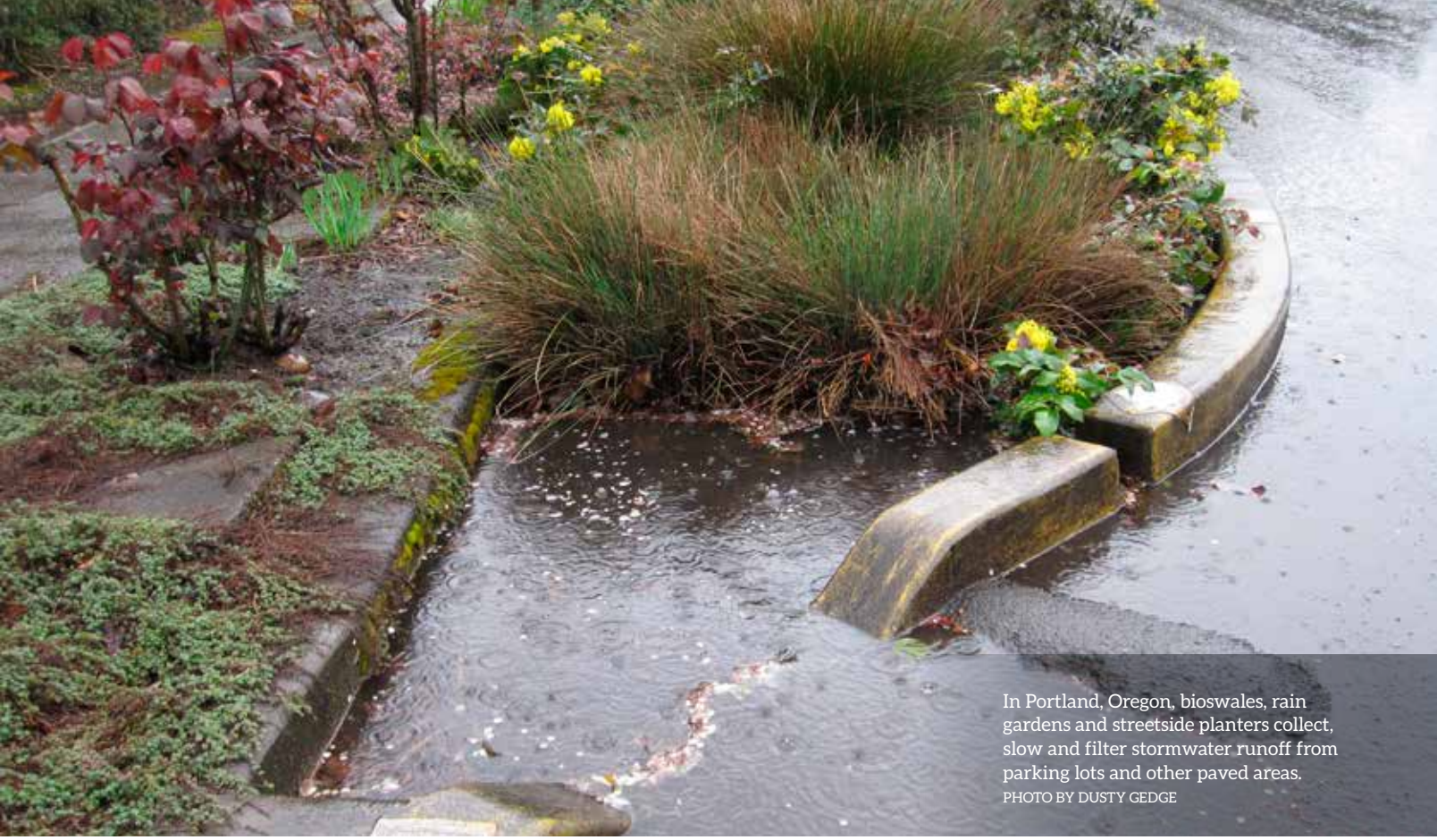


In Portland, Oregon, bioswales, rain gardens and streetside planters collect, slow and filter stormwater runoff from parking lots and other paved areas.
PHOTO BY DUSTY GEDGE

