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Solutions for a changing world!

How Might Tomatoes Provide Health Benefits?

Scientists at U.S. the Department of Agriculture's Agricultural Research Service (ARS) and The Ohio State University (OSU) have been working to investigate how tomatoes may be imparting health benefits in a recently published study.

Studies in animals have shown that incorporating tomatoes into the diet can reduce the prevalence of chronic illnesses like prostate and liver cancer. It has been thought that compounds naturally produced by tomatoes are responsible for these effects. After absorption from a meal, many of the chemical compounds found in tomato fruits travel to the liver, where they are metabolized. Some compounds remain for some time, while others are quickly removed from the body.

Meanwhile, in the liver or other tissues, some of these compounds can alter gene expression in ways associated with positive health benefits. Researchers in the past have largely focused on lycopene, a pigment that gives tomatoes their red color. However, tomatoes produce thousands of compounds, and it has been shown that tomato consumption offers more benefits than lycopene alone. A "big picture" view was missing.

"We know that eating tomatoes is associated with a number of health benefits, and our study intended to dive deeper into what happens when you eat tomatoes from the standpoint of what is absorbed and how gene expression is altered," said Michael Dzakovich Ph.D., a scientist with USDA-ARS Children's Nutrition Research Center. "Rather than focusing only on one compound, we utilized a technology called metabolomics to broadly profile how hundreds of chemical compounds were changing in the liver as a result of tomato consumption. We also used transcriptomics to measure how all the detectable genes in the liver were changing at the same time. This approach gave us valuable insight into the potential mechanisms by which tomato consumption affects the liver

and potentially the whole body."

Scientists tested liver tissue from mice that were fed control diets or control diets enriched with tomato to determine what tomato compounds were found in the liver and how gene expression changed. Tomato-fed mice were given one of two diets with the addition of commercial orange and red tomato varieties. Since not all tomato varieties are chemically identical, using multiple varieties allowed for a more comprehensive examination of how tomato consumption affects the liver in general.

"We discovered a series of metabolites [molecules produced by metabolism] that have never been reported in the liver. Several of these compounds have been found in blood, skin, and urine, but our data show that these molecules are more extensively metabolized than we realized," stated Dzakovich. The metabolites are from steroidal alkaloids uniquely produced in tomatoes.

"Steroidal alkaloids have been shown in both in vitro [in the laboratory] and animal studies to lower the absorption of cholesterol, reduce cancer cell proliferation, and reduce muscle atrophy. They also resemble many important signaling molecules made by the body. It seems reasonable to hypothesize they might be a part of a suite of compounds found in tomatoes that benefit human health."

In addition, scientists observed that regardless of the tomato variety, there was an increase in the activation of genes related to xenobiotic metabolism, a series of biological processes that help our body detoxify itself. This led the authors to hypothesize that one way in which tomatoes may be benefiting human health is in their ability to promote production of the enzymes that allow excretion of potentially toxic compounds. Similar gene expression profiles have been associated with the prevention of cancer development because of consuming vegetables like brassicas (for example, broccoli).

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International Agri-Center® Prepares for 57th World Ag Expo®

The International Agri-Center® is set to hold the 57th annual World Ag Expo®, welcoming attendees and exhibitors from around the world for the “Best Farm Show on Dirt”.

World Ag Expo® provides a platform for networking, education, and business in one of the most productive ag counties in the United States. In 2023, the show saw 108,233 attendees from 49 states and 56 countries. With more than 1,200 exhibitors and 2.6 million square feet of exhibit space.

Show officials note, 97% of exhibit spaces sold as of January 19 and domestic and international tickets sales trending at record levels.

More than 100 special events, seminars, and demonstrations are scheduled for the three-day show. Highlights include livestock demonstrations in the WW Livestock Systems Demonstration Pavilion, Prayer Breakfast, Ag Leadership breakfast, Toyota Tundra Giveaway drawing, and more. The full schedule of events is available at <https://bit.ly/WAE24EVENTS> and on the World Ag Expo® 2024 Mobile App.

Hands-on demonstrations have been in high demand with exhibitors looking to showcase new products and provide enhanced interactions with attendees.

Ride & Drives have continued to gain popularity with more interactive experiences than ever before. New demo spaces have been added to the southeast side of the grounds where you can find the latest in drone technology on display.

“There is so much innovation to see on the show grounds,” said Stan Creelman, World Ag Expo® 2024 Show Chairman. “From large manufacturers to small innovators and every solution in between.”

The Top-10 New Products Contest winners offer a look into cutting-edge technology. The impressive field of new products ranges from simple solutions to autonomous robots powered by AI. For more information on contest winners, including contacts, please email media@farmshow.org.

“2024 is turning out to be a record year for the show,” said Jerry Sinift, International Agri-Center® CEO. “Over 100 registered media will be on site to document new and innovative technology presented by our exhibitors. There is no better place to be if you are interested in learning about improving your agriculture operations.”

