ISPP INTERNATIONAL SOCIETY FOR PLANT PATHOLOGY

PROMOTING WORLD-WIDE PLANT HEALTH AND FOOD SECURITY

INTERNATIONAL SOCIETY FOR PLANT PATHOLOGY

ISPP NEWSLETTER

ISSUE 56 (2) FEBRUARY 2026

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ANCIENT OOMYCETE HONORS SOPHIEN KAMOUN

LAURA TURCHI AND MIA CERFONTEYN, KAMOUN LAB MEDIUM, 26 JANUARY 2026

Sophien Kamoun, group leader at The Sainsbury Laboratory, has been celebrated in the most enduring way possible: a newly discovered fossil species has been named in his honour.

Christine Strullu-Derrien, a paleontologist affiliated with the Muséum National D'histoire Naturelle in Paris and the Natural History Museum in London, has led an international effort to identify *Kamounia striata*, a beautifully preserved fossil oomycete (fungus-like microorganism) discovered in the Grand'Croix Chert of France. This find is particularly significant as the oomycete fossil record is notoriously sparse.

WHY THE NAME?

According to the authors, the genus name *Kamounia* recognises Sophien's transformative impact on the fields of genomics and molecular biology, specifically in revealing the evolution of pathogenic fungi and oomycetes. However, Christine shares that the decision to name this new discovery after Sophien has a bit of backstory as well. "I thought, 'One day, when I have a fossil oomycete, I will name it after him.'"

Christine and Sophien met years ago in London, when he gave a talk at the Linnean Society. After being introduced by a colleague, Christine immediately realised they had "a French connection, because Sophien did a part of his studies in Paris — so we began to discuss half in French, half in English."

According to Christine, Sophien gave "an impressive and very accessible talk about his work. It was easy to understand even for people unfamiliar with molecular techniques. Then we discussed about fossils, and he was so interested in my work that he came to the museum to see the material I worked on."

In 2014, Christine co-organised a New Phytologist workshop about the Origin and evolution of plants and their interactions with fungi that Sophien joined, which gave them one more chance to meet.

"As a researcher working on the origin and evolution on microorganisms, including oomycetes, I am aware of the importance of Sophien's work on oomycetes, and more generally of his group's research in the modern world. I really appreciate that Sophien is very open minded and very enthusiastic about fossils. It's nice to see people working on the molecular side that are supportive of fossils, not all of them are."

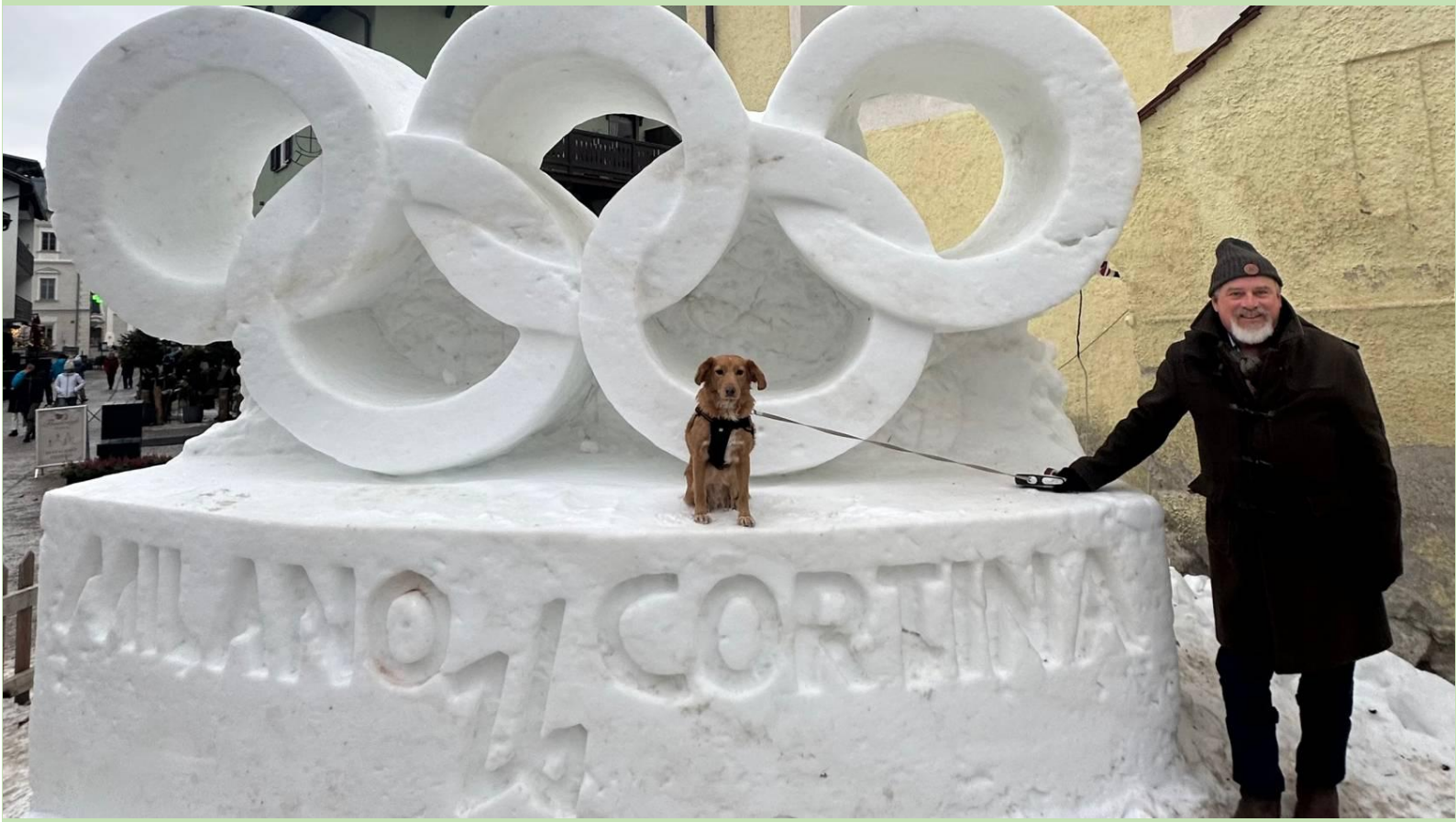
Despite never working directly with Sophien, his impressive contributions to the field and genuine interest in her work left a lasting impact. "After that workshop I thought, 'One day, when I have a fossil oomycete, I will name it after him.' It's taken a few years, but I'm glad it's finally happened!"

