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TECH FARMER

TECH MAGAZINE

TECHNOLOGY FOR FARMING

AI in Farming

LEARNING ABOUT **AI IN FARMING**

WRITTEN BY CHRIS FELLOWS

We're constantly told that artificial intelligence (AI) is going to transform farming. There's no shortage of tech companies, startups and big ag players developing AI-powered solutions for farmers. But very few people have stopped to ask: what do farmers actually want or need from AI? More importantly, what tools already exist, and how can we make them work for us right now?

This article isn't about future promises. It's about equipping farmers with practical skills to start benefiting from AI today, using freely available or affordable tools that can make everyday jobs quicker, simpler, and perhaps even more profitable.

Farming Needs Farmer-Led AI

Much of the current AI buzz centres around data collection, analysis and prediction; primarily designed to feed corporate dashboards rather than help you work your fields more efficiently. These tools can be valuable, yes, but they're rarely shaped by farmers themselves.

Our goal is different. We want to help farmers cultivate AI skills that give them control over how these technologies are used. We're not developing tech in a lab; we're starting in the field, asking real questions like:

- What AI tools are you already using (if any)?
- What kind of tasks would you like to automate or improve?
- How do we build confidence using AI without jargon or complexity?

Practical AI: Tips, Tricks and Today's Tools

While most headlines focus on flashy farm robots and complex imaging systems, some of the most powerful AI tools are already sitting in your pocket

Did You Know All These AI Models Exist?

Here's a quick look at the main players in AI today:

Model Family	Developer	Open Source?	Strengths
GPT (ChatGPT)	OpenAI	*Partially*	Multimodal, coding, strong reasoning
Gemini	Google DeepMind	*No*	Search integration, Google ecosystem
Claude	Anthropic	*No*	Long context, safe, aligned outputs
Llama	Meta	*Yes*	Fast, research-focused, open-source
Mistral	Mistral AI	*Yes*	Lightweight, efficient, on-device friendly
Grok	xAI (Elon Musk)	*No*	Integrated into X (formerly Twitter)
Command R+	Cohere	*No*	Excellent at pulling in external documents
Jurassic	AI21 Labs	*No*	Writing-focused, creative tasks
Falcon	TII (UAE)	*Yes*	Strong open-source alternative

or on your laptop. Language models like ChatGPT, for example, can help to:

- Write grant applications or stewardship paperwork
- Translate supplier emails or technical documents
- Draft health & safety protocols or job descriptions
- Summarise complex regulations or farming guidelines
- Create rotas or convert field notes into Excel spreadsheets

But it's not just about ChatGPT. There's a growing list of language models, each with different strengths.

The Challenges: Not Built for Farmers (Yet)

If you've ever asked an AI model a farming question, you've probably noticed that the answer is often skewed towards American practices. That's because the bulk of training data for many models is drawn from global sources, with a heavy US. bias. Regulations, terminology and farming systems don't always translate neatly to UK fields.

You can improve results by adding "UK only" or "according to UK law" into your prompts, but even then, the AI may struggle. That's part of the reason we believe farmers need better training, not just in what AI is, but in how to talk to it.

Crafting good prompts is half the battle. It's like asking a contractor to build a shed you'll get very different results depending on whether you hand them a sketch on a napkin or a proper plan. With AI, the more specific and detailed your prompt, the better your outcome.

Our Next Steps: Workshops and a Farmer-Led Survey

We want to understand where farmers are starting from. Whether you've never used AI in your life or you're already tinkering with it to write a nutrient management plan, we want your input.

We're launching two simple but important initiatives:

A survey to understand:

- How farmers are currently using (or not using) AI
- What problems you'd most like AI to help solve
- What training formats work best (video, in-person, printed guides)

A series of practical workshops:

Held at the Agri-Tech Centre at Harper Adams, these will offer:

- Live demos of tools like ChatGPT and Claude in a farming context
- Prompt-writing exercises tailored to agricultural needs
- Examples of real-time use in farm management, record keeping, and even diversification projects

The workshops will focus on low-cost or free tools, not expensive enterprise software. You'll walk away with hands-on skills and confidence, not buzzwords.

We Need You, No Experience Required

You don't need to be a tech expert, or even comfortable with computers. In fact, the newer to AI you are, the better. We want to create training that meets people where they are, not where tech companies assume they are.

