

# SOIL TO SEED

DECEMBER 2018



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# Welcome from Jay Noller

Greetings!

I am happy to introduce you to our inaugural edition of “Soil to Seed” the Department of Crop and Soil Science (CSS) annual newsletter. With the new format, we bring a new name and some of the exciting news about our faculty and students in Oregon and around the world. Beyond Corvallis, CSS faculty and staff work at one of 30 locations around the state, including two campuses, 10 Branch Experiment Stations, and 18 Extension or County offices, from which we offer our unique services, outreach and/or research to all Oregonians. Our faculty lead two graduate degrees, one graduate certificate in organic agriculture (new), an undergraduate major in Corvallis and newly online, the Sustainability double degree major, and have major roles in the undergraduate certificate in organic agriculture (new).

During the past year, we added four new extension faculty, from Linn to Malheur Counties, and a new Weed Scientist, with three more faculty to hire this year. We are greatly energized and bringing more focus to our role supporting healthy environment, healthy economy, and healthy people across the Beaver State. We do this in no small measure with the generous support of our friends through their gifts. Our graduate students are at the core of our research and teaching mission, and through supporting gifts from



Dr. Jay Noller, Department Head, Crop and Soil Science

alumni and emeriti we are now able to support every one of our graduate students to attend a conference in their field of study. I ask that you consider what, of all that we do, aligns with your vision of our place in Oregon’s agricultural and natural resource history (see back page for how you can contribute to our growing story).

In this issue, we introduce one of our newest faculty members, Rory Mc Donnell, who is working to mitigate slug and snail issues using novel techniques. We also learn about dryland farming from Amy Garrett, a member of OSU’s Small Farms and Community Food Systems Center, housed in the Crops Building and led by CSS faculty members Garry Stephenson and Lauren Gwin. Some of you might know Carol Mallory-Smith, our “retired” Weed Scientist. Read about Carol on page 10. Did you know that CSS hosts the Sustainable Cemetery Management lab? We hope you will enjoy the lab’s update. Finally, you will read about the

collaborative work that faculty members Shaun Townsend and Patrick Hayes are doing in fermentation science.

On the cover, I am holding a hemp stalk and flower, representing a renewed industry in Oregon. I have been OSU’s, and the state’s leader for hemp research for four years now, and I see much enthusiasm for this crop. Look for more news on this soon. I hope that this issue paints a beautiful picture of the Department of Crop and Soil Science for you (if my artwork wasn’t enough, at least for the soil connoisseur). We are excited about the new look and welcome your comments. Please feel free to contact me at Jay.Noller@oregonstate.edu or give me a call at 541-737-2821.

#### Editors

Shauna Gutierrez  
Kristin Rifai



Gray Field Slug  
Photo by Rory Mc Donnell

## One Trail at a Time: Tackling Oregon’s Slug and Snail Problem

By Rory Mc Donnell

The collective scientific name for slugs and snails, Gastropoda, goes a long way towards explaining the headaches that these invertebrates cause growers throughout the Pacific Northwest. Literally meaning ‘stomach foot’ from the Greek words ‘gastér’ and ‘podòs’, gastropods are among the most damaging pests of agricultural production in Oregon. A diverse range of crops are attacked particularly in the agriculture-rich Willamette Valley including seed crops (e.g. annual ryegrass, perennial ryegrass, radish, and white clover), a wide range of vegetables (e.g. brassicas), legumes (e.g. peas), fruits (e.g. strawberries), and cereals (e.g. wheat). Ornamental production, is also heavily impacted because slugs and snails represent a significant contamination problem when infested plants are shipped out of state. Likewise, with the Christmas tree industry where the presence of slugs on trees exported from Oregon has become a major issue particularly in Pacific Rim destinations. The problem with slugs is compounded by the fact that many species help vector both plant (e.g. choke grass) and human pathogens (e.g. *E. coli*), and they lower crop quality through fecal and mucus contamination. Despite the economic losses caused by these organisms (e.g. in recent years, slug damage has accounted for almost \$100 million in damage to the \$500 million grass seed industry) control measures are focused heavily on the use of chemical molluscicides. However, considerable variation in efficacy of the most widely used active ingredients (metaldehyde, iron phosphate and chelated iron) is reported by growers. Basically, when high slug populations exist in a crop, none of the commercially available baits suppress populations below damaging levels. Other traditional slug management strategies now have limited use in Oregon. For example in the early 2000s, burning straw residue after seed harvest was gradually phased out in the Willamette Valley and this residue in fields now provides an ideal microhabitat for slugs. Additionally, farmers in the region adopted no till production for soil conservation purposes and this change in cultivation practice is also thought to have benefitted slug population growth. There is hence an urgent need to identify and develop alternative control practices for growers in the region.

Step in the Mc Donnell laboratory! We are Dr. Rory Mc Donnell (Team Leader and Assistant Professor), Dr. Inga Reich (Research Associate and Marie Sklodowska Curie Global Fellow), Dr. Casi Jessie (Research Associate Postdoc), Dr. Maria Cordoba (Research Associate Postdoc), Matt Klein (Faculty Research Assistant), Andrew Colton (Faculty Research Assistant), Fares Alzahrani (Graduate student), Taylor Lust (Undergraduate researcher), Nina Rudin (Undergraduate researcher) and Warren Anderson (Undergraduate researcher). Our goal is to develop novel approaches for managing slug and snail pests here in the Willamette Valley, and we are currently pursuing three main avenues of research.