Sophien said: "I'm really touched by Christine's gesture, and I'd like to thank her again. What's funny is that 'kamounia' is a famous dish in Tunisia, so she'll have to come over to Tunis and we'll cook one for her!"

Read paper.

DEEP IN THE DOLOMITES, A UNIVERSITY OF CALIFORNIA BERKELEY PROFESSOR AND HIS SERVICE DOG CARRY THE OLYMPIC FLAME

ROBYN SCHELENZ, UNIVERSITY OF CALIFORNIA NEWS, 22 JANUARY 2026



Matteo M. Garbelotto-Benzon and his service dog, S'Abba, pose in the Dolomites as both prepare to carry the Olympic torch on its journey to Milan to open the 2026 Winter Games (Photo credit: Matteo M. Garbelotto-Benzon, UC Berkeley).

On 28 January 2026, University of California (UC) researcher Matteo M. Garbelotto-Benzon walked in the crisp cold of Canazei, a town near where he was raised in Italy's Dolomites mountain range. His feet crunched fresh snow in view of the Alpine peaks that inspired his career in forestry. The difference this time? In one hand, he held the Olympic torch — and in the other the lead of S'Abba, the service dog who helped him walk, and ski, again.

Garbelotto is one of about 10,000 people chosen to take the torch on its 63-day, 7,500-mile relay journey from Olympia, Greece, to Milan, Italy, which will co-host the 2026 Winter Games with Cortina, in the Italian Alps. Garbelotto believes his and S'Abba's relay journey could make history as perhaps the first time a service dog will walk side-by-side with a person with a mobility disability carrying the flame, something that seemed impossible to Garbelotto just years ago.

Being back home for the 2026 Winter Olympics has been on Garbelotto's mind since the 2019 announcement that Italy had won its bid for the Games. Garbelotto grew up listening to stories of the last Olympics held in the region, the 1956 Cortina Winter Games, from his father, who grew up nearby. Thickly forested, the region is a jewel in many ways, a place where one can find stands of spruce Stradivari first chose for his violins or the frost-colored blooms of edelweiss, a fiercely protected wildflower that grows on only the rockiest, most forbidding terrain, a symbol of courage that has long nourished legends throughout the Alps. And of course, one can find thousands of people who have come from around the world to ski, a tradition still passed down by locals. "When you grow up in a village of 300 souls, with a glacier less than an hour away, skiing is in your blood," Garbelotto says. "Skiing for people who live in the Alps is not just for the elite, it's for everybody."

Garbelotto enjoyed ski racing, but it wasn't the main draw. "I simply love the sport and being outdoors in the forest," he explains. These twin loves have nourished his career in forestry in California, his home since the 80s, where skis help him reach the remote areas he studies as a UC Berkeley professor and UC Cooperative Extension specialist. Garbelotto is famed for discovering, alongside David Rizzo of UC Davis, the previously unknown pathogen behind Sudden Oak Death, a disease that has devastated California's coastal forests.

But Garbelotto's world turned upside down after a serious ski accident in March 2018 partially cracked his 5th vertebrae and left him in and out of a wheelchair. Six months later, while researching in Tahoe, he experienced a major pulmonary embolism, a traumatic event he believes is connected to his accident. Recovering from both injuries a few months later in Sardinia, unsure if he'd ever be able to independently walk again, Garbelotto experienced a positive twist of fate: a puppy arrived at his door.

"I thought she could maybe help me walk better without always having to use a cane," Garbelotto says.Naming her S'Abba (meaning "the water" in Sardinian; Garbelotto spells her name phonetically as Saba to reflect his Ladin Venetian dialect), Garbelotto contacted a trainer and started a program to see if she might be suitable as a service dog trained for tasks around mobility and balance. S'Abba performed very well, and was able to get Garbelotto back into the field, on ski and on foot, to live out his dreams of being a student and protector of the forest. Now the two are on the precipice of another accomplishment — carrying the Olympic torch together in their home country.

"I am so proud that S'Abba may be the first service dog to help a person with a mobility disability walk with the torch for the Olympics," Garbelotto says. "It says so much about the importance of these companions in the world of sports. In Italy, only guide dogs for the sight-impaired are fully acknowledged, so I am really proud she was selected."

