



Marketing & Communications

In Q4 of 2019, CAHNRS Communications published 45 online articles that highlight accomplishments in academics, research, and Extension. CAHNRS and Extension websites received 1,052,445 total page views and garnered 479,554 new site visitors. We increased our audience size and engagement on all social media platforms, and our web team continues to provide support and training to faculty and staff.

SOCIAL MEDIA UPDATE

Facebook	49 Posts	4,271 Likes Top	78,354 Reached	3,802 Fans (+1.3%)
Twitter	289 Tweets	272,339 Impressions	6,237 Engagements	5,088 Followers (+1.9%)

NOTEWORTHY PROJECTS

- Tree Fruit Report put together and released
- CAHNRS new student recruitment poster completed
- Cheez-It Bowl photo shoot w/Cougar Gold container
- Thanksgiving and Holiday emails created
- Northwest Farm Credit Union tailgate prior to football game

TOP NEWS STORIES

[Research shows boredom is on the rise for adolescents](#), especially girls- **By Seth Truscott** | Published Nov. 14, 2019. In Reddit, Science Daily, Healthy News, StudyFinds, WIOD Newsradio, WTAX Newsradio, Washington State School Directors Association, PsychCentral

[Lifetime award honors industry impact of WSU's 'Dr. Christmas Tree'](#)- **By Scott Weybright** | Published Nov. 19, 2019. In Christian Science Monitor, CNBC, Seattle Daily Journal of Commerce, Technology Networks, Spokane Master Gardener Foundation, Pullman Radio News

[Growing a Halloween favorite more sustainably](#)- **By Seth Truscott** | Published Oct. 16, 2019. In KOMO News, KATU, KVAL, KCBY, KPIC, Daily Evergreen

Faculty Highlights

- **Lav Khot** (BSE) gave an invited talk in International Seminar on Advances in Digital Agriculture, Facultad de Agronomia e Ingenieria Forestal (FAIF), Pontificia Universidad Catolica de Chile, Santiago, Chile. October 2, 2019.
- **Manoj Karkee** (BSE) –gave a Keynote presentation at the Automation and Robotics in Agriculture, Asian-Australian Conference on Precision Agriculture, Ludhiana, India, October 14-17, 2019.
- **Manoj Karkee** (BSE) and **Qin Zhang** (CPAAS) participated the 6th IFAC Conference on Sensing, Control and Automation Technologies for Agriculture (AGRICONTROL 2019) in Sydney Australia, from December 4-6, 2019. As the Chair for IFAC Technical Committee on Agricultural Control, Karkee supervised the conference, and Zhang served as the Chair of International Program Committee of the conference and gave a Keynote speech, titled "Agricultural Cybernetics".

- **Qin Zhang** (CPAAS) and **Manoj Karkee** (BSE) co-organized an International Agricultural Workshop on Agricultural Robotics at the University Technology of Sydney on December 3rd, 2019. More than 50 participants from at least 6 countries attended this workshop.
- **Lav Khot** (BSE) and **Qin Zhang** (CPAAS) participated the 6th Class of CIGR Agricultural Mechanization Next Leaders Program from November 5th to 11th. This program was organized by CIGR (International Commission of Agricultural and Biosystems Engineering) Section of Equipment Engineering for Plant Production. All the participants were nominated by their peers then selected by a CIGR selection committee as potential professional leaders internationally in this field. As an Honorary Vice President, Qin Zhang was one of the organizer and leaders of this program.
- **Tom Collins** (V&E), Assistant Professor Analytical Chemistry, was recognized by Wine Business Monthly as one of their 2019 Wine Industry Leaders. Tom was recognized for his research that is raising awareness and finding solutions for climate-related problems with his work on smoke exposure in winegrapes.
- **Marcy Ostrom** (SoE) received Farmer Advocate of the year award at the Tilth Alliance annual conference in
- **Tom Okita** (IBC) has been named a Fellow of the American Association for the Advancement of Science (AAAS).
- **Brittany Coopers's** (HD) presentation at the Washington State Division of Behavioral Health and Recovery (DBHR)
- **Amit Dhingra** (Hort.) elected to represent American Society of Plant Biologists on the Board of Representatives of Council for Agricultural Science and Technology for a second 3-year term.
- **Lisa DeVetter** (Mt. Vernon) received ISHS Young Mind Award for best oral presentation at the 2019 Rubus and

Grant Funding

CAHNRS Office of Research faculty received **\$15.7M** in extramural support in the form of new/ongoing grants, contracts, agreements and services rendered. The two largest of these awards are included below.

