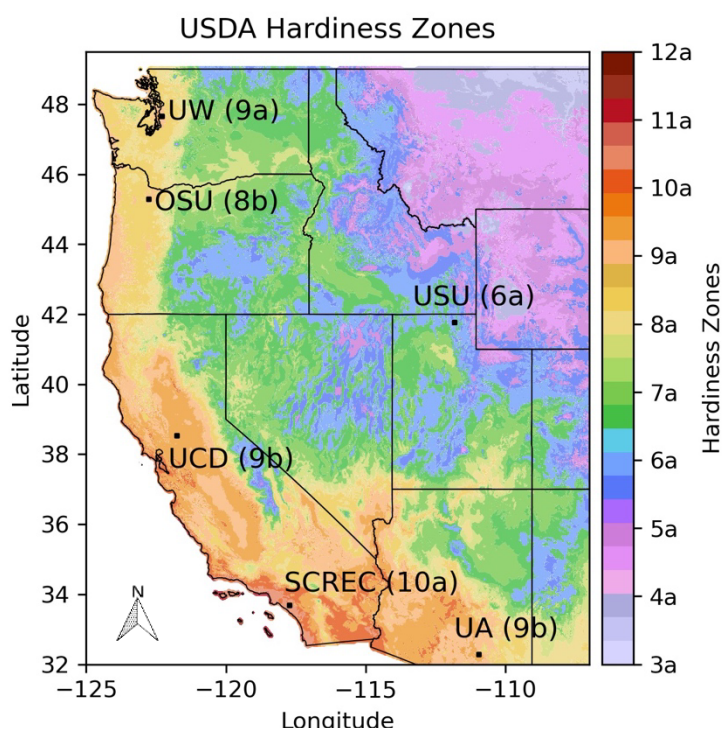


Figure 1. Climate-Ready Landscape Plants project sites overlaid on the USDA hardiness zones

spring of 2022 in the previously unmanaged field dominated by a mix of cool-season  $C_3$  grasses with a high-water table. Portions of the field experienced periodic inundations during rainy seasons in winter and early spring. Plants were installed in June of 2022, one year before treatments were implemented, giving the plants time to establish and acclimate. The plants received irrigation equivalent to 'high' irrigation treatment (80%  $ET_0$ ) during the summer of establishment year in 2022. The position and deficit treatment assigned to each plant in the

At the UW-CUH site, twelve taxa were evaluated with 24 plants in each taxon. These taxa included: *Rhododendron* 'Roblex' PP25073 Azalea Encore® Autumn Lily®, *Rhododendron* 'UMNAZ 633' First Editions® Electric Lights™ Red Azalea, *Buxus microphylla* 'Little Missy', *Cercis canadensis*, *Cercis occidentalis*, *Cotoneaster x suecicus* 'OSUCOT2' Emerald Beauty™, *Hesperaloe parviflora* 'Straight Up Red', *Miscanthus sinensis* 'NCMS2B' Bandwidth™, *Physocarpus opulifolius* 'Monlo' Diabolo® Ninebark, *Physocarpus opulifolius* 'Donna May' First Editions® Little Devil™ Ninebark, *Rosa Blushing Drift*® 'Meifranjin', *Vitex* 'Helen Froelich' Summertime Blues™. The research plot was newly set up in



plot were arranged in a completely randomized design. Plants were spaced two meters away from their nearest neighbor in each direction. Each row was covered with 5-8 cm (2-3 in.) of mulch 1 m in width to retain moisture and reduce weeds. All rows were separated with a 1-meter wide strip of garden fabric. The soil type at this site was classified as loamy sand with a water holding capacity of 7%. Three irrigation tubes were installed alongside each row in the plot corresponding to one of the three water deficit treatments. Each plant had an irrigation drip ring with a flow rate of  $2.11 \text{ mL s}^{-1}$  connected to the tube of its assigned treatment. All row tubing was connected to one main PVC pipe for each treatment and each treatment had a dedicated solenoid valve controlled by a Hunter Node 400 irrigation controller.

## Irrigation Treatments

Irrigation treatments started at the end of June 2023 and finished mid-September 2023. There were three water deficit treatments, based on reference evapotranspiration ( $ET_0$ ), corresponding to high (80%  $ET_0$ ), moderate (50%  $ET_0$ ), and low (20%  $ET_0$ ) water need. These levels were based on the Water Use Classification of Landscape Species (WUCOLS) through the University of California Davis Center for Urban Horticulture (Costello and Jones, 2014). There were up to 8 replicates per treatment per taxon. The final number of replicates varied among treatment and taxa combinations because of variable mortality rates during the experimental period (see Table 5). Irrigation occurred for a treatment when the accumulated  $ET_0$  was equivalent to 50% of the plant available water (Sisneroz et al., 2019). The volume of water applied during an irrigation event was based on soil texture, soil water holding capacity, and an imaginary cylinder representing the root volume 1m in diameter and 0.5m deep (Reid et al., 2021). The treatment level determined how fast  $ET_0$  accumulated, which controlled the irrigation frequency. An important note is that the irrigation treatments varied in frequency but not volume of each application. In other words, the same volume of water was applied to recharge the soil occupied by the plants regardless of treatment during an irrigation event and irrigation happened at different times based on treatment. For example, plants in the low water need treatment may only have been irrigated two or three times throughout the field season compared to the high treatment that was watered more than 10 times, but when any of the treatments were irrigated plants received the same volume of water to fully recharge the soil. Water was applied in pulses for uniform soil infiltration. Daily  $ET_0$  and precipitation were monitored by the closest weather station to the field site located at UW Center for Urban Horticulture (UW-CUH) and documented to keep track of irrigation timing (Washington State University AgWeatherNet: <https://weather.wsu.edu>). Total evapotranspiration ( $ET_0$ ) and precipitation recorded in centimeters for each month during the field season and irrigation summary are represented in Table 2 and Table 3. Our hypothesis was that plants using water at a lower rate than the reference plant will take longer to use up the plant available water in the soil or, if all available water is used, they can withstand water deficit conditions longer until water is provided again.

**Table 2** Total evapotranspiration (ET<sub>0</sub>) and precipitation recorded in centimeters for each month during the field season. September data includes the entire month, even though the trial concluded 9/10. All data were retrieved from the Washington State University AgWeatherNet (n.d.).

	June	July	August	September
Total ET <sub>0</sub> (cm)	11.81	14.40	11.13	6.38
Total Precipitation (cm)	2.18	0.25	0.74	5.33

**Table 3** Irrigation events and total water applied in liters per 0.39 m<sup>3</sup> for each irrigation treatment from June 29<sup>th</sup>, the beginning of the trial period, to the end of the trial period, September 10<sup>th</sup>.

