

Technology puts bacteria to work

Karsten Temme produces nitrogen through crop's microbiome

By JULIA HOLLISTER
For the Capital Press

OAKLAND, Calif. — During the time Karsten Temme was studying biomedical engineering in Iowa he saw a need for farmers to have internet access to support their operations.

"I started a company to provide a wireless link to the internet, especially for markets that didn't have cable or DSL," he said. "Through this experience I gained an appreciation for the challenges growers face, including the prohibitive cost of fertilizer."

After a chance meeting with a fellow Ph.D. student at the University of California-Berkeley, the two created a shared hypothesis: What if microbes could be re-programmed, like computer programs, to meet a specific need?

"We married our skillsets of microbiology, genetics, engineering and computer programming and founded Pivot Bio in 2011 to identify, characterize and fine-tune microbes to produce nitrogen on demand within plant roots," he said.

The company uses what it calls ON (Optimized for Nutrients) Technology.

"Our patented process uses the crop's own microbiome to produce nitrogen for the plant," he said. "Decades of fertilizer use have caused this



Karsten Temme, CEO of Pivot Bio, illustrates how microbes live in symbiosis with a corn plant's root system. He says this innovative technology is effective in fertilizing crops and increasing yields.

natural process to go dormant in the field. We've been able to reawaken and amplify the ability of these microbes to fix nitrogen into forms the plant can use."

After years of research, study, testing and tweaking, he said the company has moved past the introductory phases and now has data to show that ON Technology is not only viable, but also effective in fertilizing crops, increasing yields and positively impacting the environment.

"Our ON Technology will initially be available for corn planting in spring 2018," Temme said.

In the future, he plans to

expand the technology to other crops.

ON Technology is applied through seed coatings or in-furrow at planting. The microbes work in synergy with the crop's root system to deliver nitrogen during the growing season. This is ideal, he said, because it provides nitrogen when the crop needs it most — as the plant matures and grain develops.

"We're aiming to produce over 150 pounds of nitrogen per acre," Temme said. "This will allow farmers to use less fertilizer and avoid the time and expense of in-season side-dress applications."

In approximately two years,

the product will be offered to growers nationwide.

This year the company will expand to the development of microbes that will increase access to other nutrients, such as phosphorus and potassium, in wheat, sorghum and rice.

"Excess use of fossil-fuel derived nitrogen fertilizers is a world-wide problem that impacts both the sustainability of agricultural practices but also associated environments that are negatively impacted," said Gary Stacey, a professor of plant science at the University of Missouri.

"However, any solutions to this problem must themselves be sustainable and, perhaps



Western Innovator

Karsten Temme
Age: 38

Residence: Oakland, Calif.

Occupation: CEO, Pivot Bio

Education: BS and MS in biomedical engineering from the University of Iowa, Ph.D. in bioengineering from the University of California-Berkeley and the University of California-San Francisco.

Quote: "I have a passion for improving the productivity and sustainability of global agriculture by expanding access to innovative technologies."

more importantly, protect crop yields, which ultimately control profitability," he said. "Karsten Temme with Pivot Bio is seeking this type of solution by focusing on bacteria that promote plant growth while providing the nitrogen so essential for maintaining yield.

"Pivot Bio is at the vanguard of a worldwide phenomenon in which biologicals (e.g., bacteria) are being sought that can take the place of environmentally detrimental chemicals to support sustainable agriculture, including cropping practices widely practiced in California," Stacey said.

Scholarships available for Clackamas students

The Clackamas, Ore., Soil and Water Conservation District is offering local students two \$3,000 scholarships for the 2018-19 school year.

To be eligible, a student must:

- Be a graduate of a Clackamas County high school or a current resident of Clackamas County.
- Be at the sophomore level or above working toward an associate, bachelor or graduate degree.
- Be a full-time college

student (12 hours or more per quarter or semester equivalent) studying agriculture, natural resource sciences, or a related field such as horticulture.

• Have a minimum cumulative grade point average of 3.0.

Previous recipients may re-apply for the scholarship annually.

The scholarship may be used toward an associate, bachelor or graduate degree. Applicants must have completed their freshman year

and will be considered a sophomore or higher in fall 2018 to be eligible for the award.

