



IAREC ANNUAL REPORT



WSU Prosser Irrigated Agriculture
Research & Extension Center

WASHINGTON STATE UNIVERSITY

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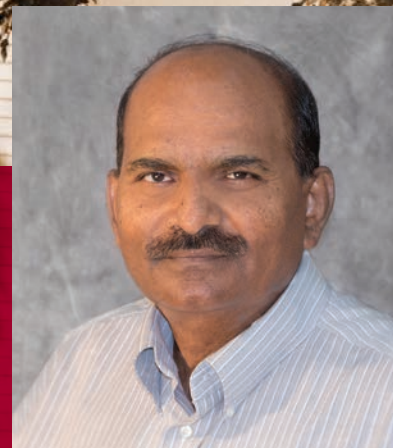
Above: The North Building on the IAREC campus, pictured in 1955. The building is currently used for organizing workshops, outreach activities and educational programs.

On the cover: Planting a tree at the Roza orchard site in the 1940s.

Message from Director

Naidu Rayapati, IAREC Director

Professor of Plant Pathology & CAHNRS Assistant Dean for WSU Tri-Cities



The year 2019 marked the 100th anniversary of Washington State University's Irrigated Agriculture Research and Extension Center (IAREC) at Prosser. One hundred years may be an eye blink in human history, but represents a significant milestone for IAREC, allowing us to celebrate the Center's extraordinary contributions to agriculture and economic development in south-central Washington.

During these 100 incredible years, IAREC has thrived to become a world-recognized center for research and development in irrigated agriculture. Over the last century, the Center has established interdisciplinary and trans-institutional partnerships for technological innovation and made substantial contributions to irrigated crop improvement, helping grow Washington state's economy and its global agricultural competitiveness.

IAREC's legacy as the birthplace of the Washington wine industry, as well as new crop varieties in cherries, potatoes, hops and beans, and innovative concepts in producing virus-free plants and precision agriculture are just a few examples that have long been recognized by agricultural communities and a wide array of stakeholders that we serve.

Over the years, the Center's faculty has embraced sophisticated communication pathways for timely dissemination of research-based results to scientific and stakeholder communities. In addition, the IAREC faculty has made mentoring students a priority, helping prepare the next generation of global citizens contributing to future agricultural sustainability.

Today, researchers from across the globe seek collaborations with IAREC faculty, while students from different countries gain transformative educational experiences at the Center. Indeed, the Center has evolved from a small 'feeder' research station to global prominence and transformed into a 'mini cosmos' where people from diverse cultures, nationalities, and ethnicities work together to resolve complex agricultural challenges, making positive impacts to local economies and communities, and broadly to global agricultural sustainability and food safety and security initiatives.

IAREC's success is a collective endeavor of many across the state, throughout WSU and across the globe. I sincerely thank the late Mrs. Ina P. Williams, state representative from Yakima from 1917 to 1919, for her initiative in establishing an Irrigation Experiment Station, now IAREC; the Prosser community for their support and investments during the formative years of the Center; and WSU, United States Department of Agriculture (USDA), Washington State Department of Agriculture (WSDA), commodity commissions, and various stakeholders for continued growth of the Center to what is today.

It is an honor for me to recognize administrators, faculty, staff, and students, past and present from WSU, USDA, and WSDA for their outstanding contributions to the growth of the Center during the past 100 years. It has also been my greatest privilege to lead IAREC and work collaboratively with WSU and the College of Agricultural, Human, and Natural Resource Sciences (CAHNRS) administration, commissions, state and federal agencies, policy makers, and other stakeholders to ensure its success in the years to come.

IAREC's future is bright. We at the Center are proud of its resiliency and adaptability with changing times. IAREC has world-recognized expertise in sustainable production of perennial specialty crops (tree fruits, grapes and hops), as well as food, forage and biofuel crops in irrigated agriculture, and deployment of emerging technologies in plant and soil health, plant protection and food safety, improved crop varieties, climate resilient cropping systems, water management, and precision agriculture. It will continue to be responsive to the changing needs of agriculture for improving people's lives, and play an increasingly significant role in advancing WSU's land-grant mission.

I invite you to read the following pages about "The Past, Present and Future of IAREC," and be part of our grand vision to expand the role of IAREC in advancing Washington state's agricultural and economic prosperity as well as global food security.

President's Letter

Kirk Schulz, President, Washington State University

Dear friends,

It's been my honor to commemorate the 100th anniversary of Washington State University's Irrigated Agriculture Research and Extension Center (IAREC) at Prosser.

From its humble beginnings with an original staff of two, the Center has grown to include 17 WSU faculty, 40 graduate students, and eight allied scientists with the U.S. and Washington State Departments of Agriculture. Their hard work and dedication continue our century-long legacy of pioneering agricultural research and extension.

IAREC has contributed groundbreaking innovations that have shaped agriculture as we know it today. In 1919, the original station supported regional farmers through work on forage crops, animal feeding, irrigation management, and the development of technologies and methods to further those initiatives.

Since then, IAREC has become the largest research and extension center in the College of Agricultural, Human, and Natural

Resource Sciences (CAHNRS), advancing the sustainability of agriculture and conducting translational research on wine, tree fruit, hops, potatoes, and a multitude of other crops. The Center is a model for partnerships between WSU, state, and federal agencies for enabling sustainable crop improvement strategies.

As we review a century of accomplishments, it is vital to now look to the future, and lead the charge to address the challenges of our time and those to come. The work of our faculty, staff, and students will continue to help feed a growing population, protect plant life from pests and disease, and safeguard our natural resources. For 100 years, IAREC has led WSU's land-grant legacy toward a productive, sustainable future. It will continue to do so for the next hundred, and beyond.

Congratulations, and Go Cougs!



Message from the Dean

*André-Denis Wright, Dean
College of Agricultural, Human, and Natural Resource Sciences (CAHNRS)
Washington State University*

To the team members and partners of Washington State University's Irrigated Agriculture Research and Extension Center, thank you for being part of this important centennial milestone.

In 2019, I was proud to join U.S. Congressman Dan Newhouse and WSU President Kirk Schulz in celebration of 100 years at IAREC. I am grateful to past directors Pete Jacoby, Gary Grove and Doug Walsh, and current director Naidu Rayapati for their leadership at IAREC, and for taking the Center into the next century.

Of course, none of this would be possible without the hard work and dedication of all the people who make up the wonderful IAREC team: our WSU faculty, USDA and WSDA scientists, more than 100 support staff, and 40 graduate students.

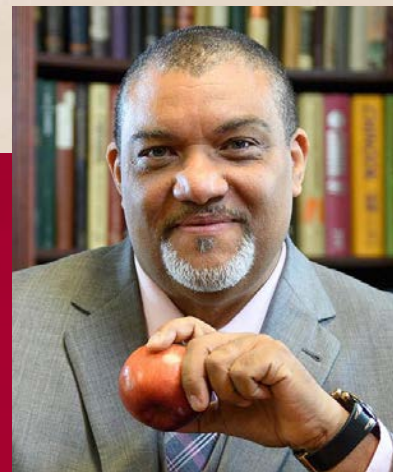
Here on this campus, we support the AgWeather Network, the Center for Precision & Automated Agricultural Systems, and the Clean Plant Center Northwest. In the prior year alone, IAREC faculty received nearly \$10 million in grants from a wide range of sources to address the most important challenges and opportunities in agriculture here in the State of Washington and abroad.

By building on the foundation laid by Walter Clore, faculty at IAREC are conducting vital research to improve wine and juice grape quality in Washington, benefiting growers, industry stakeholders, and consumers. WSU horticulturists are pioneering advances in deficit irrigation systems, helping to improve both vine vigor and grape quality while reducing irrigation by up to 30 percent.

Our entomologists are finding new and innovative ways to control pests in vineyards and other specialty crops, saving growers millions of dollars annually by increasing yields and reducing expenditures in pesticides. Through innovative research, our pathologists have developed a risk-assessment model to reduce the number of fungicide applications, and to improve spray technologies for controlling powdery mildew in vineyards. This research has reduced fungicide usage by 40 percent, cutting management costs and benefiting the environment.

IAREC faculty have implemented weather-based tools and decision aid systems for predicting cold damage to vineyards, and controlling diseases.

WSU's grape virology program is advancing strategic knowledge on virus diseases and deploying practical solutions to maintain healthy vineyards. This research has strengthened the grapevine planting supply chain and certification programs for advancing clean plant campaigns in the state. The partnership with growers, nurseries, and regulatory agencies has become a model for implementation of harmonized quarantine and certification programs at the national level.



IAREC also plays an invaluable and critical role in the tree fruit

industry. Our revitalized stone fruit breeding program is developing superior sweet cherry varieties to advance the economic impact of the cherry industry in the Pacific Northwest. The stone fruit research team is conducting work on tree physiology and improving canopy architecture to deploy next-generation orchard systems for efficiency and sustained productivity.

The food science program is providing cost-effective recommendations and training to the tree fruit packing industry for mitigating food safety risks in their operations. Faculty are contributing to soil health in fruit crops and improvement of forage and biofuel crops.

The tree fruit pathology team is also conducting applied research on powdery mildew disease in cherry orchards, sharing new predictive tools and recommended disease-management guidelines to prevent this disease, benefiting cherry growers in the Pacific Northwest. The tree fruit virology team is conducting research and education to address and slow little cherry disease complex.

What began 100 years ago as a localized research station has grown into a world-class research facility with global reach and impact.

With funding from the USAID-supported Feed the Future program, we are contributing to America's Global Hunger and Food Security Initiatives for farmers in developing countries.

IAREC's collaborative research on irrigation efficiency and precision agriculture, automation, and mechanization at CPAAS uses drones, robotics, Internet of Things applications, and data analytics to improve farming practices and advance robust cropping systems benefiting specialty crop industries.