Garbelotto wasn't sure if they would be selected, or even where they would be asked to carry the torch if so. "I worried as an American that they would simply assign me to any place, so I was a bit nervous," he says. "When I found out I would be carrying the torch in the Dolomites I was so happy and thankful I started crying."

"My whole life has been about growing up the forest and the mountains, and I'm so grateful that I have been successful in doing what I love and able to transfer my passion to California," Garbelotto says. To bear the torch in Canazei is a tribute to the mountains of both nations, and to the animal and human fellow travelers that have shaped his life.

"I know this is corny," Garbelotto says, "but in that place [where he is carrying the torch], on a high pass, my dad shared with me when I was 4 a secret place where edelweiss grow. Every year, until I was an adult, we would go look at them."

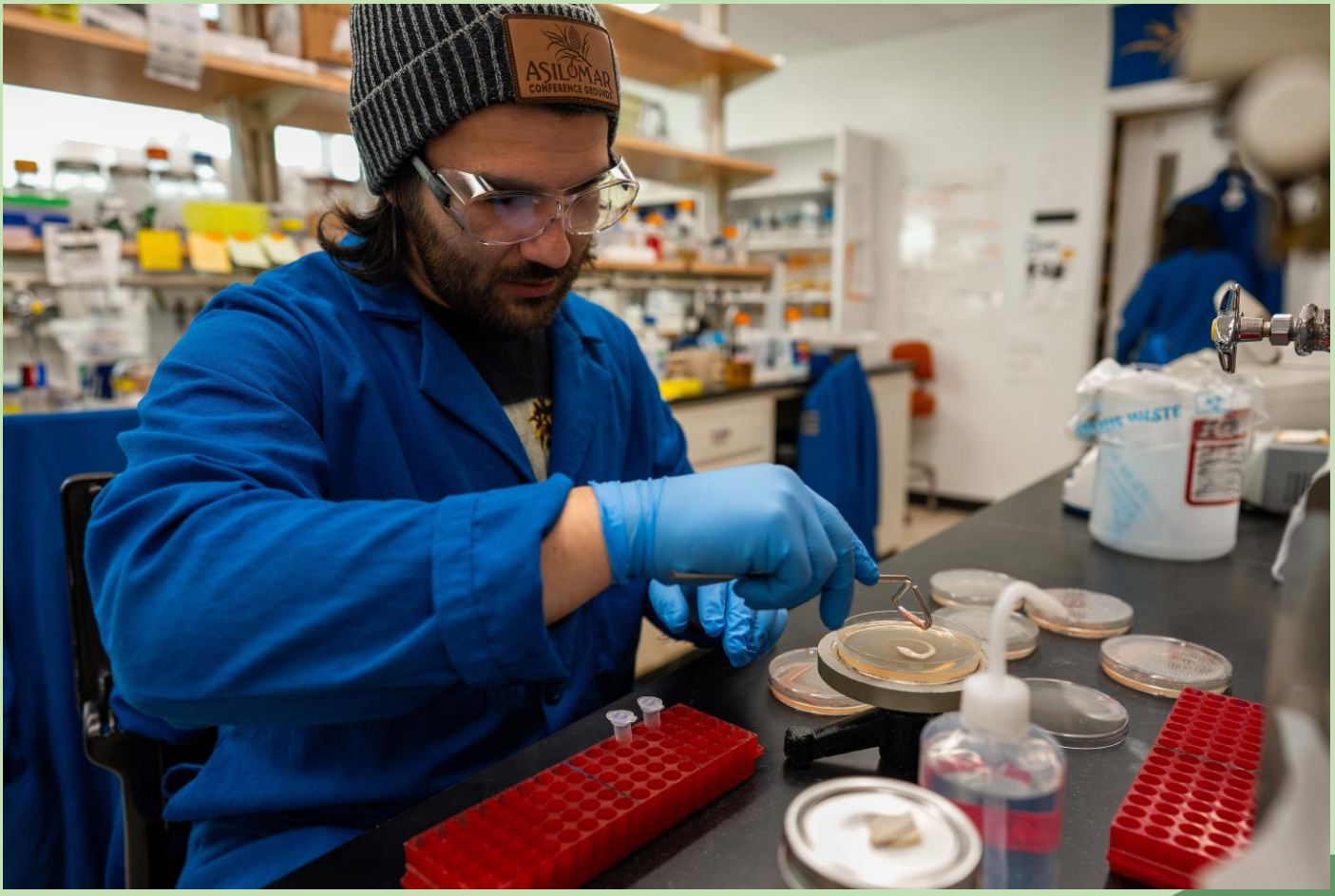
WHAT MAKES PLANT-WILTING RALSTONIA BACTERIA SO DEADLY

ANDY FELL, UNIVERSITY OF CALIFORNIA DAVIS NEWS, 23 JANUARY 2026

Slippery, drippy goop makes Ralstonia bacteria devastating killers of plants, causing rapid wilting in tomato, potato and a wide range of other crops, according to new research. The work, published in *Proceedings of the National Academy of Sciences*, comes from an unusual collaboration between plant pathologists and engineers at the University of California, Davis.

Ralstonia solanacearum can lurk in damp soils for years before infecting a plant, spreading rapidly through the water-carrying vessels (xylem). Infected plants wilt and die within days.

"My analogy is that they cause a heart attack for plants, because they clog up the vessels and cause plants to wilt and die," said Tiffany Lowe-Power, associate professor of plant pathology in the UC Davis College of Agricultural and Environmental Sciences.



