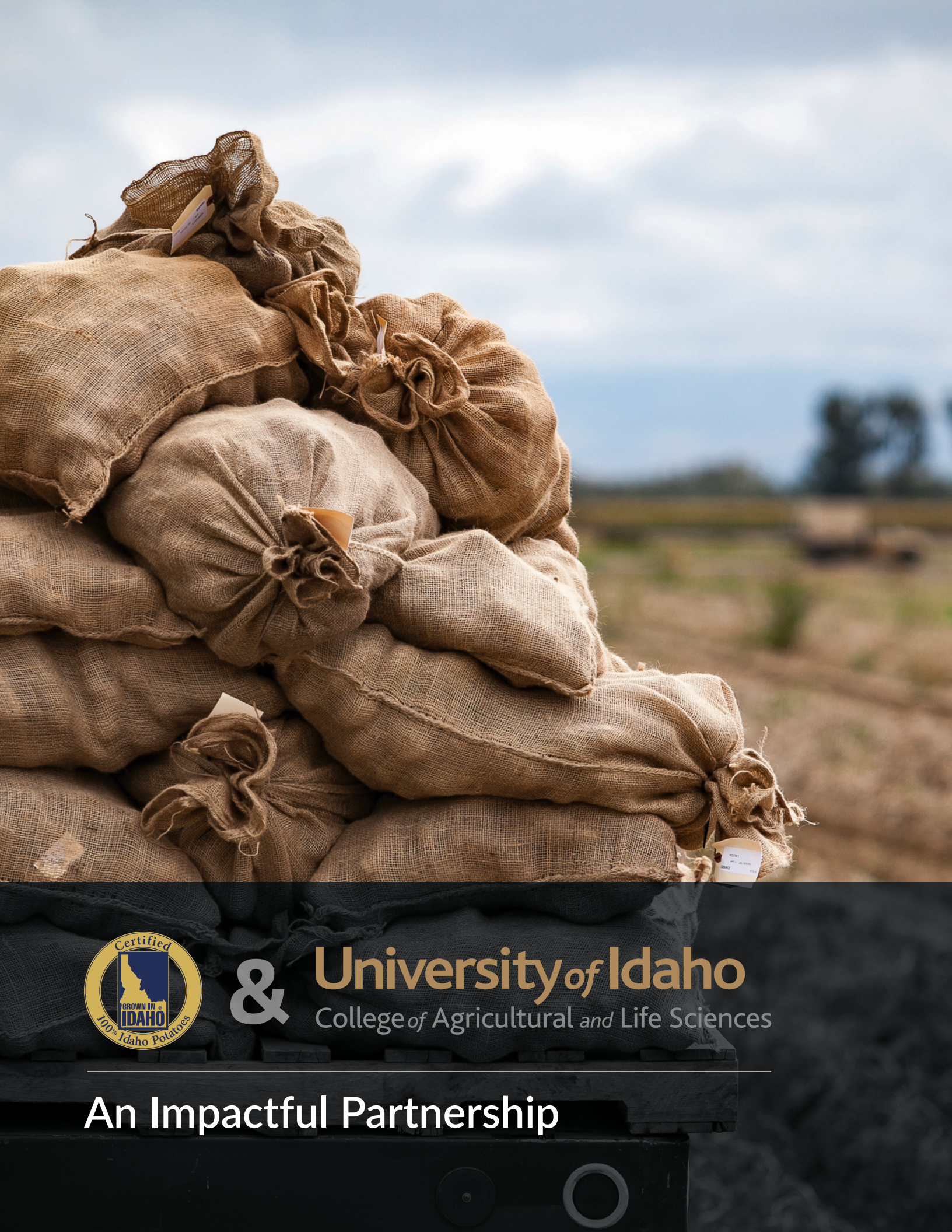
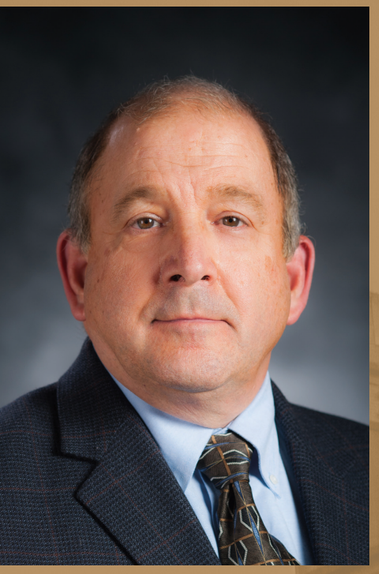

Certified
GROWN IN IDAHO
100% Idaho Potatoes
&
University of Idaho
College of Agricultural and Life Sciences
An Impactful Partnership

POTATOES & UI



From potato production to processing, harvest to storage practices, and nematology to nutrition, important work is being conducted at the University of Idaho that impacts every stage in the life of a potato. As the leading resource in the Northwest for potato research and education, the University of Idaho knows potatoes.