Next-level rain gardens

BY ELIZABETH PETERSEN

WHEN RECORD-SETTING rain doused western Oregon cities and towns last winter, stormwater management systems were put to the test. Streetside planters, bioswales and residential rain gardens had been designed to reduce the amount of water dumping into sewer systems as rain pelted already saturated soil and gravity inevitably pulled the storm water to the Willamette River.

How did they fare?

In Portland, these water diversion systems worked at capturing and slowing down stormwater from streets, driveways and diverted downspouts. Their dugout shapes collected and held back the deluge, like traffic signals slowing cars approaching freeway onramps.

Plants chosen for their ability to withstand being underwater performed as filters, removing sludge, chemicals, metals and debris that would otherwise have made it to the river.

The bodies of water downstream from Portland neighborhoods benefitted greatly from the reduced amount of stormwater that reached sewer grates on every street corner.

Still, it wasn't enough.

Despite extensive municipal efforts to divert stormwater from the city's storm drains, and despite increased capacity from the Big Pipe project completed in 2011, the combined sewer and stormwater system overflowed during massive rainstorms, sending raw sewage into the Willamette River three times last winter.

It was a gigantic improvement over earlier years, when an average of 50 overflows polluted the river annually, but challenges remain.

"Do we know these efforts are the answer for managing stormwater runoff?" rhetorically asked Maria Cahill, a green infrastructure consultant.

"Do we know they are working?"

"Do we have more to learn?"

Yes, yes and yes.

Cahill, owner of Green Girl Land Development Solutions LLC, employs her background in civil engineering to work with professionals of all types — planners, engineers, architects and landscape architects, among others — on low-impact development that protects natural resources.

Municipalities small and large are taking the protection of natural resources seriously. They are mandating efforts to manage stormwater and help restore watersheds using a combination of infrastructure and natural solutions.

Big-scale runoff prevention practices come first, Cahill said, citing efforts to minimize impervious areas and limit disturbances from development, as well as planting trees and installing pervious pavement.

Rain gardens, bioswales and stormwater planters are important, Cahill said, although by comparison they are only a "tiny piece of the overall watershed restoration effort."

Plants are a big component, as they must be able to withstand heavy water in winter and drought in summer. Collectively, these efforts can protect watersheds by reducing the flow of stormwater and keeping harmful pollutants out of rivers.

This streetside planter features two popular plant selections, dwarf redtwig dogwood (*Cornus sericea* 'Kelseyi') and *Carex obnupta* (slough sedge).
PHOTO BY GAVIN'S LANDSCAPING

Understanding the terminology

Paul Stormo, owner of Champoeg Nursery, a wholesale native plant nursery in Aurora, Oregon, helped clarify the terminology used with planted stormwater management systems.

"I often used the names bioswale and rain garden interchangeably," he said, "but they are technically different."

Rain gardens are smaller scale and usually used in residential or very small commercial landscapes, where they are installed by homeowners or landscapers. Rain gardens don't always incorporate different substrates into the catch basin or involve an engineer or landscape architect in the design.