European Brown Garden Snail

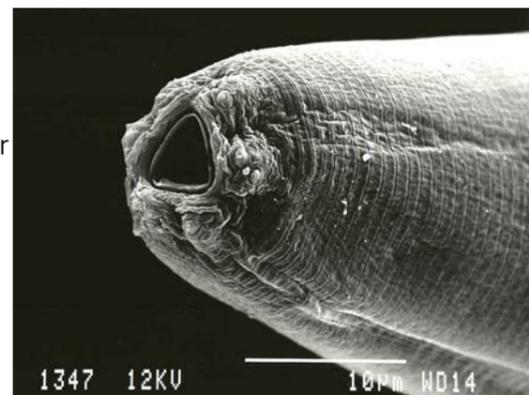
Photo credit Rory McDonnell

Plant extracts such as essential oils have been used to help control insect pests such as aphids and weevils but when it comes to slugs and snails they've been largely overlooked. Previous research completed by Rory Mc Donnell in California demonstrated that clove bud oil was lethal to the eggs and juveniles of the European brown garden snail, which is a major pest of the nursery industry on the West Coast. Over the past year, we have built on this discovery and demonstrated with the help of Tom Chastain that thyme oil is acutely toxic to the gray field slug (the most damaging pest in the Pacific Northwest). Importantly, the concentration of oil that kills the slugs does not appear toxic to tall fescue and perennial ryegrass. Using essential oils as a pesticide has a number of distinct advantages over conventional pesticides including that many are non-toxic to humans. In fact, the U.S. Environmental Protection Agency has listed a suite of oils (including

clove bud and thyme) as exempt from pesticide registration requirements and pesticide residue tolerance requirements under Sect. 25(b) of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Such an exemption will greatly reduce the cost and time required for bringing a new molluscicide containing such oils to market.

Likewise, in comparison to insect species, very little research has explored the chemical ecology of snails and slugs, especially with regard to exploiting the chemical cues that they use to find and recognize food, or locate mates. This is a knowledge gap that our team is interested in filling by attempting to identify novel attractants for use in pest gastropod management. After screening a large number of potential food items and other known attractants (e.g. beer!), we discovered that cucumber is highly attractive to the gray field slug. We are now working with a chemist in California (Prof. Jocelyn Millar, UC Riverside) who is recreating the odor of cucumber using chemicals in his lab. The ultimate goal of this research is to identify those compounds in the odor of cucumber that are responsible for the attraction and then to use these chemicals in traps, in attract and kill approaches and/or to improve pesticide efficacy.

We are also very interested in biological control, which is the control of a pest by the introduction of a natural enemy (predators, parasites and pathogens). Slugs and snails have a diverse range of natural enemies but surprisingly their biological control potential has been largely overlooked in the US. In Europe, on the other hand,



Head of *Phasmarhabditis hermaphrodita*

Photo credit Irma Tandingan De Ley, UC Riverside

a nematode called *Phasmarhabditis hermaphrodita* is currently being used as a commercially available biological control agent called Nemaslug®. The latter is lethal to a wide range of pest slugs including many of the key species impacting Oregon agriculture. Nemaslug® is not currently available in the US because until recently the nematode was never found here. However, with colleagues here in Oregon (Prof. Dee Denver, OSU) and California (Dr. Irma Tandingan De Ley, UC Riverside) we have collected the first specimens of this nematode in North America and it potentially opens up the US for the use of Nemaslug®. The ultimate aim of this aspect of our research is to develop a safe, and effective nematode biological control agent for pest slugs. Importantly, the wet weather and low light levels that promote high slug populations during the Fall in western Oregon are also optimum conditions for these nematodes so the climate in the Willamette Valley is likely to support biological control efforts during times when slugs are most active.

Our team are also keen to harness the slug and snail-killing power of other invertebrates. For example, some species of ground beetles are thought to be major predators of gastropods in agricultural systems. Our work on these insects is concerned with trying to figure out what species are the most important predators of slugs in agricultural systems and also at what times of the year they feed on these pests and other invertebrates. The third group of natural enemies we are interested in are shade flies. These under researched insects are unique in the insect world because the larvae of most species feed exclusively on slugs and/or snails and therefore have lots of biocontrol potential. Our ultimate goal is to design a set of best management practices for farmers so that they can attract and promote large populations of ground beetles and shade flies on their farms to help reduce pest slug populations.

The management of slugs and snails in agricultural systems is a complex problem and there is unlikely to be a quick fix or single silver bullet strategy. The key to future successes will be the development of novel approaches such as novel attractants, biorational pesticides and biological control, but using these new tools with existing strategies in an integrated pest management approach.