Fulfilling the mission of Extension, IAREC faculty are actively sharing research-based knowledge along multiple pathways and across many platforms to benefit stakeholders and agricultural communities.

And finally, IAREC faculty are providing educational and hands-on learning opportunities to undergraduate and graduate students to prepare a new generation of global citizens capable of addressing agricultural challenges of the 21st century.

I thank the entire IAREC team for their hard work and dedication, and for making WSU-IAREC an unrivaled leader in the world of agriculture.

100 Years of History

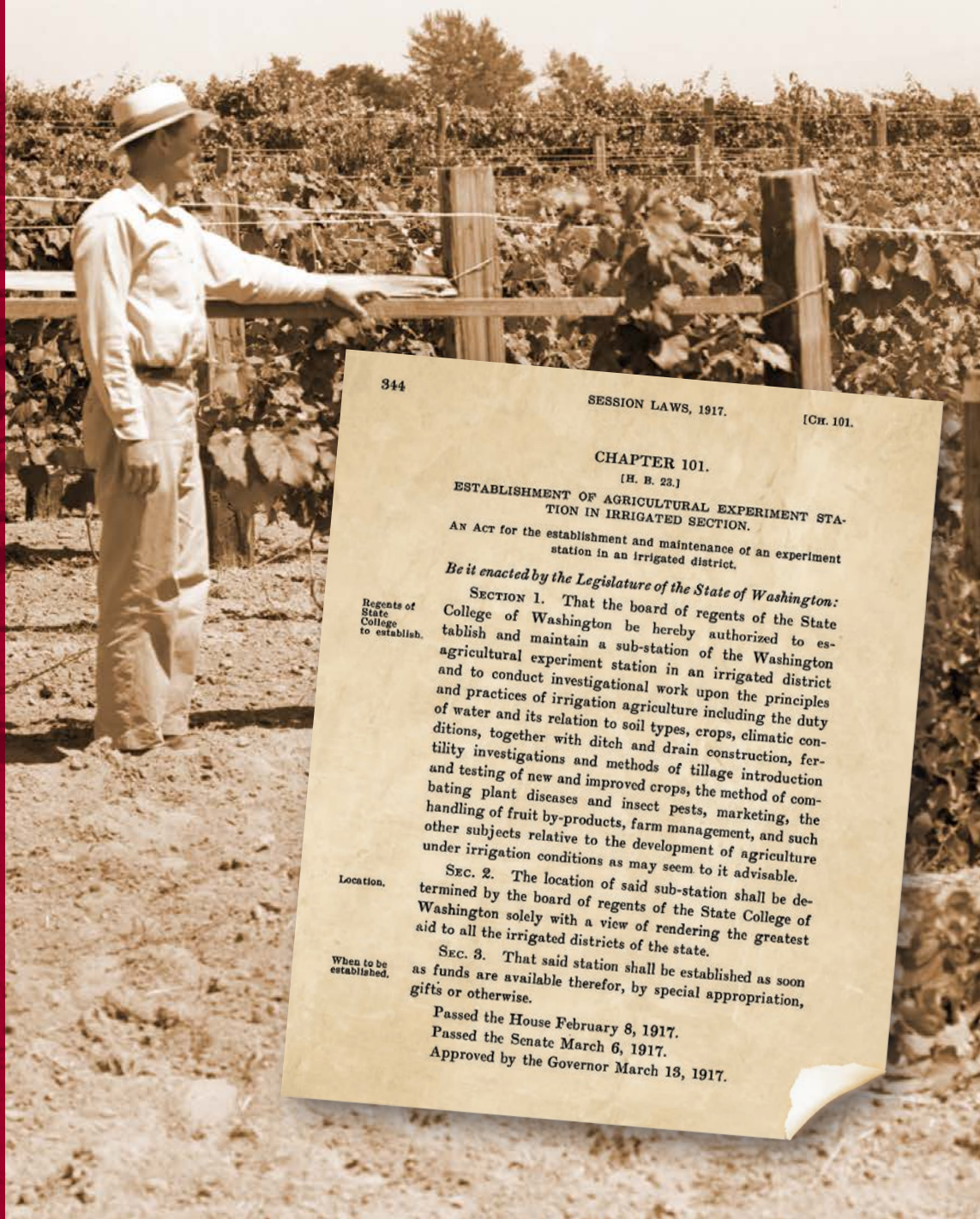
WSU Prosser Irrigated Agriculture Research and Extension Center

For 100 years, Washington State University's Irrigated Agriculture Research and Extension Center (IAREC) at Prosser has been a focal point for knowledge and discovery that has helped regional growers, industries, and communities thrive.

The history of IAREC is one of cooperation, transformation, and bold discovery in service to Washington agriculture and beyond.

Photo: Grafted concord grapes at IAREC, 1947.

Agriculture in south-central Washington started largely as animal husbandry, with grazing limited to a few head of cattle or sheep across large land areas, due to the low amount of precipitation in the region. In the early 1900s, irrigation projects began to enable farmers to grow crops, largely to support animal production.



344

SESSION LAWS, 1917.

[CH. 101.]

CHAPTER 101.

[H. B. 23.]

ESTABLISHMENT OF AGRICULTURAL EXPERIMENT STATION IN IRRIGATED SECTION.

AN ACT for the establishment and maintenance of an experiment station in an irrigated district.

Be it enacted by the Legislature of the State of Washington:

Regents of
State
College
to establish.

SECTION 1. That the board of regents of the State College of Washington be hereby authorized to establish and maintain a sub-station of the Washington agricultural experiment station in an irrigated district and to conduct investigational work upon the principles and practices of irrigation agriculture including the duty of water and its relation to soil types, crops, climatic conditions, together with ditch and drain construction, fertility investigations and methods of tillage introduction and testing of new and improved crops, the method of combating plant diseases and insect pests, marketing, the handling of fruit by-products, farm management, and such other subjects relative to the development of agriculture under irrigation conditions as may seem to it advisable.

Location.

SEC. 2. The location of said sub-station shall be determined by the board of regents of the State College of Washington solely with a view of rendering the greatest aid to all the irrigated districts of the state.

When to be
established.

SEC. 3. That said station shall be established as soon as funds are available therefor, by special appropriation, gifts or otherwise.

Passed the House February 8, 1917.

Passed the Senate March 6, 1917.

Approved by the Governor March 13, 1917.

The People

The Yakima Reclamation Project brought irrigation to the Yakima Valley in 1910, and led to the formation of the Washington Irrigation Institute.

Made up of members of local chambers of commerce and other stakeholders interested in irrigation, the Institute recognized the need for research to optimize water management and reduce soil erosion. To this end, leaders including Thomas B. Hill, Guy C. Finley, Ashel Curtis, E. F. Benson, and R. K. Tiffany approached the state representative from Yakima, Ina P. Williams. She introduced the bill passed in 1917 creating Washington State University's Irrigation Branch Experimental Station, which, with later name changes, became the Irrigated Agriculture Research and Extension Center of today.

To support this, a number of people with a great deal of foresight worked with the

Washington State Legislature to develop a branch of Washington State University to support research towards the betterment of irrigation water management.

Several locations, including Wenatchee, Yakima, Toppenish, Grandview, Kennewick, and Prosser, were considered for the development of the Irrigated Agriculture Research and Extension Center (IAREC). The Prosser site was chosen because it offered several different types of soils, as well as different landscape characteristics that the site selection committee felt best represented the challenges faced by irrigated farmers.

The original tract of land for what became IAREC at Prosser was a 197-acre parcel owned by the Union Pacific Railroad, one third of which was given to the state, the remainder sold at a reduced price.



L. Robertson, J. Satola, and G. McWhirter, visiting the Center's sheep pen, 1930.

The spirit of cooperation was large in developing the land that makes up our Center. The Prosser Chamber of Commerce supplied funds to supplement those from the state legislature. Local growers and citizens helped in developing the acreage.

The Land

IAREC manages more than 1,000 acres of land for irrigated agriculture research. The acreage is made up of multiple tracts that were purchased and developed as different irrigation districts became available in central Washington.

Unit Name	Acres	Year	Irrigation District
Headquarters	197	1919	Sunnyside Valley
Pear Acres	30	1959	Roza
Royal Slope	184	1961	Columbia Basin
Roza	240	1942	Roza
	80	1946	Roza
	80	1960	Roza
Othello	427	1961	Columbia Basin
	191	1963	Columbia Basin
Total Acreage	1429		

The first employee of the IAREC was Roy Bean, a scientist who arrived in 1919 to grow different forage crops and conduct research on feeding animals with these materials. Between 1921 and 1923, three new faculty members joined

the station: Harold P. Singleton in agronomy, Coulson Wright in irrigation engineering, and Thorland Hall in horticulture. These four positions were cornerstones of the IAREC.



The Station Leaders

Over the years, many different scientists have taken on the leadership of IAREC. The first, Roy Bean, served until he was tragically killed while working with a bull. Leading a tiny staff in the station's early days, Bean made friends fast in the local community, and engaged more than 100 volunteers in helping clear land for the station. His pioneering, connecting methods set the tone for those who followed in his footsteps, whether they were promoted from within IAREC or hired especially for the job.

Over the years, titles of the people in these roles have changed. Originally called "Superintendents," leaders are now called "Directors." These leaders have routinely served the station through either research or Extension activities in their appointments.

When there were gaps in the position, scientists stepped in to provide temporary leadership for shorter or longer periods of time, as shown below.



H.P. Singleton at his desk in 1964.