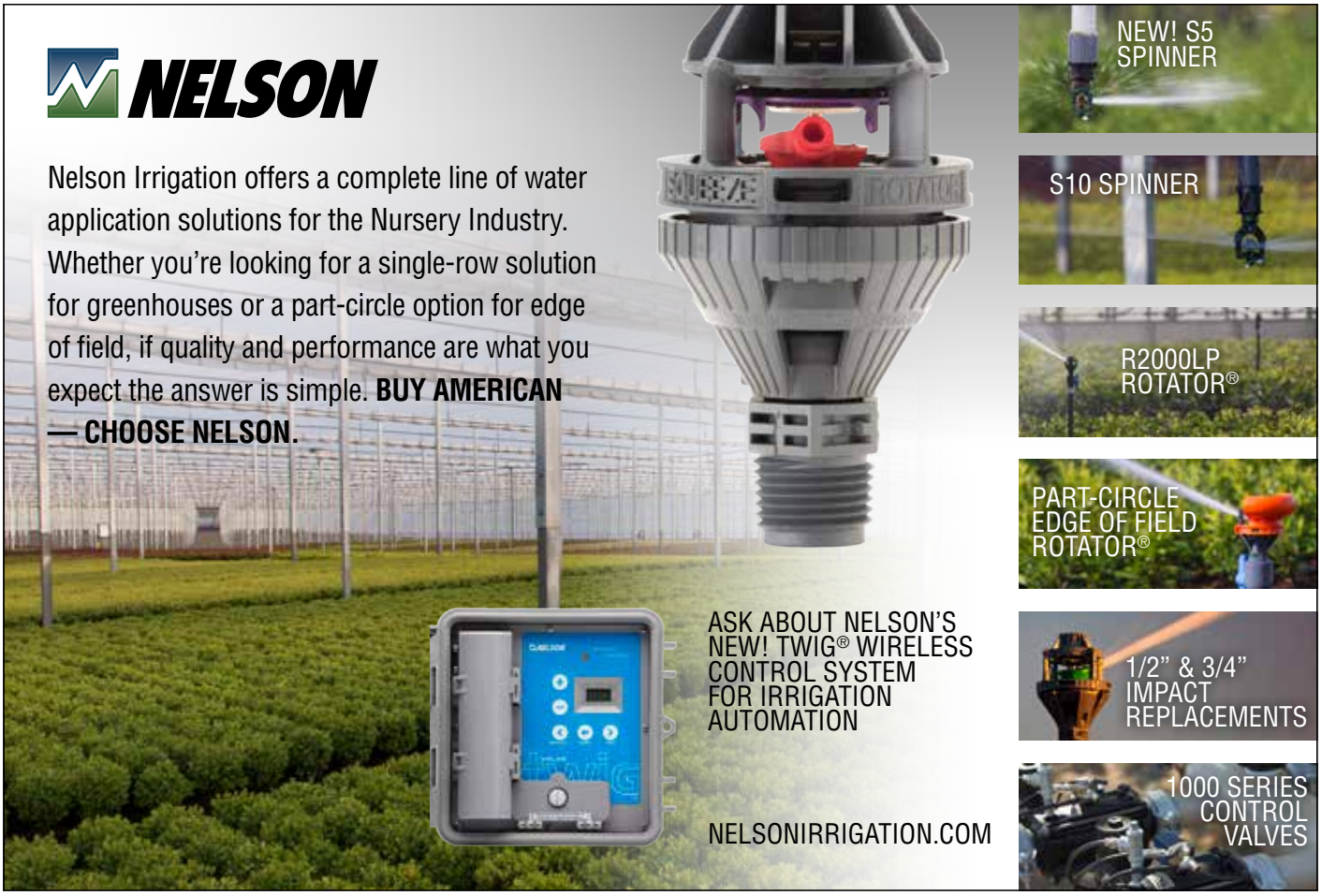
Bioswales, by contrast, are larger scale, tied to large tracts of agricultural land or associated with some type of impervious surface, such as a large warehouse roof and/or pavement installation, such as a parking lot, Stormo said.

Bioswales are designed by landscape architects or engineering professionals with specific technical details that define the size, capacity, substrates, infiltration and overflow discharge rates, among other things.