Ph.D. Student Matthew Cope-Arguello collects goopy pink Ralstonia bacteria off of petri plates in the Lowe-Power Lab at UC Davis (Photo credit: Jael Mackendorf, UC Davis).

Like many bacteria, Ralstonia colonies can secrete a film or coat around themselves. Typically, these films help trap or conserve moisture. In the case of Ralstonia, this secreted film is unusually sloppy and can make them quite difficult to work with, Lowe-Power said.

"Ralstonia are charismatically disgusting, there's this like, real grossness to them," she said.

Ralstonia's secreted film is made up of a long, sugar-like molecule called exo polysaccharide 1 (EPS-1). It has been known that EPS-1 is somehow tied to Ralstonia's ability to kill plants. But how?

"With the ways that microbiologists and geneticists go about answering questions, we are able to get somewhat close, but not really to the mechanism," Lowe-Power said. "We need a physicist."

Hari Manikantan, associate professor in the UC Davis Department of Chemical Engineering, studies the mechanics and dynamics of complex multiphase fluids.

"I love goop of all forms, saliva, foams, lung surfactants, tears," Manikantan said.

Goopy fluids are both viscous and elastic in different degrees. Elasticity measures whether a material can snap back after being stretched. Viscosity measures how easily it flows. Silly putty, for example, is elastic over a short time scale.

"You bounce it, it's a perfectly solid object. If you keep it on a table, it slowly flows out over minutes to hours," Manikantan said. "The question is what's the relevant time scale."

A MUTUAL LOVE OF GOOP

Manikantan and Lowe-Power discovered their mutual love of goop when they met during a new faculty training before the pandemic. Using equipment in Manikantan's laboratory, they were able to make highly precise measurements of the viscoelastic properties of secretions collected from Ralstonia colonies by Matthew Cope-Arguello, a graduate student in Lowe-Power's lab.

They discovered that the goop from pathogenic Ralstonia flows easily under the kind of shear forces that would be found in the xylem vessels of plants. This allows the bacteria to spread rapidly throughout an infected plant.

How common is this trait? Cope-Arguello developed a simple test. If you grow bacteria making a biofilm on a plate and hold the plate at an angle, does it drip? They looked at other Ralstonia strains, including those that don't make EPS-1, and also asked colleagues around the country to test other bacteria that are evolutionary cousins of the Ralstonia wilt pathogens.

"We were really able to show, both from the data that our collaborators collected as well as data that we mined through publicly available genomes, that this polysaccharide is unique to the plant pathogens," Cope-Arguello said.

For biologists, the research shows why EPS-1 makes these bacteria especially pathogenic. For engineers and soft matter physicists, it provides an experimental system to study.

"Now we have this actual relevant change that's guided by genetics that my community can begin to mathematically model. So I'm very excited about how this feeds back into that soft matter physics world," Manikantan said.

GLOBAL VARIATION IN PLANT-BENEFICIAL BACTERIA IN SOIL UNDER PESTICIDE STRESS

A paper by Danyan Qiu *et al.* titled "Global variation in plant-beneficial bacteria in soil under pesticide stress" was published on 27 November 2025 by *Nature Communications* (Vol. 16, Article number 10685). The abstract is as follows:-

The presence of plant-beneficial bacteria (PBB) in soil significantly affects crop production. Excessive agrochemical use in intensive agriculture causes substantial soil residue accumulation, compromising soil health, crop quality, and human health. Understanding changes in beneficial bacteria under pesticide pollution is crucial for guiding sustainable agricultural practices and promoting soil health. We analyze metagenomic data from 1919 soil samples to identify 364 PBBs. We find higher PBB diversity in agricultural soils than in non-agricultural soils; however, pesticide pollution negatively affects the abundance of PBB, particularly those with plant growth-promoting traits. Pesticides not only reduce PBB diversity as individual factors, but they also exert synergistic negative effects with other anthropogenic factors, as determined by Hedges'd effect size and 95% confidence intervals, further accelerating the decline in PBB diversity. Increased pesticide risk also leads to a loss of functional gene diversity in PBB about carbon and nitrogen cycling within essential nutrient cycles, and a reduction in specific amino acid and vitamin synthesis. Artificial application of specific amino acids and vitamins could be an effective strategy to restore PBB in high-pesticide-risk soils. This study provides guidance for regulating pesticide use to mitigate their negative effects on soil PBB and suggests potential remedial measures.

Read paper.

ROOT-KNOT NEMATODE MELOIDOGYNE INCOGNITA USES SECONDARY-METABOLITE-MEDIATED SOIL MICROBIOME SHIFTS TO LOCATE HOST PLANTS

A paper by Wu, Z. *et al.* titled "Root-knot nematode *Meloidogyne incognita* uses secondary-metabolite-mediated soil microbiome shifts to locate host plants" was published on 19 January 2026 by *Nature Plants* (https://doi.org/10.1038/s41477-025-02205-4). The abstract is as follows:-