The University of Idaho is not only the oldest public university in the state, it is also the primary research university and our state's land-grant institution. With a rich history beginning in 1889, UI is dedicated to supporting Idaho's economy and society through teaching, research and by engaging statewide to improve the lives of Idahoans.

As a significant portion of Idaho's economy, the potato industry has influenced the work we do in the College of Agricultural and Life Sciences (CALS) and helped form the landscape in which we excel; potato teaching, research and outreach.

CALS lies at the heart of our land-grant mission, providing accessible and practical education to the future of our agricultural industry and therefore, preserving Idaho's legacy. A key component to the land-grand system is the Idaho Agricultural Experiment Station. Throughout the state of Idaho, CALS operates nine experiment stations; seven of which include potato research and faculty. Amongst our faculty both on and off campus, we have 25 individuals conducting research and Extension activities as it relates to potatoes, relying on our Extension professionals to disseminate this information to our stakeholders. Annually, we recruit, educate and graduate students who enter the potato industry, providing the next generation of agriculturalists and scientists to lead us into the next century. Needless to say, potatoes fuel our success.

The following pages highlight our integral role in the potato industry throughout our state, across the nation and around the globe. As we reflect on our past and current involvement, we are inspired by the potential for growth and advancement in our partnership with the Idaho Potato Commission.

Michael P. Parrella
Dean

ENSURING DISEASE-FREE SEED POTATOES

It is a small laboratory in the University of Idaho College of Agricultural and Life Sciences with a big responsibility to Idaho's and much of the United States' potato industry: **maintaining the chain of disease-free seed potatoes**.

The college's **Nuclear Seed Potato Program** has influenced as much as 80 percent of the planting stock used by Idaho's important seed potato industry. Up to 60 percent of the seed potato stock grown across the U.S. came through the lab at one time or another by another estimate.

The Nuclear Seed Potato Program maintains **300 lines of potatoes** in tissue culture from multiple sources to create a genetic bank vault of virus- and bacteria-free germplasm.

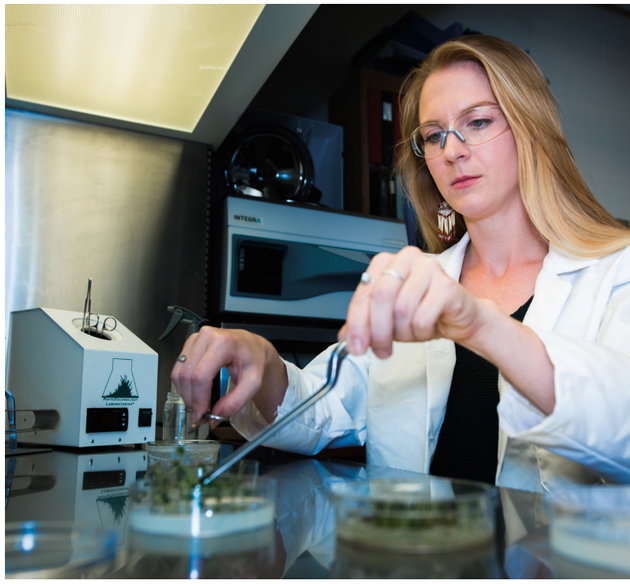
The germplasm bank includes public, Potato Variety Management Institute, private, research and experimental lines.

Each year, the lab responds to production orders from potato seed producers to grow out the germplasm in demand and ship what becomes the **first stage in the potato industry's supply line**.

Nuclear Seed Potato Program Director **Jenny Durrin** and greenhouse manager **Matt Roth** oversee the production of plantlets on petri plates and the culture of mini tubers. The numbers are impressive: **250,000 plantlets on nearly 17,000 petri plates are shipped out each year**. The program grows out tens of thousands of plantlets to produce 4,000 pounds of minitubers that save seed potato producers a growing season.

The program's value is its quality control and stringent sanitary procedures to maintain **pathogen-free germplasm lines**. Testing and inspection by the Idaho State Department of Agriculture and Idaho Crop Improvement Association ensure **disease-free status and varietal integrity**.