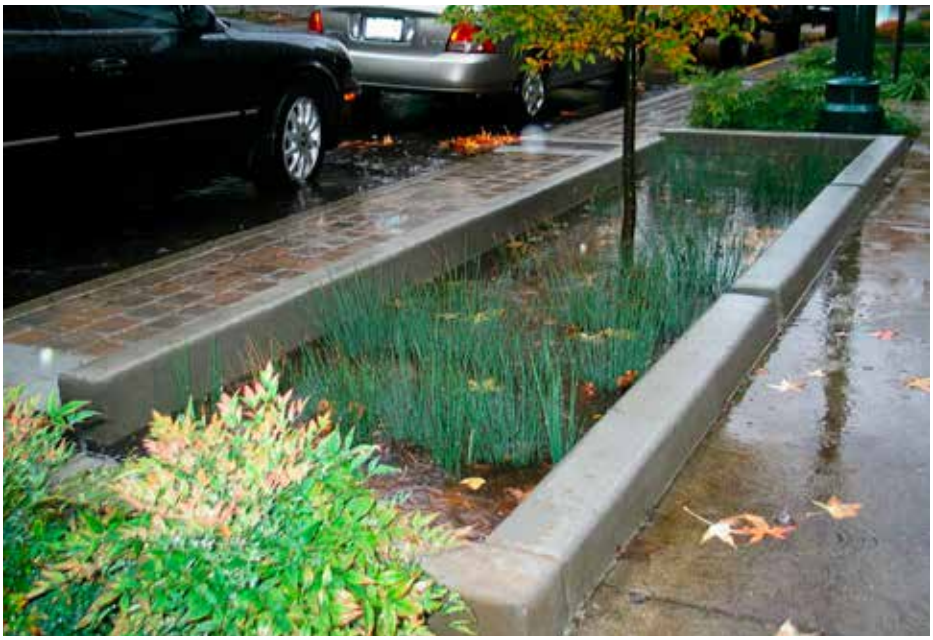
Both are intended to direct stormwater back into the soil by facilitating infiltration rather than piping, ditching or channeling the water away, Stormo pointed out.

Weston Miller, an expert in urban and community horticulture for the Oregon State University Extension Service, works on landscaping that promotes healthy ecosystems. He gave more detail about the differences between the two.

A rain garden is typically intended to be more decorative, perhaps oval or kidney



Juncus patens (spreading rush) is a natural for stormwater management projects. In its native habitat, the plant is often found growing in marshes and other wet areas, sometimes near springs and seeps. PHOTO BY KEVIN PERRY



shaped, Miller said. Smaller than a bioswale, a rain garden is designed to handle about one-tenth of the rain from a specific hard surface like a residential roof or driveway. For a 1,000-square-foot roof or other surface, for instance, a rain garden would need to be about 100 square feet.

A bioswale employs a linear shape, depending on the source and amount of water it needs to handle. Water enters one end of the bioswale and moves by gravity through plants in a specific direction toward an outflow. Natural berms, not concrete, form the edges.

Streetside planters, which are basically bioswales with concrete edges, allow water from the street in through a curb cutout and direct overflow water elsewhere, usually to the sewer or storm drain. They are designed for water to percolate into the surrounding soil within 24 hours. Bacteria in the soil helps break down pollutants from the road and other hard surfaces.

"Streetside planters are something to celebrate," Miller said. "They are turning a liability into a resource, using a plant-based system."

Education is needed

"We need more people to take responsibility for their yards," Cahill said, "because they are all part of the watershed."

Helping homeowners divert their downspouts and manage stormwater is not as easy as it might sound, however.

"Rain gardens can be intimidating to homeowners," Cahill said.

First, there needs to be an appropriate design that answers many questions: Where is the water coming from? Where is it going? How big should the rain garden be? How deep? Where should it be located to keep water from backing up into the house or causing other damage? What plants should be used?

Miller believes the nursery industry can educate the public and contractors by tapping into the niche of DIY homeowners who want to add rain gardens.

While there's no shortage of interest in rain gardens as a way for urban dwellers to promote healthy ecosystems, what's lacking is good information about planting schemes and what plants are appropriate for the unique conditions of a rain garden.

