IMPACT – 2021 – REPORT

Tree Fruit

Washington State University Tree Fruit Endowment

Seeds of Discovery

Foreseeing the benefits of applied research and discovery, forward-thinking Washington fruit growers created the Washington State University Tree Fruit Endowment.

Aimed at supporting a globally competitive state tree fruit industry, the endowment powers priority research projects, modern labs and research orchards, training and information, and quality staff. Proceeds become seed money for discovery, allowing the WSU Tree Fruit Research and Extension Program to study promising practices, solve problems, and make a profitable, sustainable future for Washington tree fruit.

The largest gift in WSU history, this $32 million fund was developed in 2013 in partnership with the Washington Tree Fruit Research Commission, and built through grower-voted assessments from the apple, pear, cherry, and stone fruit industries. The endowment was fully funded in 2020.

The Tree Fruit Endowment Advisory Committee (EAC) makes the decisions that put endowment funds into action. The EAC includes members appointed by partners at the Northwest Fresh Pear Committee, Washington State Fruit Commission, Washington Tree Fruit Research Commission, and the Washington Apple Commission.

Current EAC Members

- SAM GODWIN, Chair, Godwin Family Orchard
- SEAN GILBERT, Gilbert Orchards
- TEAH SMITH, Zirkle Fruit Company
- ALAN GROFF, Foreman Fruit Company
- DOUG GIBSON, Underwood Fruit & Warehouse Co.
- JASON MATSON, Matson Fruit Company
- ROBIN GRAHAM, Stemilt Ag Services

WSU TREE FRUIT ENDOWMENT

Achievements that Grow Your Legacy

As I reflect on the past year, I am gratified to see how far we have come and how much we have accomplished in the face of challenge and change. The WSU Tree Fruit Impact Report chronicles many of those accomplishments in this important realm of Northwest agriculture.

In these pages, you will learn about grower-funded advances we have made at WSU in support of Washington's $7 billion tree fruit industry. The achievements outlined in this annual report speak directly to the strength of the ongoing partnership that makes this important work possible.

In 2021, we boosted online education efforts while safely renewing in-person field days. We also expanded research and outreach, welcoming new Endowed Chairs in Bacterial Diseases of Tree Fruits, and Tree Fruit Environmental Physiology and Management.

Ahead, you will learn about current research into apple, pear, cherry, and stone fruit post-harvest systems, physiology, and management. Industry-funded professors introduce an ongoing and diverse set of projects—studies of different growing environments and storage regimes, evaluation of better rootstocks and genotypes, development of defenses against diseases, pests, and environmental challenges, as well as improved practices and technology.

You'll find updates on connection and education by the Tree Fruit Extension Team, including a new postharvest research-to-practice (R2P) community, cold-chain surveys in pears, and Little Cherry disease outreach.

We also look ahead to grower-funded modernization and improvements at WSU's Irrigated Agriculture Research and Extension Center (IAREC) and the Tree Fruit Research and Extension Center (TFREC) that ensure successful research, including the new plant bacteria lab and new life for soils research in IAREC's venerable, but still useful, West Building. Several of these projects are being funded through the assessment overage plan made in concert with growers.

Tree fruit research at WSU is a partnership that relies on grower and industry conversation and involvement as well as your historic investment. You are a key part of the process of discovery: your input informs decisions and research, and your businesses and orchards provide the stage for many of our projects.

I encourage you to connect with our committed team of research and extension faculty, staff, and students, meet our new chairs, and share your priorities and vision. The discoveries created through the Tree Fruit Endowment are your legacy to the future of tree fruit. We're excited to work with you in making that legacy as impactful as possible.