We're particularly keen to involve farmers of all ages, backgrounds and sectors, from mixed farms and hill sheep to arable and horticulture. Whether you're using a notebook in the cab or a spreadsheet on your phone, your input will help shape something genuinely useful for farming.

Final Thought

AI isn't the solution to every farming challenge. But it is a powerful tool if we know how to wield it. This is about giving farmers the skills and confidence to use AI on their own terms. To make their jobs easier, not harder. To use technology to serve the people who grow our food, not the other way around.

So, if you've ever wondered what all the fuss is about, or if AI could save you time and stress, now's your chance to find out, with people who speak your language.

Take the survey and sign up for a workshop. Let's build the future of AI in farming, from the ground up.

Scan the QR code to take the survey

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ON-FARM TRIALISTS 'LEAD THE FIELD'

The British On-Farm Innovation Network (BOFIN) encourages farmers to 'lead the field' in agricultural innovation by taking part in Defra-funded projects that are changing the shape of the industry. Here we catch up with the latest updates across its collaborative projects.

SLIMERS PROJECT ADVANCES IN THE BATTLE AGAINST SLUGS

Farmers involved in a major slug project are planning to patch-treat against the pest this autumn, guided by novel risk-prediction maps. Working with scientists and innovators, they are gaining ground in their battle against the slimy pests.

SLIMERS – Strategies Leading to Improved Management and Enhanced Resilience against Slugs – is a three-year £2.6M research programme involving more than 100 farms and seven partners.

Funded by Defra's Farming Innovation Programme, which is delivered by Innovate UK, the project is led by the British On-Farm Innovation Network (BOFIN). It combines expertise from partner organisations the UK Agri-Tech Centre, Harper Adams University, the John Innes Centre, Fotenix, Farmscan Ag and Agrivation. Together they are developing cost-effective forecasting and precision treatment tools, including AI-based autonomous slug monitoring and biological control and exploring 'slug resistant' wheat varieties.

Professor Keith Walters

Slug patch prediction

Now entering the third and final year of the project, researchers at Harper Adams University believe they have a reliable model to predict slug patch location. Created with data from farmers' slug monitoring activities over the previous two years of the project, combined with extensive soil mapping and testing, the model predicts areas in their fields with a high likelihood of containing slugs.

The next step is for the team of Slug Sleuth farmer trialists to put the model to the test – using it for selective applications of slug pellets rather than blanket application. The data collected will also be used to further develop the model.

Professor Keith Walters, who leads the work at Harper Adams says: "We've known for some time that slugs gather in patches, but prior to SLIMERS we didn't understand fully the specific factors that cause this and how the patches can be reliably located.

"Thanks to the data collected by the Slug Sleuths we now have that understanding and are using our predictive model to produce detailed risk maps for their fields. In 2025-6 we are asking them to treat only the predicted slug hotspots to fine-tune the models and bring the vision of precision pest management closer to reality."

AI identification & precision control

The UK Agri-Tech Centre, Fotenix and Farmscan Ag are working on AI identification of slugs, and precision biological control in the form of nematodes.

Fotenix CEO Charles Veys says: "Our role is to build AI-powered slug detection, right there in the field. But first, we've got to train the AI, and that means putting slugs in the crosshairs."

UK Agri-Tech Centre research associate Dr Kerry McDonald-Howard has been training and collecting data on Fotenix's AI-based multi-spectral imaging cameras in a lab and in the field, before taking to Slug Sleuths' farms for testing, helping pinpoint the exact spectral signature of the unwelcome visitors. As slugs don't tend to surface

Dr Kerry McDonald-Howard

until after dark this has meant heading out in the small hours to collect the training imagery data.

Dr McDonald-Howard says: "By harnessing AI and multi-spectral imaging, we are making significant progress towards in-field detection and identification of slugs. The next phase is to integrate this technology with precision application, enabling targeted biological control with nematodes for greater accuracy and efficiency.

"Through SLIMERS, we are translating advanced research into practical tools that have the potential to transform and future-proof slug management for UK farmers."

The team at Farmscan Ag are working on a system with the smallest spray width possible which will be added to an existing autonomous farm vehicle.

"We are aiming for 25cm or less, which would mean four nozzles per metre," explains director Callum Chalmers. "We are running the first trials at the end of 2025, then field trials will be in full swing in early 2026."

Slug Sleuth

The data on slug activity collected by the 20 Slug Sleuth farmers has proven valuable not just for the project researchers – the farmers have gained from the increased insight too.

