



AN INVESTMENT FOR THE FUTURE



20 TREE FRUIT 22 ENDOWMENT

Roots of Research

For nearly a decade, Washington tree fruit growers have kept their promise to make Washington State University a globally competitive tree fruit research institution.

Their gift, the largest in WSU history, created the WSU Tree Fruit Endowment, a perpetual source of funds for priority research, modern orchards and equipment, dedicated outreach, and world-class experts. Developed in partnership with the Washington Tree Fruit Research Commission, the \$32 million endowment was launched in 2013, fully funded in 2020, and continues to sustain WSU research and impact.

The Endowment Advisory Committee (EAC) oversees use of Tree Fruit Endowment resources. Members are appointed by industry partners including the Northwest Fresh Pear Committee, Washington State Fruit Commission, Washington Tree Fruit Research Commission, and the Washington Apple Commission.

\$8
Million

Research Orchard and Facilities

\$12
Million

Six Endowed Chairs

\$12
Million

Information and Technology Transfer

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



A Harvest of New Ideas



Experiencing my first Washington autumn as the new Cashup Davis Family Endowed Dean of WSU's College of Agricultural, Human, and Natural Resource Sciences, I've had the opportunity to see a beautiful bounty of fruit crops, as well as appreciate the strides that our researchers make across the state.

Having come from other states where tree fruit was core to the regional economy, I've been impressed by the Washington industry's comparative scale and impact: it's a \$10 billion economic dynamo.

This industry is also one of Washington State University's most important partners in bringing new discoveries to life. Through the \$32 million Tree Fruit Endowment, fully established with the support of all tree fruit commodities in 2013, Washington producers fund, inspire, and initiate priority projects in research, education, and infrastructure modernization.

The report in your hands is one of many ways we bring feedback to the industry, showcasing ongoing work in information and technology transfer, as well as fundamental and applied research into major pathogens and environmental challenges, physiology,

orchard management, postharvest practices, and more. With your support, we strive to maintain and update where possible our critical infrastructure, including a new water supply system at Wenatchee and modernized, improved labs at Prosser this year.

The exciting grower-funded projects detailed ahead wouldn't have world-class experts, equipment, and impact if it wasn't for the unique collaboration between the tree fruit industry and Washington State University. Together, we ensure a more productive and sustainable future for Washington apples, pears, cherries, and stone fruit.

I encourage producers and processors to stay engaged with the Washington Tree Fruit Research Commission and the Tree Fruit Endowment Advisory Committee, connecting university research with your needs and goals. I look forward to the great new ideas that spring from our partnership.

Needy Powers
Cashup Davis Family Endowed Dean



Tree Fruit Physiology & Management

Based in Wenatchee, Endowed Chair **Stefano Musacchi** makes industry impacts through tree training, pruning, and management:

- Improved pruning techniques to minimize blind wood and increase yield in WA 38 trees. These techniques could add more than \$60 million in revenue for growers.
- New apple pollinizer genotypes with improved resistance to quarantine-related diseases. 2022 weather conditions proved the importance of having correct pollination for apple, pear, and cherry trees. New pollinizers that overlap during cultivar blooming, are fully compatible, and provide viable pollen for improved fruit set, yield, and quality.
- Results about rootstocks that help growers make decisions. One of the most utilized apple rootstocks in the industry can cause problems in cultivars sensitive to bitter pit. Specific nutritional management is required.

Musacchi leads national NC-140 apple rootstock trials to evaluate innovative genotypes worldwide. Several trials have been established with the new Geneva rootstocks and other accessions to test them under Washington conditions.



Quince Rootstocks for Pears

Dwarfing rootstocks can help the pear industry introduce higher density orchards while improving fruit quality. Musacchi's team is evaluating new quince rootstocks suitable for high-density planting.

Information & Technology Transfer Endowment

Timely, reliable, multi-platform communication is fundamental to the work of the Tree Fruit Extension Team. Led by **Karen Lewis**, the team consists of **Tianna DuPont**, **Gwen Hoheisel**, **Bernardita Sallato**, **Tory Schmidt**, **Jenny Bolivar**, and **Corina Serban**.