Name	Start Date	End Date	Notes
Roy P. Bean	5/1/19	6/11/29	Killed by the dairy bull
Harold P. Singleton	7/12/29	5/31/65	Superintendent
John S. ("Jack") Robins	6/1/65	3/31/69	Acting Superintendent
C. Emil Nelson	4/1/67	6/31/69	Acting Superintendent
J. Lewis Allison	7/1/69	12/31/75	Gone 4/1 - 5/15 1973
John S. ("Jack") Robins	4/1/73	5/15/73	Acting Superintendent
Edward L. Proebsting	1/1/76	6/30/76	Interim Superintendent
Lin R. Faulkner	7/1/76	11/30/90	Superintendent
Edward L. Proebsting	12/1/90	2/28/93	Interim Superintendent
Arthur C. Linton	3/1/93	10/31/04	Title change to Director
Robert G. Stevens	11/1/04	6/30/05	Interim Director
Robert G. Stevens	7/1/05	10/31/09	Director
Pete W. Jacoby	11/1/09	5/19/13	Director
Gary G. Grove	5/20/13	5/15/18	Director
Naidu A. Rayapati	5/15/18	present	Director

There was no growth in faculty or staff for a number of years, due in part to the Great Depression and following that, World War II. In 1939, the U.S. Department of Agriculture appointed its first scientist to IAREC, C. Emil Nelson. This was the start of a trend of collaborative research between agencies that continues to today.

In 1946, Earle Blodgett became a member of the IAREC faculty as an appointee of the Washington State Department of Agriculture, a position which is still present at the Center today.

The 1940s and 1950s were years of great growth at IAREC. While agronomy, irrigation (later known as agricultural) engineering, and horticulture maintained a presence, the fields of entomology, food science, plant genetics and breeding, plant pathology, soil science, and weed science were established and grew during this period.

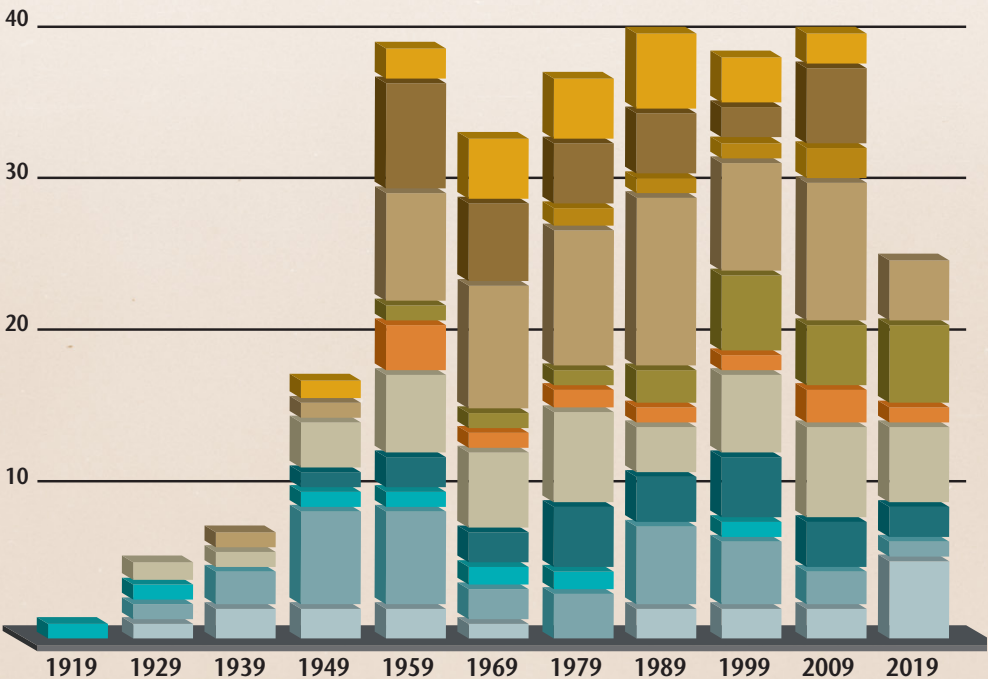
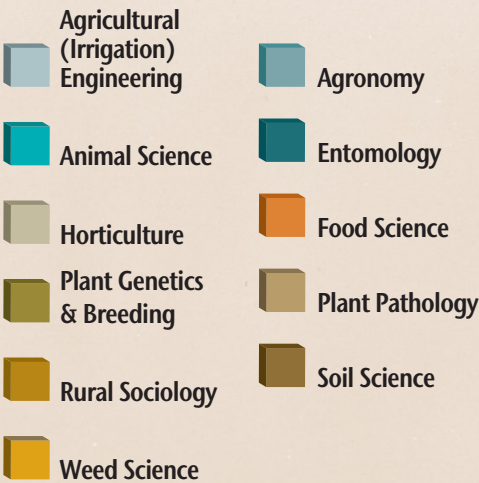
Animal sciences returned to the station, first in the form of a veterinarian, and then with additional faculty positions. It is important to recognize that these positions came from a combination of

state, university, and federal government support. Importantly, this developed a clearly collaborative, working relationship across agency boundaries.

With growth in the faculty came growth in the station's facilities, and staff. Buildings were added throughout the history of the station, with Hamilton Hall completed in the 1960s. Staff growth encompassed technical staff, farm workers, irrigators and many more. From 1960 to 2013, faculty numbers from WSU, USDA, and WSDA ranged from 34 to 41.

Department Timeline

IAREC growth and change, over time



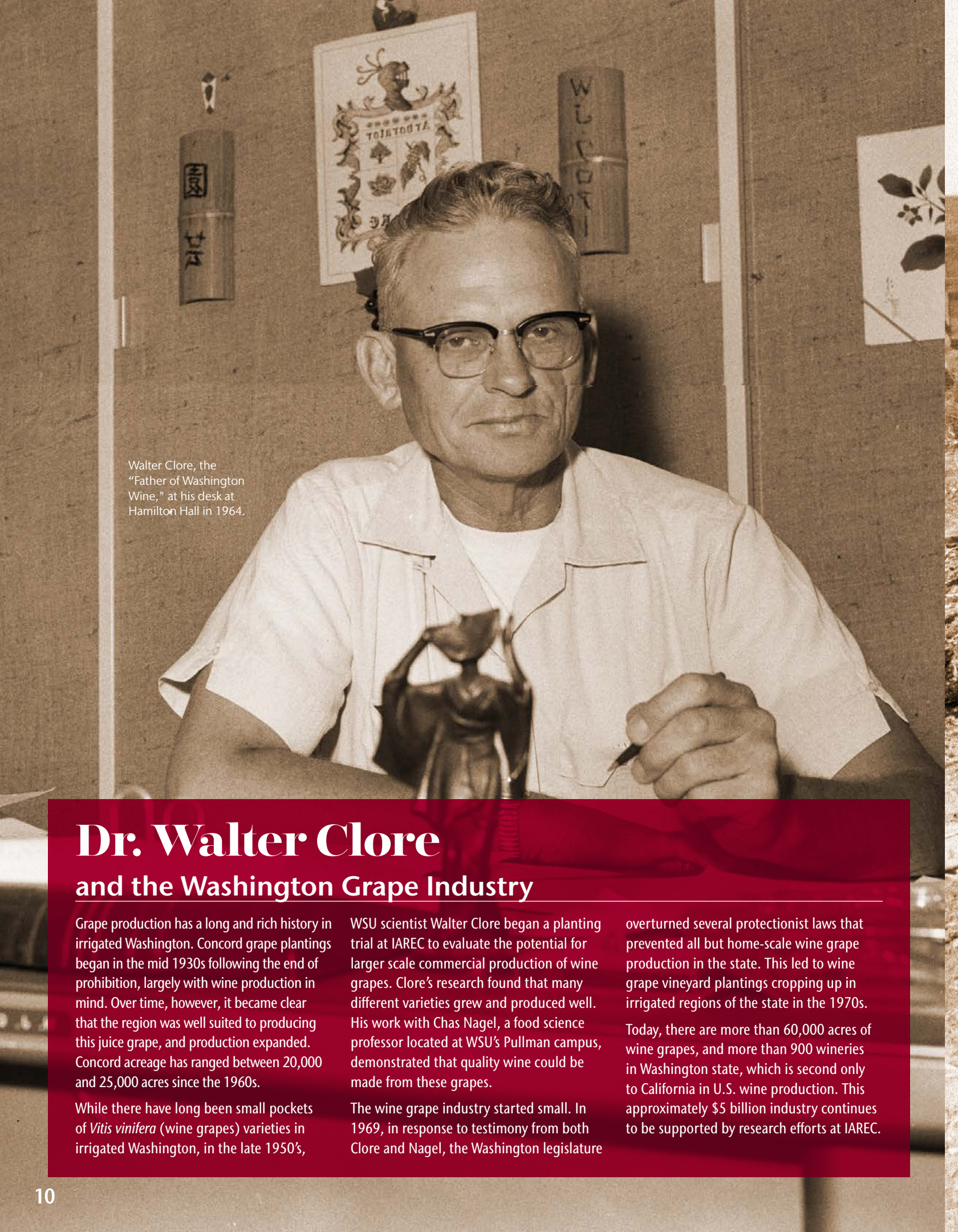
Virus Free Efforts and the National Clean Plant Network

With growing diversity of crops and cropping systems in irrigated agriculture, came the recognition of limitations to production due to diseases.

While the first WSU appointments in plant pathology came in 1936, the Washington State Department of Agriculture recognized the importance of virus diseases with the appointment of Earle C. Blodgett in 1946.

In 1950, WSU added a virology position at IAREC. With time, this program grew to the national level under the leadership of Paul Freidland and then Gaylord Mink. USDA established programs to fund testing and cleaning of plant viruses. Due to the predominance of the tree fruit industry, IAREC first became the home of the virus-free program for tree fruit, called Interregional

Research Project (IR-2), officially established in July 1955, and supported by regional research funds of the Hatch Act. The program was renamed the National Research Support Project 5 (NRSP-5) in 1992. With time, and collaboration with the federal government and industry partners, the program morphed in the late 2000s into an important node of today's National Clean Plant Network. As home to the Clean Plant Center Northwest (CPCNW), Prosser today serves as the lead program in virus-free tree fruit and hops, as well as a regionally important center for grapes. Currently, the CPCNW continues the work of many IAREC faculty who have served in this legacy program. Economic estimates found that for every dollar a grower spends on virus free plants, \$300 to \$500 is saved.