Treatment (% ET <sub>0</sub> )	Number of Irrigation Events	Mean Interval (days)	Dates Irrigated	Liters of Water Applied Per 0.39 m <sup>3</sup>
High (80%)	12	6	7/4, 7/8, 7/14, 7/19, 7/25, 7/31, 8/4, 8/13, 8/17, 8/24, 9/2, 9/10	175.7
Moderate (50%)	7	9	7/6, 7/15, 7/22, 8/1, 8/12	100.4
Low (20%)	2	29	7/15, 8/13	28.6

### Aesthetic Ratings and Growth Measurements

Each plant was assessed in six aesthetic categories: foliage quality, flowering, pest tolerance, disease resistance, vigor, and overall appearance. One baseline rating of each plant was completed just before the deficit irrigation treatments started. Once the treatment phase began, the plants were rated once a month. Additionally, flowering ratings were collected two weeks after a monthly measurement for a ‘mid-month’ metric. Plants were rated on a scale of one to five, with one representing a severely damaged or dying plant, two representing unacceptable appearance, three representing an average/acceptable plant, four representing a very nice plant, and five representing a top-performing, excellent plant (Table 4). A score of three also indicated the lowest acceptable performance of a plant. Plants that were not flowering received a score of zero, and overall appearance could be scored in half point intervals (i.e. 1, 1.5, 2, 2.5 ...).

Each plant's length (l), width (w), and height (h) in centimeters were measured at the same time as the monthly appearance ratings. These measurements were used to calculate a plant growth index (PGI, equation 1) in centimeters modified from Irmak et al. (2004).

$$PGI = \frac{h + [(l + w)/2]}{2} \quad (1)$$

Plants were measured north/south (length), east/west (width), and top of the soil to the top of the plant (height) from the furthest leaf in each direction. After baseline *PGI* was calculated for each plant, that measurement was used to calculate the relative plant growth index (*rPGI*) for each month (equation 2). The *rPGI* represents plant growth over the treatment period accounting for initial variation in plant size. *PGI<sub>m</sub>* represents the *PGI* of the current month, and *PGI<sub>i</sub>* represents the initial *PGI* value before treatments started (equation 2).

$$rPGI = \frac{PGI_m}{PGI_i} \quad (2)$$

## Statistical Analysis

All aesthetic and growth measurements were compared between treatments for each taxon during each month of the trial using a one-way analysis of variance (ANOVA) or a Type III Sum of Squares test using the *lm* function in R based on the balance of replicates per treatment per taxon. A Fisher's LSD post-hoc test was used to test how treatment means differed from each other at the 5% significance level ( $p < 0.05$ ). All data were analyzed using R version 2023.3.386 for desktop computer (Posit team, 2023). Irrigation recommendations represent the treatment where growth, health, and aesthetics were not compromised.

## Open House and Outreach

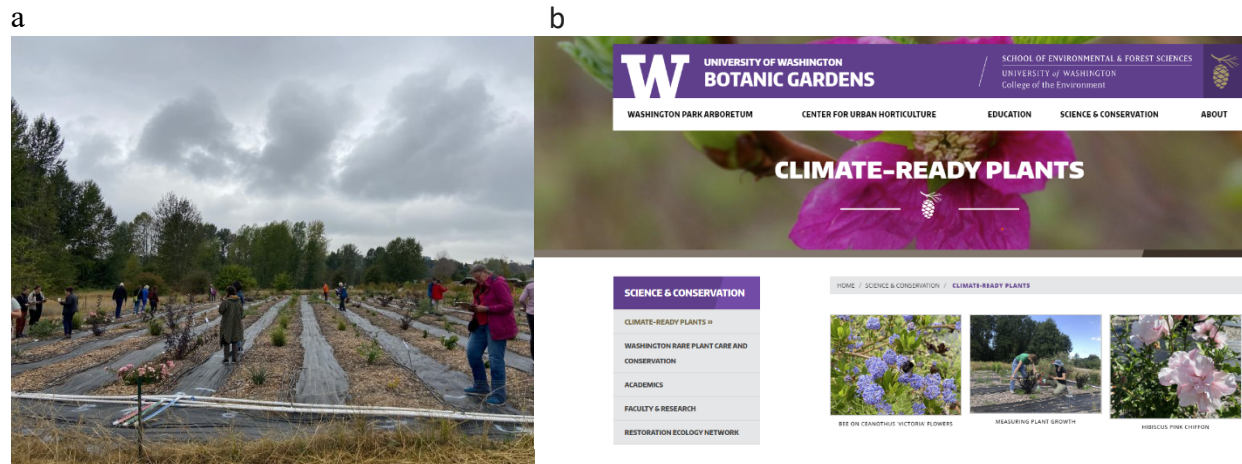
The UW-CUH site hosted an Open House event on August 29<sup>th</sup>, 2023 (Figure 1a). A total of 74 participants from various backgrounds including horticultural professionals, researchers, landscape architects, master gardeners, and garden writers participated. During this event, participants rated a select number of plants on foliage quality, flower abundance, and overall appearance. The selected plants were the healthiest and best-looking individuals on each treatment for each taxon. Average overall appearance scores +/- standard error were calculated based on the participant surveys (Table 4). Participants also recorded any taxa that were new to them, any taxa they would use professionally, and their favorite taxon (Table 5). Among the 12 taxa evaluated, *Vitex* 'Helen Froelich' Summertime Blues<sup>TM</sup> received the most votes as the favorite plant by 36 participants with the mean overall rating of 4.4 and is the UW People's Choice Award in this trial. *Hesperaloe parviflora* 'Straight Up Red' and *Physocarpus opulifolius* 'Donna May' First Editions<sup>®</sup> Little Devil<sup>TM</sup> Ninebark were close behind as runners-up in this year's trial, receiving 28 and 26 favorite votes with mean overall ratings of 3.9 and 4.4 respectively.



**Table 4** Criteria for plant aesthetic ratings. Each aesthetic quality is broken up into ratings 1 (dead/dying) to 5 (excellent). Plants that were not flowering were given a rating of zero. Overall appearance could be scored in half point increments.