The plantlets and minitubers become the **source of the first generations of commercial potato seed production**. After increases of several generations of potato seed under rigorous quality controls, Idaho's potato growers plant the seed for sale to fresh pack and processing markets. In Idaho, certified seed can be produced through six generations removed from nuclear stock.



In their quest for keeping up with emerging technology, Durrin and Roth are experimenting with **new techniques for producing minitubers by using hydroponics and aeroponics**.

The pioneering production systems grow minitubers without the use of soilless media. The plants' roots are bathed or sprayed with a nutrient solution. The tubers are harvested frequently at a smaller, consistent size. The smaller minitubers allow growers to plant them without cutting and risking exposure to disease.

Still experimental, the process presents advantages and unknowns that must be resolved before formal adoption.

The UI Nuclear Seed Potato Program maintains and propagates approximately 300 potato varieties.

RESEARCH YIELDS GLOBAL OUTCOMES

University of Idaho researchers are working to **reduce the effect of potato diseases in Idaho and beyond**—helping producers achieve control over yields and avoid seed rejections.

Louise-Marie Dandurand leads an international effort to limit the impact of **potato cyst nematodes** and their oversize threat to potato production in Idaho and the United States.

Virologist Alex Karasev is one of the best known experts who works on a pernicious disease that afflicts potatoes across the U.S. and puts shoppers off from buying one of the most popular foods worldwide: **Potato Virus Y**.

The researchers work in the UI Agricultural Biotechnology Laboratory on the Moscow campus.

Dandurand leads the $3.2 million GLOBAL project. The research is done far from Idaho's famous potato fields to lessen the threat of contamination and as a nod to the advanced biosafety features of the laboratory and greenhouse complex a block away.

The 2006 discovery of the pale cyst nematode in Idaho led to the **quarantine of more than 2,000 acres of Idaho fields from potato production**. A decade of research and regulatory measures to prevent its spread have produced optimism that a crisis was averted.

The research now focuses on **how the pale cyst nematode infects potato plant roots**, which damages yields, and **breeding nematode-resistant russet potato varieties** favored by Western producers.

Potato Virus Y (PVY)

Karasev targets Potato Virus Y, which **damages potatoes and their appeal as fresh-market produce**. The biggest effect is on seed potato producers, as it is difficult to maintain their certification because the virus is difficult to control. His research team is now working with Simplot to test the company's potato lines for PVY resistance.

Producing quality potatoes, an industry essential, relies on a rigorous seed potato certification system.

"During the past decade, PVY was the main reason for seed lot rejections in all states," Karasev said. "It's not just us."

The problem is **especially serious for potato cultivars that do not readily show symptoms**, like Norkotah, one of the most popular varieties among Idaho growers.

Impact on the Industry

UI agricultural economist Chris McIntosh led a study to estimate the **impacts of PVY to Idaho's potato industry**. A preliminary analysis estimates that the total industry output impact approaches the **loss of $34 million annually** in direct and indirect impacts to potato production, frozen and dehydrated processing and fresh pack operations.

Across the potato industry, the study estimated that **PVY is responsible for the loss of 184 jobs** outright and **reduces wages by nearly $6.5 million**. Value added impact of PVY amounts to $14.6 million, representing the sum of employee compensation, proprietor and property-type income and indirect business taxes, the study estimated.

THORNTON'S RESEARCH, PARMA FACILITIES IMPACT QUALITY AND YIELDS

University of Idaho agronomist Mike Thornton conducts research on potatoes, onions and other crops important to Idaho's agricultural industry. From his office at the Parma Research and Extension Center in the western Treasure Valley, he is one of the university's most respected potato experts.

Thornton has earned an international reputation for his research expertise. This summer he became president of the Potato Association of America (PAA). In February, he became the PAA liaison with the European Association for Potato Research.