Walter Clore, the
"Father of Washington
Wine," at his desk at
Hamilton Hall in 1964.

Dr. Walter Clore and the Washington Grape Industry

Grape production has a long and rich history in irrigated Washington. Concord grape plantings began in the mid 1930s following the end of prohibition, largely with wine production in mind. Over time, however, it became clear that the region was well suited to producing this juice grape, and production expanded. Concord acreage has ranged between 20,000 and 25,000 acres since the 1960s.

While there have long been small pockets of *Vitis vinifera* (wine grapes) varieties in irrigated Washington, in the late 1950's,

WSU scientist Walter Clore began a planting trial at IAREC to evaluate the potential for larger scale commercial production of wine grapes. Clore's research found that many different varieties grew and produced well. His work with Chas Nagel, a food science professor located at WSU's Pullman campus, demonstrated that quality wine could be made from these grapes.

The wine grape industry started small. In 1969, in response to testimony from both Clore and Nagel, the Washington legislature

overturned several protectionist laws that prevented all but home-scale wine grape production in the state. This led to wine grape vineyard plantings cropping up in irrigated regions of the state in the 1970s.

Today, there are more than 60,000 acres of wine grapes, and more than 900 wineries in Washington state, which is second only to California in U.S. wine production. This approximately \$5 billion industry continues to be supported by research efforts at IAREC.



From PAWS to AWN

Weather Data for Agriculture and Beyond

Ask a farmer about weather, and you will start a non-trivial conversation that may go on much longer than you expected. Weather is critical in agriculture, and nowhere more than in irrigated agriculture.

Average rainfall in central Washington is low, ranging four inches annually in areas of rain shadow to as much as 16 inches in areas like Walla Walla—perhaps enough for wine grapes, but certainly not enough to grow many other crops without irrigation.

In addition, irrigation systems have become important tools for facing other weather needs in agricultural production systems. In the spring, for example, irrigation water can be used to protect high-value tree fruit crops from freezing during bloom.

In 1988, scientist Tom Ley took advantage of improved technology in weather monitoring with weather stations, developing a network of weather stations to address needs in the tree fruit industry, such as an alert system for frost protection in spring.

The network, initially known as the Public Access Weather System, or PAWS, began in the Yakima Valley and extended north through the Wenatchee and Okanogan Valleys and east to Walla Walla.

With time, the importance and utility of PAWS was recognized, and the network, expanded from 50 to 188 weather stations, and gained geographic coverage throughout the state with the exception of forested areas. In the early 2000s, a legislated enhancement to the program ensured its continuance, and within a few years, the program was renamed AgWeatherNet (AWN).

Today, AWN serves more than just the agricultural community; it is freely available to anyone. Capability has expanded as well, fueled by research programs at IAREC. In addition to predicting cold events, the system includes temperature modeling, prediction of disease outbreaks, and much more. In recent years, IAREC scientists developed a downloadable mobile application for irrigation scheduling for everything from crops to lawns.

Technology Meets Agriculture – CPAAS

Precision agriculture helps producers use the right practices at the right time and in the right place to maximize their returns and minimize adverse impacts.

In the mid 1990's, a team of WSU and USDA scientists at IAREC launched a project to develop precision agriculture systems. Initial efforts were in irrigated vegetable rotations and included multiple aspects of management (nutrients, water, diseases, and weeds). The project involved intensive field monitoring using now commonplace tools—GPS, GIS (Geographic Information Systems), and yield monitors.

The efforts that began at IAREC were recognized for their importance throughout WSU's College of Agricultural, Human, and Natural Resource Sciences, and what is today known as CPAAS (Center

for Precision and Automated Agricultural Systems) was established in 1999. Housed at IAREC, CPAAS brings together scientists, engineers, Extension personnel, and growers to advance management of large agricultural systems with attention to smaller scale needs that reflect variability in time and space. Teams develop new tools that aid in mechanization of agricultural systems.

Today, CPAAS faculty work on many projects, including the use of UAVs (Unmanned Aerial Vehicles, a.k.a. drones), as well as tools to predict yield, assess variability in the field, develop prescription management maps, and collate large data sets. CPAAS helps us better understand opportunities and further fine-tune agricultural systems.

Research Varieties

Center's scientists develop better crops for Northwest agriculture

Stone Fruit & Cherry Breeding


While apples and pears were the focus of the WSU Tree Fruit Research and Extension Center in Wenatchee, stone fruits like peaches, apricots, and cherries became important in the Yakima Valley and a focus of IAREC. In 1949, the USDA hired Harold Fogel to begin a stone fruit breeding program, which continued under the guidance of Tom Toyama from 1963 to 1985. While the program was not active in breeding new varieties from 1986 through the mid-2000s, WSU revived the program by hiring a plant breeder in 2008. Efforts are again underway to develop new varieties to meet industry needs.

Cherry varieties released from this breeding program have the distinction of being named after Washington's mountains. Perhaps the

Mount Rainier inspired the name of IAREC's most famous cherry variety. A number of WSU cherry varieties bred at the station have been named after iconic Washington mountains.



most famous of these cherries is the Rainier cherry, a pink blushed white cherry developed by Dr. Toyama. Another noteworthy variety is Tieton, a large red sweet cherry that has gained popularity in the past decade.



IAREC faculty
examine hops during
a field day in 1952.

Hops

The Washington hop industry began following the end of prohibition in 1933, and expanded quickly in irrigated Washington with the discovery that our soils and climate were well suited to production.

In 1949, WSU recognized the need to support the hop industry with research on water and nutrient management. A. Irving Dow was hired as an IAREC faculty member, tasked to partner with growers to develop tools and techniques for production improvement in the hop industry.

Over the years, IAREC scientists working in entomology, plant pathology, crop and soil sciences, and food science have supported the development and growth of hops. In recent years, with the development of the craft beer industry, efforts are underway to fund a program to develop varieties that meet industry needs.

In 2017, Washington produced 75 percent of the U.S. hop harvest, with a farm gate value of approximately \$450 million. The 2017 numbers represent a 20 percent increase over 2016. Hop prices and production continue to be strong and IAREC contributes to these successes through scientific advances.

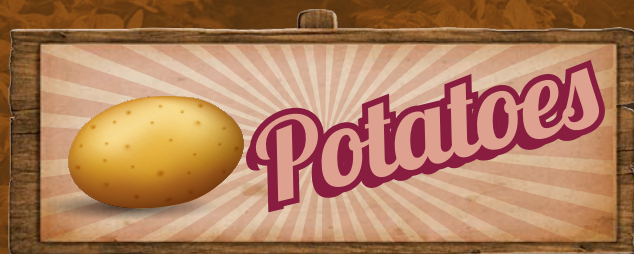


Crops by the Year

Breeders at IAREC have been prolific in their development of new fruit and vegetable varieties. From the iconic Rainier cherry, developed in 1960, to the Castle Russet potato and nearly 40 cultivars of beans bred over the last 70 years, the station has seen the genesis of improved crops for Northwest agriculture.

Potatoes

IAREC played a vital role in advancing several potato breeding lines to their final release as part of a three-state program with Idaho and Oregon. The unique plot at Pear Acres is the only place in the U.S. where potato lines can be screened against stubby root nematodes and nematode-borne diseases, such as corky ringspot.



Cherries

Researchers at IAREC discovered the first, and thus far the only, gene for cherry powdery mildew resistance, an important defense for the Pacific Northwest cherry industry. Crosses developed by then-researcher Greg Lang and master's student Jim Olmstead have held up for two decades, saving the industry millions of dollars, and remain a key part of WSU's current cherry breeding program.

Blush Sweet cherries		
Rainier _____	1960	
Tieton _____		1998
Selah & Benton _____		2000
Kiona _____		2009
Dark Red Sweet cherries		
Chinook _____	1960	
Olympus & Glacier _____	1990	
Index & Cashmere _____	1994	
Simcoe _____	1995	
Early Red Sweet cherries		
Chelan _____		1991
Cowiche _____		2010



Beans

The bean breeding program has used the the same plot of land, know as the 'Purgatory Dry Bean Trial,' since 1960 on the Roza Research Unit to select hardy beans that perform well under multiple stress conditions (low soil fertility, drought, root rot, and soil compaction).