RATING	5	4	3	2	1
<b>Foliage</b>	Perfect to excellent; plant is in full leaf with no signs (1% or less) of leaf burn, disease or insect damage, and leaves are distributed uniformly in an appealing shape for the genus/species.	Very nice. Same as 5 except for minor tip burn, edge damage or other minor damage to only a few leaves (1-10%) that does not much affect the appearance (not noticeable from 3-4').	Acceptable; may have non-uniform distribution of leaves or minor damage to 11- 25% of leaves that is less evident from a distance.	Unacceptable; loss of leaves or moderate damage than 25% of leaves; unattractive; plant is declining and may not recover; may be extremely non-uniform.	Completely unacceptable; close to dead.
<b>Flowering</b>	Full, glorious bloom; 80-100% of plant's potential for bloom coverage is open	61-80% of plant in bloom	41-60% of plant in bloom	21-40% of plant in bloom	1 bloom open to 20% in bloom
<b>Pest Tolerance/ Disease Resistance</b>	No visible damage (1% or less) especially from 3-4' away.	Minor to moderate damage to one or two leaves or stems, or very minor damage to a few leaves (1-25%) Not noticeable from 3-4 ft.	Minor damage to many of the leaves or flowers (25-50%); appearance still acceptable from a distance of 3-4'.	Major damage; appearance unacceptable (51-75%).	Severely damaged and probably dying (>75% affected).
<b>Vigor</b>	Pushing out new growth from every growing point.	Pushing out new growth from several growing points.	Plant is surviving and healthy, but not noticeably pushing out new growth.	Plant is very small for the species or is declining; dead/dying branches or leaves present.	Plant is barely alive; close to death.
<b>Overall Appearance</b>	An impressive plant; flowers (if present), leaves, the shape and condition of the plant are all very appealing. It has the WOW factor that makes it an attractive garden plant, <i>even if each individual factor isn't perfect.</i>	A very good plant; maybe a 5 when in bloom, or just a very nice species that is not quite at its prime or just lacks the WOW factor. Many foliage plants fall here, while exceptional ones may be 5s.	Acceptable but nothing special; may be past or not quite to its prime; might be better if more uniform; may be described as an 'okay' plant.	Unacceptable for any of the above reasons.	Completely unacceptable and not likely to improve.

See our team's webpage (Fig. 1a) hosted within the larger University of Washington Botanic Gardens website (<https://botanicgardens.uw.edu/science-conservation/climate-ready-plants/>) for background about the project, how the irrigation treatments were set up, and information on the Climate-Ready Vines Project (2022-2025).



**Figure 1** A picture from our 2024 open house (a), and the Climate Ready Plants website created for the project (b).

**Table 5** Participant evaluation results from the 2023 Open House. Recorded is the number of people who had not seen the taxon before (New), the number of people who would use the taxon professionally (Use), and the participant's favorite taxon (Favorite). Average overall appearance rating +/- standard error recorded for each taxon based on participant ratings. Participants rated the plants from 1-5, with 5 representing the highest score. People's Choice awards were based off of quantity of favorite rankings, not overall appearance score.

Taxon	New	Use	Favorite	Overall Appearance
<i>Buxus microphylla</i> 'Little Missy'	31	17	8	3.8 ± 0.097
<i>Cercis canadensis</i>	6	33	5	3.9 ± 0.104
<i>Cercis occidentalis</i>	6	28	4	3.1 ± 0.106
<i>Cotoneaster x suecicus</i> 'OSUCOT2' Emerald Beauty™	22	30	6	4.0 ± 0.098
<b><i>Hesperaloe parviflora</i> 'Straight Up Red' **</b>	<b>35</b>	<b>38</b>	<b>28</b>	<b>3.9 ± 0.102</b>
<i>Miscanthus sinensis</i> 'NCMS2B' Bandwidth™	24	34	8	4.3 ± 0.084
<i>Physocarpus opulifolius</i> 'Monlo' Diabolo® Ninebark	12	28	15	3.6 ± 0.1
<b><i>Physocarpus opulifolius</i> 'Donna May' First Editions® Little Devil™ Ninebark **</b>	<b>31</b>	<b>40</b>	<b>26</b>	<b>4.4 ± 0.085</b>
<i>Rhododendron</i> 'Roblex' PP25073 Azalea Encore® Autumn Lily®	25	7	0	3.2 ± 0.081
<i>Rhododendron</i> 'UMNAZ 633' First Editions® Electric Lights™ Red Azalea	26	8	0	2.6 ± 0.11
<i>Rosa Blushing Drift®</i> 'Meifranjin'	20	17	3	3.5 ± 0.086
<b><i>Vitex</i> 'Helen Froelich' Summertime Blues™ *</b>	<b>41</b>	<b>44</b>	<b>36</b>	<b>4.4 ± 0.072</b>
<b>Number of Responses</b>		<b>74</b>		

\*: People's Choice Award Winner, \*\*: Runner-ups



## Results and Discussion

Results for each taxon are listed alphabetically by scientific name, with cultivar and trademark name if applicable. In the taxon summary, the market or trademark name is used for simplicity. Recommendations for irrigation rate were determined based on the point where growth, health, and visual aesthetics were not compromised. In the case where there were significant differences in aesthetic qualities or growth, a range for recommended irrigation level is given. If there were no significant differences in traits measured, then we recommend irrigating at the lowest level for water conservation.

Our site had some mortality before the treatment phase began (Table 5). This was most likely due to cold winter temperatures, with 38 days between November and June with low temperatures below 32 °F as well as standing water in the plot and slight downhill slant causing plants to be waterlogged during the rainy season from late fall to spring. Full mortality of *Lantana* Bloomify™ Red, *Lantana* 'New Gold', *Caryopteris* x *clandonensis* 'Blauer Splat' Sapphire Surf™, and *Salvia greggii* 'Ultra Violet' resulted in those taxa being unable to continue in the trial. Only one *Cercis canadensis* died during the treatment phase, but it was in poor condition prior to the treatments and received the high irrigation treatment.

**Table 5** Mortality by taxon before and during the treatment phase.

Taxon	Mortality Before Treatment Phase	Mortality During Treatment Phase
<i>Rhododendron</i> 'Roblex' PP25073 Azalea Encore® Autumn Lily®	0	0
<i>Rhododendron</i> 'UMNAZ 633' First Editions® Electric Lights™ Red Azalea	6	0
<i>Buxus microphylla</i> 'Little Missy'	0	0
<i>Caryopteris</i> x <i>clandonensis</i> 'Blauer Splat' Sapphire Surf™	24	0
<i>Cercis canadensis</i>	11	1
<i>Cercis occidentalis</i>	14	0
<i>Cotoneaster</i> x <i>suecicus</i> 'OSUCOT2' Emerald Beauty™	1	0
<i>Hesperaloe parviflora</i> 'Straight Up Red'	5	0
<i>Lantana</i> Bloomify™ Red	24	0
<i>Lantana</i> 'New Gold'	24	0
<i>Miscanthus sinensis</i> 'NCMS2B' Bandwidth™	0	0
<i>Physocarpus opulifolius</i> 'Monlo' Diabolo® Ninebark	0	0

<i>Physocarpus opulifolius</i> 'Donna May' First Editions® Little Devil™ Ninebark	2	0
<i>Rosa</i> Blushing Drift® 'Meifranjin'	1	0
<i>Salvia greggii</i> 'Ultra Violet'	24	0
<i>Vitex</i> 'Helen Froelich' Summertime Blues™	4	0

## Taxa Performance Summaries

### ***Rhododendron* 'Roblex' PP25073 Azalea Encore® Autumn Lily®**

Location	Rec. Irrigation	Mean O/A Rating	Final Width by Height Range
UW-CUH, Seattle	Low	2.9	1' 3" - 1' 9" by 1' 2" - 1' 8"

Azalea Encore® Autumn Lily® is a mid-sized evergreen shrub with dark green leaves and velvety white flowers mid-spring and again in fall. This cultivar can grow to be 4'-5' tall and 3'-4' wide, however it remained small during this two-year trial. Plants in our trial preformed below average in overall appearance and exhibited signs of a nutrient deficiency or stress from the wet winter conditions in the plot. Researchers noted that dead flowers remained on the plants, detracting from overall appearance rating as the season progressed, some individuals had sparse foliage or uneven growing habit. Foliage quality was mixed, with some yellowing or chlorotic leaves present in July and August. Disease and pest tolerance both remained high no matter the month or treatment. Vigor was seen to increase over the treatment season, indicating higher growth rates later in the season. Flowering rating was low during the trial, due to having missed key lowering time. This cultivar showed significantly higher overall appearance ratings at low and high treatments than the medium treatment, therefore this cultivar would be recommended to be watered in the low (20% ET<sub>0</sub>) irrigation.