Adam Hayward farms at Bishop

A Slug Sleuth checks the traps

Burton in East Yorkshire. He says: "I don't feel like we are ever on top of slugs and I couldn't see a long-term solution. There must be a better way to control slugs, which is exactly what the project is looking to develop."

Like the other Slug Sleuths, Adam is paid for his time spent on the project monitoring slug traps weekly and recording data via a smartphone app.

Adam Hayward

"I soon learned which traps would have the most slugs. I didn't know where they were before and found there was huge variation within just a few metres and between different days. It's illustrated to me how spreading pellets across the whole field really isn't the way to go."

'Slug resistant' wheat

The final element of the project

Slug damaged wheat

is exploring 'slug resistant' wheat varieties. Since discovering that one of the Watkins collection of landrace wheats at the John Innes Centre appeared to have slug resistant qualities, Dr Simon Griffiths and his team have been investigating further to identify the genes responsible for the apparent resistance trait and whether it could be introduced to commercial varieties. This work is supported by Dr Victor Soria-Carrasco and his team in the insectary who are continuing feeding trials with slugs on the unusual wheat line, Watkins 788.

In year two of SLIMERS Simon and Victor teamed up with Harper Adams University and six Slug Sleuths to trial a selection of Recombinant Inbred Lines – Watkins 788 crossed with Paragon – with additional monitoring to see if indeed these varieties are spurned by slugs.

Tom Allen-Stevens, BOFIN managing director says: "This is research that would never have progressed if farmers hadn't shown an interest. We now know from our field trials there

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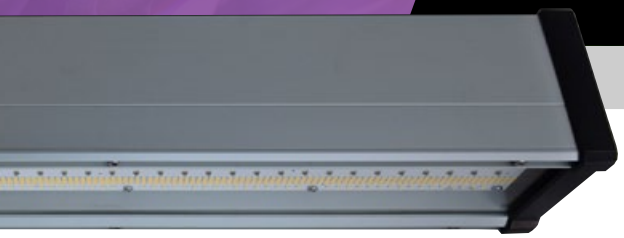

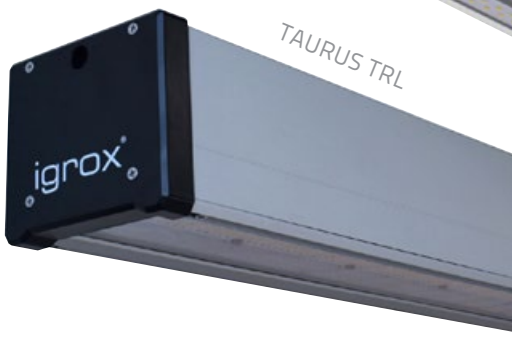

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is something in the genetics of this fascinating wheat that does indeed spurn slugs. The team at John Innes Centre have made progress on sifting through the massive wheat genome to pin down the genes responsible. We'll be doing more field trials this autumn to help them in their quest.

"In the meantime, we will soon have a service that we can roll out as a tool that all UK farmers will come to rely on to reduce their reliance and expenditure on pellets to control arable farming's biggest pest. With increasing pressure on chemical control, finding sustainable and environmental solutions has never been more important."

Tom Allen-Stevens

THREE YEARS OF PULSE PROGRESS

The Nitrogen Climate Smart (NCS) project is now in its third year, and there's plenty to celebrate, say the 17 project partners. The ambitious project aims to help UK farmers cut their carbon footprint by including more pulse crops in arable rotations – and livestock diets.

The NCS project is showing real promise as it heads into its final full year of field trials, says Roger Vickers, CEO of PGRO which leads the project. "We have now completed the second year of cropping trials so are beginning to have some interesting results which are confirming the enormous potential there is for pulses in UK agriculture.

"Together we are exploring all aspects


Roger Vickers, CEO of PGRO

of the production of peas and beans from agronomy to harvest through to processing and use in livestock feed."

Project partners believe that if pulse production was increased to 20% of UK cropping, around 50% of the imported soya currently consumed by UK livestock could be replaced by homegrown peas and beans. This could lead to carbon savings of around 3.4Mt CO2 equivalent.

John McArthur, of partner organisation McArthur BDC explains that this is equal to a 7% reduction in UK agriculture's emissions. "This one intervention would make a huge difference to both the arable and livestock sectors and is something that with continued progress we believe can be achieved," he says.

