

Digger[🌿]

MARCH 2022

Putting the pieces together



Greenhouse 1

The 2022 Greenhouse Issue

- Unsung perennials
- Watering efficiently
- Making smart use of space
- Growing with a vision
- Villains of the greenhouse, Part II

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March 2022 Vol. 66 No. 3 Digger



Greenhouse Issue 2022

Exploring the people, plants, production methods and pest management techniques of Oregon greenhouses.

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Founded by Ed, Fred, Robert and Kay Yoshitomi, the nursery grows nearly 1,000 different ornamental and edible varieties.

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Printed in Oregon on domestic recycled paper when available.

On the cover: Each element of a greenhouse operation needs to be in place to work well. ILLUSTRATION BY BILL GOLOSKI **On this page:** Left: *Hakonechloa macra* 'Aureola' cascades along a pathway. PHOTO COURTESY OF WALTERS GARDENS Right: Production at Yoshitomi Brothers Inc. covers a wide variety of annuals, perennials, vegetables and other plants. PHOTO BY CURT KIPP



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29751 S.W. Town Center Loop West
Wilsonville, OR 97070

PH 503-682-5089 PORTLAND
PH 888-283-7219 NATIONWIDE
FAX 503-682-5099 MAIN OFFICE
FAX 503-682-5727 PUBLICATIONS
info@oan.org EMAIL
www.oan.org WEB
www.diggermagazine.com NEWS BLOG

STAFF

Jeff Stone jstone@oan.org
EXECUTIVE DIRECTOR 503-582-2003
Heather Cyrus hcyrus@oan.org
EVENT & EDUCATION 503-582-2004
MANAGER
Beth Farmer bfarmer@oan.org
COMMUNICATIONS & 503-582-2013
WEB DESIGN MANAGER
Bill Goloski bgoloski@oan.org
PUBLICATIONS MANAGER 503-582-2009
Curt Kipp ckipp@oan.org
DIRECTOR OF COMMUNICATIONS 503-582-2008
& PUBLICATIONS
Rebekah Mann rmann@oan.org
MEMBER SERVICES & 503-582-2012
FRONT OFFICE COORDINATOR
Allan Niemi aniemi@oan.org
DIRECTOR OF EVENTS 503-582-2005
Stephanie Weihrach sweihrach@oan.org
DIRECTOR OF FINANCE 503-582-2001
& ADMINISTRATION

DIGGER

Curt Kipp ckipp@oan.org
EDITOR & 503-582-2008
DISPLAY ADVERTISING
Beth Farmer bfarmer@oan.org
E-DIGGER PRODUCER 503-582-2013
Bill Goloski bgoloski@oan.org
ART DIRECTOR & 503-582-2009
CLASSIFIED ADVERTISING
Dr. Jay Pscheidt jay.pscheidt@oregonstate.edu
GROWING KNOWLEDGE Oregon State University
SERIES COORDINATOR
Jon Bell, Mike Darcy, CONTRIBUTING WRITERS
Tracy Ilene Miller, Mitch Lies,
Emily Lindblom, Kym Pokorny

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Josh Robinson PRESIDENT	Robinson Nursery Inc. P.O. Box 100 Amity, OR 97101 josh@robinsonnursery.com 877-855-8733 FAX 503-835-3004
Todd Nelson PRESIDENT-ELECT	Bountiful Farms Nursery Inc. 17280 Boones Ferry Rd. N.E. Woodburn, OR 97071 info@bountifulfarms.com 503-981-7494
Amanda Staehely VICE PRESIDENT	Columbia Nursery 29490 S. Jackson Road Canby, OR 97013 amandastaehely@gmail.com 503-810-2598
Kyle Fessler PAST-PRESIDENT	Woodburn Nursery & Azaleas Inc. 13009 McKee School Road N.E. Woodburn, OR 97071 sales@woodburnnursery.com 503-634-2231 FAX 503-634-2238
Wes Bailey TREASURER	Smith Gardens Inc. 23150 Boones Ferry Road N.E. Aurora, OR 97002 wes.bailey@smithgardens.com 503-678-5373
Ben Verhoeven SECRETARY	Peoria Gardens Inc. 32355 Peoria Rd SW Albany, OR 97321 benv@peoriagardens.com 541-753-8519
Patrick Newton MEMBER-AT-LARGE	Powell's Nursery Inc. 5054 SW Boyd Rd. Gaston, OR 97119 powellnursery@gmail.com 503-357-0631

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Fly like an EAGL!

I am heading to Austin, Texas shortly.

I'm going to assist my brother, Chris (president of Robinson Nursery Inc.), and his wife, Marie (marketing director at Robinson), in finishing the capstone course for Dr. Charlie Hall's EAGL program (Executive Academy for Growth and Leadership). For those of you who haven't heard about this program, it is somewhat similar to a master's degree in nursery business management.

I have had the opportunity to join Chris for a couple of the classes, and they have been nothing short of profound. The quote that comes to mind is, "What got us here isn't what's going to get us to where we are going. So, what are we doing now to be prepared for what we need to accomplish, to get us where we want to go?"

When he signed up for the class, I thought that we had already bitten off more than we could chew. But, as with most things with our company, it doesn't matter. We need to continuously invest our time, energy, and resources to move our people, processes and products out of their comfort zones. A big step like enrolling in this program is the epitome of that. We need to find a way to be OK with being uncomfortable.

A key component of the EAGL program involves creating a one-page plan to serve as the guiding compass for our business. This plan has our values and how we define them, the company's overall mission, our 15-year vision (long-term vision), how we segment our customers, and our value propositions. It also includes a short-term strategic plan, financial metrics, and critical financial ratios so that we can measure our progress against past performances.

As a result of this process, we will end up with a simplified game plan for our operation that can be referenced as we go. It's there to drive our business decisions and enforce the accountability needed to ensure our progress is linked, aligned, and focused.

We must always remember to stop and ask ourselves: What are we doing to progress our businesses, outside of the day-to-day operations? It's easy to get caught up in priorities as they shift from area to area and season to season. But aside from putting out daily fires, it's important to ask: are you intentionally driving your company towards its goals and mission?

Here's the way we like to put it: Are we working ON the business, or are we working IN the business? As leaders, we need to do both — clearly — but the greatest emphasis should be working ON the business.

A big part of this journey was committing to becoming a Lean company first. The Peters Company has played a pivotal role in our ability to implement Lean concepts and make them sustainable. They offer services that transform companies. I tie the Lean efforts into this program because we now have a policy deployment process. That is a very similar management/leadership style to the one-page plan, but it is more accessible.

Throughout the EAGL program, Chris was trained to ask himself, do we have 3–5-year goals? Do we have a mission statement? As he began the EAGL journey, these were issues we had to discover. We had an idea of what the answers would be, but they were tucked away and visited on a limited basis. I believe that anyone that takes the concepts from this program and applies them to their business will be more successful.

I encourage you to investigate the EAGL program. It will, without a doubt, take you from good to great. ☺



Josh Robinson



Calendar

Get the word out about your event! Email details to calendar@oan.org by the 10th day of the month to be included in the next issue of *Digger*.

VARIOUS DATES

FIRST AID AND CPR CLASSES

First Aid and Adult CPR training classes for Oregon Association of Nurseries (OAN) members continue into 2022. Sign up early to guarantee your seat, as registrations will only be accepted up until two days before each class is scheduled to take place. Successful completion results in certification that is good for two years. Two Spanish-only classes will be held from 8 a.m.-12:30 p.m. on March 10 and March 17 at the OAN office, 29751 S.W. Town Center Loop West, Wilsonville, Oregon. Two English-only classes will be held from 9 a.m.-1:30 p.m. on March 8 and March 15 at the CPR Lifeline facility, 9320 S.W. Barbur Blvd #175, Portland, Oregon. Register online at www.oan.org/cprclass.

MARCH 3

COLUMBIA GORGE INVASIVE SPECIES & EXOTIC PEST WORKSHOP

The 11th Annual Invasive Species & Exotic Pest Workshop will take place 10 a.m.-3 p.m. on Thursday, March 3. Hosted by the Oregon Department (ODA) of Agriculture Columbia Gorge Cooperative Weed Management Area, the free event will be held online for anyone to participate. The symposium will feature speakers who will discuss pathways of ornamental weeds, spotted lanternfly, riparian restoration techniques and more. ODA and Washington State Department of Agriculture (WSDA) pesticide recertification credits are anticipated for attendees. Detail and registration are available on columbiagorgecwma.org.

APRIL 1

HORTICULTURAL SCHOLARSHIP APPLICATIONS DUE

Do you know any high school, college or graduate students who are considering a career as a nursery or landscape professional? If so, April 1 is the last day to apply for one of the 19 different scholarships supported by the Oregon nursery industry and offered by the Oregon Nurseries Foundation. Awards range from \$500 to \$1,500, and are sponsored by individuals and OAN chapters. For more information, log on to www.oan.org/onf, or contact Stephanie Weihrauch at 503-582-2001 or scholarships@oan.org.

APRIL 1-2

HORTLANDIA

The Hardy Plant Society of Oregon sponsors this annual plant and art sale at the Westside Commons (formerly the Washington County Fairgrounds), NE 34th Ave and Cornell Road, in Hillsboro, Oregon. Vendors from all over the Northwest will provide the latest plant introductions and alongside old favorites. Handmade, one-of-a-kind garden art made



MARCH 31

FARWEST NEW VARIETIES SHOWCASE DEADLINE

The deadline is March 31 for growers and breeders to enter new plants in Tier 1 of the 2022 Farwest Show New Varieties Showcase. Accepted Tier 1 entries pay a higher fee and gain extra visibility by being included in the July edition of *Digger* magazine, which is sent to more than 7,500 green industry subscribers. All selections are included in the New Varieties Showcase section of the FarwestShow.com website. Plants submitted for the showcase are vetted by a panel of industry experts. To be eligible, plants must be new to the marketplace in the last two years, be available from at least one 2022 exhibitor at the Farwest Show, and represent an improvement over existing selections. Only accepted plants are subject to entry fees. To submit plants for the showcase, please log on to FarwestShow.com.

from materials like metal, wood, glass, ceramic, fabric and stone will be on display throughout the event. Admission is free. There will not be any live presentations from the Grow With Us lecture series, but online offerings through the Gen(i)us Program and Garden Stories will be delivered throughout spring. For more information, log on to hardyplantsociety.org

APRIL 22

EARTH DAY

Whether you're heading out to clean up pollution in your neighborhood or writing your representative about climate action, Earth Day is the second national celebration this month that reminds us all of the importance of caring for the environment, and the role that nurseries can play. Visit www.earthday.org to learn more.

APRIL 23-24

OREGON AG FEST

Ag Fest is an annual fun-filled event where families will learn about local agriculture. The two-day event, aimed to help Oregonians better understand where their food, fiber and flora come from, is a unique learning experience. Hands-on exhibits make learning about Oregon's vast agricultural industry educational and entertaining. The ag-stravaganza will take place on the last weekend of April at the Oregon State Fairgrounds, 2330 17th St. NE, Salem. The cost is \$9 each for anyone 13 or older; younger kids get in free. Discounted tickets are available from www.oragfest.com and from Wilco stores.

APRIL 30

ARBOR DAY

The last Friday in April is nationally recognized as Arbor Day, where we celebrate the important role trees play in our lives. Reach out to your preferred garden center to purchase a tree of your own, or ask a staff member if they know of any nearby tree planting events. Your local news and social media event listings may also have details about other tree planting ceremonies so you can join in on the tradition. The holiday gatherings are often connected with environment-related activities. For more information, visit www.arborday.org.

APRIL 30 AND MAY 1

SPRING GARDEN FAIR

Nearly 100 vendors will be participating at the Spring Garden Fair, 9 a.m.-5 p.m. on Saturday and 9 a.m.-4 p.m. on Sunday at the Clackamas County Event Center in Canby. The event is organized by the Clackamas County Master Gardeners. It will include free pH soil testing, new plant introductions featuring a silent auction, the Garden Fair raffle, free plant check, plant taxis where students tow your purchases for tips, and a potting station to purchase pots and plant them up with garden soil at the fair. A full food court will be available, and the Portland Iris Society has been invited to hold their spring show on Sunday. Visit SpringGardenFair.org for all the details. ☺



Northwest News

OAN members and chapters are encouraged to send in relevant news items, such as new hires, new products, acquisitions, honors received and past or upcoming events. Email news@oan.org.