***Rhododendron* 'UMNAZ 633' First Editions® Electric Lights™ Red Azalea**

Location	Rec. Irrigation	Mean O/A Rating	Final Width by Height Range
UW-CUH, Seattle	Low	3.1	7" - 1' 4" by 8" - 1' 2"

Electric Lights™ is a hardy deciduous shrub with bright red flowers, and buds rated to -30 °F (USDA hardiness zone 4). It can grow to 4-5' tall and 3-4' wide when mature, though similar to the other *Azalea*, individuals did not reach that size in our two year trial. 6 individuals of this taxa died ahead of the treatment season, likely due to standing water in the plot over the winter. Overall appearance was average for this taxa, though notably decreased across the growing season. Foliage remained around average, with some yellowing, pale coloration, and leaf spots noted later in the growing season. The spring flowering was missed by the rating timing, but researchers noted dead flowers which remained on the plants detracting from overall appearance. Disease and pest resistance, and vigor remained fairly high for this cultivar over all months and treatments. There were no significant differences in aesthetic ratings or growth between treatments, therefore this cultivar would be recommended to water in the low (20% ET<sub>0</sub>) irrigation.



***Buxus microphylla* 'Little Missy'**

Location	Rec. Irrigation	Mean O/A Rating	Final Width by Height Range
UW-CUH, Seattle	Low	3.4	1' 0" - 2' 1" by 1' 0" - 2' 6"

'Little Missy' is a compact, evergreen boxwood with rounded habit and dense leaves. This cultivar is popular for rating in high resistance to Boxwood Blight and can reach sizes of 2'-3' tall and wide. In our trial, this plant rated above average for overall appearance. Foliage quality was generally high, and improved over the course of the season. Pest and disease tolerance were also high across all treatments and months. Ratings of vigor found that the plant was consistently putting out small amounts of new growth throughout the season. There were no significant differences in aesthetic ratings or growth between treatments, therefore this cultivar would be recommended to be watered in the low (20% ET<sub>0</sub>) irrigation.





### *Cercis canadensis*

Location	Rec. Irrigation	Mean O/A Rating	Final Width by Height Range
UW-CUH, Seattle	Low	3.3	3' - 4' 8" by 2' 4" - 5' 6"

*Cercis canadensis* (eastern redbud) is a small deciduous tree native to the eastern and central U.S. with cordate leaves which blooms pink flowers before leafing out in the spring. This species can be expected to mature to a height of 15-30ft. Individuals of this plant rated around average for overall appearance, and though not statistically significant, did rate slightly higher on the low treatment across multiple categories. Foliage was rated around average, with some instances of chlorosis or burning noted in the later part of the season. This plant rated high for disease and pest resistance across treatments and months. Additionally, individuals were fairly vigorous, putting out new leaves on most



growing axes across the season. Plants were received in the winter of the establishment year and planted as bare root during the spring, which likely contributed to 11 dying over the winter and one during the treatment period (though it was not healthy at the beginning so likely not due to the irrigation treatments). Due to small sample size, this taxa was only tested at the high and low treatments, though, given that there were no significant treatment differences in growth and aesthetic ratings this taxa is recommended to be watered in the low (20% ET<sub>0</sub>) irrigation.

### *Cercis occidentalis*

Location	Rec. Irrigation	Mean O/A Rating	Final Width by Height Range
UW-CUH, Seattle	Low	2.8	10" - 4' 0" by 8" - 3' 8"

*Cercis occidentalis* (western redbud) is a small deciduous tree native to the western U.S. with reniform leaves which blooms pink flowers before leafing out in the spring. This species can be expected to mature to a height of 10-20ft. Individuals of this plant rated just below average for overall appearance. Foliage was rated around average, with some instances of chlorosis or burning noted, which improved near the end of the summer. This plant rated high for disease and pest resistance across treatments and months. Additionally,



individuals were vigorous, putting out new leaves on some growing points at each time point, and showing increasing in vigor rating in both June and August. Plants were received in the winter of the establishment year and planted as bare root during the spring and did not survive well in the wet conditions in the plot over the winter, which likely contributed to 14 dying prior to the irrigation treatments. Due to small sample size, this taxon was only tested at the high and low treatments, though, given that the overall appearance on the low (20% ET<sub>0</sub>) irrigation was statistically lower than 3.0, this taxon is recommended to be irrigated on the high (80% ET<sub>0</sub>) irrigation.

***Cotoneaster x suecicus* ‘OSUCOT2’ Emerald Beauty™**

Location	Rec. Irrigation	Mean O/A Rating	Final Width by Height Range
UW-CUH, Seattle	Low	3.3	1' 3" - 2' 8" by 6" - 1' 6"

*Cotoneaster* Emerald Beauty™ is an evergreen shrub with emerald-green glossy foliage and small quite flowers that mature into showy red-orange berries. This cultivar was recently bred by Oregon State University for increased fire blight resistant and improved branching. Mature growth can reach 1' 6" - 2' in height, and 4' - 5' in width/spread. At our site, this cultivar improved over the course of the trial as they became more established and scored around average for overall appearance. The foliage quality improved in July and August, and appearance of berries increased the rating. Over the course of the trial, researchers noted this plant often had uneven habit, branches would start growing under the mulch, and there were some noted instances of yellowing leaves. Pest tolerance and disease resistance were consistently high. Only one plant of this cultivar died before the treatment period. Given that there were no significant treatment differences in growth and aesthetic ratings this taxon is recommended to be watered in the low (20% ET<sub>0</sub>) irrigation.