Plant-parasitic nematodes are among the most destructive soil-dwelling pests, posing severe threats to global agriculture. However, the interplay between plant metabolites, rhizosphere microorganisms and their potential role in guiding pathogenic nematodes to their hosts remains poorly understood. Here we explored this gap by investigating the role of benzoxazinoids (BXs), a class of defensive metabolites of maize plants, in influencing the host-seeking behaviour of root-knot nematodes (RKNs). Our findings revealed that, surprisingly, BXs secreted by maize roots, particularly 6-methoxy-benzoxazolin-2-one, not only enhance RKN infection but also serve as powerful attractants. Remarkably, BX effects were observed only in the presence of a soil matrix. Further analysis demonstrated that 6-methoxy-benzoxazolin-2-one modulates the abundance and composition of rhizosphere bacteria, which in turn play a crucial role in RKN attraction and infection. We discovered that rhizosphere bacteria of BX-producing plants emit volatile compounds such as methyl ketones and 2-phenylethanol, which are then used by RKNs to locate host plants. RKNs detect these volatiles through chemosensory genes, including Mi-odr-1, Mi-odr-7 and Mi-gpa-6. Our study provides mechanistic insights into how RKNs use secondary-metabolite-shaped plant-microbe interactions to enhance their host-seeking behaviour and maximize their performance.

Read paper.

AN INNOVATIVE PIPELINE TO ANALYSE PLANT PATHOGENS

TAMI TERELLA-FARAM, AGRICULTURAL RESEARCH SERVICE NEWS, 26 JANUARY 2026

Agricutlural Research Service (ARS) scientists in Corvallis, OR, in collaboration with Oregon State University, developed a disease surveillance platform that could improve U.S. agriculture by unlocking the future of plant health. PathogenSurveillance is an innovative, open-source software tool that can quickly analyse and identify novel microbial variants based on DNA sequences.

The automated PathogenSurveillance pipeline is an innovative workflow tool to help scientists respond in real-time to emerging, or re-emerging, invasive pathogens and pests. The surveillance platform will improve plant health and aid in reducing the spread of new and emerging diseases in agronomic, urban, and forest ecosystems.

"This genomics pipeline revolutionizes plant health, allowing us to identify any microbe, pest, or pathogen in just minutes-to-hours once there is a genome sequence," said Nik Grunwald, ARS research plant pathologist at the Horticultural Crops Disease and Pest Management Research Unit in Corvallis. "The genomic pipeline can be used for real-time biosurveillance of known, or unknown, pathogens relatively quickly, which lessens the barrier to adoption and use of PathogenSurveillance drastically."

Grunwald added that, since everything is sequence-based, this tool can be used to monitor the evolution of pest/pathogens in real-time, providing insights into how populations change, variations emerge, and new invasions occur. The platform can also be easily deployed to identify a specific pathogen, or to monitor the emergence of new disease strains or variants.

"Samples are sent to a local lab, and the resulting genome is sequenced and uploaded to the pipeline software system for identification," Grunwald said. "Variation in genomes can thus be monitored over time and space by comparing genomes."

This allows PathogenSurveillance to be used by labs or clinics with little computational experience, and it provides "unprecedented capability for in-field or point-of-care diagnosis of pests and pathogens," according to Grunwald.

The PathogenSurveillance platform also enables scientists to input one to several hundred population samples of small-to-modest genome sizes, including bacteria, fungi, insects, and nematodes for pathogen surveillance and identification.

The program output is also intuitive for the user because it can provide graphs of genetic diversity and create reports in the form of an interactive HTML document.

"This will be a benefit to researchers, disease clinics, and diagnosticians in their work to identify clonal, or other types of variants such as the UG99 stem rust, or NA2 of sudden oak death," added Grunwald.

Scientists can download the PathogenSurveillance software tool at: https://nf-co.re/pathogensurveillance/1.0.0/

RESEARCHERS PIONEER MOLECULAR MODELING FOR NEW FUNGICIDES

JOHN O'CONNELL, UNIVERSITY OF IDAHO NEWS, 9 JANUARY 2026

A University of Idaho (U of I) research team is pioneering the use of computer molecular modeling to develop new agricultural fungicides, including some that will attack crop pathogens in novel ways. The approach is akin to methods used in designing pharmaceuticals for human health — developing fungicides by conducting experiments, running computer simulations and combining chemicals to form new compounds. The seven scientists from the College of Agricultural and Life Sciences (CALS), the College of Science (SCI) and the College of Engineering, focusing initially on developing fungicides for potato production.

They've identified several compounds proven to be highly effective against major potato fungal diseases and expect their collaboration to yield new fungicides that U of I will license for chemical companies to produce.

"We've had a high success rate. We've screened fewer than 60 compounds and already have 15 that have some action," said Brenda Schroeder, a CALS researcher with the Department of Entomology, Plant Pathology and Nematology. "Looking at the bigger picture, this approach is adaptable to all pathogen groups in some fashion. This could be expanded past the fungi once the system is in place."

NEW MODES OF ACTION

A key strength of the project is the discovery of compounds belonging to entirely new fungicide classes with unique modes of action — targeting specific aspects of fungal biology to inhibit pathogen growth.

There are 17 fungicide groups. Overusing products from a single group without rotating modes of action can lead to chemically resistant fungi.

"When resistance pops up, there are not a whole lot of options out there," said Marty Ytreberg, a professor with the Department of Physics and director of the Institute for Modeling Collaboration and Innovation.

The researchers are developing compounds that target fungal proteins unused in existing fungicides, seeking to provide growers with new modes of action. Of those screened, Ytreberg anticipates three to five will eventually be commercialised, and two to three new fungicide groups will be introduced to the market.