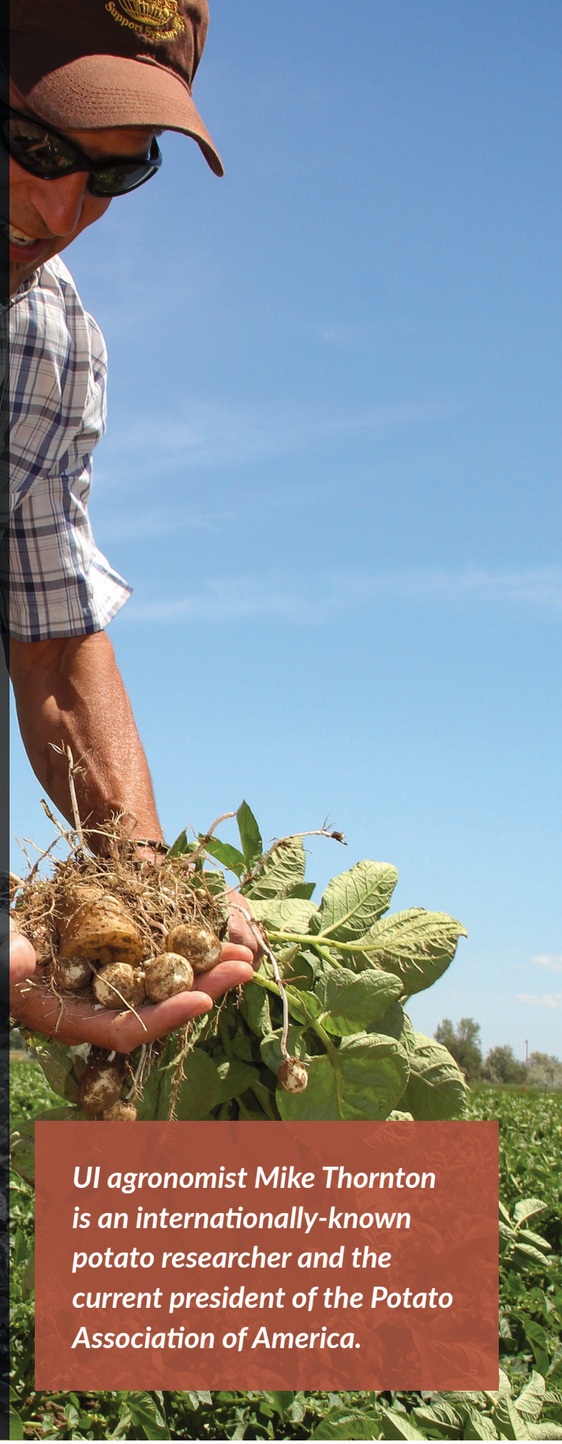
Parma's researchers and facilities provide a scientific base with the capability and expertise to meet stringent USDA Animal and Plant Health Inspection Service protocols for controlled experiments at the forefront of potato industry research. That capability serves researchers as they evaluate new potatoes at the R&E Center each year.

Parma serves as a test bed to evaluate technology coming out of J.R. Simplot Company divisions, as part of an innovative agreement reached between the company and university in 2009.

Long-term experiments with drip irrigation at the Parma center also benefit the company's efforts to retain its leadership position as a supplier of sustainable solutions for agricultural producers. Research at Parma supports industry development and evaluation of fertilizer formulations to help onion and potato producers maximize quality and yields.

Thornton serves as the university's liaison with Simplot to guide field research at the Parma center to fulfill the dynamic agreement which was key to the center's continued operations. Thornton also assists with research at Simplot's Arena Valley Research Station on Grand View Farms.

The university and Parma Research and Extension Center acts as a third-party unbiased source for evaluating the results. These tests address critical questions about the application of new technology, including the advantage it may have over the current standard.



UI agronomist Mike Thornton is an internationally-known potato researcher and the current president of the Potato Association of America.

SAVING THE PILE

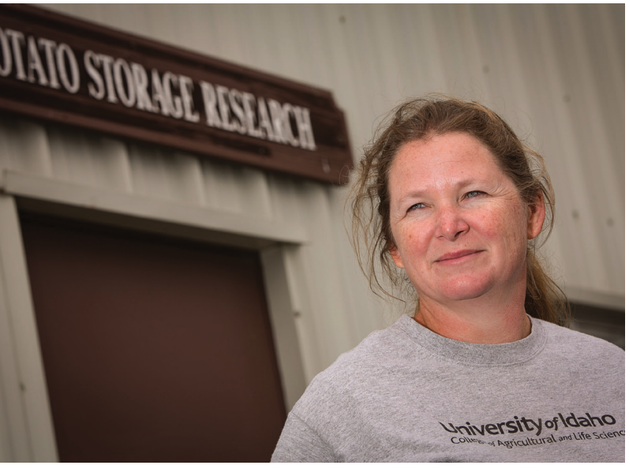
With one of the largest and most sophisticated potato storage research facilities in the United States as a laboratory, University of Idaho College of Agricultural and Life Sciences potato scientist Nora Olsen tackles the issues that could otherwise affect Idaho potatoes' famous reputation.