OSU's NWREC to be remodeled thanks to donations

Carl and Kim Casale donated \$500,000 to the

Oregon State University

North Willamette Research and Extension Center (NWREC) in the summer of 2021, according to a report from *Capital Press* (Salem, Oregon). It's the largest gift the station has ever received. Paired with a donation of \$250,000 by Northwest Farm Credit Services, the funding will be used to remodel laboratories and expand wireless internet service on the 160-acre site in Aurora, just south of Wilsonville.

Three field research laboratories will be built inside the farmhouse that was given to the center by Joan and Jack Parker in 1992. Two labs will be constructed in the basement to examine crop and soil samples, which are the main expenses of the remodel. Wireless internet upgrades will be used to control irrigation and allow research data collection. The project is anticipated to be completed by this summer.

A facilities master plan was also paid for by the Casales at the price of \$18,000. They funded the \$500,000 donation once the design was finalized. Read the full article to learn more about the Casales at tinyurl.com/29wewcwj. The family farmed vegetables and berries for generations and developed a philanthropic relationship with former NWREC director Mike Bondi and Oregon State University over the years.



This new gutter-connect greenhouse at Chemeketa Community College in Salem, Oregon is intended to help improve efforts to prepare horticulture students for jobs in Oregon's \$1.2 billion nursery and greenhouse industry. PHOTO BY CURT KIPP

CHEMEKETA READY TO CHRISTEN NEW GROWING HOUSES

The Chemeketa Community College Horticulture Program in Salem, Oregon is wrapping up construction of new and modernized growing facilities, and expects to open them in March or April.

The program's purpose is to provide badly needed future nursery workers to replace those entering their retirement years. The ultimate hope is to enroll 100 students at any given time. And according to program chair Joleen Schilling, completion wouldn't have been possible without industry support.

"We're creating this so we can support and put people into the workforce, and we're also getting tremendous support from the industry to be able to do it," she said.

Northwest Farm Credit Service donated \$200,000 for construction of a four-bay gutter-connect greenhouse with 3,000 square feet of growing space, including one LED-lighted bay strictly for propagation. "We are able to do this because of that donation," Schilling said. "As an educator and school, we really need to acknowledge their support of our program and agriculture in the mid-Willamette Valley."

Additionally, the **J. Frank Schmidt Family**

Foundation donated \$10,000 for the Woody Ornamentals Demonstration and Learning Lab (WODLL), which will include growing areas for B&B, bareroot and pot-in-pot tree and shrub production. The USDA National Institute of Food and Agriculture contributed \$274,000 to this project as well.

The growing areas will also include an area for dry farming, which some nursery growers practice to grow tough material that can survive on natural levels of precipitation.

The new growing facilities are part of the college's shiny new, \$15.5 million Agriculture Complex. The new complex was funded by the Oregon Legislature and Chemeketa Community College. However, the college was unable to do everything on its wish list due to escalating construction costs. The greenhouse would have been scaled down significantly if it were not for the donation from Northwest Farm Credit Services.

"We were having to raise funds externally for this structure to go up," Schilling said.

The project also includes Quonset greenhouses — one for propagation and one for growing. The Stanley Smith Foundation funded one with a \$6,000 donation, and J. Frank Schmidt Family Foundation funded the other as part of their \$10,000 donation. »

More COVID-19 coverage online

Further updates on how the COVID-19 virus is impacting the greenhouse and nursery industry is online at www.diggermagazine.com/category/coronavirus. We are reporting on the most current information as of press time, but please check online for the most up-to-date information.



The program plans to have an entrepreneurial component, with students conducting modest contract grows for clients in the industry, thereby creating relationships and connections that could lead to future industry employment for the students.

As part of this new entrepreneurial bent, the Chemeketa hort program is taking on leadership of the annual Plant Sale that the Willamette Chapter of OAN used to conduct at the Oregon Ag Fest, an event taking place April 23–24 at the Oregon State Fairgrounds, where consumers can learn about all types of agriculture and farming, and perhaps do a little shopping.

OAN member nurseries have long provided the plant material, and will still be called upon to do so, but the **Willamette Chapter** has turned leadership of the sale over to the hort program. Schilling will co-chair the sale along with longtime active OAN member **Val Tancredi**, who is retired from irrigation and pump vendor **Stettler Supply Co.** in Salem, Oregon.

The sale has benefitted the Chemeketa hort program and will continue to help it meet program needs. “It’s important we inform the membership this is going to continue and now we’ve got something to support,” Tancredi said.

Growers interested in helping may reach out to Schilling at 503-399-5150 or joleen.schilling@chemeketa.edu.

PORTLAND ROSE QUARTER FREEWAY PROJECT STALLED

A key Portland infrastructure project, located at one of Oregon’s most critical bottlenecks, has been stalled due to financing issues as well as opposition.

Oregon Department of Transportation (ODOT) officials said they lack the funds to expand Interstate 5 near the Rose Quarter, according to a report from the *Oregonian* newspaper (Portland, Oregon). The project area is located just north of where Oregon’s two main interstate highways meet. Interstate 5 is the main freight route on the West Coast, while Interstate 84 is an east-west route connecting Portland to Boise, Salt Lake City, Denver, the Midwest and beyond.

The agency needs another \$500 million to complete the projected \$1.18–1.25 billion expansion project. The Oregon Legislature committed between \$500–\$700 million, according to the project manager Megan Channell. ODOT will approach the city of Portland, Metro, and Multnomah County for additional funding, although it’s unclear if they had already been asked to help. Log on to tinyurl.com/yc8874hs to read more about the delay.

Additionally, the Federal Highway Administration rescinded their project approval and asked ODOT to redo the environmental assessment. Philip Ditzler, the federal administrator, pulled his approval because ODOT made modifications to the expansion project he approved in 2020. Climate activist group No More Freeways made the notice from Ditzler public. Read the full article at tinyurl.com/4243unps.

“This is discouraging news because the prospect of alleviating the traffic congestion on this bottlenecked area motivated many ag folks to support these investments,” OAN Executive Director **Jeff Stone** said. “We supported investing in transportation projects like this back in 2017 and no matter where the fault lies, the funding shortfall is a breach of trust.”

CLACKAMAS HOUSING RENTALS SUBJECT TO IMPACT TESTS

The Oregon Land Use Board of Appeals has changed a rule requiring conditional use permits for short-term housing in farm and forest zones in Clackamas County, the *Capital Press* newspaper (Salem, Oregon) reported. The original rule would have allowed hotels to operate on the land, which could impact surrounding farms. The revision requires an analysis of the projects, or “farm impact tests.”

The revised rule lets rural landowners provide rental services such as Airbnb to tourists with conditional analysis. Overnight farm lodging is becoming popular, and can provide growers with supplemental income. Neighboring farmers can weigh in on short-term stay activity and provide feedback if the projects would disrupt farm production.

There is some concern that larger businesses seeking to build hotels could push farmers out of the way by changing property values.

The 1000 Friends of Oregon and U.S. Farm Stay Association members opposed the original rule. The rules vary from county to county, and overnight lodging on farms and forest zones is not allowed under statewide land-use rules.

ODA ISSUES ADVISORY FOR MISLABELED PESTICIDES

The Oregon Department of Agriculture (ODA) said it has reason to believe the product Ecomight-Pro Weed & Grass Killer, manufactured by Ecomight LLC and marketed as being organic, contains glyphosate, permethrin, and bifenthrin. None are listed as active pesticide ingredients on the label. This advisory is based on laboratory testing and confirmation of undeclared pesticide active ingredient(s).

Growers of all crops and retailers are advised to discontinue using or selling Ecomight-Pro until further notice. ODA has issued a statewide Stop, Sale or Removal Order and is working with the manufacturer to rectify the situation. Read the full notice at tinyurl.com/4spk5kmd. For additional information or questions, please get in touch with ODA at 503-986-4635 or email the Pesticides Program at pesticide-expert@oda.oregon.gov.

OSU PUBLISHES TIPS FOR SUDDEN OAK DEATH RESTORATION PROJECTS

Oregon State University (OSU)

Extension researchers published *Preventing Phytophthora Infestations in Restoration Nurseries*, which offers details for growers and restoration areas looking to replant wildland areas impacted by sudden oak death (SOD). The publication was written by Norma Kline, Marianne Elliott of Washington State University and Jennifer Parke, Dan Stark, Dave Shaw, and Alicia Christiansen of OSU.

Phytophthora pathogens are undetectable in container plants and field equipment.

As a result, wildland areas have been inadvertently infected with the disease, causing widespread tree failure. Quarantine areas have been set, but eradicating the disease is difficult or impossible. Nursery growers and restoration practitioners need to be fully aware of the signs of infestation to ensure successful replanting projects.

The report explains why nurseries are susceptible and offers disease prevention guidelines. Sanitation tactics, chemical disinfectants, heat treatments, chemical, and biological control solutions are discussed. Read the report online or download a PDF for free at tinyurl.com/zzs78kcb.

DIAMONDBACK MOTH INFESTATIONS RISING

Growers in Central San Joaquin Valley and Oxnard, California have

reported diamondback moth issues on those vegetables that are known as cole crops, according to a report from the AgNet West Radio Network.

Cooperative Extension Advisor for Entomology and Biologicals Surendra Dara, who now serves as director of the **Oregon State University** North Willamette Research and Extension Center (NWREC), has stated that treating vegetables like broccoli, Brussels sprouts, cabbage, cauliflower, collards, and kale with pesticides has become less effective than in the past. The pest can cycle through 12 generations in a year and build a tolerance to the chemicals. Issues have also been found in parts of Arizona.

Dara advises adding a spray pheromone that can disrupt the pest's mating patterns as part of the grower's integrated pest management (IPM) toolkit. Growers should also consider rotating products, physically pulling

from infested materials, and using cultural and biological controls.

"The key point there is to understand what is happening and what kind of resistance growers might be seeing and maximizing the potential of non-chemical alternatives," said Dara. "No single tool provides complete control, but we have to take advantage of each and every one."

For more information, log on to tinyurl.com/2p8h8jc4.

USDA FORECAST PROJECTS ABOVE AVERAGE FARM INCOME

The USDA Economic Research Service expects that farm incomes will remain high, according to its most recent *Farm Sector Income & Finances: Highlights from the Farm Income Forecast*, published February 4.






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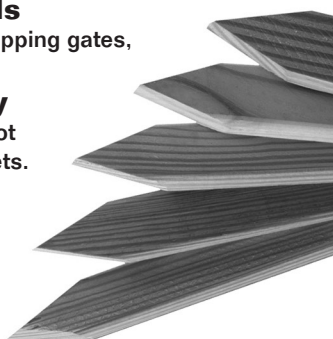
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Northwest News

High commodity prices are driving revenue to historic levels, while producers are saddled with high production costs and the phasing out of pandemic relief funds.

While U.S. farm income will decrease by 4.5%, or \$5.4 billion, in 2022, overall net income will be \$113.7 billion — 15.2% above the 20-year average. The median total farm household income is expected to remain relatively unchanged at \$88,234 in 2022. That is a 4.1% increase — or 0.1% decline after inflation — between 2020 and 2021, and a 5.9% in 2022.

Net cash farm income (cash flow) is forecast to rise 1.4% to \$136.1 billion. Cash income will be 13.6% above the 20-year average, however net cash farm income will actually be down by 2.1%, or \$2.9 billion when inflation is factored in. Additionally, the forecast also notes that direct government payments will drop by 57%, or \$15.5 billion, to \$11.7 billion in 2022.

Production expenses are likely to increase by 5.1%, or \$20.1 billion overall. Fertilizer is noted to have the greatest price increase in the future. Read the full report at tinyurl.com/yc39ksxd.

U.S. HOMELAND SECURITY RELEASES MORE H-2B VISAS

The U.S. Department of Homeland Security (DHS) and the U.S. Department of Labor (DOL) announced a temporary rule to increase H-2B visas for 2022, according to a federal release. This rule would make an additional 20,000 visas available this fiscal year. 13,500 of the visas are available to returning workers who received an H-2B visa during one of the last three fiscal years, and 6,500 visas are reserved for workers from certain countries in the northern part of Central America, as well as Haiti.

The additional visas are designated for U.S. employers that can demonstrate that they are suffering or will suffer irreparable harm if they do not receive all the H-2B workers they requested in their petition; and which they need to fill positions on or before March 31, 2022. The rule also grants some H-2B nonimmigrant workers already in the United States

to begin employment with a new H-2B employer or agent once USCIS receives a timely filed, non-frivolous H-2B petition but before the petition is approved.

This supplemental visa release does not address the urgent need for more visas for jobs starting April 1 or later. Employer groups continue to advocate for second-half cap relief.