Part of the project led by McArthur BDC is exploring the effect of dehulling and thermal treatment on the nutritive value of beans to increase the soya substitution potential of faba beans, he explained. Other partner organisations are looking at the production side aiming to increase knowledge of pulse crops.

This includes trials by partner organisations and the Pulse Pioneer farmers which all look at optimising production. As the project progresses trials are looking at the legacy effects of pulses – comparing the effect of beans on subsequent crops as well as different treatments designed to optimise production. ADAS is also combining these findings with data from the Pulse


John McArthur, of partner organisation McArthur BDC

Yield Enhancement Network (YEN).

BOFIN recruits and supports the farmer trialists in the project. Managing director Tom Allen-Stevens, who is also a Pulse Pioneer, explains that that more are needed for the 2025-26 trials.

"We currently have 23 farmer trialists on this project and need to increase that to 40 for the upcoming year," he says. "We are looking for farmers who are at the top of their game and keen to know how they can grow beans better and share that knowledge with other farmers.

"Pulses promise huge opportunities for UK agriculture, and our Pulse Pioneers are driving that."

NEW ADOPT FUND EMPOWERS FARMERS TO TRIAL INNOVATIVE IDEAS

Farmers have an exciting opportunity to put their own ideas to the test on their farms, thanks to the Accelerating Development of Practices and Technologies (ADOPT) Fund, which opened for applications in June.

Part of Defra's Farming Innovation Programme and delivered by Innovate UK, the ADOPT Fund offers grants of £50,000 to £100,000. The aim is to support collaborative, farmer-led trials of the latest agricultural practices and technologies.

Projects are encouraged to tackle key challenges such as improving productivity, resilience, and sustainability. Importantly, these trials are designed to benefit both participating farms and the wider industry by sharing valuable knowledge and building confidence in new approaches.

BOFIN has been named an official ADOPT Project Facilitator, ready to help farmers develop strong proposals, build collaborations, and manage projects. This support allows farmers to focus on running meaningful trials while BOFIN handles the paperwork and partnership building.

Laura Beaumont, BOFIN's Head of Projects, says: "We're here to make it easier for farmers to bring their innovative ideas to life. By supporting them every step of the way, from application to delivery, we hope to help drive practical changes that benefit both individual farms and the whole sector."

For more information about the ADOPT Fund and how BOFIN can help, visit **www.bofin.org.uk/adopt**

GROWERS NEEDED TO PIONEER PRECISION-BRED CROPS

Farmers are invited to explore opportunities to be paid to trial novel crop traits on their farm with Defra-funded projects for 2025-26.

PROBITY is bringing precision-bred crops onto commercial farms for the first time in Europe. In 2025-26, this will involve growing varieties produced through TILLING (Targeting Induced Local Lesions in Genomes) to test traits also being introduced by gene editing.

Two of the three TILLING varieties demonstrate 'enhanced gravitropism', resulting in deeper rooting. The project team is particularly interested in hearing from growers in drought-prone areas to test these varieties.

'PROBITY Pioneer' trialists need to be committed to the project's goals and able to demonstrate high standards of practice and professionalism, explains Andrew Newby, who drafted the grower guidelines for the trials.

"There are some important stipulations for our PROBITY Pioneers in order to retain integrity of the trials. This includes a requirement for separate storage for the PROBITY grain, the ability to clean down all farm equipment used in the trial after use, and rogue out off-types from their plots," he says. "We will also need them to be meticulous with their record-keeping and be happy to share their experiences with other farmers."

There is also the opportunity to join the NCS project as a 'Pulse Pioneer', which involves running a pulse trial. This is a pea or bean field in which an area is not growing a pulse crop (eg spring oats) that then comes back into the same crop as the rest of the field the following year. An additional product/practice should be trialled across at least two tramlines. Pulse Pioneers are also required to take samples throughout the project, a process managed through ADAS YEN, and to complete an annual carbon footprint through Farm Carbon Toolkit.

The SLIMERS project is also seeking additional 'Slug Sleuths' to join the team for the 2025-26 season. For 2025-6 this will involve patch-treating against the pest this autumn, guided by novel risk-prediction maps. Additionally, BOFIN is interested in hearing from farmers intending to grow spring wheat in 2026 who would like to join the TRUTH project as a 'Root Ranger', to explore soil and root health.

Tom Allen-Stevens, BOFIN managing director says: "The Root Rangers will get the opportunity to grow and monitor the only wheats in the world known to have the natural ability to control the rate at which nitrogen is processed in the soil – the exciting trait of biological nitrification inhibition.