**Follow us on Twitter (@RoryJMcDonnell)**



*Phasmarhabditis hermaphrodita*

Photo credit Dee Denver, OSU



Dr. Rory McDonnell

Photo credit Lynn Ketchum

# 2018 Scholarship Recipients

**Katie Akers**

George R. Hyslop Endowment

**Adan Avila**

Oregon Seed Association  
Scholarship

**Lauren Beckwith**

McGuire Scholarship

**Cayd Erickson**

Robert H. Warrens Memorial  
Scholarship

**Ethan Gallant**

Crop and Soil Science Entering  
Student Scholarship

**Case Goracke**

Timothy Scott Wirth Memorial  
Scholarship

**Liberty Greenlund**

Don Burlingham Scholarship, M.  
Dale Chipman Memorial  
Scholarship

**Margaret Halstead**

Johnny R & Helen H. Thomas  
Scholarship

**Garrett Hightower**

Oregon Seed Cleaning  
Scholarship, Oregon Seed  
Association Scholarship

**Mary Holzberger**

Johnny R & Helen H. Thomas  
Scholarship

**Lucas Kopecky Bobadilla**

Larry C. Burrill Memorial  
Scholarship

**Mathis Kuenzi**

Oregon Seed Growers League

**Samuel Kuschnick**

John Flanagan Memorial  
Scholarship

**Matthew Liszewski**

Don Burlingham Scholarship,  
John Flanagan Memorial  
Scholarship

**Chandra Maki**

Donald D. Hill Memorial  
Scholarship

**Kacie Mellville**

Thomas G. McGillivray  
Scholarship

**Maria Montes De Oca**

George R. Hyslop Endowment

**William Ortiz**

Sheldon L. Ladd Memorial  
Scholarship, Dorothea & Henry H.  
Rampton Memorial Scholarship,  
Timothy Scott Wirth Memorial  
Scholarship, John Flanagan  
Memorial Scholarship, Rod &  
Ruby Frakes Scholarship, Wayne  
& Joann Chambers Scholarship,  
William & Heidi Geschwill  
Scholarship

**Jacob Parsons**

Leo L. Anderson, Jr. Memorial  
Scholarship in Soil Science

**Riley Pye**

Wilbur Powers Memorial  
Scholarship

**Laura Love Rathbun**

John & Joan Krautscheid  
Scholarship, Arthur King  
Memorial Scholarship

**Colette Richter**

Kent Wiley Jr. Memorial  
Fellowship

**Eduardo Salas Rodriguez**

George R. Hyslop Endowment

**Raymond Seal**

Wilson H. Foote Memorial  
Scholarship, Thomas G.  
McGillivray Scholarship

**Tyler Seely**

Oregon Seed Association  
Scholarship

**Santosh Shiwakoti**

J. Ritchie Cowan Memorial  
Fellowship

**Angel Torres**

Oregon Seed Growers League,  
Western Seed Association  
Scholarship

**Aaron Zielinski**

Oregon Seed Growers League,  
Oregon Seed Association  
Scholarship

Vance Almquist  
PhD in Soil Science

Nathan Andersen  
BS in Agronomy - Summa Cum Laude

Shannon Andrews  
PhD in Soil Science

Stephany Chacon  
PhD in Soil Science

Abigail Findley  
BS in Soil Science

Ryan Graebner  
PhD in Plant Breeding and Genetics

Gunner Harrison  
BS in Agronomy

Mitchell Hassing  
BS in Agronomy

Rebecca Oakeson  
BS in Soil Science

Kristopher Osterloh  
PhD in Soil Science

Andrew Perry  
BS in Soil Science

Danielle Runion  
MS in Soil Science

Santosh Shiwakoti  
PhD in Crop Science

Stewart Simmons  
BS in Soil Science

Angel Torres  
BS in Agronomy

Blake Traeger  
BS in Agronomy

## Congratulations to our 2018 Graduating Class

Kevin Hesson  
MS in Soil Science

Barney Huang  
BS in Plant Breeding and Genetics

Robert Isaacson  
BS in Soil Science

Maxwell Jaeger  
BS in Agronomy

Justin Keller  
BS in Soil Science

Erika Mittermaier  
MS in Soil Science

Jacob Murstig  
BS in Agronomy

Stephanie Nolasco  
MS in Soil Science

Nami Wada  
MS in Crop Science

Clara Weidman  
MS in Soil Science

Casey Wilson  
BS in Soil Science

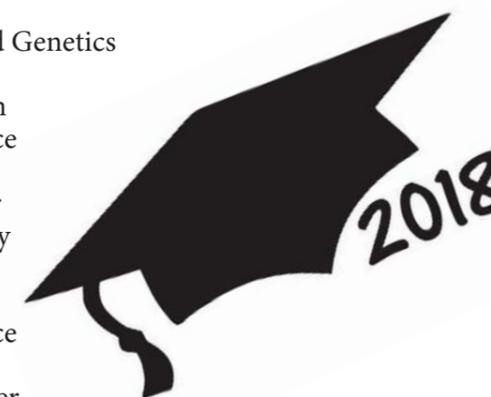
Lisa Windom  
MS in Soil Science

Jacob Parsons  
BS in Soil Science

Samuel Talbot  
BS in Soil Science

Aaron Zielinski  
BS in Agronomy

Nicholas Von Borstel  
BS in Agronomy



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todd.bastian@oregonstate.edu  
Office (541) 737-8724 or Cell (541) 231-6346

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By MITCH LIES  
For the Capital Press  
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Retired weed scientist Carol Mallory-Smith with flowering broccoli, left and canola plants. Photo by Lynn Ketchum

In a sweeping discourse, weed scientist Carol Mallory-Smith reflected on her career and addressed what growers might expect in the future.

## Mallory-Smith Reflects on Past, Sees a Future of Challenges

Projecting ahead after a 25-year career, retired Oregon State University weed scientist Carol Mallory-Smith said to expect more regulations in coming decades surrounding the use of herbicides.

Around the world, they are talking about banning herbicides, and in Europe, a lot of herbicides have already been banned," Mallory-Smith said. "Even in the last two or three weeks, we have read about talk of banning glyphosate in Brazil. It is real, and it is out there, and we have to look at it."

In a sweeping discourse at the OSU Extension Seed Crop and Cereal Production Meeting in Salem, Ore., Sept. 12, Mallory-Smith reflected on her career and addressed what growers might expect in the future.

In addition to an increase in herbicide-use regulations, she said growers can expect a buildup of resistance within weed populations and shift in weed populations promulgated by climate change.