Announcements

STONE NAMED TO DISASTER RELIEF COMMITTEE

Oregon Association of Nurseries (OAN) Executive Director **Jeff Stone** has been named to the Oregon Agricultural Disaster Relief Fund Rules Advisory Committee (RAC). The group is responsible for setting up a critical funding process to assist agricultural growers dealing with persistent natural disasters.

The Oregon Department of Agriculture (ODA) has been tasked with implementing Senate Bill 892. That bill was passed in 2021 in response to the agricultural community's request for emergency funding when confronted with natural disasters.

The agriculture community formally supported the \$40 million package in the Legislature. It set up a forgivable loan program to provide financial assistance to persons engaged in farming or ranching operations in the State of Oregon with lost gross farm income in the calendar year 2021 due to a qualifying natural disaster. A total of \$40 million was appropriated, with 10% for administering the package, including what the banks will get paid. Approximately \$36 million will be available for loans. However, the 14% to Jefferson County equals \$5 million, leaving \$31 million open for other Oregon counties. The ODA shall establish by rule the procedures and criteria for the administration of the forgivable loan program, including application requirements and processes, loan conditions and allocation amounts, loan forgiveness eligibility and standards, and other compliance incidences.

The RAC members include several ranchers, producers, members of Oregon Farm Bureau, Oregon Dairy Farmers

Association, Oregon Cattleman Association, Oregon Association of Nurseries, Organic Coalition, and Columbia Gorge Fruit Growers. Read more about the committee on tinyurl.com/ykc979sz.

USDA HIRES STATE DIRECTOR OF RURAL DEVELOPMENT

The U.S. Department of Agriculture appointed Margaret Hoffmann to lead a rural development office in Oregon, according to a report from *Oregon Capital Chronicle* (Salem, Oregon) news website. She will be helping to deliver hundreds of millions of dollars in grants and loans from the agency to farmers and ranchers. The office distributed \$680 million in assistance last year. The funding will be used to develop rural energy conservation, broadband internet, job creation, and other projects.

Hoffmann was previously a strategic operations manager for the Farmers Conservation Alliance in Hood River and an energy consultant and advisor for three years under former Oregon Gov. John Kitzhaber and Gov. Kate Brown. She will meet with rural community leaders to learn their needs and figure out the best way to provide assistance from the USDA. Read the full article at tinyurl.com/2p9e5m8h.

MA HIRES SOUTHEAST SALES MANAGER

Joseph Setter has been hired by **Mycorrhizal Applications** (MA) to be a new sales account manager for the Southeastern U.S., according to a release from the company. Based out of Greenville, South Carolina, he will support growers and distributors in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, and Texas.

Setter has more than 20 years of experience in the agriculture and horticulture marketplace. He previously served as national sales manager for a U.S.-based manufacturer, helping customers with mycorrhizae, bacteria, and amendments. Setter also has



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experience working with Chinese markets. He has a bachelor's degree in horticulture/agronomy from Kansas State University.

For assistance on using the various MA technologies or finding distributors for MycoApply® products, Setter may be reached by phone at 620-214-8704 or via email at joseph.setter@mycorrhzae.com.

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BAILEY HIRES LICENSEE ACCOUNT REPRESENTATIVE

Nick Stevens has been hired for the newly created position of licensee account representative in the consumer brand team at **Bailey**. He'll be supporting the growth of Endless Summer® Hydrangeas, First Editions® Shrubs & Trees, and Easy Elegance® Roses across 40 accounts.



Stevens was appointed to the position because he excelled in his role at Bailey, demonstrating leadership skills and building strong business relationships. Clients were able to grow their businesses with Bailey Consumer brands with his support that reached anticipated sales goals. He previously served as a sales representative for the company for four years and brings additional experience managing a regional landscape and installation company. Nick may be reached at nick.stevens@baileynurseries.com.

MCGREGOR CO. ACQUIRES TWO OREGON CHEMICAL COMPANIES

The McGregor Co. has purchased Inland Chemical Service and Sherman County Farm Chemical, according to a report from *Capital Press* (Salem, Oregon). Based out of Colfax, Washington, McGregor Co. strategically purchased the businesses to develop long-term relationships with companies in Central Oregon.

Sherman County Farms President Bob Faria noted that his company has partnered with McGregor for supplies for a long time and Inland Chemical Service President Land Haldorson looks forward to the additional resources and support that will come from the acquisition. Learn more about the acquisition at tinyurl.com/2p85jr7x. ©

Understanding the new climate rules

Oregon's new climate protection program is expected to increase certain business costs

On December 16, 2021, the Oregon Environmental Quality Commission (EQC) voted to approve the Climate Protection Program (CPP).

The CPP, codified in Oregon Administrative Rules Chapter 340, Division 271, joins other Oregon climate-focused rules, including the Clean Trucks Program and Clean Fuels Program. It traces its origins to an executive order issued by Gov. Kate Brown on March 10, 2020, one year after Oregon Senate Republicans staged a walkout in response to proposed cap and trade legislation.

Executive Order 20-04 specifically directed the Department of Environmental Quality (DEQ) and the EQC to take actions to cap and reduce greenhouse gas emissions from large stationary sources, transportation fuels, and all other liquid and gaseous fuels.

Under the auspices of the Executive Order, DEQ convened a rulemaking committee in January 2021 to address ways for Oregon to reduce greenhouse gas emissions from fossil fuels. DEQ also enlisted ICF, a consulting firm, to study program designs for programs that could reduce greenhouse gas emissions.

The EQC's vote in December represented a culmination of DEQ's work with the committee and ICF to draft rules, and gave Oregon a version of cap and reduce that did not require legislative approval.

Mechanics of the CPP

DEQ articulated three broad goals for

the CPP: 1) reduce greenhouse gas emissions in order to address climate change; 2) achieve co-benefits from the reduction of other non-greenhouse gas air contaminants; and 3) improve the welfare of communities of color, tribal communities, communities experiencing lower incomes, and rural communities. DEQ proposes to achieve the listed goals by requiring certain entities designated in the rules to reduce their greenhouse gas emissions.

At a high level, the CPP aims to cap greenhouse gas emissions from fossil fuel sources, including diesel, gasoline, natural gas, and propane. The CPP rules apply when those fossil fuel sources are used in a variety of contexts, including transportation, residential, commercial, and industrial settings.

Under the CPP, suppliers and in-state producers of the fossil fuel sources listed above are regulated entities subject to a limit on carbon dioxide emissions. The allowable limit on carbon emissions will diminish over the next few decades with the ultimate goal of a 90% reduction in emissions by 2050.



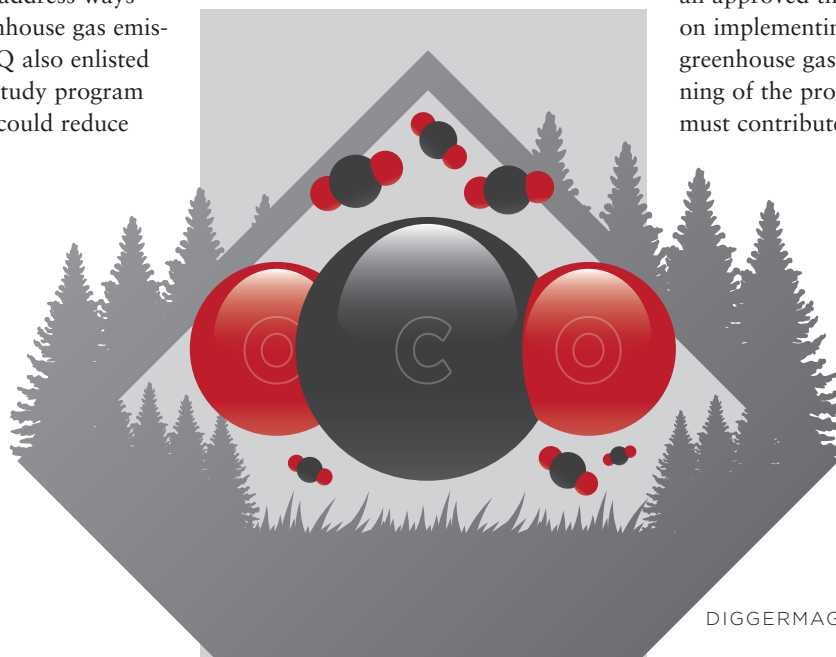
Marika Sitz

Marika Sitz is a lawyer in Jordan Ramis PC's Agricultural Law practice, focusing her practice on water and natural resources law. Contact her at marika.sitz@jordanramis.com or 541-797-2078.

While the emissions cap will be lowered each year, the CPP will give regulated entities compliance flexibility by distributing "compliance instruments" on an annual basis. The number of available "compliance instruments" will be equivalent to the annual cap established in the CPP rules. Regulated entities may trade or bank these compliance instruments in order to meet the emissions reductions requirements of the CPP. Each compliance instrument represents one metric ton of carbon dioxide equivalent (MTCO₂e).

In addition to compliance instruments distributed by DEQ, regulated entities may also submit a Community Climate Investment (CCI) credit to offset one MTCO₂e. In order to earn a CCI credit, a regulated entity must provide funding to an approved third-party entity that focuses on implementing projects that will reduce greenhouse gas emissions. At the beginning of the program, a regulated entity must contribute \$81 to an approved CCI entity to earn one CCI credit. The required amount will increase over the course of the program.

Beginning on January 1, 2022, all fuel suppliers with emissions of 200,000 MTCO₂e as measured in any year subsequent to 2019 became covered entities subject to the CPP rules. ➡



Entities with emissions that exceed 100,000 MTCO₂e will be covered by the CPP beginning in 2025, and this pattern will continue until 2050, at which point the CPP will apply to all fuel suppliers with emissions that meet or exceed 25,000 MTCO₂e.

Sequestration — a missing component

The CPP is missing one notable emissions reduction pathway of particular interest to nurseries: carbon sequestration. The U.S. Geological Survey defines biologic carbon sequestration as the process by which vegetation, soils, and woody products capture and store atmospheric carbon dioxide, a greenhouse gas. As growers of vegetation and woody plants and stewards of soil, nurseries have a significant interest in the sequestration conversation.

In an interview with the Jefferson

Exchange on Jefferson Public Radio, DEQ Director Richard Whitman acknowledged that while the process of drafting the rules included discussions about sequestration, the decision not to include it in the program ultimately came down to a question of priority.

According to Whitman, the EQC prioritized spending community climate funds to help designated communities reduce their reliance on fossil fuels. He noted that the EQC directed DEQ to look at other funding sources for sequestration, and that the department would bring that work back to the commission in 2022.

While it appears that the sequestration conversation is still alive, it remains to be seen how it will be incorporated into future CPP-adjacent efforts or other Oregon climate efforts.

Potential impacts

Since conversations about the CPP rules began, a main concern among members of the agricultural community has been the additional costs that could be incurred by fuel suppliers and passed on to agricultural entities, particularly through increased transportation costs.

Additionally, nurseries that use natural gas to heat their greenhouses have been wary of potential price increases that may occur as natural gas suppliers pass on compliance costs to the customer.

As the CPP begins its first compliance period in 2022 and moves toward the second one in 2025, nurseries and other businesses should stay alert as we begin to better understand the impact of the CPP on businesses in the state. ☺

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PHOTO BY CURT KIPP

OAN MEMBER PROFILE



OWNERS

Don and Mariah Kondo

KNOWN FOR:

Growing a wide variety of perennials (40%), annuals (40%) and vegetable starts (20%) wholesale, for delivery to retail garden centers.

PEOPLE

Randy Gettel, production, logistics and maintenance manager; **Gilbert Baltazar**, head grower; **Dan Bamberger**, landscaper sales and production manager; **Josh Stenson**, pest manager and organic vegetable production manager; **Monica Fossi**, garden center sales and office manager.

CONTACT:

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info@yoshitomibrothers.com

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LISTINGS:

NurseryGuide.com



Yoshitomi Brothers Inc.

Founded: 1960 by Ed, Fred, Robert and Kay Yoshitomi

BY CURT KIPP

DON KONDO MAY grow his annuals, perennials and veggie starts on a short cycle, but he operates his greenhouse growing operation based on a long-term vision.

“The nursery business is a long-term deal,” he said. “You either want to be in it, or you don’t. It’s a lifestyle choice and a business choice.”

Kondo made the choice consciously in 1986, when he traded a 10-year career as a general contractor in homebuilding for the opportunity to take over **Yoshitomi Brothers Inc.** from his four uncles who founded the nursery.