"That's just one of a number of opportunities we are offering to farmers to shape the future of farming. Farmers have the opportunity to lead the field – while getting paid for their time. Our on-farm trials are opening doors for forward-thinking growers to test cutting-edge innovations, influence research, and directly benefit from the results but also from collaboration with leading scientists.

"We welcome anyone with an interest in on-farm trials, and any of our projects, to find out more and register their interest with us."

For more information and to register interest visit **www.bofin.org.uk/LeadtheField**

NEW TECHNOLOGY LETS FARMS **'STEAM'-ROLL WEEDS & PESTS**

Written by John Dobberstein and originally publish in No-Till Farmer USA

Plough it, spray it, crowd it, fry it - There are many ways to kill weeds, pests and diseases – and there's a new technology emerging that allows farmers "dry clean" their fields, so to speak.

The Propane Education & Research Council (PERC) recently unveiled an eco-friendly solution for "soil disinfection" with the propane-powered soil steamer. PERC says the machine can, "address one of farmers' biggest challenges in modern agriculture: how to effectively eliminate weeds, soilborne pathogens, and nematodes without relying on chemical pesticides."

The machine's banded steam design targets the top 1-2 inches of soil, the critical zone where weed seeds germinate, providing 80% weed control for both conventional and organic crops, says Mike Newland's Mike Newland, PERC's director of agriculture business development. The system can cut weeding labour costs in half, increases yields and reduces the dependency on harmful fumigants and herbicides, he says.

PERC cites studies showing the steamer manages 90-95% of annual weeds such as purslane and pigweed, and controls major soilborne diseases like fusarium, pythium and verticillium. When used for lettuce cultivation, it has been shown to increase yield by 25% in fields affected by lettuce drop.

The technology also provides an estimated 73% reduction in weeding time compared to traditional herbicides.

Years in the Making

Steaming has been used successfully before to disinfect soil but was too costly and time-consuming for large-scale operations. Steamer increases the size of crops such as lettuce and carrots and

enables shorter crop rotation intervals, allowing for more frequent planting of high-value fruits and vegetables, Newland says.

At the current time the technology isn't cost effective for production fields with thousands of acres. Newland says he can't speculate if the steam would harm beneficial insects or soil organisms that many no-tillers work hard to protect.

Newland credited Dr. Steve Fennimore, a weed management specialist at the University of California-Davis research station in Salinas, Calif., for researching the technology here and in other parts of the world. PERC helped fund some early research. Newland says Fennimore spent much of his career, "trying to figure out exactly the appropriate temperature and appropriate duration of that temperature in soils to be the most beneficial."

There's been different iterations of field equipment with steam applications that Fennimore designed, and he also brought some equipment over from Europe to test, Newland says, but none of it was as effective enough. Fennimore approached PERC a couple of years ago to partner on a steam-related project, and Fennimore and his UC-Davis team developed the current machine from scratch.

When the buildout date arrived, the concept was taken to Valley Fabrication in Salinas, which makes custom field equipment for high-value crops in the region. "It does a great job of doing exactly what Steve and his team were hoping for. And the results are tremendous, so we're excited about it," Newland says.

"There's steam units in other parts of the world. But this unit is very unique because it doesn't move, stop and steam a block of ground, if you will. It's constantly moving, and I think that very unique feature allows for Steve to control that temperature output and the duration of that temperature."

Technology Promise

The original unit is mostly used in the lettuce industry in Yuma, Ariz., and testing is being done in carrot and strawberry crops. Valley Fabrication is preparing to build the second machine, which has already been spoken for. Newland declined to say who purchased it.

While the technology has a lot of promise, Newland says the machine is probably too expensive to run on row-crop fields with thousands of acres. He predicts most of the machines, for now, will be custom built because there is, "just enough variation in application or cropping techniques that nobody will want to pay for them to sit in a barn for most of the year."

Newland isn't ruling out the steam technology playing a future role controlling weeds and pests on production farms.

"If it moves to the Midwest," he says, "it would probably be for the toughest conditions, just from a cost-per-acre standpoint. We hate to think we'd want to do every acre for herbicide-resistant weeds. But we may reach a point where different measures are needed to control those things."

Innovative, propane-powered soil steam technology is a breakthrough method for eliminating soil pathogens and weed seeds, particularly beneficial for organic farmers or those looking to reduce the use of potentially harmful chemicals. This newest technology leverages the power of propane to create a more sustainable and effective solution for soil sanitization.