"What we are seeing across the U.S. is a lot of the weeds that only used to occur in the South have

started to move north," she said. "We are going to see different weeds in our system than what we see now."

In many cases, she said, the new weeds will outcompete weeds currently in Western Oregon production systems, which, in some cases, might not be a bad thing.

"But," she said, "usually the weed that comes in is a worse problem than the weed that you just took out.

"And something to think about is that all of the crops that we grow in Oregon, with the exception of wheat, are minor crops, and it takes a long time to get registration for many of the crops that you are growing, so it is not an easy task to get a herbicide labeled for a new weed," she said.

Oregon farmers also can expect to see more issues surrounding co-existence in the years ahead, she predicted, as crop diversity continues to increase in the Willamette Valley.

"Off-target pesticide movement is going to continue to be a problem, and it is going to be a bigger problem, both because of the kind of crops that we are growing and because herbicide use, in general, (is coming under attack)," she said. "A lot of people are opposed to any kind of pesticide use, so I think you are going to see more pushback on that."

In reflecting back on her career, Mallory-Smith identified the discovery of unauthorized Roundup Ready wheat in a field in Eastern Oregon in May of 2013 — a discovery she made in her lab from a sample sent in by a grower and a discovery that shut down some export markets for many months — as one of the biggest issues she faced.

She also identified the escape of Roundup Ready bentgrass in Eastern Oregon and in Central Oregon, and the issue of whether to allow widespread canola production in the Willamette Valley as top issues.

"The last three years of my career have been spent dealing with this issue," she said of the canola issue. "It is now turned over to the Oregon Department of Agriculture and they will be making a decision by mid-November."

As for the most difficult weed-management issues she faced, Mallory-Smith listed several grass weeds that are problematic for grass seed growers, including annual bluegrass, Italian ryegrass, roughstalk bluegrass and rattail fescue. She also identified the broadleaf weed wild carrot as a major challenge in weed management and jointed goatgrass, which is a problematic weed in the eastern half of the state, and small broomrape, a problem weed in clover production, as significant weeds in her career.

As for identifying her biggest rewards, Mallory-Smith said working with the agricultural community ranks high.

"Growers have been fantastic," she said. "We've worked on their land. They accommodated us in all kinds of ways. The industry has really helped through the years."

Mallory-Smith closed her presentation with a call for growers to speak out and educate the public about agriculture.

"We need to become more visible and more vocal," Mallory Smith said, "and becoming more vocal doesn't mean becoming louder. It means being there when we should be there.

"I think we have to help the public understand what we do, why we do it, where their food comes from, how safe their food supply is in the U.S.," she said.

"And remember that we have reduced political clout. When I first came here 25 years ago, agriculture had much more clout in this state than it does now," she said. "So, making friends on both sides of the aisle is really important. We need advocates wherever we can find them, and the people who are not sympathetic with agriculture are the people we should be sitting down with and explaining: 'Here's what we do, why we do it, why we have to do it this way, and why that is important.'"

"Agriculture is still extremely important to the economy in Oregon," she said, "but it doesn't have the voice that it used to have, and we need to make sure that we keep it out there."

# Innovations in Dryland Farming

Written by Kym Pokorny and Published by Oregon Agricultural Progress August 27, 2018

In 2015, Amy Garrett planted tomatoes, squash, beans, and melons at Oregon State University in a plot that looked like any other. There was a big difference, though: None of the plants received irrigation. Surprisingly, the crops thrived and the resulting vegetables and fruit tasted better. Garrett, an assistant professor of practice with the OSU Extension Service's Small Farms Program, is conducting research into dryland farming, an ages-old but little-used method of farming without supplemental irrigation.

The dry-farmed plants don't go thirsty, Garrett explains. Crops typically go in the ground in early to mid-May when there is still plenty of moisture at the soil surface to get plants established. Dry farmers also often pre-soak seeds and compress the soil surrounding seeds and transplants to start capillary action, lifting soil moisture to the surface to germinate seeds and encourage roots. As the season wears on, roots stretch deep—tomatoes can put roots down 5 feet to harvest the receding water. The idea caught fire with small farmers up and down the Willamette Valley. Since our first story in winter 2017, more than 200 people have joined the Dry Farming Collaborative, the Facebook page is flourishing, and more than 30 farms are hosting trials. The Collaborative was started by Garrett to exchange information, experiences, and seeds. If crops can grow without irrigation, the thinking goes, farmers can avoid the problems that come with increasingly waning water resources in light of reduced snowmelt, rising temperatures, and periodic drought brought on by climate change.

As a result of experimentation and grower interest, Garrett is engaged with several research projects involving the Collaborative, as well as OSU's Alex Stone, associate professor in the Department of Horticulture, and post-doctoral student Lucas Nebert. In partnership with the Collaborative, the trio is documenting soils conducive to dry farming and determining whether fungal inoculants can enhance drought tolerance. This year, Garrett, Stone, student workers, and more than 30 farm partners are using soil moisture sensors to determine which

sites work best. Not all do, she notes. Deep soils rich in organic matter with some clay content have more water-holding capacity. Shallow, sandy, or rocky soils are not ideal. A diversity of soil types are being assessed that will help farmers make decisions on how to select a site.

One of the main goals is to demystify dry farming and make it more widely known as an alternative to irrigated crop production in some areas, Garrett says. Some ways to do that are by developing resources and decision-making tools and growing the Small Farms Dry Farming Project website as a hub for learning and exchanging information. As they continue research, the OSU group and Collaborative farmers select the worthiest seeds from their on-going trials to find the best varieties for dry-farmed situations.