Clackamas County is ranked fourth in agricultural sales in Oregon. It is also known for its abundance of natural resources, including popular recreation areas and the drinking water source for the Portland metropolitan area. For this reason, the Clackamas Soil and Water Conservation District is committed to supporting local students who care about

natural resources and wish to promote conservation, impacting future natural resource decisions, according to a district press release.

The goal is to assist college students majoring in the fields of agriculture (including horticulture), natural resource science, or a related discipline. With the cost of education skyrocketing, the district board feels strongly about providing financial resources to help support future conservation professionals.

Over the last six years the district has offered nearly \$30,000 in scholarships.

Previous applicants used their scholarship to pursue studies in engineering, veterinary medicine and agriculture. Our recipients attended local community colleges as well as four-year colleges and universities.

Download an application at <https://goo.gl/S7yqTW>.

Applications must be received by 4:30 p.m. April 6.

Calendar

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20 Northwest Locations

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To submit an event go to the Community Events calendar on the home page of our website at www.capitalpress.com and click on "Submit an Event." Calendar items can also be mailed to Capital Press, 1400 Broadway St. NE, Salem, OR 97301 or emailed to newsroom@capitalpress.com. Write "Calendar" in the subject line.

Through Saturday Jan. 27

EcoFarm Conference. Asilomar Conference Grounds, 800 Asilomar Ave., Pacific Grove, Calif. The Ecological Farming Association (Eco-Farm) presents the 38th annual Eco-Farm Conference. Featuring over 70 workshops, intensives, keynote speakers, an exhibitor marketplace, seed swap, live entertainment, mixers and organic culinary fare. To learn more and to register, visit www.eco-farm.org/conference.

Thursday-Saturday Feb. 1-3

Agri-Action 2018. 10 a.m.-6 p.m. College of Southern Idaho Expo Center, 315 Falls Ave., Twin Falls, Idaho. Southern Idaho's largest agricultural show. Website: <http://www.kmvt.com/features/agriaction/>

Tuesday, Feb. 6

Developing or Expanding Your Farm Stand or Agritourism Operation. 2-9 a.m.-4 p.m. OSU Extension, Auditorium, SOREC, 569 Hanley Road, Central Point, Ore. Are you interested in developing or expanding a farm stand or agritourism operation? Feb. 6 is Starting a Farm Stand/Agritourism Operation. Website: <http://bit.ly/JacksonSmallFarms>

Tuesday-Thursday Feb. 6-8

Spokane Ag Expo and Pacific Northwest Farm Forum. 9 a.m. Spo-

kane Convention Center, 334 W Spokane Falls Blvd., Spokane. Presentations on the weather, ag economy and a listening session on the farm bill will be featured in addition to a full slate of workshops and the large display of equipment and services. An FFA presentation and career fair will also be offered. Website: www.agshow.org

Friday, Feb. 16

Pesticide-free Strategies for the Landscape Professional. 9 a.m.-5 p.m. Oregon City Pioneer Community Center, 615 Fifth St., Oregon City, Ore. Field session March 14. Cost: \$50 http://www.pesticide.org/healthy-landscape_workshop

Monday, Feb. 19

Oregon Blueberry Conference. 8 a.m.-7:30 p.m. Salem Convention Center, 200 Commercial St. SE, Salem. Program includes a blueberry production summary and trends, industry speakers and research updates, trade show and reception. Website: oregonblueberry.com

Thursday, Feb. 22

Part 1: Farm & Ranch Succession Planning Workshop. 6-8:30 p.m. Clackamas Small Business Development Center, 7726 SE Harmony Road, Milwaukie, Ore. Register now for the four-part Farm and Ranch Succession Planning Workshop Series. No need to attend in person. You can take this workshop remotely from anywhere in the state. This program is offered and taught by the Clackamas Small Business Development Center, along with guest presenters such as attorneys and CPAs. In addition to informative topics and experienced ag professionals, courses include confidential, one-on-one business counseling. A complimentary light dinner will start each evening at 6 p.m. To register, call 503-594-0738. Cost: Free. Website: <http://bit.ly/2CX1jvl>

Thursday-Friday Feb. 22-23

Logging, Construction, Trucking & Heavy Equipment Expo. Lane County Fairgrounds and Convention Center, 796 W 13th Ave., Eugene, Ore. The exhibits, demonstrations and log-loading competition are sponsored by the Oregon Logging Conference, which is celebrating its 80th year. Included is the Oregon Women In Timber annual dinner and auction. Website: www.oregonloggingconference.com