Tickets and more information can be found at <https://www.worldagexpo.org>

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February 17, 2024 9:00 AM

Inspection: Friday, February 16th, 9:00 to 4:00 PM

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Solving High Soil Salts Problems - Mitigation

Virtually all of Agriculture worldwide has reduced yields from reduced plant health caused by high soil salts (Na, Cl, K, & Nitrate). David Knaus (Apical-Ag) reports that 90% of the samples sent to him for analysis have a high salts problem. It is well established that every crop is damaged by high salts and conversely is improved by lowering the salts level. Using full spectrum soil biology is a viable mitigation approach that is affordable and effective.

Soil Salts are measured in Ec (Electrical Conductivity) or ds/m (Deciseimens/ Meter). Irrigation water quality is often expressed as total soluble salts (tds), an international convention being that 1 ds/m is equivalent to 640 mg/L of mixed salts. Low salts soils would be under 2 ds/m. Severe salts level would be over 8 ds/m.

The conventional proposals for mitigation of high salts level has remained the same for a hundred years. These are 1) Deep tillage to allow flushing high salts soils with low salts irrigation water, 2) Flushing the root zone with low salts water, 3) Growing cover crops, and 4) Incorporating plant residue into the plant growth zone. A key problem with this approach is the absence of low salts water that is needed to perform the soil flush. These proposals are viable and beneficial but miss a key mechanism.

A protocol that is far more effective and viable is to replenish the soil biology (bacteria, fungi, protozoa, nematodes, microarthropods, etc) found in a fully healthy soil matrix and increase the organic matter in the soil. Dr. Ingham (Soil Food Web Lab) has educated the agriculture community about the importance of a complete soil food web biology in the root zone.

Most farmers understand the importance of healthy soil and that the absence of soil biology gives dead soil. Organic matter feeds the soil food web biology. When one bacteria divides into two, the division requires seven carbon atoms and one nitrogen. When one fungi grows from one to two lengths, this requires 30 carbons and 1 nitrogen. Keeping sufficient organic matter is key to maintaining healthy soil biology.

In 1881, Charles Darwin wrote about earthworms, Darwin on Humus and the Earthworms: the Formation of Vegetable Mould Through the Action of Worms With Observations on Their Habits. Darwin declared how valuable was the presence of earthworms. The earthworms provide the most complete and diverse soil biology for soil health in the earthworm castings (a polite term for earthworm poop). Earthworms will not survive in dead soil. The earthworms require healthy soil biology to survive. Using earthworm castings to replenish the biology is key. Once the soil biology is replenished, earthworms will become present.

California Vermiculture has learned over the past 25 years, there is a major difference in the efficiency of earthworm castings depending on what feed mix the earthworms are given. If the earthworms are fed beef or dairy manures, the level of the chitin recyclers and cellulose recyclers are only 1% of the potential. Since these recyclers provide the vast majority of nutrition delivery to any plants, this makes a great difference in the plant yield. Using properly fed earthworm castings as a key component of a mix to produce a balanced brew microbial

solution (incorrectly called "Tea") can be used to replenish the complete soil food web. The mix that California Vermiculture developed, reviewed and approved by CDFA-OIM (California Department of Food & Agriculture Organic Input Material) as organic.

Note that this mix is NOT just earthworm castings. The mix must be correct to produce a balance of bacteria and fungi growth. The Soil Food Web Lab can perform testing to confirm the mix is correct. The mix must be aerated in water with no chlorine at 65-85F for 12-24 hours. This can provide a multiplication of the biology several billion times. The brewing equipment requires both fine bubbles, 1-2 mm for sufficient aeration and coarse bubbles over 10mm to provide mechanical impact strength.

The organic matter in the soil needs to be about 2%. The Earthworm Castings Solution (Tea) can be used to mitigate high salts soils. The salts remediation will happen quite rapidly with only 120 gallons/acre. The results will be very evident and dramatic. Let's look at a few real-life applications.

Low Salinity (ECe*=2 to 4 dSm-1)	Natural salinity; often seasonally dry Irrigation salinity; can be waterlogged after irrigation	Cropping salt tolerance	Low-moderate
Moderate Salinity (ECe= 4 to 8 dSm-1)	Dryland salinity; often seasonally waterlogged	Crop-pasture rotations	Moderate-high salt tolerance
High Salinity (ECe > 8 dSm-1)	Discharge areas; can be seeping or dry according to season	Grazing or revegetation	Halophytes

AVOCADOS

Avocado trees have a low tolerance to high salts. Soil salts ECe above 4 ds/m cause real problems for avocados. The irrigation water available in north San Diego County can be above 18 ds/m due to the high tds from the Colorado river water. The photo shows avocado leaves burned due to the high salts. The second picture shows new leaves 30 days after 60 gallons/acre application of WG Solution.