Richard T. Koenig, CAHNRS Interim Dean

$32M
HISTORIC GIFT
Fully funded 2020

Total Contributions by Commodity

Apple	$24,211,426.22
Cherry	$5,000,000.00
Pear	$2,598,605.89
Stone Fruit	$189,967.89

Principal of Tree Fruit Endowment Funds—6/30/2021

Pathology Chair	$2,020,671.94	Postharvest Systems Chair	$2,059,810.83
Physiology Chair	$2,039,968.24	Soil & Rhizosphere Chair	$2,102,266.91
Info & Tech. Transfer	$12,068,682.96	Entomology Chair	$2,021,214.43
Research Orchard/Facilities	$8,010,302.63	Research Chair	$2,017,351.65

Postharvest Systems in Pome and Stone Fruit Endowed Chair

Carolina Torres

Based in Wenatchee, **Carolina Torres** leads research that enhances profitability and sustainability of Northwest pome and stone fruit growers and packers. She is:

- Developing new optical sorting indexes from hyperspectral images in order to separate apples with different storage potentials based on their sun-stress level at harvest.
- Creating a new anti-scalding compound for Washington-grown pears destined for mid- and long-term storage. This work helps find an effective replacement of synthetic antioxidants.

- Studying how different growing environments modulate organic apple storage protocols to find the best alternatives for quality in long-term supply chains.
- Conducting preliminary studies on extended storage regimes for different cherry cultivars, focusing on controlled atmospheres combining low oxygen and elevated carbon dioxide.

Funding also supported research for WA-38 commercial issues by testing coating materials, revising harvest criteria recommendations for commercial storage in 2021–22, and addressing fruit greasiness.

Team members (l to r, bottom row): Corina Serban, Bernardita Sallato, Tianna DuPont, Karen Lewis—Lead, Gwen Hoheisel. Back row: Chris Hedges, Tory Schmidt. Not pictured: Jenny Bolivar-Medina.

WSU Tree Fruit Extension Team

Karen Lewis leads the Tree Fruit Extension Team, a collaboration of WSU Extension specialists, Information and Technology Transfer (ITT) coordinators, and the Washington Tree Fruit Research Commission, working together to support the industry through outreach and applied research.

- **Chris Hedges** joined the team in 2021 as an ITT postharvest coordinator. He has focused on warehouse-level surveys to quantify incidence of greasiness in WA-38, and is establishing a postharvest research-to-practice (R2P) community to connect industry postharvest professionals with leading researchers.
- **Corina Serban** was hired in the Little Cherry Disease Extension ITT position. Co-located between the WSU Yakima County Extension office and IAREC, she is focused on Little Cherry Disease outreach and assisting in applied research.
- The joint WSU-OSU Little Cherry Disease Extension Team earned the Western Extension Directors Association's 2021 Award of Excellence for their efforts to increase knowledge about how to manage X-disease and Little Cherry disease.
- Bolstering online outreach during the pandemic, the team uploaded 80 educational videos since March 2020. The **treefruit.wsu.edu** website received roughly a quarter-million views this past year. The Fruit Matters newsletter has 2,337 subscribers and strong readership.

Tree Fruit Physiology and Management Endowed Chair

Stefano Musacchi

Based at Wenatchee, **Stefano Musacchi** researches tree training, pruning, and management techniques for top fruit quality and high-performing orchards. He is working to:

- Improve management practices to optimize WA-38 production. Musacchi is helping growers master click pruning, and is engaged in a long-term study of tree training systems for improved productivity.
- Lead national NC140 apple rootstock trials to evaluate innovative genotypes from around the world, which can help address challenges in replanting. Several trials have been established with the new Geneva® rootstocks, as well as other accessions, to test them under Washington growing conditions.
- Study new potential apple pollinizer genotypes with improved resistance to quarantine-related diseases, such as bull's eye rot, speck rot, Sphaeropsis rot, and fire blight.

Pears above, quince below

New quince rootstocks are currently being evaluated for modern, high-density pear orchards in Musacchi's program.

With the pear industry transitioning to more efficient, labor-friendly spindle systems, quince offers several advantages, including dwarfing and precocity. Studying their performance characteristics, Musacchi is trialing in D'Anjou and Bartlett pears.

Pear packer survey helps understand the cold-chain

In late 2021, new Extension ITT Specialist **Chris Hedges** will start surveying Northwest pear packers, studying current handling and storage practices.

Focused on D'Anjou pears and the different ways that each warehouse manages the handling, storage, and conditioning of fruit, Hedges is collecting details on each part of the cold-chain to gain extensive insight on fruit quality variability.

Modern Orchards, Tools for Tomorrow's Advances

The Research Orchards and Facilities (ROF) Endowment helps keep the infrastructure of the WSU Tree Fruit program up to date, ensuring that labs, farms, and equipment can fully support agriculture and industry into the future.