### *Hesperaloe parviflora* 'Straight Up Red'

Location	Rec. Irrigation	Mean O/A Rating	Final Width by Height Range
UW-CUH, Seattle	Low	3.6	1' 11" - 3' 2" by 1' 1" - 4' 4"

*Hesperaloe* 'Straight Up Red' is a yucca cultivar with sword-shaped gray-green evergreen foliage and upright pink-red flower spikes which last throughout the summer. Mature side can 3' - 4' tall and wide with flower spikes up to 5' - 6'. This cultivar started off with smaller sizes and some unhealthy-looking foliage but improved in July and August when the plants became more vigorous. Some leaf tip burn was noted later in the summer on all treatments. Inflorescence were visible starting in June but most individuals in this trial did not have open flowers until August, with flower spikes lasting into the early fall. Earlier flowering time is expected with a longer establishment period, drier winter soils, and warmer summers. This cultivar rated highly for pest and disease resistance across all treatments and months. Bred for xeric and low water landscapes, 5 of individuals of this cultivar died over the winter due to the wet conditions in the test field, however, those that survived impressed the research team in their performance. Given that there were no significant treatment differences in growth and aesthetic ratings this taxa is recommended to be watered in the low (20% ET<sub>0</sub>) irrigation. *Hesperaloe* 'Straight Up Red' was a runner-up for the UW People's Choice Award receiving second most votes as the favorite by the Open House participants and a mean overall appearance rating of 3.8.





### ***Miscanthus sinensis* ‘NCMS2B’ Bandwidth**

Location	Rec. Irrigation	Mean O/A Rating	Final Width by Height Range
UW-CUH, Seattle	Low	3.7	1' 9"-3' 6" by 1' 1"-3' 1"

*Miscanthus* ‘Bandwidth’ is a compact, upright ornamental grass with variegated foliage in the form of alternating green and yellowing banding on leaves. This cultivar produces red-brown flowers in early fall and is non-invasive. Mature size is 3’ tall and wide, with flower stalks extending higher (though individuals at our site did exceed this range). Many individuals at our site had sparse foliage at the beginning of the treatment, but filled out and improved overall appearance significantly by July and August. By nature of having an overall appearance on the low treatment of  $\geq 4$  for two months, this taxon is a Blue-Ribbon winner for 2023 at UW. This taxon also rated highly for pest and disease resistance across all treatments and months. Flowering occurred after the conclusion of the treatments, so is not represented in the data. No individuals died before or during the treatment period. Given that there were no significant treatment differences in growth and aesthetic ratings, and due to winning the Blue-Ribbon award, this taxa is recommended to be watered in the low (20% ET<sub>0</sub>) irrigation.



### ***Physocarpus opulifolius* ‘Monlo’ Diabolo® Ninebark**

Location	Rec. Irrigation	Mean O/A Rating	Final Width by Height Range
UW-CUH, Seattle	Low	3.4	5" - 4' 4" by 1' 0" - 5' 8"

The *Physocarpus* ‘Monlo’ Diabolo® ninebark cultivar is a deciduous shrub with deep purple-red foliage and clusters of showy white flowers in early summer which mature into attractive seedpods. This plant has an upright form and can reach 10’ by 10’ in max size. Individuals of this taxon performed above average in overall appearance over all months and treatments. Foliage rated a little above average, though sometimes leaves had a slightly grey appearance which negatively impacted the foliage rating. Flowering period mostly occurred prior to the rating season, in early June, and was not well captured in this study. Powdery mildew was observed at the base of several of the plants in our field, and there was some deer damage on longer branches, especially near the later part of our growing season. This plant



remained very vigorous and put out new growth constantly across treatments. Some individuals put out growth that had reverted back to green, or branches with a combination of green and purple leaves. Reversions occurred across all three treatments, but primarily under medium and high irrigation. No individuals of this taxon died during the establishment phase. Given that there were no significant treatment differences in growth and aesthetic ratings, and due to winning the Blue-Ribbon award, this cultivar is recommended to be watered in the low (20% ET<sub>0</sub>) irrigation.

***Physocarpus opulifolius* ‘Donna May’ First Editions® Little Devil™ Ninebark**

Location	Rec. Irrigation	Mean O/A Rating	Final Width by Height Range
UW-CUH, Seattle	Low	4.0	1' 0" - 3' 0" by 1' 4" - 3' 6"

*Physocarpus* Little Devil™ is a ninebark cultivar that resulted from a cross between ‘Monlo’ and a more compact green leaved cultivar ‘Nanus’ to create ‘Donna May’. Little Devil™ retains the popular purple foliage, and showy white flower clusters from Diabolo® but has a more compact size and smaller leaves. At max size, this cultivar can reach 3’ -4’ tall and wide. Foliage quality on individuals of this cultivar was very high across all treatments and months, as it produced attractive leaf color and overall plant shape, however foliage did rate significantly higher at the medium treatment, indicating quality could be slightly improved with more water. Unlike Diabolo®, Little Devil™ flower at the beginning of the summer and again in mid-late summer. Little Devil™ also rated higher in disease and pest resistance, and did not have the same occurrence of powdery



mildew as the larger cultivar. Plants were also very vigorous, consistently putting out new growth across months and treatments. Only two individuals showed leaves that had reverted from purple back to the wildtype green. Two plants died during the establishment period ahead of the treatments, but none died during the treatments. Overall, this was a very popular plant by both researchers and the public who attended our open house. *Physocarpus* Little Devil™ was a runner-up for the UW People’s Choice Award receiving second most votes as the favorite by the Open House participants with the mean overall appearance rating of 4.7. Additionally, due to having an overall appearance on the low treatment of ≥ 4 for two months, this taxon is a Blue-Ribbon winner for 2023 at UW. Given that the only significant treatment differences in growth and aesthetic ratings (foliage) still rated very highly under low irrigation, and due to winning the Blue-Ribbon award, this cultivar is recommended to be watered in the low (20% ET<sub>0</sub>) irrigation.



### **Rosa Blushing Drift® ‘Meifranjin’**

Location	Rec. Irrigation	Mean O/A Rating	Final Width by Height Range
UW-CUH, Seattle	Low	3.7	2' 7" - 4' 6" by 1' 6" - 2' 0"

Blushing Drift® ‘Meifranjin’ is a compact, groundcover, disease resistant cultivar which produces double, pink flowers with yellow centers throughout the summer. Listed mature size for this cultivar is 1' 5' in height and 3' in width though individuals at our site surpassed this due to their spreading habit, but would respond well to pruning to keep a smaller size. Individuals at our site rated above average for overall appearance across all treatments and months. Flowering amount remained fairly consistent, with around 50% of the plant in bloom in June and July before a slight decrease near the end of the summer. Some flower spotting was observed, and blooms remained on the plant after they were spent



which detracted from the overall appearance ratings. Foliage quality was nice, but impacted by some occurrences of leaf spots across the three treatments. This plant remained vigorous through the trial, especially through producing additional flowers. There were no significant differences in aesthetic ratings or growth between treatments, therefore this cultivar would be recommended to be watered in the low (20% ET<sub>0</sub>) irrigation.