- **Mark Lange** (IBC) \$4 million grant from the National Center for Complementary and Integrative Health, part of the National Institutes of Health, to work on developing novel approaches for the production of taxol, one of the best-selling anti-cancer drugs on the market.
- **Dorrie Main** (Hort.) was awarded a \$2.5 million grant for “Database Resources for Crop Genomics, Genetics and Breeding Research” from the USDA NIFA National Research Support Program.

Notable Publications

- **Phil Bates** (IBC) Zhou, Xue-Rong., Bhandari, Sajina., Johnson, Brandon S., Kotapati, Hari Kiran., Allen, Douglas K., Vanhercke, Thomas., Bates, Philip D., (2019). “Reorganization of acyl flux through the lipid metabolic network in oil-accumulating tobacco leaves” PLANT PHYSIOLOGY, 182 (1), DOI: <https://doi.org/10.1104/pp.19.00667>.
- **John Peters** and **Florence Mus** (IBC) Ryu, M., Zhang, J., Toth, T. et al. Control of nitrogen fixation in bacteria that associate with cereals. NAT MICROBIOL 5, 314–330 (2020). <https://doi.org/10.1038/s41564-019-0631-2>
- **Phil Bates** (IBC) Karki, Nischal., Johnson, Brandon S., Bates, Philip D., (2019) “Metabolically Distinct Pools of Phosphatidylcholine Are Involved in Trafficking of Fatty Acids out of and into the Chloroplast for Membrane Production” THE PLANT CELL, 31 (11), DOI: <https://doi.org/10.1105/tpc.19.00121>.

- **Louise Parker, Tom Power, Jane Lanigan**, and Prevention Science graduate student **Kari Silva Garcia** (HD) Hughes SO, Power TG, Baker SS, Barale KV, Lanigan JD, Parker L, Silva Garcia K, Aragon MC, & Micheli N. (in press). Pairing feeding content with a nutrition education curriculum: A comparison of online and in-class delivery. JOURNAL OF NUTRITION EDUCATION AND BEHAVIOR.
- **Michael Cleveland** (HD) Cuttler, C., Spradlin, A., Cleveland, M.J., & Craft, R.M. (accepted for publication). Short and long-term effects of cannabis on headache and migraine. JOURNAL OF PAIN.
- **Anna Whitehall** and **Caitlin Bletscher** (HD) Whitehall, A. P., Bletscher, C. G., & Yost, D. (2019). Reflecting the wave, not the title: Increasing self-awareness and transparency of authentic leadership through online graduate student leadership programming. JOURNAL OF LEADERSHIP EDUCATION.
- **Catherine Hendrickson** (Y&F), **Seanna Hewitt** (Hort.), **Mark Swanson** (SoE), and **Amit Dhingra** (Hort.) Hendrickson, C., Hewitt, S., Swanson, M. E., Einhorn, T., & Dhingra, A. (2019). Evidence for pre-climacteric activation of AOX transcription during cold-induced conditioning to ripen in European pear (*Pyrus communis* L.). Plos One, 14(12).