Family Farm Alliance Annual Conference, Eldorado Resort Casino, 345 N. Virginia St., Reno, Nev. The theme of this year's conference is "One year in: What's changed and where are we going in Western water?" Website: <http://bit.ly/2hGieJU>

Saturday, Feb. 24

Oregon Small Farms Conference 7:30 a.m.-6 p.m. Oregon State University LaSells Stewart Center and CH2M Hill Alumni Center, 200 LaSells Stewart Center, Corvallis, Ore. The Oregon Small Farms Conference is a daylong event geared toward farmers, agricultural professionals, food policy advocates, students and managers of farmers' markets. Twenty-seven educational sessions are offered on a variety of topics relevant to the Oregon small farmers and include a track in Spanish. Speakers include farmers, OSU Extension faculty and agribusiness representatives. Website: <http://smallfarms.oregonstate.edu/sfc/registration>

Monday-Tuesday Feb. 26-27

Oregon Dairy Farmers Association Annual Convention. Salem Convention Center, 200 Commercial St. SE, Salem, Ore. Website: <https://oregondairyfarmers.org>

Tuesday-Thursday March 6-8

FSPCA Preventive Controls for Animal Food. 8 a.m.-5 p.m. Hilton Garden Inn, 1741 Harrison St. North, Twin Falls, Idaho. The new FSMA regulation requires every processing facility to have a trained resource person who has completed a specialized training course (such as this one) developed by the Food Safety Preventive Controls Alliance that is recognized by the FDA. Cost: \$720/Individual or \$648 per person for 2 or more. Website: <http://www.techhelp.org/events/400/fspca-animal-food-2-5-day-course-twin-falls/>

Thursday, March 8

Part 2: Farm & Ranch Succession Planning Workshop. 6-8:30 p.m. Clackamas Small Business Development Center, 7726 SE Harmony Road, Milwaukie, Ore. Register now for the Farm and Ranch Succession Planning Workshop Series. No need to attend in person. You can take this workshop remotely from anywhere in the state. This program is offered and taught by the Clackamas Small Business Development Center, along with guest presenters such as attorneys and CPAs. In addition to informative topics and experienced ag professionals, courses include confidential, one-on-one business counseling. A complimentary light dinner will start each evening at 6 p.m. To register, call 503-594-0738. Cost: Free. Website: <http://bit.ly/2CX1jvl>

Tuesday-Thursday March 20-22

International Mass Timber Conference. Oregon Convention Center, 777 NE Martin Luther King Jr. Blvd., Portland, Ore. There will be 70-plus speakers from 20 nations and more than 60 exhibits, plus a tour of Oregon's mass timber buildings. Website: [www. forestbusinessnetwork.com](http://forestbusinessnetwork.com)

Thursday, March 22

Part 3: Farm & Ranch Succession Planning Workshop. 6-8:30 p.m. Clackamas Small Business Development Center, 7726 SE Harmony Road, Milwaukie, Ore. Register now for the Farm and Ranch Succession Planning Workshop Series. No need to attend in person. You can take this workshop remotely from anywhere in the state. This program is offered and taught by the Clackamas Small Business Development Center, along with guest presenters such as attorneys and CPAs. In addition to informative topics and experienced ag professionals, courses include confidential, one-on-one business counseling. A complimentary light dinner will start each evening at 6 p.m. To register, call 503-594-0738. Cost: Free. Website: <http://bit.ly/2CX1jvl>

Thursday, April 5

Part 4: Farm & Ranch Succession Planning Workshop. 6-8:30 p.m. Clackamas Small Business Development Center, 7726 SE Harmony Road, Milwaukie, Ore. Register now for the Farm and Ranch Succession Planning Workshop Series. No need to attend in person. You can take this workshop remotely from anywhere in the state. This program is offered and taught by the Clackamas Small Business Development Center, along with guest presenters such as attorneys and CPAs. In addition to informative topics and experienced ag professionals, courses include confidential, one-on-one business counseling. A complimentary light dinner will start each evening at 6 p.m. To register, call 503-594-0738. Cost: Free. Website: <http://bit.ly/2CX1jvl>

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