Caution must be exercised in areas prone to landslides, Miller said. Sunken garden beds should be situated away from basements, foundations and retaining walls.

A good resource for anyone considering installing a rain garden is *The Oregon Rain Garden Guide: A Step-by-Step Guide to Landscaping for Clean Water and Healthy Streams* — free to download at **www.portlandoregon.gov/bes/article/474026**. It is a "useful primer with good information about sizing and infiltration rate," Miller said.

Storm Water Solutions, a collective public education effort involving several partners including Oregon Sea Grant and OSU, compiled the how-to guide in 2010. It provides information to safely build and maintain a rain garden, including appropriate plants for specific sites, along with references for more detailed guidance for special conditions.

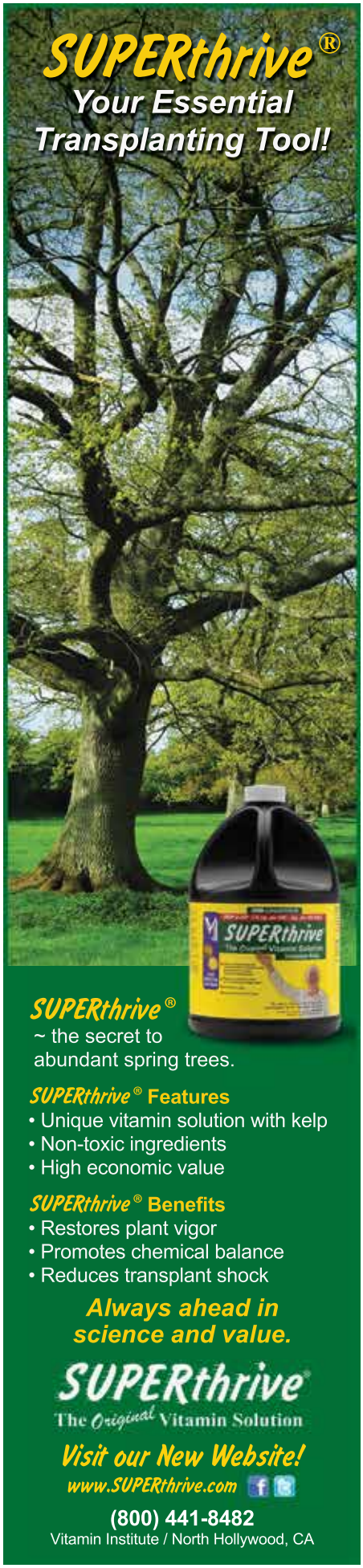
Right plants for the job

Sheila Klest owner of Trillium Gardens, a wholesale grower of Pacific Northwest native plants near Eugene, Oregon, reported that people are building a lot more rain gardens and including a wide variety of plants. Required stormwater management has gotten people thinking about how useful native plants are, which has been good for the nursery.

Klest receives calls from residential customers wondering where to get appropriate plants. She sees the need for retail garden centers to help customers with plant selection, education and signage. Demonstration rain gardens would also be helpful to "show and tell" plant and design options.

Plant selection is imperative to the success of rain gardens, since water collects in the flat bottom of a depression and percolates through the vegetation. Klest encourages the use of plants that can withstand the drought of summer and evergreen plants that actively work during winter, when most precipitation falls.

Klest recommended *Juncus patens*, an attractive, spreading, soft rush and *Carex obnupta* (slough sedge), an attractive evergreen that produces drooping flower spikes. It is widely used but "takes dry conditions less well." She also singled out *Deschampsia cespitosa* (tufted hairgrass) — a "really good selection," she said.