WSU Extension Highlights

FACULTY HIGHLIGHTS

- **Diane Smith**, Associate Professor, Food Access & Health Promotion Specialist for WSU Extension, Skagit & Whatcom Counties, was honored with the Flash of Silver Award by the Child Nutrition Coalition 1095 Skagit.
- **Kayla Wells**, FCS Faculty, Colville Reservation & Director in Okanogan County, was honored recently at the National Extension Association for Family and Consumer Sciences (NEAFCS) 85th annual session, whose theme was “Nurturing the Richness of Lifelong Learning”.
- **Kayla Wells, Linda McLean, Tabitha Parr, and Dorothy Palmer** received the Second Place National and First Place Western Region NEAFCS Excellence in Teamwork Award at the conference held September 30 - October 3, 2019 in Hershey, Pennsylvania. In receiving the award, Wells was recognized for her work on The Food Sovereignty / Food Security Garden Program that addressed the needs of people living in a food desert on the Colville Reservation to create healthy, fresh, nutritionally packed food.
- **Carol Black**, WSU Pesticide Education Specialist, was selected by US EPA Office of Pesticide Programs to serve a three-year term on their federal advisory committee, the Pesticide Program Dialogue Committee.

PUBLICATIONS

- **Michelle Moyer** (IAREC), **Gwen-Alyn Hoheisel** (ANR), and **Markus Keller** (IAREC) Moyer, M.M., L.J. Mills, G.A. Hoheisel, and M. Keller. Revised 2019. Assessing and Managing Cold Damage in Washington Vineyards. WSU EXTENSION PUBLISHING #EM042E. Pullman, WA, USA. 12 pp. (1,4,5). Previous editions: 2011. Also en Español #EM042ES (2015).
- **Linda Chalker-Scott** (Puyallup) Chalker-Scott, L. and A.J. Downer. 2019. Soil myth busting for Extension

GRANT FUNDING - CAHNRS Extension faculty received **\$13.1M** in extramural support in the form of new/ongoing grants, contracts, agreements and services rendered for a total of **\$22.4M** so far in fiscal year 2020.

Extension Events, Community Outreach

V&E released three new wines this fall, a Cabernet Sauvignon and two Chardonnays. Four more wines will be released at V&E's Spring Release Party in Richland, WA. Service center account was renewed in late October and had record sales of Blended Learning wine in November and December 2019.

WSU's new apple 'Cosmic Crisp[®]' was released to the public on December 1. Estimated earned media as of Dec 9 was \$47.6M, reaching 5.135B people.

WSU Prosser IAREC had a successful Centennial Celebration on October 2, 2019.

Student News

Sharol Schmidt (PhD student, IBC) in Dr. Andrei Smertenko's Lab received a [2019-2020 Helen and Loyal H. Davis Fellowship](#). This Research Fellowship consists of a stipend for calendar year 2020 and a cash award of \$3,000 to spend for travel to a professional conference and/or research supplies.

Alex Alleman (PhD student, IBC) in Dr. John Peters' Lab received a [2019-2020 John & Maggie McDougall Scholarship](#). The Scholarship carries a cash award of \$3,000 to spend for travel to a professional conference and/or research supplies.

Sajina Bandari (PhD student, IBC) in Dr. Phil Bates' Lab, Joshua Polito in Dr. Mark Lange's Lab, and Hsin-Hua (Joelle) Wu in Dr. John Peters' Lab received the Clarence "[Bud](#)" [Ryan Institute of Biological Chemistry Travel Scholarship](#) for the 2019-2020 academic year in the amount of \$1500. The travel scholarships were made possible through an endowment gift by Pat Ryan (wife of the late Bud Ryan).

Facilities, Infrastructure & Programmatic

Phase one of V&E teaching lab is now complete, and phase two will advance when remaining funds are raised.

Alumni & Development

DEVELOPMENT HIGHLIGHTS

In an effort to continue stewarding the historic \$32 million Tree Fruit gift, CAHNRS has produced the [2019 Tree Fruit Endowment Impact Report](#) (See Below) to be shared with tree fruit growers, producers, and industry members throughout the state. This report was personally sent from Dean Wright to 100+ of the top producers and growers. It was also published in the January issue of the Good Fruit Grower magazine. In it's third year, this report has grown to be the primary communication of impact and research strides to our industry partners.

The V&E Program received a \$25,000 gift from Quintessence Vineyard. These funds will be applied to the final phase of the Wine Science Center Teaching Lab build-out.