More than a quarter-million users visited their website, treefruit.wsu.edu, nearly half a million times between Aug. 31, 2021, and Sept. 1, 2022. The *Fruit Matters* newsletter and email LISTSERV have a steady subscription rate of 2,400. A texting notification system is being piloted, and social media reinforces direct LISTSERV emails and event notifications.

Environmental Stress Management

Information Technology Transfer Specialist **Jenny Bolivar** addresses environmental stress management in apples, pears, and cherries, as well as general horticulture and emerging needs, sharing:

- Resources in English and Spanish to better reach the industry.
- Insights on emerging technologies, including smart orchards, agricultural AI to transform decisions and the workforce, and plant-based sensors for irrigation decisions.
- Information on horticulture and upcoming needs, such as the WA 38 applied research and demonstration block, as well as rootstock and production system recommendations for new apple selections.



Little Cherry Disease Extension and Outreach



Joining the Tree Fruit Extension Team in July 2021 as the Little Cherry Disease Extension Coordinator, **Corina Serban** leads outreach and is a co-primary investigator in projects:

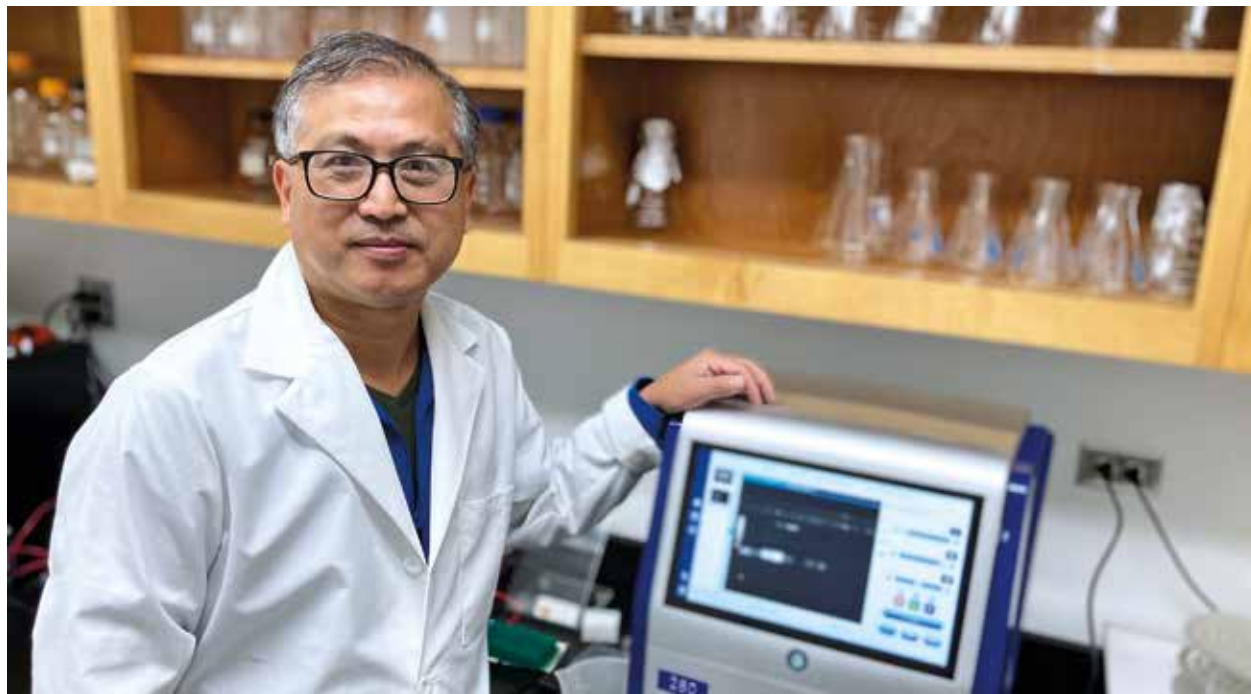
- Evaluating replant strategies for X-disease infected orchards.
- Developing rapid, reliable ID methods while building on continued research:
 - ▶ Physiology-based identification of X-disease infected cherry trees. The goal: an inexpensive, easy, early assay to understand prevalence and spread.
 - ▶ Identification of Little Cherry-linked volatile biomarkers for a faster, non-invasive way to identify LChV-2 and X-disease pathogens.
 - ▶ Canine LCD detection skills for economic, efficient early detection.