Pintos

Columbia _____ 1956
NW-410 & NW-590 _____ 1980
Holberg and Pindak _____ 1982
Nodak _____ 1984
Othello _____ 1986
Burke _____ 1998
Quincy _____ 2005
Palomino _____ 2017
Scout _____ 2019

Small Reds

Big Bend and Coulee _____ 1966
Rufus _____ 1974
NW-590 & NW-63 _____ 1980
LeBaron _____ 2000
Rojo Chiquito _____ 2002
Claret _____ 2003
Atillos (USRM-20) _____ 2018

Dark Red Kidney

Royal Red _____ 1968
Fiero _____ 2005

Light Red Kidney

Kamiakin and Kardinal _____ 1986
Blush _____ 2005

Snap beans

Yakima _____ 1968
Apollo _____ 1970
Blue Mountain _____ 1983

White Kidneys

Lisa _____ 1972
Silver Cloud _____ 2006

Pink beans

Gloria, Roza, & Viva _____ 1974
Harold and Victor _____ 1983

Navy beans

NW-395 _____ 1979
Hyden _____ 1984

Black and white beans

Orca _____ 2002

Cranberry beans

Krimson _____ 2012



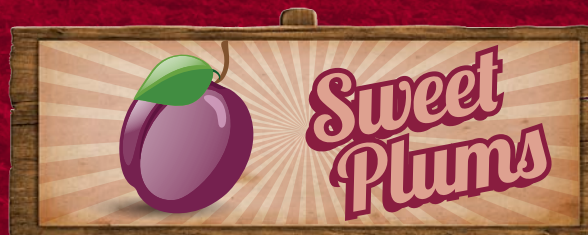
Apricots

Rival and Goldrich _____ 1971
Tomcot, Goldbar, & Goldstrike _____ 1989



Sweet Plums

Autumn _____ 1990



Hops

Olympic _____ 1984
Chinook _____ 1986
Centennial _____ 1991
Vanguard _____ 1993
Glacier _____ 2000
Cashmere, Tahoma, Yakima Gold _____ 2013



Grants by the Numbers

New Grants 47
Renewed Grants 43

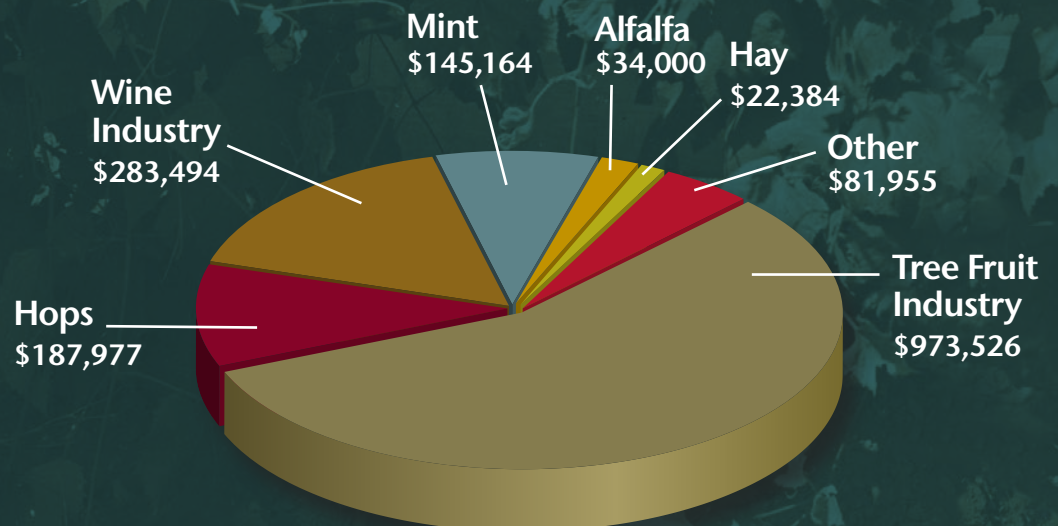
State Gov.
\$1,137,659

Gift Grant/Private
\$74,015

Industry
\$1,728,500

Federal
\$4,960,003

Industry Breakdown



TOTAL Prosser Grants

\$7,900,177

Grant-Funded Research 2019

Federal

FRAME: Fungicide Resistance Assessment, Mitigation and Extension Network for Wine, Table and Raisin Grapes



Lead investigator: Michelle Moyer

Funding agency: U.S. Department of Agriculture, National Institute of Food and Agriculture (USDA-NIFA), Specialty Crop Research Initiative

Award amount: \$2,340,790

Production of G1 foundation fruit trees, grapevines, and hops to protect U.S. agriculture



Lead investigator: Scott Harper

Funding agency: USDA-Animal and Plant Health Inspection Service

Award amount: \$1,070,058

CPS: Small: Localized, Geospatial Sensing of Canopy and Fruit Microclimate for Real-time Management of Sunburn in Apple



Lead investigator: Lav Khot

Funding agency: USDA-NIFA

Award amount: \$449,742

Distributed Harvesting Robots in Strawberry Fields



Lead investigator: Manoj Karkee

Funding agency: National Science Foundation (NSF)

Award amount: \$302,888

Washington State IPM Extension Implementation Program



Lead investigator: Doug Walsh

Funding agency: USDA-NIFA

Award amount: \$299,996

CREST: Culturally Responsive Education in STEM



Lead institution: Heritage University

Lead WSU investigator: Naidu Rayapati

Funding agency: NSF

Award amount: \$129,673

Engaging Grower Audiences: Using Research and Extension to Improve Agriculture Spray Practices



Lead investigator: Michelle Moyer

Funding agency: USDA-NIFA

Award amount: \$117,194

IR-4 Magnitude of Pesticide Residue Trials

Lead institution: University of California–Davis
Lead WSU investigator: Doug Walsh
Funding agency: USDA–NIFA
Award amount: \$85,500



Inland Northwest Pasture Calendar for Agricultural Professionals

Lead institution: Montana State University
Lead WSU investigator: Steve Fransen
Funding agency: USDA–NIFA (Western SARE)
Award amount: \$74,623



Heat stress in wine grapes: acclimation and potential mitigation

Lead investigator: Markus Keller
Funding agency: USDA–Agricultural Research Service (Northwest Center for Small Fruits Research)
Award amount: \$49,653



Phenotypic Response of the Soil Microbiome to Environmental Perturbations

Lead institution: Pacific Northwest National Laboratory–Battelle
Lead WSU investigator: Steve Fransen
Funding agency: Department of Energy
Award amount: \$34,986



Enhancing and Protecting Populations of Alfalfa Seed Pollinators

Lead investigator: Doug Walsh
Funding agency: USDA–Agricultural Research Service
Award amount: \$24,971



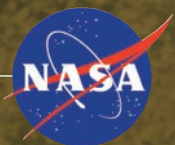
Understanding and managing Esca trunk disease in multiple grape-production systems

Lead investigator: Michelle Moyer
Funding agency: USDA–Agricultural Marketing Service
Award amount: \$23,949



Data to model mid-sized UAS sprayer drift in open field conditions

Lead institution: Continuum Dynamics, Inc
Lead investigator: Lav Khot
Funding agency: National Aeronautics and Space Administration
Award amount: \$14,575



Western Center Grant 2

Lead institution: Oregon State University
Lead WSU investigator: Faith Critzer
Funding agency: USDA–NIFA
Award amount: \$12,857



IR-4 TASC Magnitude of Pesticide Residue Trials

Lead institution: University of California–Davis
Lead WSU investigator: Doug Walsh
Funding agency: USDA–Foreign Agricultural Service
Award amount: \$12,000



Phenotypic Response of the Soil Microbiome to Environmental Perturbations

Lead institution: Pacific Northwest National Laboratory–Battelle
Lead WSU investigator: Steve Fransen
Funding agency: Department of Energy
Award amount: \$11,662



Using the native blue orchard bee for pears and sweet cherry orchard pollination

Lead investigator: Doug Walsh
Funding agency: USDA–Agricultural Research Service
Award amount: \$10,424



Vegetable crops and mango IPM in Asia

Lead institution: Virginia Polytechnic Institute and State University
Lead WSU investigator: Naidu Rayapati
Funding agency: United States Agency for International Development (USAID)
Award amount: \$9,135



State

Food Safety Modernization Act: Workshops and Extension for Washington State Tree Fruit Growers

Lead investigator: Faith Critzer
Funding agency: Washington State Department of Agriculture (WSDA)
Award amount: \$450,292



Optimizing vineyard irrigation management by grape variety

Lead investigator: Markus Keller
Funding agency: WSDA Specialty Crop Block Grant Program
Award amount: \$245,324



Reducing cold damage in tree fruit

Lead investigator: Matthew Whiting
Funding agency: WSDA Specialty Crop Block Grant Program
Award amount: \$188,165



Clean Plants for Healthy Nurseries and Grower Vineyards

Lead investigator: Naidu Rayapati
Funding agency: WSDA–Nursery License Surcharge
Award amount: \$159,945





Greenhouse Renovation for 'Clean' Grapevine Propagation and Research

Lead investigators: Markus Keller/Naidu Rayapati
Funding agency: WSDA—Nursery License Surcharge
Award amount: \$55,000



Winter-Proofing the Grape Screenhouse at the CPCNW

Lead investigator: Scott Harper
Funding agency: WSDA—Nursery License Surcharge
Award amount: \$30,000



Understanding the Pathology of Newly Discovered Apple Viruses

Lead investigator: Scott Harper
Funding agency: WSDA—Nursery License Surcharge
Award amount: \$30,000



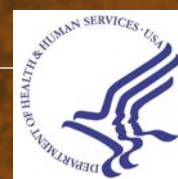
Improving the Tissue Culture Facility at the CPCNW

Lead investigator: Scott Harper
Funding agency: WSDA—Nursery License Surcharge
Award amount: \$20,000



A multi-level approach to heat-related illness prevention in agricultural workers

Lead institution: University of Washington
Lead WSU investigator: David Brown
Funding agency: Department of Health and Human Services—NIH
Award amount: \$16,187



Evaluation of Grapevine Cold Hardiness to Prevent Crown Gall Outbreaks

Lead investigator: Markus Keller
Funding agency: WSDA—Nursery License Surcharge
Award amount: \$13,273



Contributions to WSU's Land-Grant Mission

Undergraduate and Graduate Education

IAREC faculty is committed to preparing a new generation of global citizens with a breadth of knowledge and essential life skills to succeed in the rapidly changing milieu of the 21st Century.

Faculty members offer academic courses for undergraduate and graduate students in Pullman, the Tri-Cities campuses, and WSU Research and Extension Centers. They provide experiential educational opportunities to improve the quality of undergraduate education in STEM fields, as well as a variety of career-focused higher education pathways for undergraduate students from culturally and ethnically diverse communities in the Yakima Valley.

IAREC faculty mentor graduate students and post-doctoral research associates to pursue high quality research under collaborative and interdisciplinary team-based research and extension environments, and hone professional skills to become research and extension faculty capable of navigating complex agricultural challenges.