None of their children wanted to carry it on, but seeing the potential the business had, he went for it. And today, has no regrets.

“I think that it’s not for everybody, but I enjoy the business,” he said. “I enjoy the people, and my employees are great. It’s like any business. You always have situations that happen, but you just try to mitigate those and hopefully try to make everything work out better down the road.”

Yoshitomi Brothers Inc. grows a broad selection of greenhouse material, with close to 1,000 different plant varieties offered.

Perennials make up 40% of the plants shipped, and include not just the traditional perennials, but grasses, ferns and herbs. These are sold mostly in 1-gallon containers, with some 4-inch containers also offered.

Seed-grown annuals make up another 40% of the nursery’s output, with the remaining 20% consisting of vegetable starts. The starts are sold in 4-inch containers and jumbo 6-packs, and they include onion, cabbage, lettuce, tomato, squash, cucumber, peppers, and strawberries.

Product is delivered on weekly routes radiating out from the Portland area — north to the Puget Sound area, south down the Willamette Valley to Eugene, west to the Oregon Coast, and eastward into Central Oregon. “We deliver 100% of our product for the retail garden center,” Kondo said.

The nursery ships year-round these days, but as one might expect, it is busiest from April 1 through the end of May. “The hectic time is basically only five or six weeks, which is enough,” Don said.

Edible roots in the nursery business

Many nurseries have interesting roots, but in the case of Yoshitomi Brothers, ➡

PHOTO BY CURT KIPP

the roots are edible. That's because the company started out in vegetable farming in 1960.

The story goes back further than that, however — all the way back to 1918, when a young Keijiro Yoshitomi boarded a slow boat for the long journey from Japan to the United States, hoping to find opportunity.

"He came over because in Japan, if you're not the first-born, you're not entitled to anything," Don said, alluding to primogeniture — the cultural practice of giving the family inheritance to the eldest child. "Basically, you have nothing. So, the oldest brother stayed in Japan, and my grandfather and his brother and his sister all came to the United States."

They landed in Seattle along with other Japanese immigrants to the West Coast. Keijiro soon went back to Japan to bring over his wife, Shimo. They became part of the Issei — the generation of Japanese Americans who immigrated prior to 1924, when the Johnson-Reed Act, also known as the Immigration Act of 1924, placed a severe crimp on immigration.

Like many Asian immigrants, Keijiro became a farmer, which was a respected profession in the old country. He and other family members settled on land near Milwaukie, Oregon, where they grew vegetables.

"My grandfather would deliver vegetables to the Early Morning Market in Portland five days a week," Don said. "That's a long trip by horse and buggy. He didn't go every day, but it was still quite a chore."

The business prospered, with Keijiro's four sons — Ed, Fred, Robert and Kay

— joining in as they came of age. They all worked in partnership with other relatives until their shared farm was condemned in 1960 for highway development. The state wanted the land for the Milwaukie Expressway, now known as Highway 224.

Keijiro retired, and his four sons broke off from the other family members to form their own business, Yoshitomi Brothers. They purchased land at Peach Cove, a flat patch of land south of West Linn on the northern banks of the Willamette River. There, they started growing greenhouse annuals as well as vegetables, including cauliflower, cabbage, celery, zucchini and peppers.

Growing up, Don spent a fair amount of time on the nursery his uncles owned. "I worked during the summers while I was in high school, and I worked occasionally on certain weekends when I wasn't playing sports," he said.

He remembers his uncles getting together often with other growers, especially in the early days. "They had a lot of other greenhouse growers that were either friends from generations before, or current friends that were in the business," Don said.

They shared information and product and would problem-solve together, sharing solutions to problems they encountered.

"I thought that was really cool," he said. "We don't see as much of that anymore."

Putting in the time

After high school, Don attended Oregon State University and then Portland State University, graduating with a degree

in business administration. He didn't immediately go to work at the nursery afterwards. Instead, he learned the construction trade and built homes, ultimately serving in the role of general contractor.

"I had a friend that had a good opportunity for me, and we did that for several years," Don said. "I ran my own jobs, hired subcontractors and so on and so forth. I learned how to do a lot of it myself — framing, finishing, concrete work — a little bit of everything. I dabbled in a little bit of land development and helped a bit with that, putting in underground utilities and street curbs."

But in 1986, he had an offer from his uncles to work at the Yoshitomi family nursery and ultimately take over. That's also the time Yoshitomi Brothers shifted its focus to the nursery side of the business.

"1986 was the last year of vegetable farming," Don said. "They were getting older, and the greenhouse was becoming a lot more profitable than the vegetables. They decided to head in that direction."

Don accepted his uncles' offer to take over the family farm.

"I saw a great opportunity and I was willing to put in the time and effort that it takes to be in this business and to run a greenhouse and nursery," he said. "I was willing to sacrifice the time. That was a point in my life where I was ready to roll with it."

The decade he spent in home construction allowed him to fully appreciate the opportunity for both the challenge and the reward that it represented.

"When you're younger, you don't appreciate things sometimes, and it takes

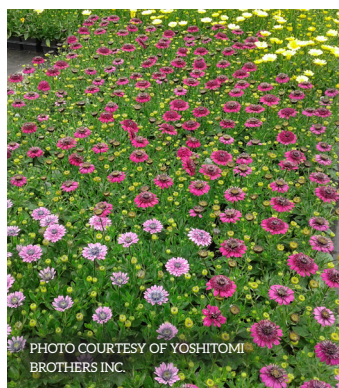


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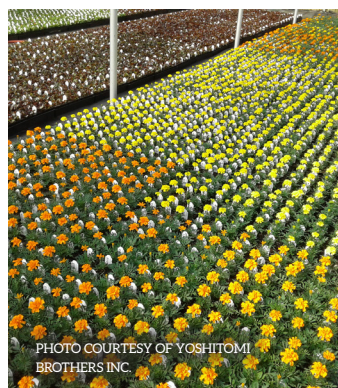


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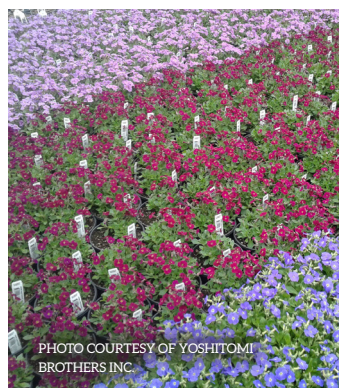


PHOTO COURTESY OF YOSHITOMI BROTHERS INC.



PHOTO BY CURT KIPP

a while to grow up, hopefully before it's too late and the right opportunity comes around," he said. "It's all about investing in that opportunity and taking advantage of it."

Meeting challenges, finding success

Don's goal was to take the business further and make it more successful than it had been thus far. By that measure, he has been successful. The 75,000 square feet of greenhouses present when he started have been expanded to 375,000 square feet, or four times more. The company offered 100 different products when he took over. It offers 1,000 or so now.

Over this time, the company's workforce also expanded. It started with mostly family members and temporary helpers, but is now comprised of 28 workers year round, and more than that during peak season. Don credits the success and growth of his customers, and of gardening in general, for the growth in his business.

"It's the only way you can grow," he said. "To see our customers successful helps us be successful also."

One of the changes Don has seen is a lengthening of the gardening season, which he attributes to global warming as well as greater consumer interest in gardening. Even recessions and downturns tend to drive interest in gardening, he noted.

"People tend to plant a little more," he said. "It gets them started and gives them something to fall back on. I even find myself going out [in my garden] and working on the vegetable garden a little bit. It's fun, and you feel good about it because you bring in something and put it on the table."

Despite the heightened interest in gardening and plants, several factors make doing business a challenge.

"I think labor is always going to be an issue," Don said. "Years ago, we used to get 15, 20, 30 people looking for

employment. Now, we don't see any, and the last several years, we've resorted to contract labor. Last year was different, because the labor contractors couldn't even get people to come work for them."

The rising cost of raw materials — soil, containers, labels, seeds, starts — hasn't helped, and the continued availability of water is also something to monitor.

Finally, there's weather. The nursery endured it through three catastrophic events in the last 18 months — the Oregon wild-fires, the ice storm in February 2021, and the heat waves in June and August 2021.

The nursery managed to protect its material through all three, but was without power for 10 days during the ice storm. They used generators to heat growing spaces. When these failed, they put backups into service.

"A couple of times, we were on the backups to our backups," Don said.

The heat wave events had their workers starting early, finishing early, and taking frequent breaks.

"Guys would come into the air conditioning and then go back out," Don said. "We kept plenty of fluids around — ice cubes and popsicles and hydration, hydration, hydration."

Don credits the loyalty and versatility of his core workers for the nursery's success. About 20 have remained for more than a decade.

"We have employees that are dedicated and, I hope, happy working for us, which has kept our business going," Don said. "We wear a lot of hats around here."

Don trusts his team with day-to-day decision making, knowing they have the proven experience, problem-solving ability and teamwork to face the challenges that arise and meet the needs of customers. They have full latitude to do so.

"They always seem to make the right decisions," he said. ☺



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Unsung perennials

A treasure trove of options is available for those who want to go beyond the staples

BY TRACY ILENE MILLER

THOUSANDS OF BOOKS are written about them, as are poems, and there are even songs sung about the flowers we know as perennials. Perennials are the backbone of most garden designs and some container gardens, as well. Consumers adore perennials. Growers and designers, too.

In the search for the perfect perennial, consumers sometimes defer to online sources, finding those “10 best,” “15 best,” “20 best” (and so on) lists that often return to the same heralded few, bypassing a whole selection of perennials marked by outstanding qualities.

Here, we go a little further, providing a roundup of unsung perennials beloved by plant people who say these bloomers deserve a little more love for either their durability, color, form, performance — or all of the above. These underappreciated plants are here to get their due.

Groundcover, short-statured perennials

Allium ampletens (narrowleaf onion), a bulb, thrives in well-drained clay soil, wet winters and springs, and dry summers. In other words, it's a natural for the Pacific Northwest and higher elevation areas of the West.

“It's a short-statured, late-blooming showy *Allium* that looks phenomenal in mass plantings,” said Mike Ridling of **Sevenoaks**

Native Nursery LLC (Albany, Oregon). The flowers bloom May to June in white to pink, on leafless stems, with a height of 6–12 inches.

Aquilegia canadensis ‘Little Lanterns’ (previous page), a native, is a favorite of Ali Beck, production manager at **JRT Nurseries** (Aldergrove, BC, Canada) for its very dwarf, barely one-foot-high and wide stature, delicate foliage and red and yellow dangling flowers.

“It looks delicate but is so tough,” Beck said. “I’ve seen them growing out of rocky cliff out of a thimble of soil. It’s not as showy as the bigger ones, and it does self-seed a bit, but very demurely. It’s short-lived, which is advantageous in a self-seeding plant.”

Coreopsis auriculata ‘Elfin Gold’ (dwarf mouse-eared tickseed) is a steady, consistent bloomer of golden yellow rays, producing throughout summer on 8–10-inch-high by 10–12-inch-wide plants with slightly fuzzy deep-green leaves that can turn burgundy in fall. Slow to spread, it is easy to grow and works as an edge plant. Beck recommends it because it is drought tolerant once established.

Cotula ‘Tiffindell Gold’ (this page) works as a tough, free-blooming, evergreen lawn substitute that lasts decades, and matures at 2–4 inches high and 24–36 inches wide. Its blooms are like gold buttons. It can be mowed once a year and is virtually maintenance-free, according to Grace Dinsdale of **Blooming** ➤

Unsung perennials

Nursery (Cornelius, Oregon).

Dianthus alpinus (Alpine pink) is a hardy, rockery carnation, with a tight, semi-flat, low gray mound (2–4 inches high by 6–12 inches wide) and little pink flowers that smell like cinnamon. “It’s old-fashioned, out of the 1950s, and easy,” said Donna Giguere of Giguere Landscape Design (Portland, Oregon).

Dianthus ‘Pink Fire’ is a heavy summer and repeat bloomer on a gray mat, 6–8” high by 8–12” wide, and avoids splitting, as other *Dianthus* do, said Ben VanderWerf at JRT Nurseries. It is fragrant and drought tolerant.

Many *Diascia* are sold as annuals, Dinsdale said, but hardier, very drought tolerant ones are worth their perennial status for the mass of flowers — like *Diascia integerrima* ‘Coral Canyon’ (this page), which needs space, but will reward with 4–6-inch-wide plants bearing a mass of soft pink flowers all summer long on 12–13-inch stems. “They’re great in a rock garden,” she said.

