

# GROWING KNOWLEDGE

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Oregon State University



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## Adaptable, not just marketable

Plants in drought tolerance field trial at North Willamette Research and Extension Center, part of the study by Amelia Keyser-Gibson. PHOTO COURTESY OF OREGON STATE UNIVERSITY

### Public interest surges in climate-ready plants, but what does that mean?

BY LLOYD NACKLEY

**A**t the end of October 2025, Xera Plants announced plans to consolidate its Southeast Portland retail garden center with its Sherwood farm operations in 2026.

Though modest in size, Xera has long been recognized as one of Oregon's premier niche propagators of Pacific Northwest climate-adapted plants. Its

selections, drought-tolerant perennials, resilient shrubs, and regionally proven natives, have earned a loyal following among gardeners and collectors seeking plants that perform reliably under the Pacific Northwest's distinctive pattern of wet winters, dry summers, and increasingly variable extremes.

The timing also coincides with a broader surge of interest in "climate-ready" plants. From the Farwest Climate Summit to recent trade editorials such as *Green Infrastructure: Growing for a Hotter Future* in *Nursery Management Magazine*, industry attention has turned toward adaptation, function, and measur-

able ecosystem services.

Consumer research further supports this trend, showing that buyers increasingly value sustainability, environmental benefits, and native plant performance. Xera's decision to move its retail center, serves as an entry point for a timely discussion: what does it mean for a plant, or a nursery, to be "climate-ready"?

#### What does "climate-ready" mean?

Oregon essentially bridges the maritime Pacific Northwest and the interior Great Basin, making it a natural laboratory for studying climate adaptability in plants. In the Willamette Valley, heart of

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nursery country, we grow within a modified Mediterranean climate.

Classic Mediterranean climates, such as southern California or coastal Chile, feature wet winters and long, dry summers, with rainfall concentrated in a few months and extended cloudless periods in summer. Plants adapted to these conditions balance extended drought tolerance with the ability to exploit brief wet periods.

The Willamette Valley shares the general pattern but with cooler, wetter winters and maritime-tempered summers. This creates a productive growing region, but one with sharp seasonal contrasts that challenge plants to manage feast-and-famine cycles.

Only 2% of Earth's land surface has Mediterranean-type climates. For nurseries in Oregon, this means we operate in one of the world's most uncommon climate regions. Climate change is shifting our baseline: summers are getting hotter and longer, winters less predictable, and extreme events more frequent. For a plant to be "climate-ready," it must endure change within change, adjusting to a moving environmental baseline that challenges even well-adapted species.

Adding complexity, Oregon-grown plants are often sold outside the state, where climatic stresses differ markedly. The Southeast U.S., for instance, is humid subtropical, with hot, humid summers and mild winters, while the Midwest and Northeast experience temperate continental climates, with cold winters and rapid freeze-thaw cycles. A cultivar that thrives under Oregon's moderate stresses may face entirely different constraints elsewhere.

Climate readiness, then, is regional and multi-faceted: heat and drought in the West, freeze tolerance in the North, and flood or humidity resilience in the Southeast. Understanding these distinctions is essential for nurseries and landscape professionals alike.

### What makes a plant climate-adapted

Climate-ready plants are those with traits that allow them to adjust, not merely survive, under shifting environmental conditions.

Responses occur on multiple times-



Graduate researcher Scout Dahms-May collects plant transpiration measures as an assessment of phenotypic plasticity. PHOTO COURTESY OF OREGON STATE UNIVERSITY

cales. Within a single plant's life, acclimation allows morphological or physiological adjustments: leaves may shrink or thicken in response to heat or drought. Across generations, adaptation occurs as populations evolve to thrive under particular conditions.

Together, these mechanisms represent phenotypic plasticity, the ability to modulate form or function in response to the environment.

### Drought as a case study

Drought is the defining feature of the western U.S. Some experts predict that in the West landscape irrigation accounts for ~70% of residential water use per person, and increasing populations intensify this demand.