### **Vitex ‘Helen Froelich’ Summertime Blues™**

Location	Rec. Irrigation	Mean O/A Rating	Final Width by Height Range
UW-CUH, Seattle	Low	3.7	1' 5" - 5' 10" by 1' 1" - 2' 9"

‘Helen Froelich’ Summertime Blues™ is a deciduous shrub with large purple flower spikes and light green-blue foliage. Cultivars of *Vitex*, including this one, are marketed as a support for native pollinators and an alternative to the invasive *Beddlea davidii* (butterfly bush). The mature size of this cultivar is 5'-6' in height and 4'-5' wide. During the study, we observed individuals could benefit from pruning to avoid getting too leggy. Plants were a little slow to come out of dormancy at our site, likely due to the presence of water in our plot over the winter months and four individuals died ahead of the treatment. Overall appearance ratings for this cultivar were above average across the treatment period, with a notable increase in August as flowering increased. Foliage rating was good, but impacted by some yellowing leaves and uneven growing habit. Pest

and disease resistance remained high across all treatments and months. This taxon was also very vigorous, putting out new growth and flowers from most growing points at each rating time. During peak flowering time, plants were very popular with pollinators. Significant differences in growth rate indicate that this cultivar could grow faster with higher water, but that was the only significant difference in aesthetic ratings or growth between treatments, therefore this cultivar would be recommended to be watered in the low (20% ET<sub>0</sub>) irrigation. Notably, Summertime Blues™ received the most votes as the favorite plant by the participants in the Open House event held in August 2023. Participants gave the mean overall rating of 4.6 for this plant. For this, *Vitex Summertime Blues*™ receives the UW People's Choice Award in this trial.



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## Appendix A. Comprehensive Aesthetic Evaluation Data Tables

**Table A1** *Rhododendron* ‘Roblex’ PP25073 Azalea Encore® Autumn Lily® average monthly quality ratings (scale 1-5, 1= lowest, 5 = highest) at University of Washington on three ET<sub>0</sub> based irrigation levels in 2023.

Category	ET <sub>0</sub> %	Jun	Jul	Aug	AVG
<b>Overall Appearance</b>	80	3.0	3.0	2.9	3.0
	50	2.7	2.6	2.7	2.6
	20	3.0	3.1	2.9	3.0
<b>Foliage</b>	80	3.0	3.9	3.3	3.4
	50	2.6	3.4	3.0	3.0
	20	3.0	3.9	3.0	3.3
<b>Flower</b>	80	0.0	0.0	0.0	0.0
	50	0.3	0.1	0.0	0.1
	20	0.0	0.2	0.0	0.0
<b>Pest Tolerance</b>	80	4.8	5.0	5.0	4.9
	50	4.4	5.0	5.0	4.8
	20	4.8	4.9	5.0	4.9
<b>Disease Resistance</b>	80	5.0	5.0	5.0	5.0
	50	5.0	5.0	5.0	5.0
	20	5.0	5.0	4.9	5.0
<b>Vigor</b>	80	4.0	3.8	4.5	4.1
	50	3.9	3.5	4.4	4.0
	20	4.1	4.2	4.9	4.2

**Table A2** *Rhododendron* ‘UMNAZ 633’ First Editions® Electric Lights™ Red Azalea average monthly quality ratings (scale 1-5, 1= lowest, 5 = highest) at University of Washington on three ET<sub>0</sub> based irrigation levels in 2023.

Category	ET <sub>0</sub> %	Jun	Jul	Aug	AVG
Overall Appearance	80	3.6	3.0	2.9	3.2
	50	3.3	2.8	2.9	3.0
	20	3.5	3.3	2.8	3.2
Foliage	80	3.9	3.7	3.1	3.6
	50	3.2	3.4	3.2	3.3
	20	3.7	3.8	3.0	3.5
Flower	80	0.0	0.0	0.0	0.0
	50	0.0	0.0	0.0	0.0
	20	0.0	0.0	0.0	0.0
Pest Tolerance	80	4.1	4.6	4.6	4.4
	50	4.9	4.4	4.6	4.6
	20	4.2	4.5	4.5	4.4
Disease Resistance	80	3.0	3.3	5.0	4.9
	50	2.4	3.4	5.0	4.8
	20	3.0	3.4	5.0	4.9
Vigor	80	4.9	4.4	4.6	4.6
	50	4.6	4.0	4.0	4.2
	20	4.5	4.2	4.0	4.2



**Table A3** *Buxus microphylla* ‘Little Missy’ average monthly quality ratings (scale 1-5, 1= lowest, 5 = highest) at University of Washington on three ET<sub>0</sub> based irrigation levels in 2023.

Category	ET <sub>0</sub> %	Jun	Jul	Aug	AVG
<b>Overall Appearance</b>	80	3.5	3.5	3.3	3.4
	50	3.4	3.4	3.6	3.5
	20	3.5	3.3	3.1	3.3
<b>Foliage</b>	80	3.8	4.0	4.0	3.9
	50	3.5	4.0	4.2	3.9
	20	3.6	3.8	3.9	3.8
<b>Flower</b>	80	0.0	0.0	0.0	0.0
	50	0.0	0.0	0.0	0.0
	20	0.0	0.0	0.0	0.0
<b>Pest Tolerance</b>	80	4.9	5.0	5.0	5.0
	50	4.9	4.8	5.0	4.9
	20	4.4	5.0	5.0	4.8
<b>Disease Resistance</b>	80	5.0	4.9	4.8	4.9
	50	5.0	4.9	4.9	4.9
	20	5.0	4.9	4.5	4.8
<b>Vigor</b>	80	4.1	4.4	4.0	4.2
	50	4.0	4.0	4.1	4.0
	20	4.0	4.1	4.0	4.0

**Table A4** *Cercis canadensis* average monthly quality ratings (scale 1-5, 1= lowest, 5 = highest) at University of Washington on two ET<sub>0</sub> based irrigation levels in 2023 (there were not enough replicates for the 50% treatment)

Category	ET <sub>0</sub> %	Jun	Jul	Aug	AVG
Overall Appearance	80	3.5	2.9	3.1	3.2
	50	-	-	-	-
	20	3.6	3.3	3.6	3.5
Foliage	80	3.3	3.3	3.5	3.4
	50	-	-	-	-
	20	3.7	3.4	3.7	3.6
Flower	80	0.0	0.0	0.0	0.0
	50	-	-	-	-
	20	0.0	0.0	0.0	0.0
Pest Tolerance	80	4.2	4.7	4.8	4.5
	50	-	-	-	-
	20	4.3	4.7	4.4	4.5
Disease Resistance	80	5.0	4.0	4.0	4.3
	50	-	-	-	-
	20	5.0	4.1	4.6	4.6
Vigor	80	4.8	4.2	4.2	4.4
	50	-	-	-	-
	20	4.7	4.4	4.9	4.7

**Table A5** *Cercis occidentalis* average monthly quality ratings (scale 1-5, 1= lowest, 5 = highest) at University of Washington on two ET<sub>0</sub> based irrigation levels in 2023 (there were not enough replicates for the 50% treatment).