BUILDING A PROTEIN CATALOG

The team prioritised targeting fungal proteins distinct from those in plants and animals to avoid unintended impacts on crops, human health or the environment. "We've really only targeted a minimal number of proteins that we've identified in fungi as important," said Schroeder, whose lab tests the compounds in greenhouse potato production to ensure spud growth isn't hindered. "We have a large number of proteins that we've identified as important that we could potentially target, so this is just building the foundation."

The team has identified 80 additional compounds that look promising based on modeling and await lab testing.

Once products are proven effective, Ytreberg, Jagdish Patel, with the Department of Chemical and Biological Engineering, and Kristopher Waynant, with the Department of Chemistry, explore chemical modifications to further improve the potential fungicide's performance. Then, Schroeder and Department of Biological Sciences faculty Klas Udekwu and Paul Rowley evaluate them yet again in trials, and Bernards investigates application techniques.

A major challenge is the lack of complete genomic sequences for most commercial crops. Genomic sequencing — deciphering an organism's DNA to reveal genetic information essential for biological functions — is critical for identifying target proteins for pesticide development.

"There are big pieces missing in the agricultural data, and when you move from potatoes to corn to wheat to onions, all of those hosts have very different genomes," Schroeder said.

PLAYING TO THEIR STRENGTHS

About three years ago, Ytreberg and Rowley began recruiting U of I researchers interested in drug design. After struggling to find funding for the work, they pivoted and played to U of I's strength in agricultural science as a land-grant university.

"We put two and two together and said, 'Wait a minute. What are we missing for conducting human research with antifungals? Well, a hospital,'" Rowley said. "Then we came to the realization that we have farm field trials. We have people doing all sorts of great work in agriculture. We have the complete package there."

They recruited Schroeder her expertise in fungal pathology and agriculture.

They've positioned themselves as trailblazers in crop protectant development. While major agricultural-chemical companies use computer molecular modeling to refine products, U of I researchers aren't aware of anyone else applying their strategy to develop compounds.

"This is completely unique in the ag world," Waynant said. "At least for now, we're the only ones doing it."

HELPING POTATO FARMERS

The researchers first targeted four major potato diseases — late blight, Verticillium wilt, Fusarium dry rot and Pythium leak.

They launched the project with a one-year, $100,000 IGEM grant from the state's Higher Education Research Council and, in fall 2025, secured a two-year, $120,000 Specialty Crop Block Grant (SCBG) from U.S. Department of Agriculture's Agricultural Marketing Service, administered by the Idaho State Department of Agriculture.

The team will use SCBG funding to screen compounds against early blight, black dot, silver scurf, Rhizoctonia, pink rot and powdery scab — diseases for which growers currently have few control options.

DESPERATE RACE TO RESURRECT NEWLY-NAMED ZOMBIE TREE

UNIVERSITY OF QUEENSLAND NEWS, 23 JANUARY 2026

A recently identified species in Queensland, Australia, has been given the name 'zombie' by scientists who say ambitious assistance is needed to reverse its 'living dead' status. University of Queensland (UQ) botanist Professor Rod Fensham said it was a race against time to save *Rhodamnia zombi* from the fungal disease myrtle rust.

"This species did not have a name when it was first assessed in 2020, and since then 10 per cent of the trees have died and none of those remaining are producing flowers or fruit because of myrtle rust," Professor Fensham said.

"It is a small to medium-sized tree with large dark green leaves, shaggy bark and hairy white flowers growing in rainforests in the Burnett region.

"The bright yellow fungal pathogen attacks and kills off its young shoots over and over again meaning an infected tree can't grow or reproduce and eventually dies."

Myrtle rust was first detected in Australia in 2010 and *R. zombi* has been added to a list of species classified as potentially critically endangered because of the disease.

"Without any intervention, the 17 species on this Category X list will be extinct within a generation," Professor Fensham said.

"None of them appear to have any resistance to myrtle rust or any wild population which is not yet infected."

Professor Fensham, from UQ's School of the Environment, said the wider Rhodamnia genome provided some hope for the zombie tree with related species displaying myrtle rust resistance.

"A survival strategy starts with finding clean cuttings in the wild before myrtle rust attacks them and propagating them to grow at safe sites," he said.

"So far seedlings are being grown by specialists in Lismore and Townsville which look promising, but they need to be constantly vigilant.

"Hopefully once they produce seed, lurking in the next generation of Rhodamnia zombi some resistance will become apparent."

Ultimately, he hopes resistant individuals can be put back into forests to take their place in the ecosystem.

"It's a long shot and ambitious but the species needs time and space without being constantly walloped by myrtle rust to hopefully express some resistance," Professor Fensham said.

"Left to its own devices, the trees in the wild really will be the living dead."

The research has been published in *Austral Ecology*.

PLANT MICROBIOTA: WAR AND PEACE UNDER THE SURFACE

MANUELA PALMA DE FIGUEIREDO, UNIVERSITY OF LAUSANNE (UNIL) NEWS, 3 OCTOBER 2025

When we talk about microbiota, we usually think of the one inhabiting our gut. But there is another, less known and equally vital: the plant microbiota. In an article featured on the cover of "Science" (October 2, 2025), Professor Niko Geldner and his team at the University of Lausanne (Unil) unveil the subtle alliances and rivalries that unfold between bacteria and roots, hidden beneath the soil.