"It's a dynamic, lifelong learning journey," Garrett says. "There's no cookie-cutter approach. You're out there observing, adapting and making yourself available when things need to happen. You go out in the morning and say, 'OK, today's the day to prep the soil' rather than scheduling it for next Wednesday. We're experimenting and not afraid to fail. We're slowly building on our successes."

Funding for the various research and educational projects comes from the U.S. Department of Agriculture Northwest Climate Hub, USDA Risk Management Agency, and USDA AFRI.

*Dry farmed melon tasting at the OSU Dry Farming Field Day at the North Willamette Research and Extension Center in Aurora, Oregon. Photo by Lynn Ketchum*



## CSS DEPARTMENT MEMBERS ARE ACROSS OREGON AND BEYOND

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### Hermiston, OR

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## SOUTHERN OREGON RESEARCH & EXTENSION CENTER

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Cynthia Beal walks through a shower of sunlight streaming through the branches of Doug-firs at Rest Lawn Memorial Park. Next to her, leaning against a tree trunk, is a coffin made from willow. The handmade coffin will eventually be used for a natural burial, an alternative to the traditional method of metal coffins encased in concrete vaults, a practice used since the 1950s and the way most burials are done today.



Beal talks fast and passionately about what may be happening underground. As the owner of two cemeteries and a former teacher of a sustainable cemetery management class at Oregon State University, she's learned a lot about what goes into the ground, but what happens after that is a mystery.

Few have studied how the concrete, metal, and embalming chemicals of traditional burial might impact the soil and water.

As she submerged herself in site management, Beal started to think about what happens to water when it hits the vaults — or boulders, as she calls them — and

whether it carries toxic materials. No one seems to know.

“For whatever reason, science hasn't looked at it,” says Jay Noller, head of OSU's Department of Crop and Soil Science. “It's low-hanging fruit.”

Noller met Beal in 2012 when he was a professor of soil science. Her ideas intrigued him, and he set up a meeting with the department's faculty. They, too, saw the value of Beal's ideas.

So, Noller and Beal approached Sonny Ramaswamy, then dean of the College of Agricultural Sciences at OSU. He agreed to have Beal develop an online course in sustainable cemetery management through OSU's Ecampus. She and Noller founded the Sustainable Cemetery Studies Lab, and Beal wrote the curriculum and taught the class for three years.

“The dean said her project was important and that we needed to listen to Cynthia, and I'm glad we did,” says Noller, director of the lab. “It's very relevant to soil science.”

As the pair moved forward, Beal remembered Steve Clarke, an old friend and prospective graduate student, and she brought him into the project. Now a doctoral student in Crop and Soil Science, Clarke also teaches water conservation and watershed science at Lane Community College. He was a perfect candidate to do the work that

Beal is so passionate about, but the going has been tough. For four years, he's been heavily embroiled in research that only a handful of people in the world are doing—in the United States, he's the only one.

“Google ‘Superfund’ and you'll get millions of hits,” Clarke says. “I have maybe 100 papers that look at cemetery issues and they are dealing with different issues. Soil and water is very, very under-researched.”

The reason, he says, is that it would require a lot of money and the ability to sample many cemeteries, a lot of which haven't even been located for a census. Also, there just isn't enough interest by the public or even cemetery owners, though they could be held liable if pollution is running off their property into waterways or getting into groundwater. Since cemeteries live in perpetuity, they often end up in public hands when an owner dies or can no longer keep them. Then the possible liability shifts to taxpayers.

#### On a mission

So, Clarke is going solo. He spent two years looking for non-existent research and then turned to topography maps and engineering models to pinpoint areas to drill 15-foot monitoring wells where there might be pollutants moving off the property.

If they are, he needs to determine how they move. He describes the top couple of meters of soil in the middle of the cemetery as a

waffle iron with boundaries of undisturbed soil — a situation like no other. Common sense, he says, tells us water will in all probability move down through the topsoil and potentially stall out in the region of the gravesites.

“It's very different than it was 100 years ago,” Clarke says. “Traditionally, people were buried in wood boxes or shrouds. There wasn't a whole lot of container involved. There's a lot more going into the ground now, and we don't know what will happen to them in the long term or if we need to be concerned.”

So, the idea is to find out how — or if — cemetery pollutants move around in the soil. It's a combination of precipitation, soil type, and how many graves are dug and where and how deep.

“All of the residuals from burials becomes the raw stuff that may move through the property,” Clarke explains. “You have to understand enough about the inside to appreciate where it might come out. Some chemicals get in and out quickly. Others sit around for a very long time.”

#### Natural alternative

The handwoven coffin in the shady setting at Rest Lawn, put aside for a natural burial, captures a trend waiting to happen. Being buried in a biodegradable coffin appeals to many of the vast population of Baby Boomers who are starting to think about end-of-life arrangements. When Beal explains the benefits of a more environmentally sustainable burial, many see it as a viable alternative to metal coffins deposited in concrete vaults.

“But that wasn't always the case,” Beal says. “Eight years ago, few people I met had heard of natural burial. Most thought it was illegal, and many had stories

of cemeteries or funeral homes telling them that purchasing a vault or having mom embalmed was required by state law, which is not true.”

Beal came at natural burial in an unusual way. At the dawn of the 21st century, she began writing a science fiction book that took place in 2040. As she wrote, she pondered what would happen to her characters when they died. The idea of natural burial popped into her mind.

