

Rain Garden Plant Research at Washington State University-Puyallup

Rita L. Hummel, Ph.D.

Washington State University Puyallup Research and Extension Center

hummelrl@wsu.edu

Low Impact Development (LID) is an emerging concept for treating urban storm water with a goal of restoring the natural hydrologic function to urban landscapes. One important tool in the integrated LID approach is bioretention, which utilizes the biological, physical, and chemical properties of plants, soil media, and microorganisms to infiltrate water and filter pollutants. Rain gardens or bioretention cells are shallow depressions in the landscape filled with soil media and plants. Plants are a critical component of rain gardens; they transpire water and help maintain favorable soil infiltration and microbiological activity. The moisture status of plants within a rain garden can vary with season and location. Plants must tolerate the wet winters of the Pacific Northwest as well as the dry summers, preferably without supplemental irrigation. During wet seasons, rain gardens will have different hydrologic zones, varying from temporarily saturated, oxygen-deprived conditions in low areas to dry conditions in the upper area that merges with the existing landscape. For long-term success, identifying plants that will be healthy and viable under these widely varying conditions is crucial.

Replicated rain garden cells were installed at the Puyallup Research and Extension Center. Each cell has approximately 256 ft² surface area, and a bioretention soil mix depth of 18 inches. The mix is a 60% sand:40% compost blend. Funding for the construction of this infrastructure was obtained through a Department of Ecology Grant (<http://www.wastormwatercenter.org/rain-garden-research-facility/>).

Rain garden experiments include three different plant treatments and an unplanted control treatment. The three plant treatments are: 1) a trees and shrubs planting; 2) a mixed landscape planting with trees, shrubs, ornamental grasses, sedges and rushes; and 3) a managed grassland planting of four grass species. Each design is replicated four times. Plants were selected based on aesthetic characteristics and their considered potential for survival in the different rain garden hydrologic zones. The table below lists the plants and the hydrologic zones in which they are being tested.

Table. Plants Under Evaluation* in the WSU Puyallup LID Research Rain Gardens		
Scientific Name	Common Name	Rain Garden Hydrologic Zone
TREES		
<i>Acer truncatum</i> x <i>A. platanoides</i> 'Warrenred'	Pacific Sunset® maple	**Transition Zone
<i>Amelanchier</i> x <i>grandiflora</i> 'Autumn Brilliance'	Serviceberry	Dry and Wet Zones
<i>Arbutus menziesii</i>	Pacific madrone	Dry Zone
<i>Arbutus</i> 'Marina'	Strawberry tree	Dry Zone
<i>Betula nigra</i> 'Summer Cascade'	Summer Cascade birch	Transition and Wet Zones
<i>Magnolia virginiana</i> 'Henry Hicks'	Sweetbay magnolia	Dry and Wet Zones
<i>Nyssa sylvatica</i>	Tupelo	Transition Zone
<i>Taxodium distichum</i>	Bald cypress	Wet Zone
<i>Taxodium distichum</i> 'Cascade Falls'	Cascade Falls Bald cypress	Transition Zone
SHRUBS AND GROUND COVERS		
<i>Cistus</i> x <i>purpureus</i>	Purple rockrose	Dry and Transition Zones
<i>Clethra alnifolia</i> 'Hummingbird'	Summer sweet	Transition and Wet Zones
<i>Cornus sericea</i>	Redosier dogwood	Transition and Wet Zones
<i>Cornus sericea</i> 'Kelseyi'	Dwarf redosier dogwood	Dry and Transition Zones
<i>Diervilla lonicera</i>	Dwarf bush-honeysuckle	Transition Zone
<i>Diervilla sessifolia</i> 'Cool Splash'	Cool Splash bush-honeysuckle	Transition Zone
<i>Fragaria chiloensis</i>	Beach Strawberry	Dry and Transition Zones
<i>Gaultheria shallon</i>	Salal	Dry Zone
<i>Helianthemum nummularium</i> 'Sudbury Gem'	Sudbury Gem sunrose	Dry and Transition Zones