The response of the fruit production is significant. The left picture shows avocado production with no WGS at 125 lbs/tree. With 120 gpa the fruit drop decreased from an estimated 80% to under 20% first season. This resulted in a yield increase from 120 lb/tree to over 1,000 lb/tree.



Salt Problems

continued from previous page

BLUEBERRIES

Remediation of High Salts (37 ds/m/ low moisture retention



(7%) and no structure to 1 ds/m salts 33% moisture retention, and real soil structure using 60 gpa WGS took 60 days. Before high salts remediation, blueberry seedlings would not grow.

The picture shows after the salts remediation, blueberry seedlings grew to over 6 ft the first season using only 60 gallons per acre.

SALT WATER LAKE SOIL REMEDIATION

Even weeds won't grow in salt water. Millions of acres of farmland around the world have become non productive as the salts levels have approached seawater salinity. This WGS application has shown remediation of saltwater soil.

Near Wasco, CA, the saltwater lake evaporated over 20 years ago. Nothing would grow, not even weeds. A land developer asked, "could this saltwater soil be remediated?" This application proved it can. Twelve 5 gallon buckets of this salty soil were dug. Pistachio seedlings were used since pistachio trees are the most salt resistant. Six seedlings were planted in the harvested salt water soil. Five of the six seedlings died right away. Only one grew and after 60 days was only five inches tall.

The organic matter was under 1% so the equivalent of 1 ton/acre of earthworm castings/compost mix was added, then irrigated with 20% WGS water. All six plants began rapid growth with beautiful red new growth. In 60 days, all six of these seedlings were 40" tall. The picture shows the growth difference as presented to the developer. Three board members had planted pistachio seedlings in harvested high salts lake soil. None had survived. Only the seedlings planted in soil with the WG/WGS protocol survived and thrived.



The ability to remediate salty soils without the necessity of finding large amounts of clean (low salts) water for flushing means:

1. Any crop with a soil sample salts level above 4 ds/m will be able to see crop health and yield increase by replenishing the soil biology.

2. Any crop with high salts irrigation water can reverse the damaging effects by replenishing the soil biology.

3. Cropland that has been removed from production due to high soil salts level can be brought back to production by increasing the organic matter to over 1% and replenishing the soil biology.

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KIOTI Releases Compact Loaders to Dealers Across North America and Delivers Very First Machine to Country Star Trace Adkins

Designed to enhance comfort, performance, and durability, the new compact track loader and skid steer loader expand KIOTI's proven equipment lineup



KIOTI Tractor, a division of Daedong-USA, Inc., unveils its latest innovation with the launch of its TL750 Compact Track Loader and SL750 Skid Steer Loader. Rugged and tough, the new line builds on KIOTI's proven history in machine development to deliver power and performance without sacrificing comfort. As with every KIOTI machine, the models were designed, engineered, and manufactured in-house, providing an unparalleled level of quality, consistency, and control.

"KIOTI's entrance to the compact market arrives at a pivotal time for both our company and the industry. Compact sales exploded over the last decade, with no signs of slowing down," said Justin Moe, product manager – Construction Division, KIOTI Tractor. "Our customers are part of this demand, seeking compact equipment for everything from acreage management to worksite applications. With the TL750 and SL750, we are meeting this demand, leveraging 35 years of experience and extensive customer feedback to deliver proven, durable machines that are built to power through tough jobs."

Enhanced Comfort for an Elevated Operator Experience

Both machines feature a wide cabin, available with the standard open station design or an optional enclosed cab

with HVAC for added comfort. With customer needs top of mind, the compact models include a high-back suspension seat and LCD digital display. The standard roll-up style door allows for easy entrance and exit, regardless of the position of the bucket or attachment. The overhead door design increases flexibility on the job as operators can work with the door open or closed.

The design enhances machine visibility to the front, sides, and rear. The standard rearview camera, seamlessly integrated into the LCD digital display, offers an on-demand rear view when traveling in reverse or with the push of a button, enhancing job site awareness and safety. The models feature premium LED front and rear work lights as a standard offering, further enhancing visibility when operating in low-light conditions.

Activated with the switch of a button, the standard self-leveling feature automatically keeps the bucket or attachment in a horizontal plane when lifting. When enabled, the operator no longer needs to worry about manually adjusting the machine, reducing fatigue when handling materials. Additionally, optional ride control further reduces material spillage and lift arm movement when moving materials across the site for enhanced operator comfort.

Proven Power and Performance

Both models utilize a powerful 74-horsepower KIOTI diesel engine. Field-tested and proven across applications, the engine delivers consistent power and reliability, providing added confidence when tackling tough jobs.