“A little scenario came to me to put our bodies somewhere, and that led me into thinking about natural burial,” she says.

So in 2003, Beal sold her Eugene natural foods store. A year later, she started the Natural Burial Company

After canvassing the globe for sources of biodegradable coffins, she discovered that England was on the cutting edge of natural burials. She turned to coffins made of woven willow, bamboo, and hemp, or “Ecopods” made of pressed paper. Another option was simply a beautiful shroud. With sustainable burial, the body would decompose naturally and “dust to dust” would have meaning again. In 2007, she brought the first commercial biodegradable coffins to Oregon.

She realized there could be demand if people knew about natural burial. So she did something extraordinary. Without ever being involved in cemetery management, she bought two: Rest Lawn Memorial Park near Junction City and Oak Hill Cemetery just west of Eugene, both more than 150 years old.

Beal, a slight woman usually dressed in jeans with glasses perched on her head holding

back a mane of dark hair, dove into natural burial and sustainable cemetery work in a big way. She knew the social and historical significance of cemeteries and realized there was considerable environmental value as well. Being a steward of the land became her mantra. Natural burial fit perfectly.

#### Sustainable Landscapes

For Beal the mystery of the possible pollutants leached from coffins and vaults is frustrating.

“Most coffins are 7 feet long, 3 feet wide and 2½ tall,” she says. “They're like giant boulders. Imagine all those boulders. What are they



doing for the availability of water, as well as to the water? It's just drying up the landscape.”

The soil is a sponge, she explains, and every one of those boulders can't hold water the way soil can.

“We know how water and gases will exchange through soil,” Noller says, “but we don't know what happens when looking at cemeteries that have a vault wall and one next to it and then another. We're constrained by that. We can take soil samples, but that doesn't tell us how the water moves.” Beal and Noller

## Underground Mystery

By Kym Pokorny

Oregon Agricultural Progress September 19, 2018

Photos by Stephen Ward

are hoping for more information about how chemicals are affecting tree root systems, topsoil, vapor, circulation, and how alternatives like natural burial could help. That, in turn, could carry implications for urban planners, insurers, and communities, particularly as cemeteries that were once rural get swallowed by urban centers and are closer to water sources. “It might be one of the reasons we’re seeing rivers with higher-than-expected arsenic in them,” Noller says.

Walking through the Doug-firs and birch at Rest Lawn, Noller and Beal point out the things that have been done to restore the habitat. With help from soil science students, they grubbed out invasive plants and added native ones. They’ve built berms out of downed branches and other debris to catch rainwater runoff and eroding soil. Not only are they functional, they also add atmosphere to the forest where eventually natural burials will take place.

“The forest makes sense,” Noller says. “If bodies are placed in the ground, they decompose and feed the trees and ferns.”

In coffins sealed in concrete, the body doesn’t decompose. It often turns to sludge, Beal says. She respects those who still want traditional burials and offers those at her cemeteries. But she makes sure customers know about natural burial, which costs about the same as a traditional burial, depending on which coffin you buy.

At Oak Hill, Beal is busy with restoration as well. Swallows grab birdhouses as fast as she can put them up. Some areas are mown only twice a year to leave a soft meadow of grasses. Perennials pull in pollinators. She never stops.

Cemeteries aren’t just places to bury people, Beal points out. They

have historical value. People have connections to their ancestors, and online genealogy has amped up interest. Cemeteries act as parks, provide income for a multibillion-dollar industry, and can — and should — be examples of environmental stewardship.

**Way of the future**  
On a June day, Beal takes a break from cutting veggies for a salad and moves into the living room. In a place of honor in front of the floor-to-ceiling window looking out on Fern Ridge Lake sits a beautiful white Ecopod. She’s used her artistic talent to mold swirls in the top. She is not afraid of death.

“When I first started the Natural Burial Company, I found out I had a tumor,” she says calmly. “I could have been my first and last customer.”

But she recovered and is in remission. The coffin, though, reminds her that life is fleeting. She strongly believes people should plan their end-of-life wishes. And she strongly believes natural burial is the way to go.

But first she needs to convince other mortuary owners, who sell the coffins and services, and the cemetery owners, who sell the plots and sometimes the coffins. But it’s tough going. Mortuaries hesitate to change because they think there’s not enough demand. Cemeteries hold back because they’re not getting requests from funeral homes. And most people have never heard of natural burial.

At first, there was no market for her coffins. So, Beal got busy. She carted her coffins to trade shows and displayed them in galleries in Portland and Philomath. And she talked. For many people, she didn’t have to talk much. They got it. When they learned there was such a thing as natural burial and that it’s legal, they got excited. Beal is convinced demand will change tradition. Or rather take us back

to tradition. There will be 3 million people dying a year by 2026 and 4 million by 2046, according to census statistics. That will have large impacts on cemeteries.

“It’s inevitable,” Beal insists. “The way we do burial now is not sustainable economically, environmentally, or demographically. Natural burial is the future.”

## Seeds of Love

Leo and Xue Ting Ting, two visiting scholars (PhD students) from China, came to study seed science with Oregon State University professor and senior researcher, Sabry Elias, and ended up getting married! Leo and Ting met at the OSU Seed Lab and were married on September 23rd. Congratulations Leo and Ting!



The bride and groom had Chinese and Western style wedding ceremonies.