2019
TREE FRUIT
 IMPACT REPORT
 WSU TREE FRUIT
 ENDOWMENT

Created through history-making support from Washington fruit growers, the Tree Fruit Endowment helps Washington state take its place as the global center of tree fruit research.

This self-sustaining fund is fueling research and innovation essential to WSU's role in supporting the state's multi-billion-dollar tree fruit industry, addressing growers' top priorities and enhancing Washington's economic competitiveness.

Developed in partnership with the Washington Tree Fruit Research Commission, the endowment was initiated through grower-voted assessments in the apple, pear, and stone fruit industries.

The Tree Fruit Endowment Advisory Committee guides and oversees this historic, \$32 million gift. Members are appointed by industry organizations which include 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, Chelan Fresh Marketing
- SEAN GILBERT, Gilbert Orchards
- BOB GIX, Blue Star Growers Inc.
- ALAN GROFF, Foreman Fruit Company
- JAKE GUTZWILER, Stemilt Growers, Inc.
- JASON MATSON, Matson Fruit Company



HISTORIC PARTNERSHIP BEARS FRUIT

As Dean of the College of Agricultural, Human, and Natural Resource Sciences, I've had the opportunity to see much of Washington state's bounty firsthand.

Over the past year, I've toured orchards and packing houses, met with scientists and growers, and tasted the fruits of their hard work.

This September, I helped dedicate the original mother tree of the apple now called Cosmic Crisp®, which holds wonderful promise for Washington. Days later, I assisted in the centennial celebration at our Irrigated Agricultural Research and Extension Center at Prosser, birthplace of another important WSU-developed fruit—the Rainier cherry.

Neither one of these industry-changing varieties would have come to light without the vital partnership between the state's growers and our land-grant university.

This year, WSU's largest ever gift, the Tree Fruit Endowment, will meet an important milestone. The special project assessment that has been fueling the historic endowment is expected to be complete this year.

While the endowment is just coming into its own, it is already helping WSU scientists make great strides, supporting research programs, outreach, and improvements that put ideas and tools in your hands.

Your support has allowed us to deliver on innovative practices with multi-million-dollar economic potential for Northwest orchards.

It has brought scientists to WSU who are working to reveal the factors that affect fruit quality before and after harvest, ensuring our best products reach consumers.



None of this would be possible without your support. WSU and Washington state are the envy of institutions the world over because of our unique relationship with growers, a partnership that brings resources and collaboration that turn discovery into applicable knowledge and fruitful practices.

As a steward of this gift, I thank you once again for your support and involvement. Together, we are leading the nation in discoveries that enhance tree fruit quality, security, and profitability.

André-Denis Wright, CAHNRS Dean

ENDOWED CHAIR IN TREE FRUIT PHYSIOLOGY



Based at Wenatchee, **Stefano Musacchi** researches training, pruning, and management techniques to ensure high-performing orchards and high fruit quality. Originally from Italy, Musacchi joined WSU in 2013.

Endowment funds have allowed Musacchi and his team to:

- Develop improved pruning techniques to minimize blind wood in WA 38 trees. When combined with other beneficial practices, these techniques could add more than \$60 million in economic impact.
- Replace older cultivars while maintaining existing root systems. Top work is very common in Washington. Musacchi leads a project developing a multi-axis system in which WA 38 was top-worked onto a mature Granny Smith orchard grafted on M9 rootstocks. His work helps compare training systems, allowing growers to turn old orchards into modern 2D canopies suitable for mechanization of principal operations.
- Lead NC140 apple rootstock trials to evaluate the most innovative genotypes from around the world.
- Lead research on new potential apple pollinizer genotypes with improved resistance to quarantine diseases.
- Support the pear industry by exploring pear maturity variability in the canopy, developing new multi-axis training systems in pears, and evaluating 15 new quince rootstock genotypes to identify ones that perform well in high-density planting pear orchards.