- Forty graduate students under the mentorship of IAREC faculty: 12 master's and 28 doctoral students, with nine students graduated in 2019. (See page 29)
- IAREC provided hands-on research opportunities for two undergraduate students supported by National Science Foundation's McNair Scholars Program and Research Experiences for Undergraduates Program funded through Heritage University.



Blanca Ruiz-Llacsahuanga prepares experiments on bacterial populations at IAREC's Biosafety Core Lab.

Interdisciplinary research and scholarship

As a global leader in irrigated agriculture research and development, IAREC contributes to sustainable production of perennial specialty fruit crops (tree fruits, grapes and hops) and food, forage and biofuel crops for advancing Washington State's economy and its global agricultural competitiveness. Synergies between IAREC, subject-matter centers (AWN, CPCNW, CPAAS), USDA-ARS programs and WSDA Plant Services program and trans-institutional collaborations nationally and globally provide transformational opportunities to conduct multidisciplinary and team-based research, and translate scientific innovations into practical applications benefiting agriculture and allied industries in Washington state and spillover benefits to global food security.

IAREC faculty is actively seeking funding from international, national, and state competitive grant programs and commodity commissions to support research and Extension programs. Funding received from USDA, NSF, USAID, WSDA and other federal and

state programs and from the Washington Tree Fruit Research Commission, Washington State Wine Commission, Concord Grape Research Council, Hop Research Council, Washington Hop Commission, Washington Blueberry Commission, Washington Raspberry Commission, and many other sources is helping faculty to conduct research, support graduate students, and publish research knowledge in peer-reviewed scientific journals benefiting the research and extension community worldwide.

- IAREC faculty received \$7,900,177 from federal competitive programs, commodity commissions and gifts, accounting for 11.5% of total CAHNRS generated grant awards (\$68,751,687).
- IAREC faculty published 58 research articles in peer-reviewed scientific journals showcasing fundamental and applied research outcomes. Two faculty members contributed to book chapters; one member edited a textbook.

Extension

Translating research-based knowledge for practical applications benefiting society is central to the mission of IAREC. Our faculty utilize a wide range of dissemination pathways for delivering research-based knowledge to growers, agriculture and agriculture-based industries and other stakeholders in a timely manner, including Extension publications, fact sheets, industry magazines, Facebook, Twitter, webinars, podcasts, and face-to-face meetings. These activities are conducted individually and as interdisciplinary teams, depending on the need and topic.

Extension Publications

1. Moyer M., L. Mills, G. Hoheisel and M. Keller. 2019: Assessing and managing cold damage in vineyards. WSU Extension Publication. EM042E, 12 pp.
2. Hoheisel, G.A., and M.M. Moyer (eds). Updated Annually. 2019 Pest Management Guide for Grapes in Washington. WSU Extension Publication EB0762. Pullman, WA, USA. 68 pp.
3. Sallato, B, T. DuPont, and D. Granatstein. 2019. Tree Fruit Soil Fertility and Plant Nutrition in Cropping Orchards in Central Washington. WSU Extension Publication EM119E.
4. Khot, L. R., G.-A. Hoheisel, and J. Zhou. 2019. FS321 Unmanned aerial systems in agriculture: part 3 (Mid-sized UAS).



Based at IAREC, associate professor Michelle Moyer works closely with other members of the Viticulture and Enology program to put research knowledge in the hands of the wine industry.

Highlights of Extension activities and impacts:

- Faith Critzer organized three new workshops in 2019 to extend the training opportunities for the fresh produce industry. Pre- and post-workshop evaluations indicated a roughly 30 percent average knowledge gain among participants attending these workshops.
- Michelle Moyer produced the Viticulture and Enology Extension News (VEEN), a twice-a-year publication featuring industry updates and research articles in lay-terms.
- Doug Walsh serves as state liaison from Washington State to the U.S. Department of Agriculture's Interregional Research Project #4 (USDA/IR-4) for pesticide registration on specialty crops. His laboratory serves as the Field Research Center for EPA Region 10 consisting of Eastern Oregon, Eastern Washington, and most of Idaho. All IR-4 research, both field- and laboratory-based trials, were conducted based on Good Laboratory Practice (GLP) requirements as mandated by EPA. Since 1998, more than 140 GLP residue trials were successfully completed.
- Bernardita Sallato, a key member of WSU Tree Fruit Extension, conducted Qualtrics Surveys for Tree Fruit Extension program assessment in English and Spanish languages. A total of 227 responses, including from more than 100 Hispanic members, indicated impactful learning outcomes from workshops and field days related to tree fruit extension.
- Scott Harper and Bernardita Sallato are members of WSU's Little Cherry Disease Task Force to coordinate statewide comprehensive response to disease outbreaks guided by research, extension and industry stakeholders.
- IAREC faculty members Markus Keller, Michelle Moyer, David James, Troy Peters, Joan Davenport and Naidu Rayapati teach course modules in the Viticulture and Enology Certificate Programs and organize grape camps at IAREC for hands-on learning of vineyard management.
- IAREC faculty research and Extension activities are regularly featured in local and national media, including TV, radio, newspapers and web sites.
- IAREC faculty members Gary Grove, David James, and Matt Whiting participated in Citizen Science, Master Gardener, and local 'Science Pub' programs.
- As part of human and institutional capacity building in developing countries to defend against viral diseases in subsistence agriculture, Naidu Rayapati organized a hands-on training course on virus diseases affecting vegetable crops benefiting nearly 20 early-career scientists from the Nepal Agricultural Research Council, funded by USAID's Feed the Future Innovation Lab for Integrated Pest Management.

Community Engagement

IAREC values community engagement for mutually beneficial partnerships at individual and community levels. The Center is pursuing several community engagement modules spanning many institutions in the Yakima Valley to enrich agricultural knowledge and improve Washingtonians' practical skills for problem solving.

The following are some examples of community engagement activities advancing IAREC's vision.

Hispanic Orchard Employee Education Programs: Developing Ag Leaders

For more than 25 years, an educational program led by WSU alumni has helped thousands of Washington farm workers cross knowledge gaps and the language barrier toward better careers in agriculture.

Led by WSU Horticulture alumni Leo Garcia and Francisco Sarmiento, Wenatchee Valley College's Hispanic Orchard Employee Education Programs, or HOEEP, was held at IAREC in 2019.

HOEEP addresses the need for education that serves the tree fruit industry by building employees' skills for management. Advised by growers, educators and industry experts, HOEEP has helped more than 1,300 people gain increased knowledge, self-confidence, and communication skills.

Students learn the basic principles and practices of fruit production, exploring plant physiology, orchard management and economics, human resources, harvest planning, food safety, and other important topics.



Working partnerships with the Washington Wine Growers Association and regional colleges supplement field trips and a visit to the annual meeting of the Washington Horticulture Association.

Supporting Hispanic and Native American students in STEM

IAREC is part of a \$2.5 million National Science Foundation-funded effort helping Hispanic and Native American students build careers in STEM. Led by educators in the Yakima Valley, the project, "Culturally Responsive Education in Science, Technology, Engineering, and Mathematics" seeks to increase the number of Hispanic and Native American students in the science, technology, engineering and math workforce. Headed by Heritage University, a Hispanic Serving Institution at Toppenish, Wash., the project began in fall 2019, and runs through summer 2024.

IAREC is part of a \$250,000 grant funded to Columbia Basin College by USDA's Hispanic Serving Institutions Education Grants Program. This three-year project "Feeding the Future: Expanding Student Interest and Diversity in FANH Science Careers" beginning in October 2019 will provide students with the opportunity to succeed in higher education and increase the number and diversity of students pursuing post-secondary education in STEM to help meet our region's educated workforce demands.



IAREC Centennial Celebration

The greater Prosser community was invited to take part in IAREC Centennial celebrations in fall 2019. Prosser families, community partners, and station alumni joined WSU President Kirk Schulz, André-Denis Wright, Dean of the College of Agricultural, Human, and Natural Resource Sciences, and U.S. Congressman Dan Newhouse, as well as current faculty, staff, and students, in celebrating the past, present and future of IAREC. Guests learned about ongoing discoveries, met the next generation of scientists and students dedicated to agriculture, and saw the unveiling of an historic display for the Benton County Museum. A family day helped the community celebrate and learn through educational booths on a variety of topics, including Washington state grapes, robots, potatoes, butterflies, plants and photosynthesis, weather, and desert plants, and enjoy fun activities.



Celebrating IAREC's 2019 centennial, from left are André-Denis Wright, Dean of the College of Agricultural, Human, and Natural Resource Sciences; WSU President Kirk Schulz; Congressman Dan Newhouse; and IAREC Director and Professor Naidu Rayapati.

History of IAREC at Prosser High School

In recognition of the Prosser community's strong support and investments in the establishment of IAREC, Prosser High School has included the history of the Center as part of a history class. To relate the narrative in the classroom, one teacher and more than 20 students visited IAREC in fall 2019 to experience the historical aspects of the station, view historical photos, and learn about research conducted by faculty.

Inspiring local high school students to pursue higher education

Six students and a teacher from Wapato High School visited for a field trip with easy to do hands-on activities and simplified scientific language and to learn about careers in agriculture.

A group of 25 middle school students from Housel Middle School in Prosser toured the center on October 23, interacting with faculty and learning about the significance of agriculture in our daily lives.

Prosser High School Career Fair

IAREC is playing an active role in student recruitment activities. The Center's staff joined forces with representatives from WSU Tri-Cities to showcase WSU and encourage high school students and others from the community to consider pursuing higher education at the university. As an introduction to different careers and research areas, IAREC representatives engaged with students about summer work opportunities at the Center, and provided information to visit the Center and explore opportunities with faculty.

IAREC hosts Prosser Economic Development Association Leadership Development class

As part of a Prosser Economic Development Association leadership course, a group of about 12 individuals from different professional backgrounds visited IAREC, interacted with faculty, and toured the campus and its facilities to gain better insights about the station's history and contributions to Washington's agricultural development.