Researchers at the University of California Davis and University of Arizona began the project in 2020 with funding support from the Propane Education & Research Council (PERC). The banded applicator injects steam along the seed line before planting. Researchers say heating the soil to 150-160 degrees Fahrenheit for 15-20 minutes controls more than 90% of certain troublesome weeds.

What Is Soil Steam Technology?

Propane soil steam technology involves using steam to sanitize the soil, killing pathogens, pests, and weed seeds. Soil steam equipment uses propane to heat water and create steam, which is then injected into the soil. This method is environmentally friendly, reducing the need for chemical pesticides or herbicides, making it an ideal solution for organic farmers and beyond.

Why Propane?

Environmental Sustainability: Unlike chemical herbicides, which can contaminate soil and water and harm non-target organisms, soil steam technology relies solely on heat while remaining extremely effective. Propane produces fewer emissions, reducing the environmental impact of farming operations, and produces minimal emissions compared to gasoline or diesel, making it a greener choice for pest and weed control.

Effective Pathogen and Weed Control: Propane-powered soil steam units effectively eliminate a wide range of soil pathogens and weed seeds. The high temperatures achieved by these units ensure thorough sanitization for healthier crop growth.

Improved Soil Health: Soil steaming technology reduces the need for chemical treatments, for optimal soil health and minimal ecosystem interruptions. Healthy soil supports better crop growth for higher yields and better-quality produce.

Organic Farming Compliance: Propane-powered soil steam units align with sustainable farming principles and practices. Farmers using soil steam technology can easily meet organic certification requirements

Real-World Experiences

Recent field testing showed the soil steaming process reduced weeding times by 73% compared to standard herbicide, and increased lettuce yields by 25% where lettuce drop was present. Propane also presents significant fuel cost savings compared to diesel models.

Steve Fennimore, professor of Cooperative Extension at the University of California-Davis, has been conducting a research and extension program focused on weed management since 1997 and is currently focusing on the development of field-scale steam applicators

to reduce the need for chemical fumigation.

"An incredible benefit to this technique is that we don't have to treat the entire field and are instead able to target exactly where the disinfestation is needed," said Fennimore. "Not only does soil steam technology allow producers to get into the field almost immediately after using it, the effects last weeks to months because it takes a while for the pest to reinvade what is now clean."

By integrating new propane-powered soil steam technology into weed and pest management efforts, farmers can enhance crop quality, boost yields, and contribute to a more sustainable future in agriculture.

Case Study

Steam: Sustainable management for weeds, soil pests

Based on article from by Trina Kleist, UCDavis

Steam treatment of soil offers growers a viable alternative to chemicals and a money-saver for organic farmers. She is assessing the impacts on weeds, soil-borne disease and the soil biome of steam treatments used to disinfest lettuce and spinach fields in the Salinas Valley.

She works with Steve Fennimore, a professor of Cooperative Extension in the UC Davis Department of Plant Sciences, and she presented her research during the poster session at the recent Automated Technology Field Day here.

Steam injected into the ground is hot enough to kill most weed seeds in the soil after cultivation, making it a sustainable alternative to both chemical herbicides and hand-weeding, Escalona said. With temperature above 160 degrees Fahrenheit for 10 to 20 minutes, steam also kills pathogens such as Fusarium, Pythium and Sclerotinia -- all fungi that grow in the soil. They can cause plants to rot from the roots and die, causing farmers to lose production.

"It's a balance," Escalona said. The steam can't be too hot, or it could kill things living in the soil that help the plants. "At 70 degrees Celsius, we're finding good recovery of the soil microbiome after 30 days, including the beneficial organisms."

Erika Escalona is a graduate student working with Steve Fennimore, in the UC Davis Department of Plant Sciences. The machine shown here is a custom-built steam applicator, used to tackle pests in the soil before planting. (Trina Kleist/UC Davis)

Steam treatment was used as early as the 1880s, mostly in greenhouses but also in fields, to battle weeds and disease, Escalona said. It fell out of favor when chemical pesticides became more prevalent in the 20th century.

Previous studies have shown steam treatments reduced weeds and boosted lettuce yields. In addition, steaming appears to reduce the fungus Fusarium; and the tiny balls, or microsclerotia, that allow fungus to survive in the soil, according to Fennimore's research.

"It also offers a tool for organic farming to deal with pests, because right now they don't have a lot of options," Escalona said.

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