Restrictions during drought are common. For example, during a drought in 2022, metro regions in Utah limited irrigation to twice per week. During a multi-year drought in California, 2012–2016, some surveys suggested that urban vegeta-

tion declined up to 10% because of mandated water restrictions.

Roses provide an illustrative example of plasticity in practice. Chen et al. (2023) examined five popular cultivars, including Oso Easy® Urban Legend®, Petite Knock Out®, and Cherry Frost™, under irrigation intervals that simulated water restrictions. Though total water applied remained constant, some roses maintained flowering and canopy health, while others showed wilting and slower recovery. The differences reflected physiological strategies: stomatal closure rates, leaf size and orientation, and root system efficiency.

This demonstrates that "drought-tolerant" is not a single trait, but a coordinated set of responses that unfold over time. For growers, this underscores the importance of observing how plants respond under stress, rather than relying on labels alone.

### Phenotypic plasticity in action

Plasticity underlies resilience. Plants can adjust morphology (leaf area, root depth) and physiology (stomatal control, water-use efficiency) to cope with water stress. Some plants will shed leaves, some will change leaf size and shape, and some will go dormant, letting the foliage completely desiccate. These can be characterized in a range of drought tolerance and drought avoidance.

A recent publication (2025) by Amelia Keyser-Gibson and others took a deeper dive into drought-tolerant, so called climate-ready plants in study sites across the West, in Oregon, California, and Utah. They tested redbuds (*Cercis occidentalis*, *C. canadensis*) and ninebark (*Physocarpus*) cultivars ('Monlo' and 'Little Devil') under reduced irrigation.

Even under low irrigation, zero to two times per season after establishment, plants maintained physiological performance and visual quality. This confirms that these species have sufficient plasticity to handle variable moisture conditions, providing reliable landscape performance while reducing maintenance and water demand.

### Epigenetics: plants remember stress

Adaptability also occurs at the molecular level. Plants can retain a "memory" of stress through epigenetic modifications, such as DNA methylation, which prime genes to respond more rapidly to recurring stress. These marks may persist across generations, offering seedlings a head start in stressful environments. For growers, this suggests that controlled stress during production could "train" plants for resilience in the landscape.

Together, physiological plasticity and epigenetic memory define real climate readiness. A plant's ability to sense, adjust, and remember stress is central to consistent performance across environments.

### Industry implications: marketing and consumer behavior

Marketing climate-smart plants is increasingly both an ecological and commercial imperative. Beyond aesthetics, plants serve as green infrastructure by



Manzanita plants grown and sold at Xera Plants are similar to collections selected by Oregon State University Neil Bell and Heather Stoven, brought to evaluation 15 years ago, showing a nice connection between researchers and production. PHOTO COURTESY OF OREGON STATE UNIVERSITY

cooling cities, managing stormwater, sequestering carbon, and mitigating urban heat (Markgraf, 2025).

Urban heat islands can raise daytime temperatures by 1–7 F and nighttime temperatures by 2–5 F, with extreme cases reaching 10 F, creating stress for human and ecological systems alike. Consumers and landscape professionals increasingly value plants for measurable functions, not just beauty.

Research by Alicia Rihn, Ph.D. (University of Tennessee), Ariana Torres, Ph.D. (Purdue), and colleagues demonstrates that consumer decisions are influenced by both environmental awareness and future-oriented thinking. Individuals who consider long-term consequences are more likely to purchase plants for mental health and ecological benefits.

Their work suggests that younger, urban, and more educated consumers spend approximately 80% more on native and climate-adapted plants than non-adopters. These studies also indicate that marketing is most effective when it emphasizes specific, measurable traits such

as drought tolerance, pollinator support, or flood resilience are in alignment with consumer motivations and increasing both adoption and spending.

Portland fits the research demographic for climate-conscious consumers: younger, urban, and highly educated. The city's median age is 38.6 years, and 51% of residents aged 25 and older hold at least a bachelor's degree, well above the national average of 33% (Portland State University). Combined with a strong gardening culture and environmental ethos, these demographics align with consumer segments identified in research by Rihn, Torres, and colleagues, groups more likely to purchase native and climate-adapted plants, often spending up to 80% more than non-adopters.