Shaun Townsend, Assistant Professor (Sr Res) Crop and Soil Science

*“European varieties of hops came over with the immigrants. These probably crossed with indigenous varieties to produce new strains.”*

– Shaun Townsend



Patrick Hayes, Professor Crop & Soil Science  
Photos by Lynn Ketchum

# The Evolution of Beer

The world’s second-oldest beverage keeps on bubbling along

Oregon’s Agricultural Progress  
August 22, 2018  
By Gail Wells

The other day Patrick Hayes invited a visitor to join him and two colleagues for a wide-ranging chat about...beer. In their professional guises, Hayes, Tom Shellhammer, and Shaun Townsend represent a sizable chunk of Oregon State University’s renowned research and teaching programs in fermentation science—which covers not just beer but bread, cheese, wine, and distilled spirits. What emerged was an afternoon’s pleasant meditation on the history, current status, and future prospects of the world’s most venerable, and arguably most popular, beverage.

For full article see <https://oap.oregonstate.edu/2018/08/22/evolution-of-beer/>

# Art About Soil

Fairbanks Gallery, OSU Campus (Sept-Oct 2018) featured works by Jay Noller, Crop and Soil Science Department Head



**Rooted**  
Soil paint on archival wood panel



**Split Rock**  
Acrylic on canvas



**Yachats Convexol**  
Acrylic on shaped archival panel



**Sea Stack 1**  
Acrylic on canvassed archival panel



**Climate Changed**  
Soil paint on aluminum composite panel, Two-sided



**Seacliff at Yaquina Lighthouse**  
Acrylic on canvas

**Burrowed Spodosols**  
Soil paint on archival wood panel

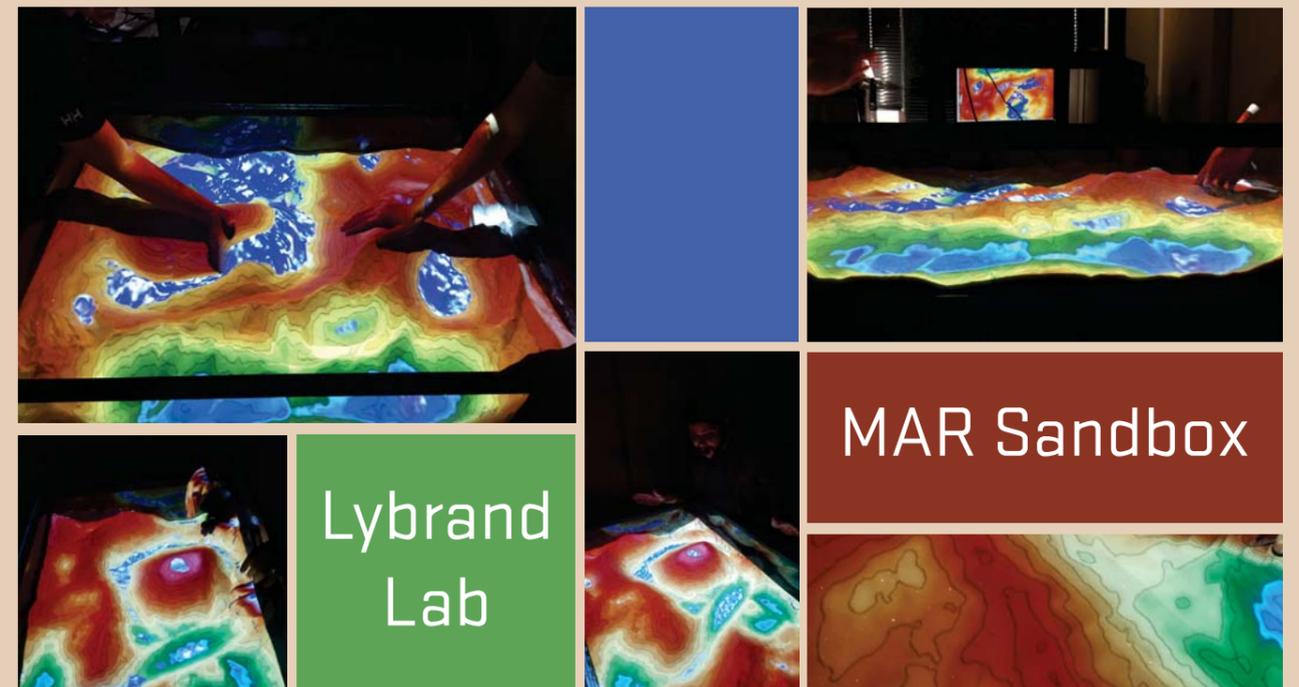


Lybrand Lab and Oregon State's Department of Crop and Soil Science Present...

## The Mobile Augmented Reality Sandbox

Dr. Rebecca Lybrand (Assistant Professor with the Department of Crop and Soil Science, OSU), collaborator Dr. Jonathan Maynard (Research Ecologist with ARS) and Soil Science PhD student, Erin Rooney have just finished construction on the Department of Crop and Soil Science's Mobile Augmented Reality (MAR) Sandbox. The second augmented reality sandbox on campus, this dynamic teaching tool will serve as a portable resource for professors, students, and community members. Funded by an Individual Learning Innovation Grant from Oregon State University and Crop and Soil Science departmental funds, the MAR Sandbox provides a multisensory teaching tool that enhances and reinforces information taught using traditional modalities. The MAR Sandbox will also provide informal learning opportunities through campus or community events where students can interactively engage in the study of soil landscapes. Augmented reality sandboxes have become popular additions to science classrooms all over the world. Originally developed by researchers at UC-Davis, the sandbox allows students to both visualize and interact with landscape topography and water flow. On the MAR Sandbox's maiden voyage, Oregon State University's soil judging team explored coastal, glaciated, and volcanic landforms and placed soil order placards across the landscapes. The sandbox is able and ready to move around and will be offered to professors and outreach projects around Corvallis.