INFORMATION & TECHNOLOGY TRANSFER

Karen Lewis leads the WSU Tree Fruit Extension Team, a collaboration of researchers and Extension Specialists from WSU, the Washington Tree Fruit Research Commission, and Oregon State University Extension who work to support the Northwest industry through outreach and applied research. Members include Faith Critzer, Tianna DuPont, Gwen Hoheisel, Wendy Jones, Bernardita Sallato, Ashley Thompson (OSU) and WTFRC project manager Tory Schmidt. Their accomplishments include:

- In the last year, use of the Treefruit.wsu.edu grew by 26%. Page views climbed to 473,980—a 34% increase. Industry partners report regular use of the site.
- The Crop Protection Guide online system was upgraded to a new database and platform at cpg.treefruit.wsu.edu. More than 50 major updates included product efficacy tables, a new major insects and diseases section for each crop, organic symbols, and multiple new products.
- *Fruit Matters* electronic newsletter subscriptions increased to 1,774.
- More than 320 visitors attended WSU Fruit School—Cherry Production from Bud to Bucket, delivered via distance technology to Prosser, Wenatchee, and The Dalles. More than 200 took part in cherry pre-harvest field days in Okanogan, Royal City, Prosser, and The Dalles.
- New hires: Jenny Bolivar was hired in Nov. 2019 for an Extension ITT horticulture position focusing on outreach and applied research in abiotic stress management and apple rootstock evaluation and demonstration. Future hires include Extension ITT positions in post-harvest systems and tree fruit communications.

ENDOWED CHAIR IN TREE FRUIT POSTHARVEST SYSTEMS



Helping Northwest tree fruit growers and packers bring their best produce to consumers more profitably and sustainably, alumna **Carolina Torres** is the university's first Endowed Chair in Tree Fruit Postharvest Systems. Joining WSU in February 2019, Torres' past work as a student and researcher included an exploration of how pre-harvest factors affect fruit quality after harvest, using phenomics, metabolomics, and genomics tools.

The Tree Fruit Endowment has allowed her to:

- Remodel and establish the new postharvest laboratory at the Wenatchee TFREC and build her research team.
- Research biomarkers in pears to predict superficial scald, an important storage disorder.
- Engage in collaborative research with USDA-ARS postharvest scientists, as well as WSU colleagues focused on preharvest fruit production. Topics covered in new WTFRC grants include non-destructive methods to predict sun-related apple disorders during cold storage, reduction of scald in pears, and optimized storage methods for organic apples.
- Unravel the effect of climate on fruit quality and maturation, pre- and postharvest, as well as physiological disorders during postharvest, along with the final outcome for the consumer.
- Support the WSU Extension Team in developing improved varieties for Washington growers, and survey partners across the industry to establish future lines of research.

RESEARCH **ORCHARDS & FACILITIES** (ROF) ENDOWMENT

This fund provides WSU Tree Fruit faculty and staff with facility upgrades, keeping our programs productive and responsive to industry needs.

Project Updates

Biosafety Level-2 Core Lab

Based at WSU's Prosser Irrigated Agriculture Research and Extension Center, **Faith Critzer** works to support the Washington tree fruit industry by closing gaps in our knowledge about how pathogenic bacteria spread, and sharing best practices with growers and packers.

The Research Orchards and Facilities Endowment enhanced Critzer's efforts by providing funds to establish a stand-alone Biosafety Level-2 Core Laboratory. This facility helps deploy research-based strategies to keep harmful pathogens out of the fruit supply chain.

The facility received Biosafety Level-2 approval in the spring of 2019. Since then, several projects have begun which will benefit the tree fruit industry, including understanding prevalence and distribution of bacteria on food contact surfaces in apple packing facilities, changes in the apple microbiome throughout storage, and efficacy of irrigation water treatments.

Upgraded IPM Lab

The upgraded Entomology Integrated Pest Management Lab at Wenatchee helps scientist **Tobin Northfield** develop sustainable strategies to defeat devastating pests and diseases that threaten apple, pear, cherry, and other fruit crops.