Category	ET <sub>0</sub> %	Jun	Jul	Aug	AVG
Overall Appearance	80	3.1	2.7	2.9	2.9
	50	-	-	-	-
	20	3.1	2.5	2.5	2.7
Foliage	80	3.2	2.8	3.2	3.1
	50	-	-	-	-
	20	2.8	3.0	2.8	2.9
Flower	80	0.0	0.0	0.0	0.0
	50	-	-	-	-
	20	0.0	0.0	0.0	0.0
Pest Tolerance	80	4.2	4.2	4.4	4.3
	50	-	-	-	-
	20	4.4	4.6	4.0	4.3
Disease Resistance	80	4.8	4.4	5.0	4.7
	50	-	-	-	-
	20	4.6	3.8	3.8	4.1
Vigor	80	4.4	3.6	4.4	4.1
	50	-	-	-	-
	20	4.8	3.6	4.2	4.2

**Table A6** *Cotoneaster x suecicus* ‘OSUCOT2’ Emerald Beauty™ average monthly quality ratings (scale 1-5, 1= lowest, 5 = highest) at University of Washington on three ET<sub>0</sub> based irrigation levels in 2023.

Category	ET <sub>0</sub> %	Jun	Jul	Aug	AVG
Overall Appearance	80	3.3	3.5	3.4	3.4
	50	3.0	3.0	3.4	3.1
	20	2.9	3.4	3.4	3.2
Foliage	80	3.5	4.2	3.8	3.9
	50	3.1	3.9	3.8	3.6
	20	3.3	4.2	4.1	3.9
Flower	80	0.3	0.3	0.0	0.2
	50	0.6	0.1	0.2	0.3
	20	0.1	0.3	0.0	0.1
Pest Tolerance	80	5.0	5.0	5.0	5.0
	50	4.9	5.0	5.0	5.0
	20	5.0	5.0	5.0	5.0
Disease Resistance	80	5.0	5.0	5.0	5.0
	50	5.0	5.0	5.0	5.0
	20	5.0	5.0	5.0	5.0
Vigor	80	4.3	4.3	4.1	4.2
	50	3.9	3.5	4.1	3.8
	20	3.9	3.9	3.9	3.9

**Table A7** *Hesperaloe parviflora* ‘Straight Up Red’ average monthly quality ratings (scale 1-5, 1= lowest, 5 = highest) at University of Washington on three ET<sub>0</sub> based irrigation levels in 2023.

Category	ET <sub>0</sub> %	Jun	Jul	Aug	AVG
<b>Overall Appearance</b>	80	3.5	4.1	3.9	3.8
	50	3.1	3.4	3.8	3.5
	20	3.3	3.5	3.8	3.5
<b>Foliage</b>	80	3.4	3.8	3.8	3.7
	50	3.3	3.6	3.9	3.6
	20	3.0	3.7	3.4	3.4
<b>Flower</b>	80	0.0	0.4	0.6	0.3
	50	0.0	0.3	0.3	0.2
	20	0.0	0.1	0.4	0.2
<b>Pest Tolerance</b>	80	5.0	5.0	5.0	5.0
	50	4.9	5.0	5.0	5.0
	20	4.9	5.0	4.7	4.9
<b>Disease Resistance</b>	80	5.0	4.8	5.0	4.9
	50	5.0	5.0	5.0	5.0
	20	5.0	5.0	4.9	5.0
<b>Vigor</b>	80	4.8	4.8	4.4	4.7
	50	4.7	4.3	4.0	4.3
	20	4.9	4.3	4.1	4.4



**Table A8** *Miscanthus sinensis* 'NCMS2B' Bandwidth™ average monthly quality ratings (scale 1-5, 1= lowest, 5 = highest) at University of Washington on three ET<sub>0</sub> based irrigation levels in 2023.

Category	ET <sub>0</sub> %	Jun	Jul	Aug	AVG
<b>Overall Appearance</b>	80	3.1	4.1	3.9	3.7
	50	3.2	3.8	3.8	3.6
	20	3.1	4.0	4.0	3.7
<b>Foliage</b>	80	3.4	4.8	4.1	4.1
	50	3.4	4.5	4.0	4.0
	20	3.4	4.6	4.3	4.1
<b>Flower</b>	80	0.0	0.0	0.0	0.0
	50	0.0	0.0	0.0	0.0
	20	0.0	0.0	0.0	0.0
<b>Pest Tolerance</b>	80	5.0	5.0	5.0	5.0
	50	5.0	5.0	5.0	5.0
	20	4.4	5.0	5.0	4.8
<b>Disease Resistance</b>	80	5.0	5.0	5.0	5.0
	50	5.0	5.0	5.0	5.0
	20	5.0	5.0	5.0	5.0
<b>Vigor</b>	80	4.1	4.0	4.3	4.1
	50	4.1	3.9	4.5	4.2
	20	4.3	3.9	4.5	4.2

**Table A9** *Physocarpus opulifolius* ‘Monlo’ Diabolo® Ninebark average monthly quality ratings (scale 1-5, 1= lowest, 5 = highest) at University of Washington on three ET<sub>0</sub> based irrigation levels in 2023.

Category	ET <sub>0</sub> %	Jun	Jul	Aug	AVG
Overall Appearance	80	3.6	3.1	3.1	3.5
	50	3.9	3.5	3.3	3.6
	20	4.1	3.4	3.0	3.3
Foliage	80	3.9	3.8	3.6	3.8
	50	4.4	4.0	3.5	4.0
	20	4.1	3.9	3.3	3.8
Flower	80	0.0	0.0	0.0	0.0
	50	0.0	0.0	0.0	0.0
	20	0.6	0.0	0.0	0.2
Pest Tolerance	80	4.1	4.8	4.9	4.6
	50	4.8	5.0	4.9	4.9
	20	4.8	4.8	4.8	4.8
Disease Resistance	80	3.6	4.8	4.9	4.4
	50	4.0	5.0	4.9	4.6
	20	4.3	4.8	4.8	4.6
Vigor	80	4.4	4.4	4.1	4.3
	50	4.9	3.9	4.3	4.3
	20	4.8	4.4	4.3	4.5

**Table A10** *Physocarpus opulifolius* ‘Donna May’ First Editions® Little Devil™ Ninebark average monthly quality ratings (scale 1-5, 1= lowest, 5 = highest) at University of Washington on three ET<sub>0</sub> based irrigation levels in 2023.