ROOTS AND MICROBES

The plant microbiota, or "phytobiome", brings together communities of bacterial and fungal microorganisms that can be partners, allies – and sometimes enemies. The part most closely associated with roots is called the "rhizospheric" microbiome, from greek "rhizo-" (root). To assemble specialised and protective microbiome, plants selectively recruit these bacteria from the soil. The fragile balance of the microbial community influences the plant's growth, health, and ability to withstand environmental stress. When plants are weakened, some microbes can even switch roles and become pathogens.

ROOT EXUDATES: THE KEY TO RECRUITMENT

How do plants choose their microbial partners? By releasing a complex cocktail of molecules called "root exudates". These exudates contain sugars, amino acids, and other organic compounds. Whereas it was known that these compounds are of great importance for bacterial colonisation, little was known about how, where, and when exudates are released at the microscale relevant to microorganisms.

This is the puzzle researchers at Unil set out to solve, in close collaboration with Dr. Feng Zhou (CEMPS, Shanghai) and German colleagues.

WHEN THE BARRIER BREAKS

Much like the intestinal epithelium in animals, the plant root endodermis acts as a selective filter, preventing the leakage of energy-rich compounds from their central transporting vein into the soil. But during growth, this barrier can temporarily break: "For example, when a lateral root emerges from the main root, part of the barrier breaks down to allow the radicle to come through," explains Niko Geldner, co-senior author of the article. "Although the broken barrier will soon be repaired, the rupture causes a temporary outflow. Bacteria then cluster and proliferate precisely at that spot. The question was: what attracts them and makes them proliferate?"

From this came the scientists' hypothesis: Alteration of the endodermal barrier influences microbial recruitment and the composition of the bacterial communities. The challenge was to uncover the mechanism behind this phenomenon. To do so, mutants of the model plant *Arabidopsis thaliana* (thale cress), completely lacking endodermal barriers, were used. "Our observations confirmed that changes in endodermal barriers profoundly affect bacterial colonization," says Niko Geldner. "We therefore wondered whether the bacteria were especially fond of one or more particular substances that were leaking". Making use of their Arabidopsis mutants, the team then discovered a significant accumulation of amino acids – especially glutamine – in the exudates.

GLUTAMINE, A BACTERIAL BEACON

Glutamine plays an important role in transporting nitrogen from root to shoots and was a prime candidate for the researchers. At this stage, the expertise of Prof. Christoph Keel's laboratory at Unil's Department of Fundamental Microbiology came into play. For several decades, his team has studied a very specific bacterium, *Pseudomonas protegens* CHA0, which grows well on various plants, including the roots of thale cress, and can protect them from fungal diseases. To see whether this bacterium is attracted to glutamine, the researchers genetically manipulated this model bacterium: "We generated bacteria that had specifically lost their ability to 'sense' glutamine. Intriguingly, these bacteria were unable to find the sites where lateral roots were emerging," reports Dr. Huei-Hsuan Tsai, postdoctoral researcher in Geldner's group and co-first author of the study. Moreover, the researchers were also able to observe that the bacteria use glutamine for their growth, by developing a fluorescence reporter system that only switches on when glutamine is metabolised.

This amino acid thus acts as a major signal allowing bacteria to find and colonise precise leakage sites on the root surface. "We showed that the bacteria metabolically adapt to this glutamine-rich niche and use it as an energy source, which enables them to proliferate even more," adds Huei-Hsuan Tsai.

A CHALLENGE FOR SUSTAINABLE AGRICULTURE

These findings demonstrate that localized glutamine leaks shape bacterial colonisation and highlight the fine-tuned interactions between roots and microbes. Geldner's team now aims to identify other attractive compounds, especially those released under stress conditions (drought, salinity, heat).

Could such discoveries be applied to agriculture, at a time when reducing fertilizers and pesticides is a priority? "This is the dream of many researchers. Yet each soil has its own unique microbiota, making it difficult to ensure that a specific bacterial strain will take hold and protect a given plant." warns Niko Geldner. Laboratory experiments are needed to uncover general principles of interaction between roots and bacteria, using simplified microbial communities. "What is certain," he concludes, "is that plant health depends on their microbiota. Without better knowledge of their interactions with roots, we will never truly understand what happens in our fields."

CURRENT VACANCIES

There are no current vacancies.

ACKNOWLEDGEMENTS

Thanks to Grahame Jackson, and Greg Johnson for contributions.

COMING EVENTS

8th International Bacterial Wilt Symposium (IBWS)
22 March – 26 March, 2026
Wageningen, the Netherlands
Website: event.wur.nl/ibws2026

71st Annual Conference on Soilborne Plant Pathogens and the 56th California Nematology Workshop
24 March – 26 March, 2026
Kearney Agriculture Research and Extension Center in Parlier, CA, USA
Website: soilborneplantpathogens.org

21st Reinhardsbrunn Symposium 2026 – Modern Fungicides and Antifungal Compounds
19 April – 23 April, 2026
Friedrichroda, Germany
Website: https://reinhardsbrunn-symposium.de/de/

VIII International Symposium on Postharvest Pathology
18 May – 22 May, 2026
Ullensvang, Norway
Website:
https://nibio.pameldingssystem.no/isphpp2026#/contact-2228

36th Symposium of the European Society of Nematologists
1 June – 5 June, 2026
Egmond aan Zee, The Netherlands
Website: www.esn2026.nl/home

25th Annual Fusarium Laboratory Workshop
21 June – 26 June, 2026
Manhattan, Kansas, USA
Contact: John Leslie jfl@ksu.edu