It's science in a big, complicated arena.

"You can picture," she said, "a football field filled up with potatoes up 20 feet high."

That is a typical Idaho potato storage, said Olsen, whose research is based at the Kimberly Research and Extension Center. Somehow, growers have to care for the health of the living, respiring spuds until grocery stores, restaurants or processing plants need them.

"We direct research and Extension efforts toward anything that can impact potato quality. We look at sprout development and ways to minimize or suppress sprouting in storage. We also focus on various means of disease control," Olsen said.



In the disease world, viruses that affect potatoes, just like those that affect people, are always recombining into new strains and posing new threats.

"We want to learn which varieties may be more sensitive to a virus or virus strain and how the response may be in storage," she said. "We want to see if symptoms might develop with time in storage, are there negative quality effects from asymptomatic infection and what can we do to lessen the impact or risk to a grower."

Olsen's research focuses largely on the details of potato storage, large and small. But her viewpoint must take in the whole of the potato's lifecycle from planting to its ultimate journey to the grocery aisle or processing plant.

From the field, potatoes enter storage in dormancy phase, but they want to wake up, live and grow the next generation. This is great for seed potatoes, but something that needs to be kept in check for fresh or process potatoes.

Sprouting and the physiological changes that accompany the switch from dormancy are unacceptable for end users.

Research to control sprouting in recent years has focused on uses of essential oils like mint and clove to help suppress the tubers' urges to sprout.

Disease is a major issue because problems seldom happen in an easy location within the potato pile. Murphy's Law says that it will usually occur in the center of the pile.

Potato growers focus much of their attention on keeping potatoes healthy in the field before harvest so they enter storage as disease-free and healthy as possible.

Beyond that, Olsen's research has focused on finding a treatment that can help keep diseases from developing in the pile. Some of the most promising results have come from research on phosphites, or salts of phosphorous acid, a safe, easy product to use.

The treatment pioneered by Olsen and colleague Jeff Miller has proved effective against diseases including late blight and pink rot—both threats that could destroy an entire potato pile if left unchecked.

"That really is a highlight for our research program. We were able to identify a product that could be applied to potatoes going into storage that could really save millions of dollars for our growers by helping them avoid dealing with the potential for a complete decay and disaster."

THE CASE FOR CLEARWATER

"I like to say the Clearwater russet is the clear winner," says Addie Waxman. She ought to know because she has invested much effort in evaluating the **new Idaho-bred potato variety that McDonald's recently approved for use in its world famous French fries**.

The Clearwater russet was developed as an agronomically superior potato through the efforts of the University of Idaho and U.S. Department of Agriculture's Agricultural Research Service potato breeding and testing collaboration based at the Aberdeen Research and Extension Center.

In the field, the Clearwater russet give the prized russet Burbank potato a run for its money.

The Clearwater russet, a dual-purpose potato suitable for processing or fresh pack, **requires 20-25 percent less nitrogen** during the growing season than russet Burbank. Requiring less fertilizer may **provide savings for growers and reduce environmental impacts**.

The Clearwater typically produces high yields with a high percentage of U.S. No. 1 tubers that contain **protein concentrations 38 percent higher than Burbank**. Its high specific gravity and resistance to sugar ends and defects help its processing appeal.

That's where Waxman's efforts as a potato scientist and as a candidate for a UI doctorate in potato science came into play. She will defend her work, the final step before the award of the highest academic degree, at the end of October.