For more information or to visit the sandbox, please contact Erin Rooney at [Erin.Rooney@oregonstate.edu](mailto:Erin.Rooney@oregonstate.edu). The MAR Sandbox is currently housed in room 3035 in Agriculture and Life Sciences, 2750 Campus Way.



# Future Crop & Soil Scientists



Assistant Professor -HAREC, Ruijun (Ray) Qin and his wife are happy to announce the birth of their baby girl, Natalie, born on May 30th.

Congratulations to Ray and family!

Instructor, Lorien Reynolds and husband Felix are happy to announce the birth of their baby boy, Joaquin weighing in at 8 lbs 6 oz. Joaquin was born on October 11, 2017 at 10:04 pm.



Congratulations Lorien, Felix and family on your newest arrival!

On the morning of December 12, Baby Leo Townsend made his great escape and joined parents Kim Townsend and Lennie Rummel at last. All 9lb 14oz and 22in of him made it in extraordinary health.

Congratulations to the happy family!



Graduate Student, Santosh Shiwakoti and his wife are happy to announce the birth of their baby girl, Slesha, born at 9:45pm on Friday, October 5th

Congratulations to Santosh and family!



Instructor, Adam Lindsley and wife Ashley are happy to announce the birth of their baby boy, Gus Vero Lindsley weighing in at 8 lbs 14 oz, and 20.5" long! Born on Tuesday, October 10, 2017 at 1:30 in the morning.

Congratulations Adam and family on your newest arrival!

Veronica Puig Sanvicens and Rory Mc Donnell welcomed the newest member of their family, Ella on Saturday, May 5th at 3:26pm.

Congratulations to the happy family!

# Resignations

Maziar Kandelous-Assistant Professor  
Hannah Kammeyer-Cereal Variety Outreach Coordinator  
Evan Hansen-FRA Wheat project  
Shannon Andrews-Manager, Central Analytical Lab

# Promotions

James Cassidy promoted to Senior Instructor II  
Scott Fisk promoted to Senior Faculty Research Assistant I  
Kyle Roerig promoted to Senior Faculty Research Assistant I

# Retirements

George Hoffman- Research Associate (Entomology: Integrated Pest Management, crop pollination, slugs, mites, blue orchard bees)



Tracy Mitzel  
Office Specialist 2 (Admin)

# In Memoriam

Jackson W. Ross  
July 31, 1920-June 24, 2018

Jackson Weaver Ross, Jr., longtime Corvallis resident died from congestive heart failure at 97. He earned a Bachelor of Science from Oregon State College in 1951 as a Farm Crops major and was hired as a Seed Certification Specialist. In 1952 the family moved to Madras, Oregon where he was a Jefferson County Extension Agent. In 1955 the family moved back to Corvallis where Jack worked in a series of positions with the Extension



Service: Farm Crops Specialist, Area Supervisor, Community Development Specialist and finally Assistant Director, County Programs. In 1959 he received a Kellogg Foundation Fellowship and earned a Masters Degree in Extension Administration at the University of Wisconsin, Madison. He retired in August 1975 at 55

years old. He was named Corvallis Senior First Citizen in 1994. The same year he and Steve Besse went on assignment to Belarus for Volunteers in Overseas Cooperation Association (VOCA) an AID affiliate. Jack was honored for 28 years of service with Meals on Wheels and a few weeks before he passed, he and fellow Kiwanis members, were still installing grab bars for people. For recreation in addition to golf, he enjoyed woodworking projects, travel, family gatherings, repairing and recycling everything, in addition to operating his computer and keeping up with family members.

Arnold P. Ableby  
Oct 24, 1935-Dec 6, 2018

Arnold Appleby died at the age of 83 in Corvallis, OR. He received a B.S. in Agricultural Education and M.S. in Agronomy from Kansas State University. He joined the faculty in Farm Crops at OSU in 1959, received a PhD in Weed Science at OSU in 1962. He spent two seasons at the Pendleton Branch Experiment Station. He then returned to Corvallis where he became project leader of domestic research. He taught beginning weed control courses and herbicide science to nearly 2,000 students over the 30 years until he retired. Appleby was active



in both the Weed Science Society of America and the Western Society of Weed Science. He was named Teacher of the Year in Crop Science three times, received the R.M. Wade Award as Outstanding Teacher in the College of Agriculture, won three Distinguished Professor awards, and won several Distinguished Service awards from commodity groups and other organizations. He took great pleasure in advising graduate students. He directed 44 M.S. programs and 30 PhD programs. He authored several books, including the history of WSSWS, WSSA, the OSU Crop Science Department, the OSU weed program, and the Agricultural Research Foundation. He was on the Board of Directors of the Agricultural Research Foundation and chaired the Competitive Grant Committee for sixteen years. He was named Volunteer of the Year by the OSU Retirees Assoc. In 2001, he received the Distinguished Service award from Kansas State University. In 2009 he was named Diamond Pioneer at OSU, and in 2010, he was inducted into the OSU College of Agriculture Hall of Fame, the first on-campus faculty to be inducted in the 30-year history of the Hall. He is survived by his wife, Gerry; two sons, Brian and Brent; two sisters and a brother; five grandchildren, and five great-grandchildren.



# Oregon State University

Crop and Soil Sciences  
109 Crop Science Building  
Oregon State University  
Corvallis, OR 97331

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- Paul R. Pugh Grass Seed Endowment Fund – Seed crop research, extension and teaching
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