\$32M Historic Gift

The Tree Fruit Endowment was fully funded in 2020 through contributions from four commodities:

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





Bacterial Diseases of Tree Fruits

Based at IAREC in Prosser, Endowed Chair **Frank Zhao** and his team—Research Associate **Ricardo Santander**, intern **Elizabeth Juarez**, and students **Sheersa Mann** and **Katelyn Kiick**—examine bacterial diseases of tree fruits, including pathogen biology, genetics, genomics, and management for fire blight disease of apple and pear, and X-disease phytoplasma. Projects include:

- Monitoring and mapping antibiotic resistance in Washington apple orchards. Zhao will share results with growers and provide instructions about antibiotic use in orchards.
- Determining genome evolution and virulence status of field isolates of fire blight pathogens in Washington. Zhao has determined that at least four genotypes of fire blight pathogen exist in regional orchards. Combined with pathogen-systemic movement results, this information helps direct the level and intensity of management tactics, especially in shoot blight.
- Establishing a rapid, sensitive new method for early detection of X-disease phytoplasma. It is critical that infected trees be identified as rapidly as possible, especially before symptoms appear. Zhao will apply the newly developed method for field sample diagnosis and promote it to growers for disease management.

Environmental Tree Fruit Physiology & Management

Based in Wenatchee, Endowed Chair **Lee Kalcsits** studies abiotic stress, plant nutrition, and photosynthesis, addressing significant environmental challenges to fruit production. His current projects with multi-institutional teams include:

- Genetic, environmental, and horticultural contributions to sunburn susceptibility in apples. Researchers have found genetic variability in sunburn susceptibility partially linked with harvest timing and tree vigor. They've started experiments on increasing light penetration into the canopy near harvest, through netting retraction or de-leafing, to keep fruit protected during the heat of the summer while enhancing red color.



- Carbohydrate movement in X-disease infected sweet cherry trees as part of the Little Cherry Task Force. Endowment funds help match federal support for this work, launching in 2023, that may help identify points of infection as well as seasonal carbon fluxes and their relation to phytoplasma movement in trees.
- The endowment supports work by Kalcsits' Postdoctoral Researcher **Victor Blanco** to explore water relations and irrigation strategies to optimize pear fruit size. His research leads to better understanding of pear fruit growth dynamics under heat waves, irrigation strategies to produce bigger fruit, and new baseline knowledge for managing irrigation in pear orchards.



Postharvest Systems in Pome & Stone Fruit

Wenatchee-based Endowed Chair **Carolina Torres** leads research that enhances profitability and sustainability of Northwest pome and stone fruit growers and packers:

- Learning how environmental conditions and climate change events affect fruit quality postharvest in apples, pears, and cherries. Results help growers determine their fruit potential for different postharvest systems.
- Developing a system-based approach for quality, safety, and shelf life of organic apples.
- Supporting WA 38 commercialization issues through technical support and protocols for skin greasiness and related quality defects.



Sweet Cherry Texture

Preliminary studies by Torres' lab on sweet cherry texture and its relationship with instrumental measurement and eating quality has led to a recently approved USDA-AFRI project on this topic.

Controlling Scald in Pears

Torres develops treatment methods to control superficial scald on Washington-grown pears, including a newly developed anti-scalding active ingredient. Positive results in fruit from various growing environments and seasons will give the industry a near-future, commercial alternative to synthetic antioxidants.