Plant Health 2026
1 August – 4 August, 2026
Providence, Rhode Island, USA
Website:
www.apsnet.org/meetings/annual/PH2026/Pages/default.aspx

Plant Pathology 2026
8 September – 10 September, 2026
John Innes Centre Conference Centre, Norwich, UK
Website: Not yet available

13th Australasian Soilborne Diseases Symposium
14 September – 18 September, 2026
Melbourne, Australia
Website: www.asds-apps.com

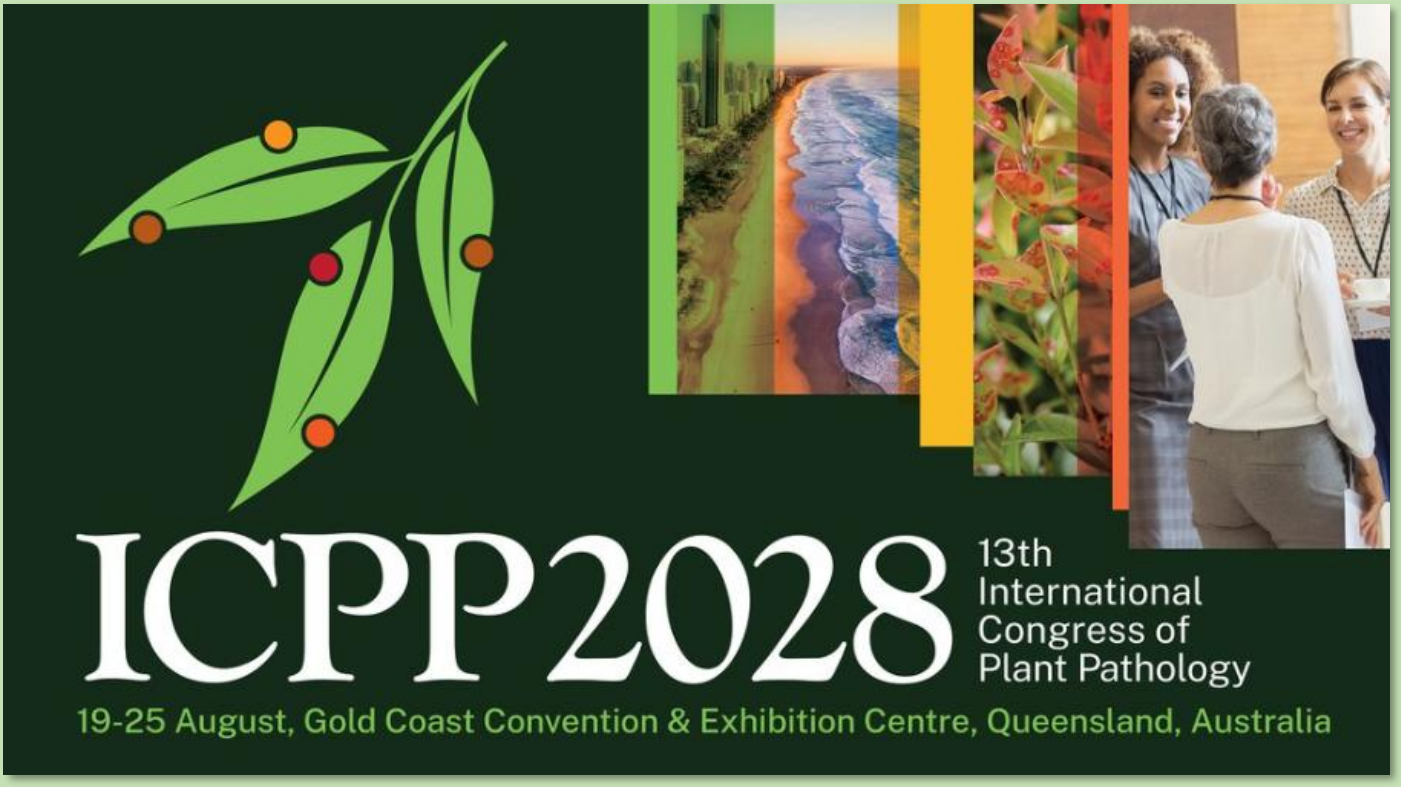
20th IOBC – WPRS Working Group meeting on: "Integrated Control in Oilseed Crops"
29 September – 1 October, 2026
Swedish University of Agricultural Sciences (SLU), Campus Alnarp, Lomma, Sweden
Website: www.slu.se/ICOC20

7th International Symposium on Fusarium Head Blight
5 October – 8 October, 2026
Department of Agricultural, Food and Environmental Sciences, University of Perugia
Perugia, Italy
Website: www.7isfhb.org

International Phytobiomes Conference 2026
3 November – 5 November, 2026
Niagara-on-the-Lake, Ontario, Canada
Website: https://phytobiomesconference.org/

International Plant Protection Congress
Dates not announced yet, 2027
Christchurch, New Zealand
Website: www.plantprotection.org

13th International Congress of Plant Pathology 2028
19 August – 25 August, 2028
Gold Coast, Queensland, Australia
Website: www.icpp2028.org


ICPP2028
13th International Congress of Plant Pathology
19-25 August, Gold Coast Convention & Exhibition Centre, Queensland, Australia

INTERNATIONAL SOCIETY FOR PLANT PATHOLOGY (ISPP)

WWW.ISPPWEB.ORG

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