Erigeron glaucus (seaside daisy or flea-bane, this page) is a coastal evergreen plant that Ridling believes is starting to get utilized by landscape designers for its large, 2-inch lavender-pink blooms with yellow centers, extremely short stature of 2–11 inches high by 12–24 inches wide, fall color and drought tolerance. “It will grow out of a crack with a white daisy that attracts small pollinators,” Giguere said. No watering is necessary for the spring-blooming, fine-textured perennial. Plant it anywhere you want pollinators, she said, as a groundcover under blueberries or apple trees, for instance. “They can get scrappy, but they will stay green all winter if there is no snow.”

Geum coccineum ‘Koi’ bears sprays of orange-red cup-shaped flowers, loose and open on delicate stems, above the 10 inch high by 18 inch wide plant with glossy, “rip-ply” foliage, almost like lettuce, VanderWerf said. The semi-evergreen mounds do well in the garden and in containers.

Heuchera micrantha (crevice alum-root) is most interesting for its dainty white flower, according to Ridling. It is versatile, surviving in semi-moist to dry

applications. Flowers bloom between May and August, depending on elevation, above compact clumps of foliage 1–2 feet wide and reddish stems up to 2 feet high.

Leptinella perpusilla (brass buttons) gets a strong recommendation by Dinsdale to use as a groundcover and in places with light foot traffic.

“I’ve filled a lot of holes with it,” she said, including a long driveway in both partial shade and sun. “It stayed flat,” she said, and the 1 inch high by 12–18 inch wide plant formed a tight mass with no weeds and was maintenance-free. Blooms spring through summer.

Penstemon cardwellii is an easy-to-grow native plant with tubular violet-blue flowers from May to early August, lasting sometimes until fall, that is a pollinator and hummingbird magnet. With small, round evergreen leaves, the 4–12 inch high by 12–15 inches wide plant can be used as a groundcover, in a slab or in a rookery. It roots through nodules on the stem, grows in full sun and needs no water, unless in extreme heat.

“I have seen it die from too much water,” Giguere said.

Sedum spurium ‘Pink Cloud’ was selected for its hardiness, its ability to withstand heat, dryness, winters — every-

thing, according to VanderWerf.

“When it blooms, it’s a pink could; you can’t see the plant, you can’t see the leaves,” he said. The evergreen forms a vigorous 1-2 inch high by 12-24 inches wide mat.

And *Sedum spurium* ‘Rhubarb’, with the same growth habit, matches a hot pink flower with a green and red-trimmed emerging leaf for a “stunning” plan,” VanderWerf said. “We’ve been taking it to shows this year, and it got a lot of notice.”

Tiarella ‘Pink Bouquet’ (foam flower) is one of VanderWerf’s favorites with multi-season interest and an alternative to the overused vinca or pachysandra. Clean maple-leaf shaped foliage emerges chocolate and turns green in summer. Masses of sweet-smelling flowers burst open on 12-inch high spikes like New Year’s sparklers and rebloom occurs through August.

Diascia integririma ‘Coral Canyon’
PHOTO COURTESY OF BLOOMING NURSERY INC.

Erigeron glaucus
PHOTO COURTESY OF SEVENOAKS
NATIVE NURSERY LLC



Viola adunca

PHOTO COURTESY OF SEVENOAKS
NATIVE NURSERY LLC

The leaves are semi-evergreen, and it thrives in sun and shade.

“*Viola adunca* (early blue violet, sand violet, Western dog violet, and hookedspur violet, this page) forms tight tufts that bloom profusely, and is tough as can be,” Ridling said. A self-spreading native, the white, purple, and deep purple-veined flowers bloom compactly in a variety of conditions, from dry to moist, April through August, on plants approximately 3–6 inches high.

Viola ‘Etain’ (Etain violet) start blooming heavily in spring and keep reblooming, especially in mild winter conditions and even in heat.


“It just keeps going,” VanderWerf said. Yellow flowers trimmed in lavender are large and fragrant hanging above the clump-type 6–8 inches high and wide plants. Although it will survive some heat, it prefers moist soils and part shade.

Mid-height perennials

Castilleja iniate (scarlet paintbrush) is different than other paintbrushes for its ability to thrive in wet-to-dry conditions and low-to-high elevations, according to Ridling. “It has a large flower for a *Castilleja* that is pretty showy.” It blooms May to September, reaching 8–32 inches high.

Dicentra formosa (Western bleeding heart) is easy, for people who want natives, but don’t like ferns, according to Giguere. It grows 1–2 feet in sun and shade, with light pink blooms May through July, and will grow under rhododendron. The plants are ephemeral, so the fine-textured leaves can be gone by summer, but not always.

Dryopteris erythrosora ‘Prolifica’ (autumn fern) matures to a large 2 foot high and wide, and is refined, according to VanderWerf, with glossy foliage »



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Unsung perennials

Geranium oregonum
PHOTO COURTESY OF SEVENOAKS
NATIVE NURSERY LLC

and a delicately dissected leaf. The new foliage on the semi-evergreen fern emerges red, turns green in summer, and then copper red in fall, and then plants reproduce by underground stems.

Geranium oregonum (Oregon geranium, this page) is a native with a showy, 2-inch bloom that fits well behind other ones, creeping up and out, on 18–30-inch-high by 6–18-inch-wide plants, according to Ridling.

Polemonium yezoense 'Purple Rain' (purple leaf Jacob's ladder) produces deep purple blooms on strong stems above a mound of fern-like leaves, that emerge a bronzy maroon and turn a deeper green in summer and in shade. Beck describes it as evergreen in mild winters, and it reaches 12–23 inches high by 12–18 inches wide.

Sidalcea malviflora ssp. *virgata* (rose checkermallow, this page), with dainty, soft

pink flowers, thrives in the dry conditions of Oregon summers once established, although they benefit from some moisture. It works as a cut flower, and insects and pollinators are drawn to it. It's a long-seasoned native bloomer, from May through July, reaching up to 24 inches by 12–24 inches wide, fitting well in the front of the border, according to Ridling.

Symphotrichum chilense (formerly *Aster chilensis*; Pacific aster), a native, stays low (1–3 feet high by 1–5 feet wide), never flops and blooms late with iridescent violet flowers, providing late pollen. "Plant it in a parking strip. It doesn't need to be watered; so easy," Giguere said.

Thermopsis gracilis (slender golden-banner) has yellow spring and summer flowers with the distinct shape and form of its legume family, and tends to stay



Sidalcea malviflora
ssp. *virgata*

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Aconitum columbianum

PHOTO COURTESY OF SEVENOAKS
NATIVE NURSERY LLC

evergreen deep into winter. A mountain plant that thrives in the valley, it grows up to 3 feet high and is a good lupine alternative, by Ridling's standards.

Moisture-loving perennials

Aconitum columbianum (Columbian monkshood, this page), in the buttercup family, has stems ranging between 2 and 6 feet, bearing palmate leaves and purple flowers with a top petal that folds, like a hood. Moisture-loving, sun-seeking plants, this native does well at all attitudes of the West and can present with flowers in yellow, white and tinged

green, and blooms all summer, according to Ridling. It should be planted in areas away from pets or children, as parts of the plant are, in varying degrees, poisonous.

Arnica amplexicaulis (Clasping arnica) has daisy-like, pale yellow blooms, June through August, on single stems, with small lower leaves that drop before blooming, leaving the flower perched above a slim, erect stem. The plants prefer full sun to partial shade and need moist wet soils, pointing to its alternate common name, streambank arnica. "The tuft gets bigger and bigger to the point that it can have 100 blooms on a plant," Ridling said, with a height of 6–30 inches.

Disporum hookeri (Hooker's fairy bells), a native in the lily family, prefers full to partial shade and moist soil, and reproduces from slender rhizomes, with 1–3 white hanging bells appearing May

through June, followed by bright red-orange fruit. It maintains a nice, full habit up to 18 inches.

Hakonechloa macra (Japanese horse grass) is a slow-growing, very hardy, shade tolerant grass that grows in a cascading mound. The color varies in sun to shade, and by cultivar, and its long leaves with wiry steams give the appearance of an arching mini bamboo, 12–36 inches high, without being invasive, according to VanderWerf.

Iris sibirica 'Flight of the Butterflies' is a distinct Siberian iris, with masses of small flowers from late spring to early summer, that when established look like bunches of butterflies (on 30–36 inch stems at maturity), according to Dinsdale. It prefers moister and sunnier settings, but will thrive in partial shade.

Sidalcea cusickii (Cusick's check- ➤

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Unsung perennials

Zauschneria,
Epilobium cana
'Woody's Peach
Surprise'

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Coreopsis 'Zagreb'

PHOTO COURTESY OF
BLOOMING NURSERY INC.

ermallow) is high, sturdy and easy-to-grow in riparian zones and other open moist habitats.

"Large blooms are pink, and it as an outstanding plant if you have an area where it can spread, even if in the back of other plants," Ridling said. Blooms from May to June on 1½–6 feet high by 8–12 inch wide plants.

Veronica gentianoides 'Little Blues' (Gentian speedwell, page 21) grows in a 12–18 inch, evergreen rosette with loose, 6–8 inch spikes of bright blue flower that pop larger than other Veronicas, according to Beck. Blooms spring and early summer above light green, powdery mildew resistant foliage.

Heat- and drought-tolerant perennials

Coreopsis verticillata 'Zagreb' is bullet-proof, surviving in hot, dry conditions,

according to Dinsdale. Cheerful yellow blooms last spring through summer on 12-inch high by 18-inch wide plants that need no dividing.

Dodecatheon hendersonii (broad-leaved shooting star, page 21) has a striking flower, takes dry to moist conditions, is small, and can be tucked anywhere, according to Ridling. It blooms February to June on leafless 12–18-inch stalks, followed by leaves that go dormant.

Formerly classified as *Zauschneria*, *Epilobium cana* 'Woody's Peach Surprise' (12–18 inches high by 9–18 inches wide, this page) and *Epilobium cana* 'Bowman's' (1½–2 feet high and wide), are commonly called California fuchsia or hummingbird trumpet for the attraction by the nectar-sipping birds. The gray foliage and tubular flowers that last through summer and into fall are appreciated by humans,

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as are the drought tolerance, the upright consistent form and the easy care.

Halimium lasianthum, sometimes called the other rock rose, has returned to the Blooming Nursery lineup. "It is a great long-term plant with low to zero maintenance, a symmetrical habit, and when it blooms, from June to August, it is covered in bright yellow flowers with a reddish blotch in the middle," Dinsdale said. The 2–3-foot-high by 3–5-foot-wide plants are drought-tolerant, and butterflies love them.

An intergenetic cross, *Halimicistus* × *wintonensis* 'Merrist Wood Cream' (next page) has all the same tough properties as *H. lasianthum*, with larger, felted grayish olive foliage and larger blooms, according to Dinsdale.

Helleborus argutifolius (Corsican hellebore), the largest of the species hellebores, with a holly leaf, is evergreen with shiny attractive serrated leaves on a 3 foot high by 5 foot wide low bush. It brings texture to a full sun to open shade area beyond its late winter to early summer bloom season, according to Giguere. It is more sun-tolerant than other hellebores, deer resistant and drought tolerant once established.

Leontopodium alpinum 'Blossom of Snow' (Edelweiss) has white flowers with a hint of yellow held high on 12–16 inch stems, contrasting with the silvery gray, narrow foliage. Beck considers it low maintenance, compact, and will rebloom in fall if cut back in summer.

Penstemon rydbergii (Meadow penstemon), a native, defies expectations in nursery settings, with its wide-ranging ability to thrive in habitats from moist to extremely dry, with some water needed in high heat situations. Ridling recommends it because it blooms May to August, depending on elevation, and grows to 8–28 inches high by 1–3 feet wide.

Rosmarinus officinalis 'Blue Spire' (page 21) was brought back into production at Blooming Nursery because of its hardiness. 'Tuscan Blue' and 'Arp' are industry standards, but Dinsdale explains that they have to be replanted every few years because they're less winter hardy. "Blue Spire" doesn't," she said. The »

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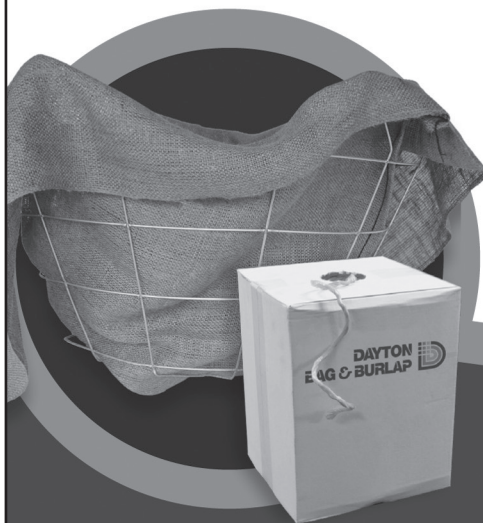
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Unsung perennials

tough, drought-tolerant plants bloom spring through summer, and mature 4–5 feet high by 2–3 feet wide.