Category	ET <sub>0</sub> %	Jun	Jul	Aug	AVG
Overall Appearance	80	4.1	3.7	3.9	3.9
	50	4.3	3.9	4.5	4.2
	20	3.4	4.1	4.1	3.9
Foliage	80	4.3	4.5	4.8	4.5
	50	4.7	4.7	4.9	4.8
	20	3.6	4.4	4.7	4.2
Flower	80	0.0	0.0	0.3	0.1
	50	0.0	0.4	0.6	0.3
	20	0.0	0.1	0.4	0.2
Pest Tolerance	80	5.0	4.8	5.0	4.9
	50	4.7	5.0	5.0	4.9
	20	4.6	5.0	5.0	4.9
Disease Resistance	80	4.5	5.0	5.0	4.8
	50	4.9	5.0	5.0	5.0
	20	4.6	5.0	5.0	4.9
Vigor	80	4.9	4.9	5.0	4.9
	50	4.9	5.0	5.0	5.0
	20	4.7	4.9	5.0	4.9

**Table A11** *Rosa Blushing Drift*® ‘Meifranjin’ average monthly quality ratings (scale 1-5, 1= lowest, 5 = highest) at University of Washington on three ET<sub>0</sub> based irrigation levels in 2023.

Category	ET <sub>0</sub> %	Jun	Jul	Aug	AVG
<b>Overall Appearance</b>	80	3.9	3.8	3.5	3.7
	50	3.9	3.6	3.9	3.8
	20	4.1	3.5	3.6	3.7
<b>Foliage</b>	80	3.9	4.1	4.1	4.0
	50	3.9	3.9	4.3	4.0
	20	3.9	3.9	3.8	3.8
<b>Flower</b>	80	2.8	2.5	1.8	2.3
	50	2.9	2.4	2.4	2.6
	20	2.9	2.0	2.4	2.4
<b>Pest Tolerance</b>	80	4.1	4.3	4.6	4.3
	50	4.4	4.3	4.3	4.3
	20	4.5	4.1	4.4	4.3
<b>Disease Resistance</b>	80	3.9	4.1	4.1	4.0
	50	3.9	3.9	4.3	4.0
	20	4.1	4.0	4.0	4.0
<b>Vigor</b>	80	4.3	4.4	4.3	4.3
	50	4.1	4.3	4.6	4.3
	20	4.3	4.4	3.9	4.2

**Table A12** *Vitex* ‘Helen Froelich’ Summertime Blues™ average monthly quality ratings (scale 1-5, 1= lowest, 5 = highest) at University of Washington on three ET<sub>0</sub> based irrigation levels in 2023.

Category	ET <sub>0</sub> %	Jun	Jul	Aug	AVG
<b>Overall Appearance</b>	80	3.4	3.7	4.2	3.8
	50	3.4	3.8	4.0	3.7
	20	3.5	3.2	3.8	3.5
<b>Foliage</b>	80	3.5	3.8	4.3	3.9
	50	3.6	4.3	4.6	4.1
	20	3.6	3.9	3.9	3.8
<b>Flower</b>	80	0.0	0.0	2.2	0.7
	50	0.0	0.0	1.9	0.6
	20	0.0	0.0	1.3	0.4
<b>Pest Tolerance</b>	80	4.8	5.0	5.0	4.9
	50	4.7	5.0	5.0	4.9
	20	4.4	5.0	5.0	4.8
<b>Disease Resistance</b>	80	5.0	4.7	5.0	4.9
	50	5.0	4.9	4.9	4.9
	20	5.0	4.7	5.0	4.9
<b>Vigor</b>	80	5.0	5.0	5.0	5.0
	50	4.9	4.7	4.6	4.7
	20	5.0	4.7	4.7	4.8



## Appendix B. Plant Photos<sup>1</sup>

<sup>1</sup>June photos were taken before treatments began. Photos captured by A. Fron and A. Keyser-Gibson.

Photo 1. *Rhododendron* 'Roblex' PP25073 Azalea Encore® Autumn Lily®



June 2023 – Low Water



June 2023 – High Water



August 2023 – Low Water



August 2023 – High Water



Photo 2. *Rhododendron* 'UMNAZ 633' First Editions® Electric Lights™ Red Azalea



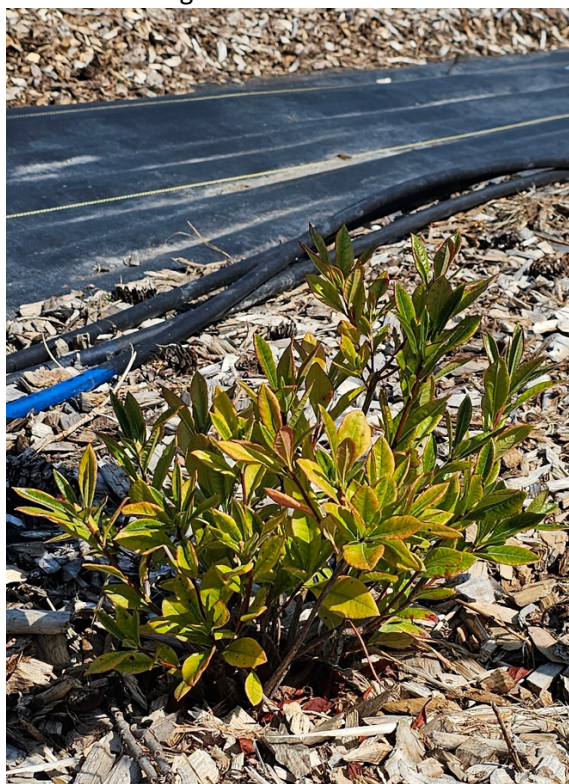
June 2023 – Low Water



June 2023 – High Water



August 2023 – Low Water



August 2023 – High Water



Photo 3. *Buxus microphylla* 'Little Missy'



June 2023 – Low Water



June 2023 – High Water



August 2023 – Low Water



August 2023 – High Water



Photo 3. *Cercis canadensis*



June 2023 – Low Water



June 2023 – High Water



September – Low Water



September – High Water



Photo 4. *Cercis occidentalis*



June 2023 – Low Water



June 2023 – High Water



August 2023 – Low Water



August 2023 – High Water



Photo 5. *Cotoneaster x suecicus* 'OSUCOT2' Emerald Beauty™



June 2023 – Low Water



June 2023 – High Water



August 2023 – Low Water



August 2023 – High Water



Photo 6. *Hesperaloe parvifolia* 'Straight Up Red'



June 2023- Low Water



June 2023 – High Water



August 2023 – Low Water



August 2023 – High Water



Photo 7. *Miscanthus sinensis* 'NCMS2B' Bandwidth



June 2023 – Low Water



June 2023 – High Water



August 2023 – Low Water



August 2023 – High Water



Photo 8. *Physocarpus opulifolius* 'Diabolo'



June 2023 – Low Water



June 2023 – High Water



August 2023 – Low Water



August 2023 – High Water



Photo 9. *Physocarpus opulifolius* 'Little Devil'



June 2023 - Low Water



June 2023 – High Water



August 2023 – Low Water



August 2023 – High Water



Photo 10. *Rosa* Blushing Drift® 'Meifranjin'



June 2023 – Low Water



June 2023 – High Water



August 2023 - Low Water



August 2023 – High Water



Photo 11: *Vitex* 'Helen Froelich' Summertime Blues™



June 2023 – Low Water



June 2023 – High Water



August 2023 – Low Water



August 2023 – High Water