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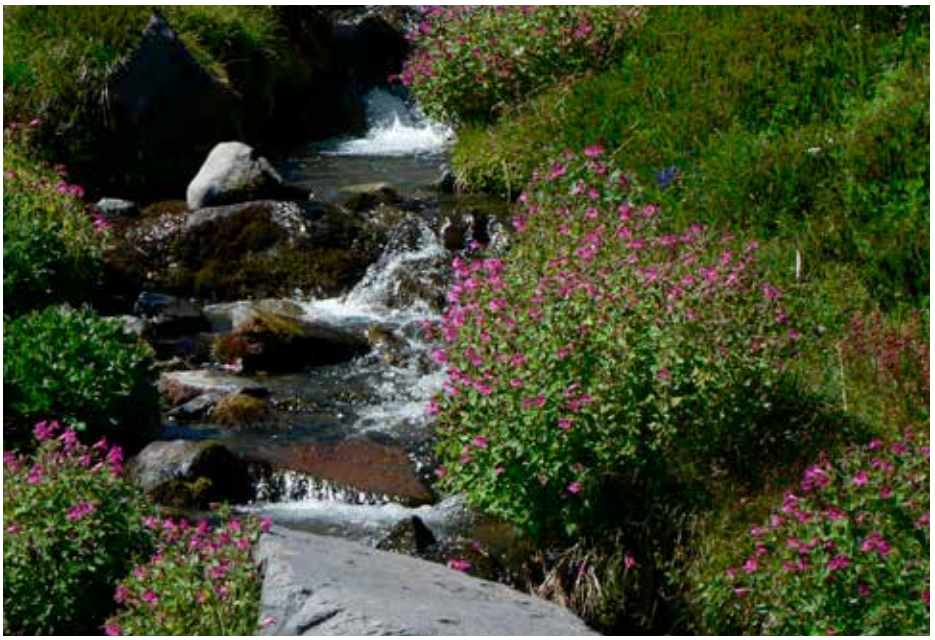

Mimulus lewisii (purple monkeyflower) grows well in moist or wet soils. Its deep pink flowers attract hummingbirds, butterflies and other pollinators.
PHOTO BY WALTER SIEGMUND

A rain garden may also provide flowers to attract and feed pollinators, and to enhance the appearance. Streambank lupine (*Lupinus rivularis*), yellow monkeyflower (*Erythranthe guttata* aka *Mimulus guttatus*), red monkeyflower (*Erythranthe lewisii* aka *Mimulus lewisii*) and *Beckmannia syzigachne* (American slough grass) do well in the lowest, very wet zones of rain gardens, Klest said.

For the sloping sides of rain gardens, where conditions are less wet, Klest recommended Oregon sunshine (*Eriophyllum lanatum*), a "well-behaved" sub-shrub that blooms all spring and summer and takes the very dry conditions of summer.

Some designs also add shrubs around the higher edges of a rain garden. Dwarf redtwig dogwood (*Cornus sericea* 'Kelseyi') is very popular due to its short stature. *Spiraea douglasii*, *Rosa pisocarpa* and other native roses, salmonberry, Pacific ninebark (*Physocarpus capitatus*), *Philadelphus lewisii* and thimbleberry are also popular selections, according to Klest.

Stormo, of Champoeg Nursery, agreed that native plants are uniquely adapted to take the conditions of these landscape features, but he has also seen many installations that add ornamental plants to the mix.

"The most important feature should be how well the rain garden/bioswale functions to manage stormwater, and that the chosen plants work with the amount of time the owner can commit to maintaining them. If the correct plants are chosen, they require little maintenance," Stormo said.

Growers need to know what designers want, however. "Please communicate with growers when designing rain gardens and selecting the palette of plants, so that growers can continue to supply what is in demand," he said.

He encouraged garden centers to "provide technical brochures for customers so they can educate themselves about rain gardens."

And his advice for growers?

"Stay in contact with customers to continue providing the most desirable plants for these projects," Stormo said. "Don't hesitate recommending alternative or less common species that will function well in these plantings to the regulatory agencies that publish approved plant lists."

Elizabeth Petersen writes for the garden industry and teaches SAT/ACT test prep at www.satpreppdx.com. She can be reached at gardenwrite@comcast.net or satpreppdx@comcast.net.