Higher perennials

Anemone × hybrida 'Honorine Jobert' is an old-fashioned Japanese anemone, introduced in 1858, that does well tucked into a corner, according to Giguere. The white flowers with yellow stamens, summer through fall, float on 3–4 foot stamens over plants that remain low, and grows to 12–18 inches. It gets less rambunctious than other anemones, but confine it, as it does spread. It grows in shade, and is vigorous and low maintenance.

Dinsdale said she didn't fully appreciate *Solidago rugosa* 'Fireworks' (rough goldenrod) until last summer, when at three years, the 3 foot high by 3 foot wide drought tolerant plants were covered in tiny flowers that burst along 6–9 inch racemes, shooting in all directions. 'Fireworks' is a perfect name," Dinsdale said for the long-lasting blooms that last until mid-fall. ☺

Tracy Ilene Miller is a freelance writer and editor who covers several topics, including gardening. She can be reached at tmillerwriter@gmail.com.

Halimicistus
'Merrist Wood
Cream'
PHOTO COURTESY OF
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Flooding the floor waters plants from the roots up.

PHOTO COURTESY OF SMITH GARDENS

Making every drop count

Using water efficiently in the greenhouse

BY EMILY LINDBLOM

ONE OF THE MOST vital elements for growing plants is becoming more and more scarce. With agriculture, municipalities, and environmental communities competing over limited water supplies, growers have every reason to use it deliberately and efficiently.

Greenhouse growers have several options to consider that could help them do that, from advanced water system controllers to efficiency upgrades and even systems that recover, clean and recycle used water.

Staying in control

Al Warren of **Power Development Solutions** said his company is adding computer intelligence to the agricultural system with a brand new product to help greenhouses use water more productively.

Known as the PowerTraker, this new system controls and monitors the environment. It measures temperature, humidity, soil moisture, carbon dioxide, light, pH levels and other data and decides when and how much to water each plant. If the temperature increases, the watering time increases, and if the humidity goes up, the watering time goes down.

Warren said with more control over water usage, the less water is wasted.

Power Development Solutions sells software that farmers can use to set up watering schedules and parameters for watering times, and then the PowerTraker makes the adjustments based on those factors.

“That saves the farmer from having someone monitor temperature and humidity and having someone to check the timer,” Warren said. “We’re trying to automate the whole process, which will save labor, be more efficient and be more accurate.”

The PowerTraker can turn AC units on and off based on the time of day, and it monitors the amount of energy the irrigation system is using.

“You can control all of this over the internet,” Warren said. “You can be on the beach in Mexico and use your phone to check what’s going on in your greenhouse in Southern Oregon.”

Cameras help nursery owners visually check in on how the equipment is doing.

Warren added he hopes this system will give farmers the freedom not to have to be tied to their farms.

“We’ve talked to small and medium-sized farmers who are excited because it gives them that freedom they’ve never had because they were tied to the farm, keeping everything going,” Warren said.



Making every drop count

Energy Trust of Oregon provides financial incentives for efficient irrigation systems

PHOTO COURTESY OF ENERGY TRUST OF OREGON

“With climate change and drought conditions, water will become less available, so it dictates the need to do things more efficiently and that’s the niche we’re trying to fill here,” Warren said. “At some point in the future, there’s probably going to be more regulations for water usage.”

This new technology goes well with irrigation systems that target plants directly.

Incentive programs

Energy Trust of Oregon provides cash incentives for customers using energy-efficient programs.

“When thinking of energy efficiency in greenhouse irrigation, there are two main concepts: use less water to begin with by applying it where it’s needed; and deliver the water you need more efficiently,” said Steve Ziemak, senior program analyst for industry and agriculture at Energy Trust.

That can be a challenge at nurseries that mainly water by hand. Ziemak suggested making sure employees are properly trained to water appropriately, and setting up a schedule to water the plants by type, pot size and temperature.

Automatic irrigation systems can make energy and water efficiency easier to achieve. Instead of overhead sprinklers, Ziemak recommends using micro-sprinklers for drip irrigation, directing the

water onto the plants as much as possible.

In a micro-irrigation system, tubes deliver water to emitters inside each pot at the base of a plant.

“Thus, irrigation is delivered directly to the roots of each plant at a consistent rate and can be precisely controlled,” Ziemak said. “There is no waste from, for example, overhead sprinklers which would spray water everywhere, or from hand watering which would still likely get the leaf canopy of the plants unnecessarily wet and would likely provide inconsistent irrigation.”

However, this micro-irrigation is only feasible for larger potted plants and can be labor-intensive to set up.

Once set up, automatic watering equipment requires less labor but still needs regular maintenance to prevent excessive watering from things like worn-out nozzles. The size of irrigation zones also needs to make sense for the quantity of plants in a specific area to ensure the water is hitting plants instead of empty ground.

According to Ziemak, the first step in delivering water more efficiently is to eliminate excess pressure loss in the system. This can be done by making sure the pipes are the right size and by eliminating any unnecessary valves or pipe fittings.

“Generating excess pressure is going to use more energy and show up on the electric bill,” Ziemak said. “So one of the

biggest items we incentivize is a variable speed drive.” This is a pump controller that can change the speed of the water at the pump based on the pressure in the system.

For example, if watering requires 70 pounds of pressure, the variable speed drive will speed up or slow down the pump to make sure it is running at that amount.

Energy Trust of Oregon offers two basic types of incentives: a rebate incentive and a calculated incentive. Nurseries usually receive the calculated incentive, which requires pre-approval of a project before they purchase the micro-sprinklers and variable speed drives. The incentive amount is meant to be proportional to the savings of that particular project.

These incentives are funded by the major electric and gas utility companies in the state, including Pacific Power, PGE, Northwest Natural, Avista and Cascade Natural Gas.

Reusing water

John Morgan, head grower at Smith Gardens in Aurora, Oregon oversees three



Left and right: Advanced water system controllers improve grower water use. PHOTO COURTESY OF SMITH GARDENS



In a flood floor greenhouse irrigation system, water not absorbed by plants is drained back into a tank, where it can be treated and then used again.

PHOTO COURTESY OF SMITH GARDENS

different types of irrigation systems across 30 acres of greenhouses.

All areas use overhead systems with boom irrigators. The facility also uses two types of flood floors to cater to the amount of water that different plants need. With a cascade floor system, water comes in on one side of the greenhouse and cascades down the floor to drain out on the other side.

The other is a soft cloth floor that slowly fills up with water from underneath and then drains out. According to Morgan, garden center staff members need to be careful about what kind of equipment they drive over the soft cloth so as not to damage it. In that way, the cascade flood floor is more user-friendly.

“With all those floor systems, once the floor’s drained, that water is captured,

filtered and added back into a holding tank to reuse until it’s uptaken by the plants,” Morgan said.

Smith Gardens primarily uses the water from the holding tank and tops it off with water from on-site wells.

“We’re not always pulling on the wells if there is already water in the system,” Morgan said.

Smith Gardens recirculates about >>



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40 thousand gallons of water each day, which also allows it to reuse the fertilizer retained in that water.

"We're saving money and resources by not always having to add more fertilizer to our irrigation water," Morgan said.

In addition to those savings, the facility saves labor costs and time by using automated watering systems. For example, the flood floor system is set on a computerized schedule so staff members don't need to be there physically.

Morgan said reusing water is becoming more of a common practice in the past decade.

"For a lot of growers it's becoming somewhat of a finite resource, because they can only drill so many wells or pump so much out of the ground," Morgan said.

Less than a decade ago, Smith Gardens' plants were all hand-watered

with hoses and water lines. Since then, Morgan said it's been hard to find skilled people in the industry, so the center has needed to cover the area with a smaller amount of staff members.

"So when you do find good people, you have to give them as many tools as possible to cover the ground," Morgan said. With automation, the equipment can run without any direct supervision.

Morgan acknowledged that these irrigation systems come with steep upfront costs, but over time a facility would save a lot by saving water and labor costs.

Andrey Kaya is a certified irrigation designer at Salem, Oregon-based **Clearwater Irrigation Supply**, which sells equipment for greenhouses including drip irrigation, drip tape and small irrigation travelers for nurseries to use in overhead watering.

Kaya said his company sells spinning irrigation systems with a hanging assembly that covers two or three lines in a greenhouse.

"With that type of system in greenhouses most of the guys will have drainage that will go to an overflow pond or retention pond," Kaya said. "Most of the systems are really efficient and most growers do a good job of retaining water in some way."

Kaya added Clearwater Irrigation Supply has been working with more and more greenhouses each year. ☺

Emily Lindblom is an Oregon-based freelance journalist covering business, environmental and agricultural news. She has a background in community reporting and a master's degree in multimedia journalism. Visit her website at emilylindblom.com or reach her at emily@emilylindblom.com.

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Arranging for efficient greenhouse production

The intentional, strategic use of space can determine how efficiently a greenhouse functions and how profitable it is

BY MITCH LIES

NURSERY OPERATORS TEND to fill greenhouses to capacity, so that enough product is available when sales come knocking.

But according to Rick and Elizabeth Peters of Lean consultants **The Peters Company** (Wilsonville, Oregon), a packed greenhouse at times can inhibit worker access to plants. Ultimately, that can cost a nursery.

“When we are so concerned about maximizing every square foot of potential growing space in our operation, we sometimes leave out what is necessary for that plant to exist while it is growing,” Rick Peters said. “If we fill up every bit of space in that greenhouse with our product, it subtracts from our ability to actually access and care for that product.”

In interviews with *Digger*, the Peters Company and two Oregon nursery operators discussed optimal ways to arrange greenhouses in terms of plant needs, efficiencies and other factors.

Ultimately, both Mike Hicks of **Little Prince of Oregon**

Nursery in Aurora and Ben Verhoeven of **Peoria Gardens Inc.** in Albany said the top priority in greenhouse organization is to meet the cultural needs of plants.

“The number-one priority in arranging a greenhouse is to grow a quality crop,” Verhoeven said. “After that, it is making best use of your resources.”

Knowing your plants

Meeting the cultural needs of a plant involves knowing its growth characteristics, he said, as well as its water, sun and fertility needs. “Knowing how quick one plant will grow compared to others and understanding their needs is really important in terms of how you arrange your greenhouse space,” Verhoeven said.

Hicks agreed: “You need to know a plant’s requirements and also their timing,” he said. “You don’t want to put a crop that is going to be done really fast with some other crops that are going to take a long time, because the goal is always to completely >>

empty a greenhouse and start over. It is always good to start fresh.”

Understanding markets also is essential in greenhouse arrangement, Verhoeven said. “Having a good sense of your market helps in reducing consolidation, and that is something we are constantly trying to do.”

“Bigger containers we like to put with other bigger containers, because they are going to have a similar growth trajectory and water requirements. And smaller plants, we will put with other smaller plants.”

— Ben Verhoeven of Peoria Gardens, Albany, Oregon

Verhoeven also believes it is important to move out plants as soon as they are ready. “Once that plant is ready to go, once it has completed its growth cycle and is up to a sellable stage, we want it to head out the door. We want to move it right onto a truck because it is occupying good space,” he said.

Grouping plants by need

Grouping plants with similar needs can help in operational efficiencies, as well as facilitate efforts to clear a greenhouse before refilling, according to the nursery operators.

“Things that like it dry, we like to put next to things that also like it really dry,” Verhoeven said. “Bigger containers we like to put with other bigger containers, because they are going to have a similar growth trajectory and water requirements. And smaller plants, we will put with other smaller plants.”

“And we like to put young things with other young things, because they are going to finish close to the same time and

have similar needs in terms of heat and fertilizer,” Verhoeven added. “We want to avoid putting something like a four-inch zucchini next to a gallon lavender. Their needs are totally different.”

Hicks agreed: “I like to put all the *Sedums*, the *sempervirens*, the succulents all into one area,” he said. “Then you have your shaded plants, like the ferns; they all like heavy shade, moist conditions. I like to get all those together.”

“You always want to put sun by sun, shade by shade,” Hicks said. “And if you have a lighter or a heavier shade, you have to consider those factors, too. And then you want to go by irrigation requirements, as well.”