Enhanced with a new roof, HVAC system, floor, ceiling, lighting, benches, and soon, new bench equipment, the improved facility enhances Northfield's ability to train graduate students working on applied problems, and will enable cutting edge research in insect behavior and biocontrol to address industry needs and compete for external funding.



Entomologist Tobin Northfield's program benefits from a remodel and upgrades to the IPM Lab.



▲ Studying pathogens to stop their spread, scientists at WSU's BL2 Core Lab include Anjali Krishnan, Alexis Hamilton, Faith Critzer, Robyn Zaches, and Blanca Ruiz Llacsahuanga.

◀ Endowment funds helped cherry breeder Per McCord modernize his greenhouse and lab.

Newly Funded Project

Modernization Speeds Up Cherry Breeding Program

Thanks to upgrades at the Fruit Quality Lab and Cherry Breeding Greenhouse in Prosser, the ROF Endowment is helping scientist **Per McCord** accelerate the WSU cherry breeding program, increasing his capacity to test and identify promising new varieties.

The ROF Endowment provided funding in 2019 to equip the Fruit Quality Lab with a combination refractometer and titrator, which allows greater throughput, speed, and accuracy in analyzing flavor and storage quality.

Meanwhile, a remodel of the greenhouse is nearly complete. Funding replaced the decades-old electrical system with modern equipment that allows for proper lighting and temperature controls.

Future Project

Cold Storage and Fruit Handling

Refrigerated storage and fruit handling spaces are priority needs for scientists at the WSU TFREC in Wenatchee.

Cold storage is vital to keep fruit viable for experiments, and with the addition of Endowed Chair **Carolina Torres** and her postharvest research program, there is an increased demand for dedicated areas. The Center has embarked on a multi-phased expansion for these much-needed cold-storage and fruit handling facilities.

Funding from the ROF Endowment will be used to complete infrastructure changes necessary to support a significant increase of cold storage units planned for the near future.

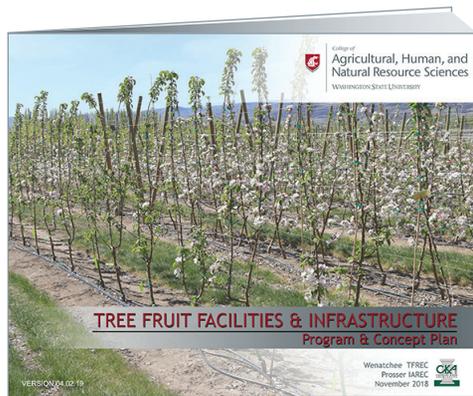


Long Term Planning

Facilities and Infrastructure Concept Plan

WSU CAHNRS has drafted a forward-looking study of long-term facility needs at both the Wenatchee and Prosser Research & Extension Centers.

Existing facilities were inventoried and priority projects for each campus were identified. This concept plan, developed last fall, will guide future master planning, evolving as needs change and ensuring that WSU tree fruit research remains modern and strong to deliver valuable knowledge to the industry.



NEW & UPDATED ENDOWMENTS



Endowed Chair in Tree Fruit Soil and Rhizosphere Science

This search is temporarily on hold. Pending the outcome of discussions with the Endowment Advisory Committee, we anticipate re-advertising this position in 2020.



TF Pathology Endowed Chair

This position will focus on effective disease management of tree fruit in Washington state and the Pacific Northwest. The search process has been initiated with hopes to fill the position in 2020.



NEW—TF Entomology Endowed Chair

This position will focus on insect behavior modifying tools for IPM in conventional and organic tree fruit production programs. The position will be finalized in March with a search likely in 2020.



NEW—TF Research Endowed Chair

Funding for this position will be completed in early 2020. The Endowment Advisory Committee will meet to discuss the area of highest academic need identified by the industry to focus this position.

We thank the Washington Tree Fruit Research Commission for their leadership and commitment to further the tree fruit industry through this assessment.