<i>Ilex vomitoria</i> 'Nana'	Dwarf yaupon holly	Transition Zone
<i>Leucothoe axillaris</i>	Coast leucothoe	Transition Zone
<i>Mahonia aquifolium</i>	Oregon grape	Transition zone
<i>Mahonia nervosa</i>	Longleaf mahonia	Dry Zone
<i>Mahonia repens</i>	Creeping mahonia	Dry Zone
<i>Myrica californica</i>	Pacific wax myrtle	Transition and Wet Zones
<i>Philadelphus lewisii</i> 'Blizzard'	Blizzard Mockorange	Transition Zone
<i>Physocarpus capitatus</i>	Pacific Ninebark	Wet Zone
<i>Physocarpus opulifolius</i> 'Center Glow'	Center Glow ninebark	Dry, Transition and Wet Zones
<i>Potentilla fruticosa</i>	Shrubby cinquefoil	Dry and Transition
<i>Salix integra</i> 'Hakuro-nishiki'	Dappled willow	Wet Zone
<i>Spiraea douglasii</i>	Douglas spiraea	Wet Zone
GRASSES		
<i>Deschampsia cespitosa</i> 'Northern Lights'	Tufted hairgrass	Dry, Transition and Wet Zones
<i>Festuca glauca</i> 'Boulder Blue'	Blue fescue	Dry and Transition Zones
<i>Miscanthus sinensis</i> 'Little Kitten'	Japanese silvergrass	Dry, Transition and Wet Zones
<i>Molinia caerulea</i> 'Skyracer'	Moor grass	Dry, Transition and Wet Zones
<i>Agrostis capillaris</i>	Colonial bentgrass	Dry, Transition and Wet Zones
<i>Deschampsia cespitosa</i>	Tufted hairgrass	Dry, Transition and Wet Zones
<i>Festuca arundinacea</i>	Tall fescue	Dry, Transition and Wet Zones
<i>Festuca rubra</i>	Slender creeping red fescue	Dry, Transition and Wet Zones
<i>Festuca rubra</i> var. <i>commutata</i>	Chewings fescue	Dry, Transition and Wet Zones
SEDGES AND RUSHES		
<i>Carex obnupta</i>	Slough sedge	Transition and Wet Zones
<i>Juncus. ensifolius</i>	Dagger-leaf rush	Transition and Wet Zones
<i>Juncus tenuis</i>	Slender rush	Wet Zone
HERBACEOUS PERENNIALS		
<i>Solidago missouriensis</i>	Goldenrod	Dry Zone
<i>Xerophyllum tenax</i>	Beargrass	Dry Zone

***Disclaimer:** This is a list of plants being tested for their potential adaptability to rain garden hydrozones, not a list of recommended plants. Although some of the plants are tried and true rain garden species, some were included for experimental purposes. The plants were placed in different hydrozones in the rain garden based on their potential adaptation. For example, the Pacific madrone and beargrass were only planted in the upper or dry zone while the tufted hairgrass was planted in all three zones (wet, transition and dry). Survival, growth and quality of all plants will be evaluated over time.

**Plants in the transition zone may be placed higher (drier) or lower (wetter) depending on the plant species.

Beargrass, Pacific madrone, colonial bentgrass, tufted hairgrass, and the fescues were grown from seed at WSU Puyallup. The other plants were obtained from Briggs Nursery, Fourth Corner Nurseries, J. Frank Schmidt & Son Co., Vasey Nursery, Woodbrook Nursery and The Landscape Plant Development Center. Seed Research of Oregon supplied the grass seed. We would like to thank them all for their assistance and support of this project.

For more information check out the following:

Low Impact Development Technical Guidance Manual for Puget Sound. December 2012. Available at http://www.psp.wa.gov/downloads/LID/20121221_LIDmanual_FINAL_secure.pdf

Rain Garden Handbook for Western Washington: A Guide for Design, Installation, and Maintenance. June 2013.

Planting Trees and Shrubs in the Landscape. WSU Extension Fact Sheet, FS047E. 2011. Available at <http://cru.cahe.wsu.edu/CEPublications/FS047E/FS047E.pdf>