House plants also go together at Little Prince of Oregon Nursery, Hicks said. “They need the warm, humid conditions with shade,” he said. “We have about a 90,000 square-foot gutter-connect house where we are running bottom heat, and all of our house plants basically go into that house.”

Clearing a greenhouse

Completely clearing a greenhouse has several advantages over partially clearing houses before refilling, Hicks said. At times, he will even consolidate plants if it serves that end.

“I will find a house that is completely

empty or mostly empty and maybe consolidate that house with a couple of others that have similar timing, then replant the whole thing,” he said. “Now you’ve got all of your young plants together, and you can treat the house as a whole, as opposed to a block-by-block arrangement.”

“Also, once you clear the house out, you can now drive vehicles in there and pull the trailer in to unload right from the trailer, instead of having to carry a couple of plants at a time into the house,” Hicks said. “It makes building the house a lot easier, and it is also a lot easier on the irrigators, because all of the plants are at a similar stage, water and growth wise.”

Hicks also said it is important to consider the space needs of a plant when arranging a greenhouse. “We grow everything ‘can tight,’ for the most part, and try and sell them before the point where we would have to space them,” he said. “But there are certain varieties, like lavenders and salvias, that you have no choice but

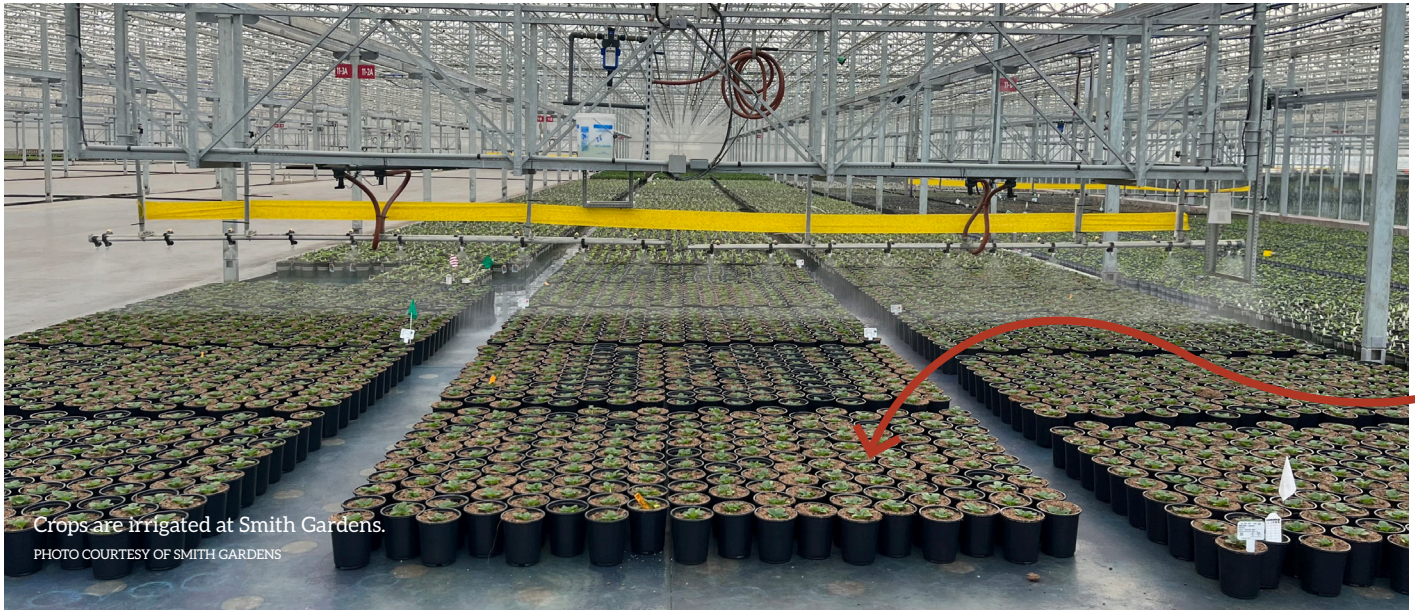
“Spending a little time planning and organizing and thinking about the plants individually and as a whole definitely helps you out.”

— Mike Hicks of Little Prince of Oregon Nursery, Aurora, Oregon

to space them. So, you have to plan for that part, as well.”

Keeping things moving

The Peters, who counsel clients on the Lean strategy that is employed in multiple industries, said one of the biggest mistakes they see in greenhouse arrangements is the propensity of greenhouse operators to clog aisles or other access points to plants.



Crops are irrigated at Smith Gardens.
PHOTO COURTESY OF SMITH GARDENS

“That is a touchy subject, because nurseries make money by growing and selling plants,” Rick Peters said. “And as long as they have a market for it – the more plants they can grow and sell – the more money they make.”

Packing a greenhouse to the point that it inhibits a worker’s ability to access plants is more than an inconvenience for

workers, he said. It can be detrimental to a nursery’s bottom line. He and his wife, Elizabeth, co-founders and owners of The Peters Company, said they have seen several instances where an overfull greenhouse has resulted in crews picking up and moving plants to access the plants they need to work with.

“So, all of a sudden, you’ve got

motion,” he said, referring to the fact that motion is one of several forms of waste identified in Lean. “You’ve got transportation because you are moving product; you’ve got over-processing because you are over-handling things. And, by doing that, you are introducing more waste, and therefore more cost.”

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ing are also considered forms of waste.

"If they haven't provided access to the product throughout its growing cycle, they have introduced a number of problems that are sometimes hard to account for, and some growers don't pay too much attention to that," Peters said. "We've seen numerous incidents where it is costing them more than if they just left a few plants off to create reasonable walkways or accessways every so many aisles. Access to the product is really important."

Planning time pays dividends

The Peters identified several other examples in greenhouse arrangement where adopting Lean could improve a nursery's bottom line, including: ensuring tools are readily available for workers; arranging greenhouses so workers have "line-of-sight," a Lean term regarding a worker's ability to see an entire operation from a particular vantage point; and even proper signage, so a seasonal or part-time worker knows where to go to fulfill a job assignment.

It also can be beneficial for greenhouse operators to keep things on wheels whenever possible to accommodate flexibility. "At any point, you might find a better way to do a process," Elizabeth Peters said. "So, you should try to minimize bolting things down."

Also, Rick Peters said, one form of waste often spills into other forms. "Oftentimes, the bad news is when we engage in one form of waste, we automatically create more types of waste to go along with it," he said. "The good news is, once we discover what we are doing, we have the opportunity to not only eliminate that one waste that we were targeting, but it can take out other forms of waste as well."

Ultimately, Hicks said, organizing a greenhouse comes down to knowing a plant's growth habits and its needs, and arranging the house to meet those needs and those of your workers. And it is worth spending some extra planning time when arranging a greenhouse to achieve that.

"In the springtime, when everybody is just crazy busy and it is all we can do just to get some plants in, you just do what you can at that point," Hicks said. "But for the rest of the year, spending a little time planning and organizing and thinking about the plants individually and as a whole definitely helps you out." ☺

Mitch Lies is a freelance writer covering agricultural issues based in Salem Oregon. He can be reached at mitchlies@comcast.net.



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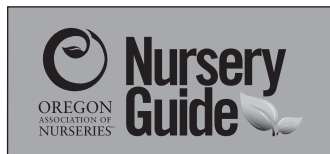
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EMPLOYMENT

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3. Plant Health: Work closely with the IPM manager and production manager to ensure the best pest and disease control plan is in place.
4. Production Plan: Work closely with herbaceous planning coordinator and production manager to implement production plan according to sales plan and production schedules.
5. Training: Develop, schedule and conduct training for operational processes as deemed necessary.

Minimum Qualifications:

- One year of Green Industry Operation related experience.
- One year of management experience
- Advance knowledge of herbaceous plant production methods and techniques

Application requirements:

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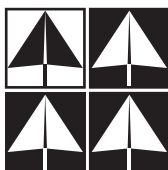
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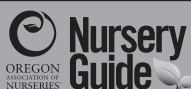
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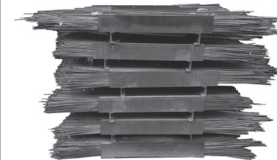
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Villains of the greenhouse II

When seedlings fail, *Fusarium* damping-off or wilt could be another cause

BY JAY W. PSCHIDT

THERE ARE MANY FUNGI that live and survive in the soil that can be responsible for seedling failure. The usual suspects include *Rhizoctonia* species, *Fusarium* spp., and *Pythium* spp. Each is favored by different conditions, even though the symptoms are similar. In this article, we will focus on diseases of greenhouse grown ornamentals caused by *Fusarium*.

Many different plants are susceptible, from woody perennials to herbaceous annuals. Damping-off (pre- or post-emergence) due to *Fusarium* has been a problem in the Pacific Northwest on *Delphinium*, Douglas fir, *Petunia*, and pine as well as vegetables, all grown in the greenhouse. Wilt and root rots have been a problem on these same plants, as well as on carnation, *Cyclamen*, marigold, and *Zinnia*. Basal rots of bulbs or corms grown in containers have been a problem for *Gladiolus*, iris, and tulip.

Symptoms

Poor emergence or seedling collapse are indicative of damping-off. Seeds or emerging radicles may be rotted. After emergence, stem, root, and cotyledon may rot at or below the soil line. In *Petunia*, darker-red lesions that become brown with reddish borders develop, or brown lesions with diffuse margins, or simi- ➤

Part two of a series. Part one of *Villains of the greenhouse*, published in the April 2021 issue of Digger, covered *Rhizoctonia* damping-off, root rot and stem rot. It can be viewed at www.diggermagazine.com/villains-of-the-greenhouse.



Figure 1: *Osteospermum* with *Fusarium* basal rot where both roots and the base of the stem/ root crown had decay. OSU PLANT CLINIC IMAGE, 2020.



Figure 2: These young Sedum plants had Fusarium crown and root rot with small, rotting root systems and decay extending into the crown. OSU PLANT CLINIC IMAGE, 2020.

larly discolored longitudinal streaks.

Osteospermum plants may develop root and crown rot when infected by *Fusarium* (Figure 1). It is difficult to determine which organism(s) might be involved by causal observation, so it's a good idea to send them to the Oregon State University (OSU) Plant Clinic for an accurate diagnosis.

Lower leaves of carnation yellow, wilt, and dry up one side of the plant. Symptoms progress up the plant. The stem often shrivels and turns grayish, and the xylem tissues turn brown. Shoots may be stunted and grow abnormally. The top of the main shoot grows at a right angle to the main stem. Plants may curl when symptoms develop on one side of the plant. *Sedum* plants may develop similar symptoms when infected by *Fusarium* (Figure 2).

Cyclamen corms in cross-section show patches of reddish-brown-to-black, or purple, discoloration in the vascular system (Figure 3). Roots exhibit vascular discoloration and may be totally discolored and darkened.

Plants in general can be yellowed and stunted and show irregular growth within a planting. Late in disease development,

the carnation roots and stems rot, and the plant dies. In marigold, root production is greatly reduced, and a dark-colored root rot may be observed. In wet weather, salmon-color spore masses may form on infected stems.

When diseased tulip bulbs are forced in the greenhouse for flowering, stunted growth and leaf yellowing occurs within a few weeks. Plants generally die before flowering. The basal plate and roots decay and become a dull gray. The decay spreads to the bulb scales and lower stem.

The fungus

Fusarium spp. are soilborne fungi that infect plant roots or wounded cuttings. They survive in the soil as thick-walled, dormant chlamydospores, and on wooden benches used for plant production in the greenhouse. Chlamydospores germinate in response to exudates from nearby plant roots.

Hyphae then penetrate the roots (wounded or not), colonize the cortex, and move into the xylem tissue, which becomes brown. Small spores (microconidia) are produced and carried up into the plant.

Infection of the vascular system interferes with water and nutrient absorption.

As the plant dies, the fungus erupts through the epidermis and forms tuft-like structures called sporodochia. Spores formed on these tufts can become airborne and infect nearby soils and plants. These macrospores and mycelium in the host tissue convert to chlamydospores and are released into the environment as the tissue decomposes. In the absence of a host, these spores can still persist in the soil for years.

The fungus can be spread by soil, wind, water, infected cuttings; and contaminated tools, equipment, and clothing. Growing media often gets contaminated by field soil when it is introduced via seeds, tools or even surface sources of irrigation water. Poorly cleaned containers from a previous crop may also contain enough of the fungus to affect the next crop. Fungus gnats may also spread propagules of *Fusarium*.