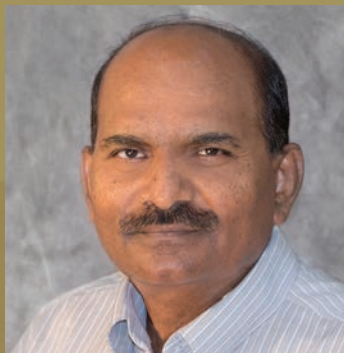


IAREC hosted students and staff from WSU Tri-Cities campus

IAREC collaborated with WSU Tri-Cities faculty to provide hands-on lab experiences for undergraduate students. Faculty and staff in the cherry breeding program and the Clean Plant Center Northwest conducted lab demonstrations relevant for the students' course in plant propagation. IAREC also hosted the WSU Tri-Cities campus Student Affairs staff retreat, providing a tour of the facility and opportunities for building relationships between IAREC and Tri-Cities in experiential education for WSU students.

IAREC Faculty

Washington State University



Naidu Rayapati

Professor, Plant Pathology; IAREC Director | At WSU since 2004 | PhD from Sir Venkateswara University, Tirupati, India

Focus on virus diseases of horticultural, vegetable, and fruit crops, including characterization, diagnosis, and development of integrated management strategies.



Scott Harper

Assistant Professor, Plant Pathology; Director, Clean Plant Center NW | At WSU since 2017 | PhD from University of Auckland, New Zealand

Focus on transmission & expression of viruses and other systemic pathogens in fruit trees, grapevines, hops, & other crops.



David Brown

Associate Professor, Crop & Soil Sciences; AgWeatherNet Director | At WSU since 2007 | PhD from University of Wisconsin-Madison

Focus on precision agriculture, environmental sensors, and spatio-temporal data science.



Markus Keller

Professor, Horticulture; Chateau Ste. Michelle Distinguished Professor of Viticulture | At WSU since 2001 | PhD from Swiss Federal Institute of Technology, Zürich

Focus on environmental factors and management practices influencing wine and juice grape production.



Matthew Whiting

Professor, Horticulture; Tree Fruit Extension Specialist | At WSU since 2002 | PhD from WSU

Focus on horticultural and physiological issues facing tree fruit growers, including mechanization and automation in orchard systems.



Manoj Karkee

Associate Professor, Biological Systems Engineering; CPAAS faculty | At WSU since 2010 | PhD from Iowa State University

Focus on crop sensing, machine vision and control for agricultural automation and robotics including tree fruit harvesting & pruning, & crop-load estimation.



Lav Khot

Associate Professor, Biological Systems Engineering; CPAAS faculty | At WSU since 2013 | PhD from North Dakota State University

Focus on sensing, decision support and automation technologies for site-specific, precision management of production agriculture.



Steve Fransen

Associate Professor, Crop & Soil Sciences; Agronomist | At WSU since 1983 | PhD from South Dakota State University

Focus on varieties, harvest management, and cultural management in irrigated perennial warm-season grasses grown for biofuels and forage.



Joan Davenport

Professor Emeritus, Crop & Soil Sciences | At WSU since 1997 | PhD from University of Guelph, Ontario, Canada

Focus on understanding soil variability and management of water and nutrients, primarily in perennial fruit crops.



Gary Grove

Professor, Plant Pathology | At WSU since 1986 | PhD from Ohio State University

Focus on epidemiology and management of aerial diseases of crops including grapes, hops, and stone fruit.



Qin Zhang

Professor, Biological Systems Engineering; CPAAS Director | At WSU since 2009 | PhD from University of Illinois, Urbana Champaign

Focus on agricultural automation and smart agriculture.



Doug Walsh

Professor, Entomology; Extension IPM Coordinator for Washington State | At WSU since 1998 | PhD from University of California, Davis

Focus on integrated pest management in hops, grapes, alfalfa, mint, and seed crops.



David James

Associate Professor, Entomology | At WSU since 1999 | PhD from Macquarie University, Sydney, Australia

Focus on sustainability of IPM and conservation biological control in viticulture and pollinator conservation.



Michelle Moyer

Associate Professor, Horticulture; Statewide Viticulture Extension Specialist | At WSU since 2011 | PhD from Cornell University

Focus on vineyard production research and developing educational programs for industry.



Per McCord

Associate Professor, Horticulture | At WSU since 2018 | Stone Fruit Breeding and Genetics | PhD from North Carolina State University

Focus on developing superior sweet cherry varieties for the Pacific Northwest, and research to enhance stone fruit breeding.



Troy Peters

Professor, Biological Systems Engineering; Extension Irrigation Specialist | At WSU since 2006 | PhD from Utah State University

Focus on increasing irrigation efficiency through improved scheduling and adoption of precision technologies.



Melbar Salazar-Gutierrez

Research Assistant Professor, Biological Systems Engineering | At WSU since 2010 | PhD from Universidad Nacional de Colombia

Focus on crop modeling, impact of climate variability, cold hardiness of tree fruit and grapes, and use of statistics in agricultural systems.



Faith Critzer

Associate Professor, Food Science; Statewide Produce Safety Extension Specialist | At WSU since 2018 | PhD from University of Tennessee

Focus on providing science-based food safety recommendations and training to farms and packinghouses.



Bernardita Sallato-Carmona

Regional Tree Fruit Extension Specialist | At WSU since 2016 | MS from Pontificia Universidad Catolica de Chile, Santiago

Focus on soils-water-nutrient relations in tree fruit, stress mgmt & general horticultural practices through applied research & outreach for the tree fruit industry.

Scientists

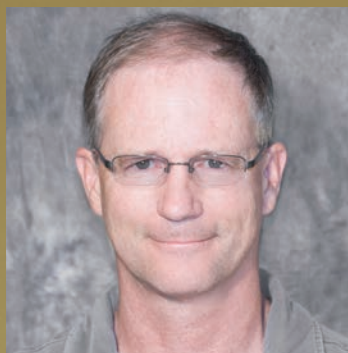
U.S. Department of Agriculture & Washington State Department of Agriculture



Roy Navarre

Research Geneticist; Adjunct faculty, Plant Pathology and Horticulture & Landscape Architecture | With USDA-ARS since 2001 PhD from Oregon State University

Focus on food security, nutrition, and disease resistance of potatoes.



Phil Miklas

Research Geneticist; Adjunct faculty | With USDA-ARS since 1992 | PhD from North Dakota State University (Plant Breeding & Genetics)

Focus on developing disease and stress tolerant dry edible beans



Lyndon Porter

Research Plant Pathologist; Adjunct faculty | With USDA-ARS since 2005 | PhD from Washington State University (Plant Pathology)

Focus on integrated management of foliar and root diseases in peas, chickpeas, lentils, and beans.



Brian Irish

Geneticist/Curator; Adjunct faculty; Plant Germplasm Introduction & Testing Unit | At Prosser since 2016 | PhD from University of Arkansas (Plant Pathology)

Focus on forage legume (alfalfa, clover, trefoil & wild relatives) and U.S. native plant germplasm.



Kylie Swisher Grimm

Research Plant Pathologist; Adjunct faculty | At Prosser since 2016 | PhD from University of Arizona (Molecular & Cellular Biology)

Focus on new and emerging diseases and pests of potato in the laboratory, field, and greenhouse.



Long-xi Yu

Research Geneticist; Adjunct faculty, Plant Pathology and Crop & Soil Sciences | PhD from University of Orleans, France (Plant Molecular Biology)

Focus on enhancing resistance to biotic and abiotic stresses in forage crops.



Max Feldman

Research Geneticist; Adjunct faculty | PhD from Washington State University (Molecular Plant Sciences)

Focus on germplasm development in potato using quantitative genetics and high-throughput phenotyping.



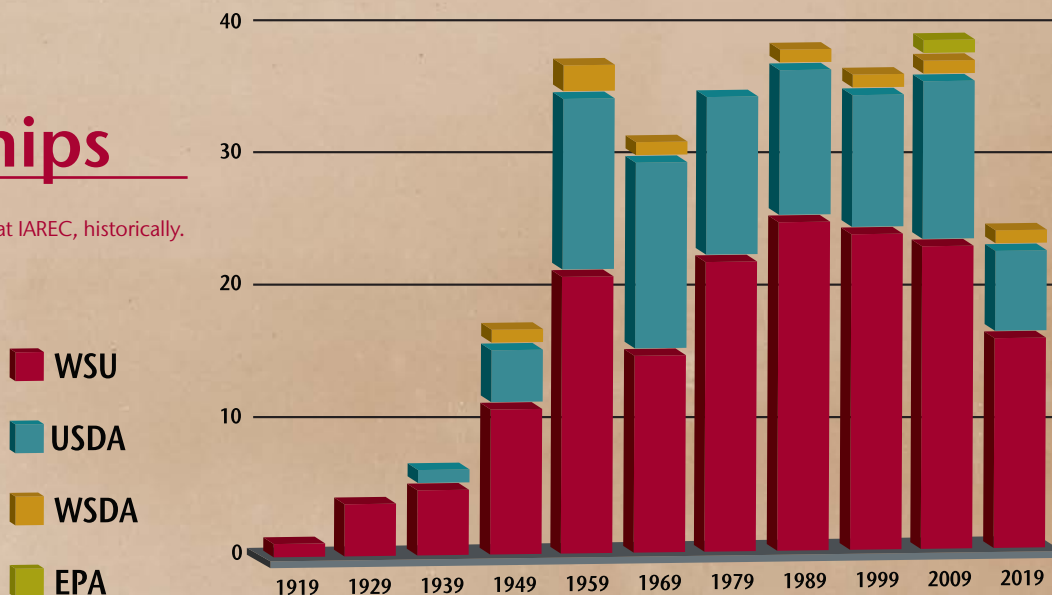
Lauri Guerra

Coordinator, WSDA Tree Fruit Certification Program; Supervisor, Nematode Diagnostics Laboratory | At WSDA since 1999 | PhD from University of California, Davis

Focus on providing plants with minimal risks of virus or nematode presence.