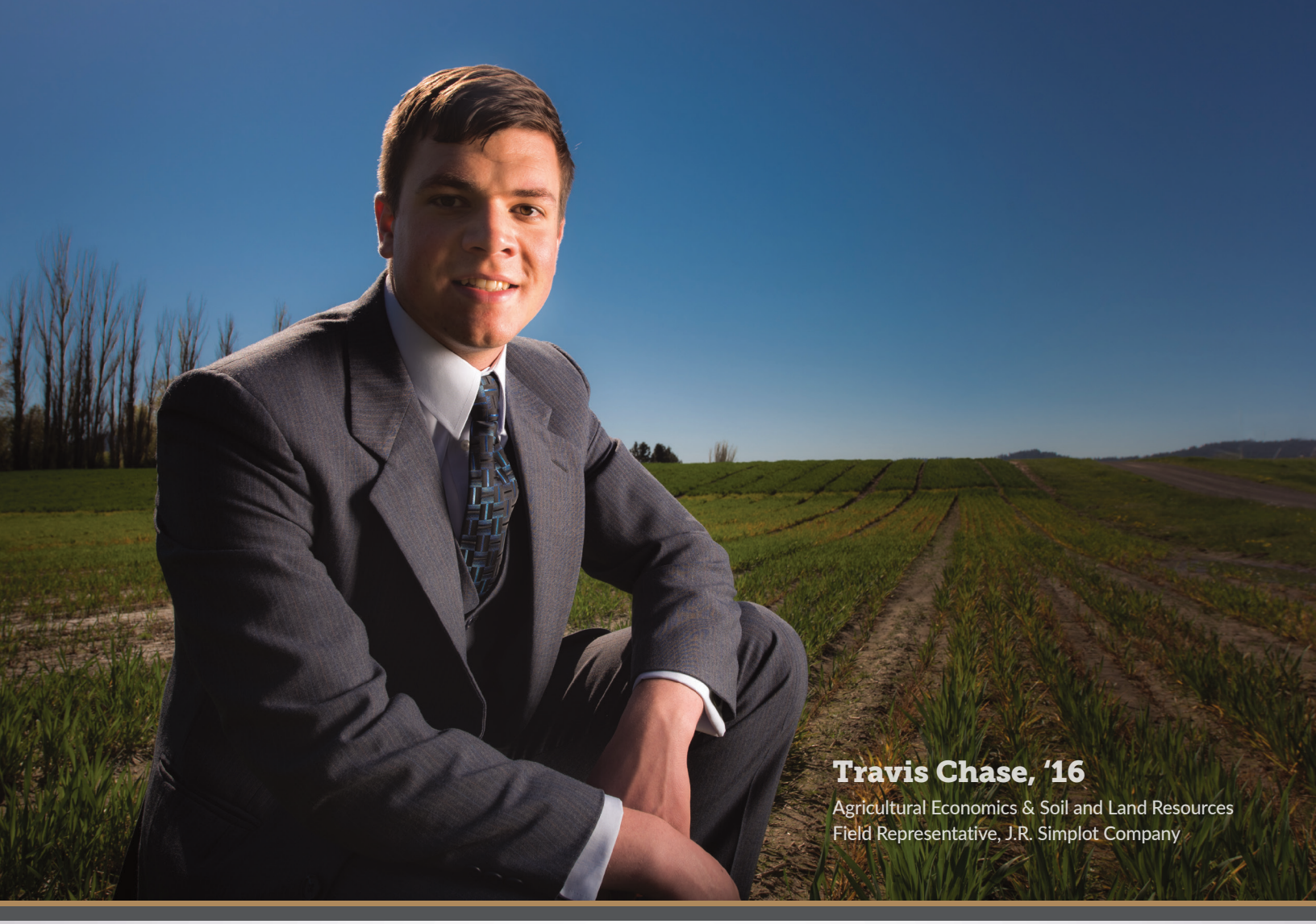
Her scientific committee includes the top potato scientists on the College of Agricultural and Life Sciences faculty: experts in variety development, Jeff Stark; potato breeding, Rich Novy; storage, Nora Olsen; agronomy Mike Thornton; and economics, Joe Guenthner.

Like most rising stars, the Clearwater russet's story was one of persistence and hard work on the part of Stark and Novy, Waxman said. They led the variety's development, then championed its merits until they became convincingly clear.

Already employed as a potato scientist by the Meridian-based 1,4Group, which develops and markets treatments to prevent potatoes from sprouting in storage, she is earning her doctorate through the company-sponsored educational benefit program, fulfilling a career goal set decades ago.

Before it allows a new potato variety to enter its supply chain for French fries, McDonald's wants proof that it will perform as expected. Her research evaluated Clearwater russet and found that it demanded less technical virtuosity than the Burbank and had more net benefits than another newer potato variety, the Alpine russet.

$3.8 M *$2.1 M in support from the Idaho Potato Commission allowed UI to garner an additional $3.8 M in support for potato research.*



94% Job Placement Rate

An average of 22,500 agricultural-related jobs go unfilled each year.

The University of Idaho College of Agricultural and Life Sciences (CALS) is working to fill those jobs with well-prepared graduates who are ready to meet the challenges of a changing world.

CALS averages a **94 percent job placement rate** for new graduates and our alumni find careers with top international companies such as Simplot, Land O'Lakes, Glanbia and Chobani.

Our students are able to focus on becoming the best employees due in part to scholarship support. CALS awards nearly $1 million in scholarships each year. More than half of our students receive scholarships.

University of Idaho
College of Agricultural and Life Sciences

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