Warm temperatures and conditions favor these diseases. *Fusarium* are stimulated by high temperatures, near neutral pH conditions, and by nitrogen (especially ammonia) fertilization, particularly early in the growth cycle. Potting media with peat or coir fiber are also conducive to disease development.

Most *Fusarium* spp. can colonize

seedling root systems without eliciting disease symptoms. Severe root disease symptoms often become evident when seedlings are stressed. This is especially true for woody perennials stressed to initiate bud formation and begin hardening. Stresses from media being too wet or fertilizer burn can induce disease development.

Symptoms typical of *Fusarium*, however, can be due to other pathogens, including *Rhizoctonia*, *Pythium* and *Phytophthora*. It is not easy to tell these organisms apart by visual inspection, so send samples to the OSU Plant Clinic for diagnosis.

Management

Good sanitation and cultural practices are essential, including clean growing surfaces, clean water and handling practices, along with soilless media.

First things first: Start with culture-indexed plants free of the pathogen. This includes the purchase of new, clean seeds.

Next, plan to use a new soilless potting mix. If you must use soil or reuse media it has to be steam-treated for at least 30 minutes at 180 F. Once it has been purchased or treated keep field soil out of contact with clean media. Also, avoid reusing pots or trays from a previous crop for propagation.

If pots or trays must be reused, then wash off all debris and soak them in a sanitizing solution, or treat them with aerated steam for 30 minutes. Disinfect any tools and equipment that might be used, as these could contaminate the media.

During production, use sound horticultural practices that have been successful in your facility. Maintain adequate fertility for moderate plant growth using nitrogen sources derived from nitrate. Monitor soluble salt concentrations regularly. Use media pH and soil wetness appropriate for good crop growth. Water plants such that they are not wet for extended periods of time. Also, manage fungus gnats especially during rooting.

Remove plant debris during production and thoroughly clean and sterilize the greenhouse between production cycles.

These cultural control practices >>

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reduce or eliminate the need for chemical drenches. Chemical treatment should be preceded by an accurate diagnosis, since most of the chemicals are not effective against all the pathogens that might cause damping-off. If used, treatments must be made before infection occurs. Rotate among fungicides from different groups with different modes of action. Be sure to check labels for crop safety before application.

A few chemicals are registered for the management of *Fusarium*. These include: Heritage (FRAC group 11) applied as a drench or drip application, Medallion (group 12), Terraguard (group 3), and Thiophanate-methyl-based products (group 1) such as Cleary's 3336 OR OHP 6672. Trinity (group 3) is also registered for crown and basal rots.

Biological control

Several biocontrol products are registered and are considered organic, but they must be used in conjunction with other control tactics such as thorough sanitation.

The fungal-based products include:

Asperello T34 (*Trichoderma asperellum* strain T34) which can be incorporated into the potting media; Bio-Tam 2.0 or Tenet WP or Obtego (*Trichoderma asperellum* and *T. gamsii*); LALStop G46 WG or Prestop (*Gliocladium catenulatum* strain J1446) can be applied as long as other products are not in the same tank (rated very good to excellent for begonia.); RootShield Plus Granules (*Trichoderma harzianum* Rifai strain T-22 and *T. virens* strain G-41) but IR-4 reports poor to mediocre efficacy; and SoilGard 12 (*Gliocladium virens* strain GL-21).

The bacterial based products include: Actinovate SP (*Streptomyces lydicus* strain WYEC 108) used as a soil drench; Howler (*Pseudomonas chlororaphis* strain AFS009) as a soil drench; Mycostop or LALStop K61 WP (*Streptomyces* Strain K61) which must be applied with enough water to move the product into the root zone; Subtilex NG (*Bacillus subtilis* strain MBI 600) as a drench; and Triathlon BA (*Bacillus amyloliquefaciens* strain D747).

Immersing cuttings in a fungicide or disinfectant solution is not generally

recommended. A few infected cuttings can contaminate the entire batch with disastrous results. It is better to use products before cuttings are taken and/or after sticking them.

Summary

With good sanitation and attention to the horticultural needs of the crop, these diseases can be avoided. If disease develops, get an accurate diagnosis and follow appropriate recommendations accordingly. ©

Jay W. Pscheidt is an extension plant pathology specialist and professor of Botany and Plant Pathology with Oregon State University in Corvallis, Oregon. He can be reached at pscheidj@science.oregonstate.edu.

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One can't be green without the green industry

The nursery and greenhouse industry knows a simple truth.

And that truth is: what the green industry grows and ships throughout the country and world is a benefit to the climate. It is as real as the promise of buds in spring and the trucks waiting to be loaded with product.

You can imagine the frustration when urban legislators and activists play politics, or some academics focus more on tenure and publications than real-life solutions that are right in front of them. I honestly don't know what is worse — those who simply do not know what they do not know, or those who presume to know everything.

When state leaders appointed a work group to look at the state's new Climate Protection Program (CPP), I was chosen as the primary agricultural voice. I was engaged and forceful — but in the end, I was ignored for the expediency of political egos.

Ahead of its time

With a federal grant in 2010, Executive Director Cheryl Goar at the Arizona Nursery Association created the Plant Something program. It was intended to be similar to the "Got Milk?" campaign by the dairy industry — something irreverent but compelling to promote our product and boost sales.

The program highlights a coherent set of research-proven benefits of planting things in our built environment. Oregon was proud to be one of the first states to join in this program. 23 other states and British Columbia have joined in. The research (as seen at www.plantsomethingoregon.com/pmlb) was compelling then and now — plants help the climate, and that's a fact. Recent reports have indicated that the loss of biodiversity and nature could put up to \$31 trillion of cities' gross domestic product (GDP) at risk, according to research released by the World Economic Forum.

The assessment is sobering — more than 70% of the 576 biggest urban centers worldwide, comprising more than 1.4 billion people, are at elevated or extreme risk from environmental hazards such as pollution, water contamination or extreme heat.

Without action, heat dome events like

the one that occurred in a heavily carbon-friendly state like Oregon last summer will become more likely. What is clear to me is that the urban areas need rural agriculture to save their collective bacon. Is that where policy is headed? Are we trying to incentivize greener fuel sources? No. We're trying to punish everyone for the sins of China and other areas of the globe.

The 2021 State of Cities Climate Finance Report found \$384 billion in climate finance went to urban areas in 2017–2018, compared to an estimate of \$5 trillion needed. We've elected to throw money at it instead of reinvesting in working lands, thus clearing the way for ag to do what ag does best — grow our way out of this mess.

Ignoring the consequences

During discussions with a large stakeholder effort within the CPP, the summary judgement against fossil fuels and natural gas was akin to the Salem witch trials to purify the soul of Oregon. During that time, I was pointed in my comments. I asked, "What kind of economy do you want in 20 years?" The economy is not a speedboat. It is a large vessel at sea and needs time to turn. I was greeted with blank stares.

Certain truths remain. The price of electricity along the West Coast is likely to spike over the next few decades, and weather events and droughts are also likely to impact the reliability of the coast's power grid.

The nursery and greenhouse industry long ago accepted its need to become more efficient. It made a decades-long investment in natural gas to heat growing spaces and water. Across the board, operations invested and made use of this source of energy, then recommended as the cleanest option.

But now, the state-adopted CPP sets steadily declining caps on emissions from fossil-fuel suppliers, including the natural gas our producers spent all that money installing. Punishing green industries now with higher fuel and natural gas costs seems illogical, when it won't help the climate much.

Instead of adding these costs to thin-margin producers, we should be ramping up production to provide sequestration on a massive scale.



Jeff Stone
OAN EXECUTIVE DIRECTOR

Batteries are dirty business

Plug-in stations nationwide will eventually happen, just like the gas stations that preceded them. Electronic vehicles (EV) are growing in market share and will be part of the fleet options in the coming decades.

There is a difference, however, between consumer choice and governmental directives. Americans love their cars, and the green agenda has a dirty little secret — the lithium batteries used for EVs contaminate water and the environment.

The U.S. has more than 9% of the world's known lithium reserves, but only one domestic mine in Nevada. The source produces about 1% of the global output, and it must be shipped abroad for processing.

About 90% of the world's lithium is produced by Australia, Chile and China. China processes almost 60% of the metal for use in batteries. Trade wars could cripple American consumers, so pay attention. But one cool thing on the horizon is the new high-performing Ford F-150 EV trucks.

Taking responsibility for outcomes

When it comes to climate, I get feisty and protective of our industry. When policy is a hammer — everything looks like a nail. A fundamental question: Will Gov. Brown, DEQ Director Richard Whitman and the environmental community take responsibility for treating everything in a regulatory way and ignoring how agriculture should have been supported and not harmed?

Of course not. The entire exercise was about the politics, not the impact Oregon has on the climate. It is a great disappointment and sadly, it was predictable. We stand ready for our opportunity to help — I hope it comes. ☺

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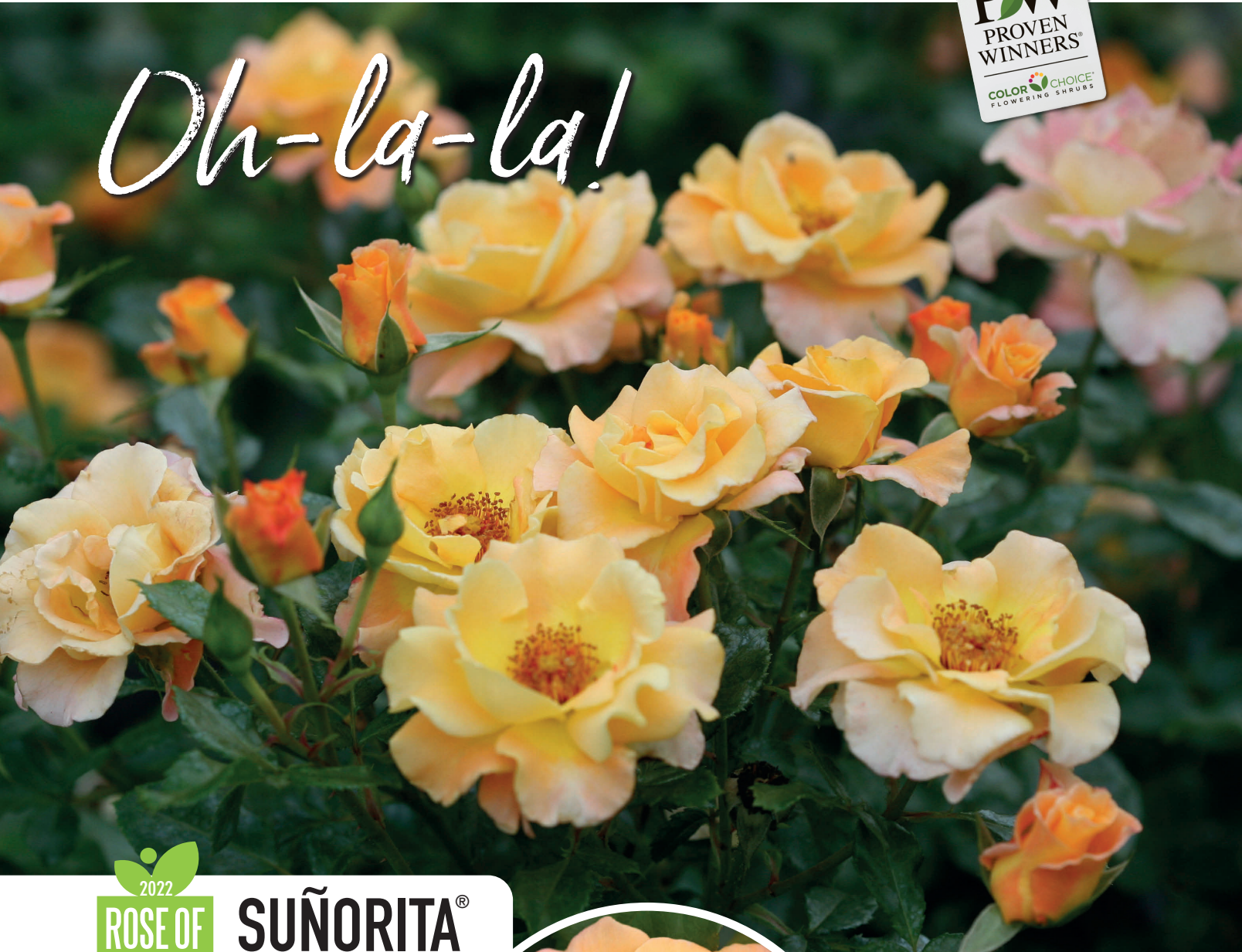
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