Growing Partnerships

Faculty and agency partnership at IAREC, historically.



WSU FACULTY AWARDS



Manoj Karkee
Associate Professor

- ASABE Superior Paper Award, American Society of Agricultural and Biological Engineers
- Featured as Western Innovator, Capital Press, 2019
- 2019 Pioneer in AI and Internet of Things, Connected World Magazine



Michelle Moyer
Associate Professor

- ASEV Extension Distinction Award, American Society for Enology and Viticulture. National. Nominated. (2019)
- Faculty Excellence in Extension Award, Washington State University - CAHNRS College, Nominated. (2019)



Matthew Whiting
Professor

- ASABE Superior Paper Award, American Society of Agricultural and Biological Engineers
- Awarded one-month visiting professor scholarship through Shanghai Jiaotong University



Faith Critzer
Associate Professor

- 2019, USDA Excellence in Multistate Research Award, S1077 Enhancing Microbial Food Safety by Risk Analysis



Qin Zhang
Professor

- ASABE Superior Paper Award, American Society of Agricultural and Biological Engineers



Nomatter Chingandu
Post-Doctoral Research Associate

- Third Prize for research poster under Professional Category at the 2019 Washington Association of Wine Grape Growers Annual Meeting & Trade Show, Kennewick, WA

Student Experience

WSU IAREC hosts graduate students from all over the world. They study entomology, plant pathology, horticulture, crop and soil sciences, and biological systems engineering, working directly with irrigated crops and growers, while engaging with world-class faculty mentors. The Prosser Graduate Student Association (PGSA) was formed in 2015. PGSA supports academic and social engagement and interaction, and hosts events to build camaraderie. These include monthly international movie nights, late night bowling, trips to other Research & Extension Centers, welcome lunches, camping trips, and more.

STUDENT AWARDS



Margaret McCoy

- USDA-NIFA Predoctoral Fellowship
- Foundation Fund Scholarship from Washington Wine Industry Foundation (WWIF)
- WSU Ste. Michelle Wine Estates and “Raise A Glass” Program Scholarship
- WSU Graduate and Professional Student Association Senator of the Year Award
- Wine Spectator Scholarship from the WSU Viticulture and Enology Program to attend the Plant Health 2019 American Phytopathological Society (APS) Annual Meeting in Cleveland, Ohio
- First place graduate student poster at the Washington Association of Wine Grape Growers Annual Meeting



Arunabha Mitra

- Foundation Fund Scholarship (WWIF)
- Horse Heaven Hills Wine Growers Scholarship from the Horse Heaven Hills Wine Growers Association (via WWIF)
- Kenneth F. Baker and R. James Cook Student Travel Award from the APS Foundation to attend the Plant Health 2019 APS annual meeting
- Wine Spectator Scholarship from the WSU Viticulture and Enology Program to attend the Plant Health 2019 APS annual meeting
- Phytobiomes Student Poster Award at the Plant Health 2019 APS annual meeting, on behalf of the Noble Research Institute and the American Phytopathological Society
- First Prize for oral presentation and Third Prize for a research poster under Graduate Student Category at the Washington Association of Wine Grape Growers Annual Meeting



Rakesh Ranjan

- Outstanding Graduate Student Award (Walter and Vinnie Hinz Scholarship) from Biological Systems Engineering



Kory Anderson

- Maughan H. Delight Scholarship for the 2019-2020 academic year



Kaitlin Miller Hadaway

- Foundation Fund Scholarship (WWIF)
- The Everett and Helen Kreizinger award
- Washington State Grape Society scholarship award
- Best poster at the IEEE Women in Engineering Leadership Summit



Yaqoob Majeed

- Biological Systems Engineering Outstanding Graduate Student Award, Walter and Vinnie Hinz Scholarship
- ASABE Superior Paper Award, American Society of Agricultural and Biological Engineers



Xin Zhang

- 2019 ASABE AIM, Boston, MA, Dept. of Biological Systems Engineering, WSU
- 3rd Prize at BSYSE 598 Fall Student Seminar, Department of Biological Systems Engineering, WSU
- ASABE Superior Award, American Society of Agricultural & Biological Engineers



Blanca Ruiz-Llacsahuanga

- The College of Agricultural, Human, and Natural Resource Sciences and School of Food Science Scholarship Award, Don & Carolyn Lee



Alexis Hamilton

- Margaret Nicholson Schafer Graduate Fellowship in Food Science (School of Food Science, Schafer Family)



Nataliya Shcherbatyuk

- King Douglas W. Endowment Scholarship
- Viticulture and Enology Scholarship (American Society of Enology and Viticulture)
- Washington Wine Industry Foundation

Long He, not pictured
ASABE Superior Award, American Society of Agricultural & Biological Engineers



PGSA Officers 2019

Advisor: Michelle Moyer
President: Behnaz Molaei
Vice President: Sushma Thapa
Treasurer: Kaitlin Hadaway (Spring), Mark Jacob Schrader (Fall)
Secretary: Amit Bhasin (Spring), John Paulo Sacdalan (Fall)
Social Coordinator: Noorani Barkat (Spring), Xin Zhang (Fall)
Academic Coordinator: Rakesh Ranjan



CAHNRS Dean André-Denis Wright and Director Naidu Rayapati with IAREC graduate students.

2019 Graduates

SPRING:

Katherine E. East, Ph.D., advisor: Dr. Michelle Moyer
Rajeev R. Sinha, Ph.D., advisor: Dr. Lav Khot
Haitham Y. Bahlol, Ph.D., advisor: Dr. Lav Khot
Joshua Milnes, M.Sc., advisor: Dr. Elizabeth Beers & Doug Walsh

FALL:

Abid Sarwar, Ph.D., advisor: Dr. Troy Peters
AbdelMoneim Mohamed, Ph.D., advisor: Dr. Troy Peters
Kaitlin Hadaway, M.Sc., advisor: Dr. Naidu Rayapati
Katie Taylor, M.Sc., advisor: Dr. Matthew Whiting
Amit Bhasin, M.Sc., advisor: Dr. Joan Davenport & Dr. Lisa DeVetter

The Centers

AWN

AgWeatherNet (AWN) provides access to current and historical weather data from WSU's automated weather station network, along with a range of models and decision aids.

The network's weather data, advisories, and decision support systems help improve production and product quality, optimize resource use, and reduce environmental impact. AgWeatherNet has more than 170 automated weather stations, located primarily in the irrigated regions of eastern Washington. The first station was installed in 1988. Standard weather variables include air temperature, relative humidity, dew point

temperature, soil temperature at eight inches, rainfall, wind speed, wind direction, solar radiation, and leaf wetness. Some stations also measure atmospheric pressure. Variables are recorded every five seconds and summarized every 15 minutes. The monitoring stations are Campbell Scientific CR-1000 data loggers combined with a range of sensors, powered by a solar battery. Communications are handled through cell phone data telemetry and the Internet. Following processing, the weather data are disseminated via the website weather.wsu.edu. Data and tools on the site are updated continuously.

Contact Dave Brown, AWN Director, dave.brown@wsu.edu

CPAAS

The Center for Precision & Automated Agricultural Systems (CPAAS) was established in 1999 to lead automated and precision agriculture research, education, and outreach at Washington State University.

Our highly skilled, transdisciplinary team of researchers and support staff develop solutions for more effective growing, harvesting and processing of crops to improve the quantity, quality and safety of food production in the state of Washington, Pacific Northwest, and worldwide. CPAAS also supports postdoctoral research associates, graduate students, and

visiting scholars from around the world. Technologies developed at CPAAS, including an automated labor management system, a hand-held mechanical blossom thinner, a high-trellis hop-twinning robot, and smart targeted sprayer, have been commercialized by local manufacturers or adopted by individual growers. CPAAS' mission is to develop world-preeminent, Washington-relevant research, collaboration, and educational programs in agricultural automation and precision farming, providing a venue for high impact outcomes benefiting our stakeholders.

Contact Director Qin Zhang, qinzhang@wsu.edu

CPCNW

Founded in 1961, the National Program for Controlling Virus Diseases of Temperate Fruit Tree Crops has evolved into the Clean Plant Center Northwest (CPCNW) a decade ago and offers clean plant services for the economically important Northwest fruit tree, grapevine and hops industries.

Part of the USDA-supported National Clean Plant Network, and backed by Washington commodity groups, CPCNW works closely with industries to propagate, maintain and distribute virus-tested

fruit trees, grapevines, and hop plants from facilities at IAREC, ensuring the productivity and competitiveness of U.S. agriculture. The Center also conducts targeted research to find more effective ways to diagnose and eliminate viruses, and safeguards more than 1,800 fruit tree, grapevine and hop selections from viruses in insect-proof greenhouses. Clean 'mother' plants are a cornerstone of U.S. industries and state certification programs. Our philosophy of "start clean, stay clean" emphasizes the importance of planting with clean materials to ensure robust, high-quality production.

Contact: Scott Harper, Director, scott.harper@wsu.edu

Strategic partnerships and mutually beneficial collaborations are central to the mission of IAREC. With an established record of successes during the past 100 years, the Center is exploring innovative opportunities to build synergies with research and educational institutions and seek public-private partnerships for advancing research, Extension and education that transcend borders benefiting the civil society globally.



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Sponsors

WSU Prosser IAREC, in partnership with the Washington State Wine Commission, would like to thank our Centennial Sponsors



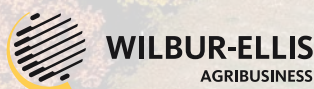
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