MODERNIZATION AT IAREC

Phytobacteriology Lab and Greenhouse

WSU is using ROF funds, paired with a portion of the special project assessment, to refurbish laboratories and a greenhouse at the WSU Irrigated Agriculture Research and Extension Center at Prosser.

In Hamilton Hall, a modern, expanded work and research space for Professor **Frank Zhao**, WSU's new phytobacteriologist, will be completed in winter 2022. A nearby greenhouse will also receive improved water, electrical, heating, and cooling infrastructure to conduct research under controlled conditions.

Soils and Plant Nutrition Lab

Built in the 1950s, the West Building (pictured below) is still structurally sound, but is in need of modernization to house current tree fruit research programs. Planned for completion in 2022, remodeled lab space in this building will strengthen Tree Fruit Extension Specialist **Bernardita Sallato's** focus on soils and plant nutrition, enabling more applied research, outreach, and educational workshops.

Once Sallato's lab is complete, refurbishment of additional space in the West Building will support other faculty discovery, training, and service activities in cherries and other tree fruits.

Bernardita Sallato

Like many of the older buildings at IAREC, "the foundation and skeleton here are so strong, there is no need to demolish and rebuild," said Center Director **Naidu Rayapati**. Modernization allows older structures to be more functional, efficient, and effective for successful programs advancing WSU's land-grant mission.

In 2020, IAREC completed upgrades to cold rooms and workspaces serving stone fruit breeding, horticulture, plant pathology, and Extension, and added new laboratory equipment used by plant physiology and food safety scientists.

Special Project Overage Assessment

The special assessment created by growers to fund the Tree Fruit Endowment collected more than $900,000 above the original $32 million total.

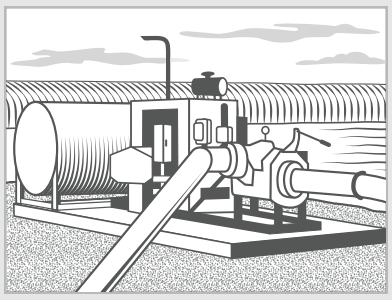
The Washington Tree Fruit Research Commission and WSU jointly developed the Special Project Assessment Overage Utilization Plan to benefit all contributing crops and enhance the established endowment.

From the total, $120,000 was used to establish start-up packages for Information and Technology Transfer positions. The remainder was split evenly between the two Research and Extension Centers serving the tree fruit industry.

IAREC is using its funds to modernize research infrastructure at Prosser, expanding laboratory, greenhouse, and workshop space and enabling better service for decades to come. At TFREC, overage funds will support design and planning for a new, state-of-the-art Plant Growth Facility, and building resilience into the main irrigation supply for the Sunrise Research Orchard.

WENATCHEE

Reliable Water Supply for Orchard Irrigation

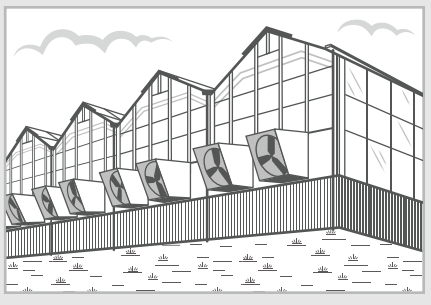


WSU's Sunrise Research Orchard relies on water drawn directly from the Columbia River and piped for more than a mile. This system worked well for decades, but is now subject to increasing maintenance costs, leaks, and disruptions. To add resilience, and bring the orchard's water system up to date, TFREC is using endowment and excess assessment funds for design of an on-site 2.5 million-gallon pond and pump system, which will store and deliver water in a more reliable, timely, and efficient way. University funds will permanently repair the main pipe.

"This is mission-critical," said Tree Fruit Research & Extension Center Director **Chad Kruger**. "Without water, we don't have a research orchard."

Completion is expected by summer 2022.