Xera and other Oregon nurseries, including Cornell Farm, Cistus Nursery, **Little Prince of Oregon**, and Van Hevelingen Nursery, have effectively targeted this interest through marketing that emphasizes plant function: drought resilience, pollinator value, and low-input performance. The Hardy Plant Society of

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Oregon and similar advocacy groups have further amplified this message, nurturing public enthusiasm for plants that contribute to climate resilience and ecological health.

At first glance, the consolidation of Xera's Portland retail store might seem paradoxical given these market dynamics. However, Xera has stated through social media and customer communications that the change is a move toward operational efficiency by uniting retail and wholesale operations at the Sherwood site. The new model provides greater logistical efficiency while positioning the nursery closer to suburban communities such as Sherwood, Wilsonville, Tualatin, and Tigard, where larger lot sizes often translate to more substantial landscaping projects. This approach hopes to mirror the success of other Portland-area retail garden centers that operate on the metropolitan edge, places like **AI's Garden & Home**, **Bauman Farms**, Cistus Nursery, **Farmington**

**Gardens, Fessler Nursery** and Tony's Garden Center. These businesses offer can create agro-tourism type opportunities for urban customers willing to travel. For growers, these hybrid spaces can reinforce brand identity, create efficiencies, and enhance the storytelling opportunities around Oregon nursery plant production.

### Moving beyond buzzwords

Oregon's nursery industry has long led in innovation, from advanced production systems to technology-enabled plant management. This leadership offers an opportunity to redefine climate readiness. True climate-ready plants are defined not by labels, but by their capacity to adjust, adapt, and thrive under shifting environmental conditions.

It is useful to distinguish terminology. Climate-adapted plants fit an existing climate, whether native or not. In the PNW, this generally means tolerance of cold, wet

winters and hot, dry summers.

Climate-ready or climate-smart plants, by contrast, focus on plastic responses and acclimation to change, essentially, within generation adjustments to the shifting baseline of climate change.

While native plants often capture public attention, not all natives are suitable for urban scenarios or extreme weather outside their historical range. Likewise, the focus cannot be on plasticity alone, considering that some plants with the highly plastic responses have become the most notorious invasive plant species in North America. Therefore, effective communication is as important as production.

Though quite the mouthful, phenotypic plasticity and epigenetics offer a conceptual framework for breeders and growers. Think of plasticity like a plant's "gearbox" — it can shift how it grows and uses resources depending on the conditions it faces, and epigenetics as the

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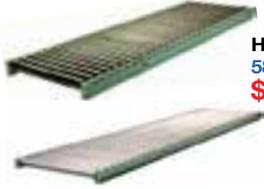
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“memory” that helps it respond faster if similar stress comes around again.

Future breeding may prioritize flexibility itself, selecting genotypes that perform across diverse conditions while screening for traits of plant invasiveness. For growers, integrating mild, controlled stress during production, monitoring recovery, and sharing observations can enhance plant resilience and inform practical management decisions.

Similarly for marketing, broad terms like “drought-tolerant” and “climate-ready,” can be paired with biological basis, like deeper roots, adaptive leaf architecture, sustained flowering under heat. Programs like the Climate Ready Landscape Plant initiative test plants under real-world stress to identify flexibility, ensuring that performance is consistent, not lucky.

#### Practical takeaways

**Train for toughness:** controlled targeted stress during production can strengthen responses for plants in the landscape.

**Observe adaptability:** if a stressful event (heatwave, irrigation accident, missed fertilization) happens, monitor the recovery speed after stress as a key resilience indicator.

**Select for flexibility:** prioritize consistent performance across environments.

**Tell the real story:** strengthen effective marketing with mechanistic explanations.

**Collaborate:** breeders, growers, and researchers each hold part of the adaptation puzzle.

By combining rigorous science, applied research, and clear storytelling, Oregon’s nursery industry can continue to lead nationally by producing plants that are not only marketable but genuinely climate-ready, fostering landscapes that are resilient, functional, and ecologically responsible. ©

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