Research Orchards & Facilities (ROF)

This endowed fund helps keep WSU tree fruit infrastructure modern, productive, and responsive to industry needs.

New, Modern Research Spaces

At the Irrigated Agriculture Research and Extension Center at Prosser, endowment funds support upgraded and modernized research facilities in IAREC's 1960s-era Hamilton Hall and '50s-built West Building.

Coming online this fall is a new, dedicated West Building laboratory for Tree Fruit Extension Specialist **Bernardita Sallato's** program in soil fertility, plant nutrition, stress management, and general horticultural practices.



Earlier this year, recently hired Endowed Chair **Frank Zhao** moved into a remodeled, updated phytobacteriology lab at Hamilton Hall.

"Upgrades to these labs enable our scientists to pursue both more fundamental as well as applied research, while training graduate students in scientific advances," said **Naidu Rayapati**, IAREC Director.

Future upgrades to Hamilton Hall will create a modern lab space for the planned Tree Fruit Soil and Rhizosphere Ecology Science endowed position.

Cherry Fruit Sorting and Cold Storage Facility

IAREC is currently in the planning phase for a cherry fruit sorting and cold storage facility at the West Building, moving ahead with financial support from Northwest Farm Credit Services. This facility will aid WSU as well as industry and agency partner research on sweet cherry breeding, whole tree physiology, nutrient management, food safety, automation, and postharvest issues, as well as advance cross-campus collaborations for greater synergies.

Upgrading Vital Infrastructure

At the Tree Fruit Research and Extension Center at Wenatchee, critical needs are being addressed.

Cold Storage Atmosphere Control

A controlled atmosphere (CA) system is being added to recently installed cold storage rooms at TFREC with partial support from endowment funds. CA environments allow researchers to better understand postharvest storage conditions and challenges.

Tree Fruit Entomology Laboratory

ROF funds will be used to create and equip a Wenatchee-based lab for this new endowed position. A candidate search is currently underway.

Future Plant Growth Facility

Replacing its long-outmoded main greenhouse, TFREC completed pre-design for a new Plant Growth Facility. Funding is being developed for this major project.

Water System Replacement

A resilient water supply is a critical need for any orchard. The aging main water line for Sunrise Research Orchard is failing and needs to be fully replaced. Endowment funds support design of a modern, \$1.5 million water system, and will pay for construction of a new pond and pumps, roughly half the total cost of the entire project. Completion means reliable, timely, and efficient water delivery at the research orchard.

Future Endowed Chairs

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 will likely begin in 2023.

Tree Fruit Entomology

This scientist will focus on insect behavior modifying tools for Integrated Pest Management in conventional and organic tree fruit production programs. A search is in progress.

Principal of Tree Fruit Endowment Funds, 6/30/22

Pathology Chair.....	\$2,020,671.94
Physiology Chair.....	\$2,039,968.24
Information & Tech. Transfer	\$12,068,682.96
Research Orchard/Facilities.....	\$8,010,302.63
Postharvest Systems Chair	\$2,059,810.83
Soil & Rhizosphere Chair.....	\$2,102,266.91
Entomology Chair.....	\$2,021,262.05
Environmental Tree Fruit Physiology & Management	\$2,017,351.65

Overage Supports Extension, Facilities

The special assessment collected more than \$900,000 above the original \$32 million total. The Washington Tree Fruit Research Commission and WSU jointly developed a special project plan to enhance the endowment and benefit all contributing crops through facilities improvements and Extension efforts.





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, Chair
- ▶ Perry Beale
- ▶ Jeff Cleveringa
- ▶ Sam Godwin
- ▶ Craig Harris
- ▶ Matt Miles
- ▶ Teah Smith
- ▶ Keith Veselka
- ▶ Dena Perleberg Ybarra

<https://treefruitresearch.org>

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

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WASHINGTON STATE UNIVERSITY
**College of Agricultural, Human,
and Natural Resource Sciences**