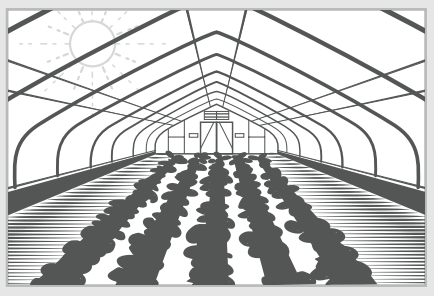
Future Plant Growth Facility



Built more than 70 years ago, Wenatchee's greenhouses are also past the end of their functional life. Replacing them with a modern plant growth facility, one that can serve the industry for decades to come and help retain top-class scientists and students, is the next major priority. ROF and excess assessment funds support the pre-design stage, retaining professionals who will work with scientists and stakeholders to determine needs and scope, and also help secure additional funding for construction over the next decade.

"We're thinking big-picture," Kruger said. "We're asking, what is the state of the science for a tree fruit plant growth facility? Once we figure out what we really need, we can address the challenge of making it a reality."

Quarantine High Tunnels



Research into fire blight and pear psylla as well as control of other pests and pathogens will benefit from new high-tunnel hoophouses, planned for construction in 2022.

Built with endowment funds, the two 2,000-square-foot houses will be capable of being disassembled and moved based on changing annual experiment needs.

Future Endowed Chairs

New Endowed Chairs

WSU seeks to fill the following chair positions:

Tree Fruit Entomology

This scientist will focus on insect behavior modifying tools for Integrated Pest Management in conventional and organic tree fruit production programs. The position plan was finalized by the Endowment Advisory Committee and a search was started in fall 2021 with expected hire in summer 2022.

Tree Fruit Soil & Rhizosphere Ecology Science

This role will address challenges to fruit production through improved understanding of soil processes and soil-plant interactions. A search date has not been set.

Kalcsits takes on Environmental Physiology and Management

Helping Washington's tree fruit industry solve production challenges from heat and other environmental stresses, **Lee Kalcsits** leads expanded research as WSU's new Endowed Chair for Tree Fruit Environmental Physiology and Management.

"Washington produces extremely high yields of high-quality fruit, but there's a thin line between optimum quality and heavy losses," said Kalcsits, who studies the interactions between fruit tree genetics, the environment, and growing practices. His role helps reveal the physiological mechanisms that can improve tree fruit productivity and assist orchards in tolerating environmental stresses such as drought and heat waves.

"I plan to work alongside the industry to support the development and production of scion and rootstock cultivars that succeed in Washington's hot, semi-arid environment."

Endowed Chair will Launch Tree Fruit Bacteriology Lab

Joining the plant pathology team in January 2022, **Youfu "Frank" Zhao** is WSU's new Endowed Chair in Bacterial Diseases of Tree Fruits.

Coming to the Irrigated Agriculture Research and Extension Center at Prosser from the University of Illinois, Zhao's top priority is to find the best solutions for managing bacterial diseases of pome and stone fruits, including fire blight disease and X-phytoplasma disease.

"The major challenge we face is that there aren't very many tools in our toolbox to deal with bacterial diseases, especially in organic production," Zhao said. "One of my roles is to address these challenges to promote fruit production and profitability in the Pacific Northwest."

Zhao has spent several decades working on bacterial pathogens, most recently focused on fire blight and Pseudomonas. He wants growers to share their priorities, and to connect with him to discover how he can help.

12th International Symposium Explores Orchard Systems

Held virtually from Wenatchee in the summer of 2021, the *12th International Symposium on Integrated Canopy, Rootstock, and Environmental Physiology in Orchard Systems* brought together hundreds of scientists, local industry members, and students for discussion of the latest advances in tree fruit.

Convened by Professor **Stefano Musacchi**, the event was sponsored by three working groups of the International Society for Horticultural Science, the world's leading organization of horticultural scientists.

Over five days, participants from around the globe took part in more than 130 in-person and poster presentations and round table discussions. CAHNRS Interim Dean **Richard T. Koenig** was among the opening speakers.

WSU thanks the Washington Tree Fruit Research Commission for its commitment to service and discovery through the Tree Fruit Endowment.

- Ines Hanrahan, Executive Director
- Jim Doornink, Chairman
- Luisa Castro
- Jeff Cleveringa
- Sam Godwin
- Craig Harris
- Matt Miles
- Brent Milne
- Teah Smith
- Keith Veselka
- Dena Perleberg Ybarra

To learn more about supporting Tree Fruit at Washington State University, contact

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