- Jim Doornink
- Harold Schell
- Dena Perleberg Ybarra
- Tom Butler
- Brent Milne
- Teah Smith
- Jeff Cleveringa
- Jake Gutzwiler
- Sam Godwin

Ines Hanrahan, Executive Director

WASHINGTON STATE UNIVERSITY

Linda Bailey, Interim Senior Director

College of Agricultural, Human, and Natural Resource Sciences

Alumni and Development

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How Does the Tree Fruit Endowment Work?

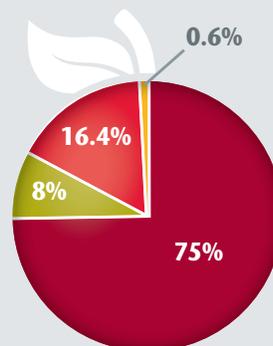
The Tree Fruit Endowment was created to provide a dependable, perpetual source of funding. The endowment's principal is invested, and a portion of the growth on that investment, typically 4 percent, is paid out annually to fund strategic initiatives identified in collaboration with the Tree Fruit Endowment Advisory Committee.

CONTRIBUTIONS BY COMMODITY

Fruit Value as of 6/30/19

● Apple	\$22,587,385.19
● Pear	\$2,389,922.69
● Cherry.....	\$4,999,542.24
● Stone Fruit.....	\$192,002.77

TOTAL.....\$30,168,852.89

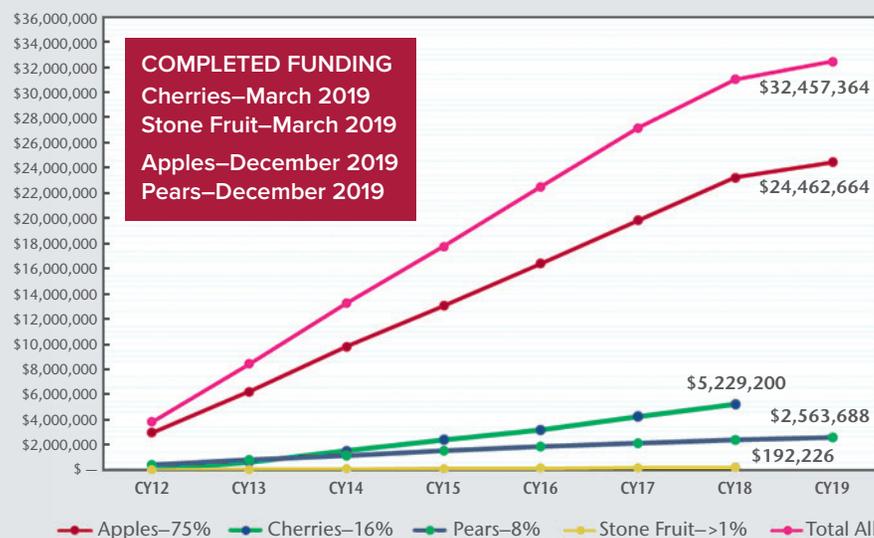


Principal Balance of Tree Fruit Endowments

Pathology Chair.....	\$2,126,567.58
Physiology Chair.....	\$2,171,404.91
Info and Technology Transfer	\$12,217,363.74
Research Orchard and Facilities	\$8,166,003.18
Postharvest Chair	\$2,121,034.02
Soil and Rhizosphere Ecology Chair.....	\$2,131,034.32
Entomology Chair	\$2,000,000.00
Research Chair (fully-funded goal is \$2M)	\$168,852.89

SPECIAL PROJECT ASSESSMENT REVENUE

With projections through December of 2019



Actual and projected income into the 2019 crop year for the \$32 million WSU Tree Fruit Endowment special assessment for tree fruit research, extension activities, and facilities improvement. The inset provides a projection of the month and year collections will cease for the fruits listed.

Based upon projections provided by the Washington Tree Fruit Research Commission, it is anticipated that the special assessment to support the WSU Tree Fruit Endowment will be finished in December, 2019. This is a projection, and the assessment will conclude when the actual contributions reach the original \$32M goal.

If you have questions about this graph or the projections reported, please contact Ines Hanrahan, (509) 665-8271.