For a premium touch and feel, hydraulic pilot joystick controls offer the ultimate in maneuverability, delivering superior "featherability" and finite control. As a result, the machine feels like an extension of the operator, enabling precise work even in tight spaces or during complex tasks. The fingertip controls allow the operator to easily utilize the attachment function from the joystick for a smooth and effortless operation.

Designed to lift, push, and power through rigorous de

See Kioti continued on next page

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Kioti

continued from previous page

mands, the machines have up to a 10.8-foot height to hinge pin and vertical lift path. Among the top of the class in lift height for both machines, operators can easily dump materials into trucks and high-sided hoppers.

Unmatched Dependability, Effortless Maintenance

The solid-mounted undercarriage on the TL750 keeps the machine on the ground, improving grading performance, while the track design reduces the chance of de-tracking. Other features include protected hose routing and the open track system, further enhancing durability and minimizing downtime.

For improved machine maintenance, the swing-out rear radiator allows the operator to better reach common service items by removing two bolts. The easy-to-lift cab and quick access to fittings and valves further simplify serviceability.

The compact models feature KIOTI's standard three-year, 3,000-hour warranty, providing customers with added confidence and protection when taking on challenging work.

Country Superstar Trace Adkins Receives First TL750 Model

In October, KIOTI delivered its first-ever TL750 Compact Track Loader to country music singer and songwriter Trace Adkins. Adding to his robust lineup of KIOTI equipment, Adkins received the keys to his new TL750 and spent the afternoon experiencing the machine's performance and durability firsthand with the KIOTI team at his Tennessee farm. "My friends at KIOTI Tractor came out to the farm and delivered their very first track loader. The serial number even says #1! My KIOTI TL750 Compact Track Loader is great, and I have already started using it around the farm! Being able to switch out the attachments as needed makes this loader perfect for almost any job," said Adkins.

To learn more about the new models, contact your local dealer or visit KIOTI.com. Additionally, those attending World Ag Expo from Feb. 13-15, 2024, can see the TL750 Compact Track Loader and the SL750 Skid Steer Loader at KIOTI booth.

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Are cattle a secret weapon for taking on California wildfires? Fighting fire with feeding



Researchers, including UC Davis and UC ANR scientists, calculated the greenhouse gas emissions of cows consuming vegetation that would otherwise burn in wildfires. Photo by Elena Zhukova

By Mary Burich, CLEAR Center

California's cattle ranchers contribute a significant amount to the region's culture, economy and food supply, but do they also inadvertently help to temper the wildfires that have been plaguing the state? And if so, is it a better alternative – environmentally speaking – to letting grasslands burn?

A new study published in the journal *Sustainability* delves into the topic, weighing the advantages – and disadvantages – grazing cattle bring to the table. Researchers, including scientists from University of California, Davis and UC Agriculture and Natural Resources, set out to calculate the greenhouse gas emissions of cows consuming vegetation that would otherwise burn in wildfires. Then they estimated the GHG emissions that would result should that forage be untouched and therefore, consumed by fire, eventually comparing the two.

Feeling the burn

Given the severity of California's recent wildfires and the belief they will continue and even escalate in the near future, it's a discussion worth having, said Frank Mitloehner, an expert in animal agriculture and air quality from UC Davis, director of the CLEAR Center and one of the researchers who contributed to the peer-reviewed article.

"Each year from 2010 to 2020, California lost on average 89,000 acres of grassland to wildfires," said Mitloehner, who is also a Cooperative Extension specialist. "In addition to the obvious disruption and devastation they caused, the fires spewed greenhouse gases and harmful particulate matter such as black carbon into the air and into our atmosphere. Those alone threaten climate health and human well-being."

A fast and furious gas

Cattle are adept at eliminating herbaceous fuel as they graze. However, at the same time, their specialized digestive system produces methane that is expelled most often in the form of enteric emissions . . . more commonly known as belches. By way of background, methane is a potent greenhouse gas that warms the atmosphere at 25 times the rate of carbon dioxide over 100 years. But it's only in the atmosphere for 10 to 12 years after it's emitted. Following that, it's broken down into carbon dioxide and water vapor.

For that reason, Mitloehner refers to methane as a "fast and furious" gas. Furious because it warms with a vengeance and fast because it does so for only a short time, especially when compared to carbon dioxide. Furthermore, because of the biogenic carbon cycle, whereby plants extract carbon dioxide from the atmosphere for photosynthesis, the warming of methane and its byproducts can end entirely when it's hydrolyzed and used by plants.

How researchers calculated emissions

In order to determine if grazing, methane-emitting cattle are better for the atmosphere than burning grasslands, Mitloehner and the other researchers employed a method known as "Monte Carlo simulation," a mathematical technique used by scientists to predict outcomes of an uncertain event.

Looking exclusively at methane emissions, they found it's better to have cows eat vegetation than to have wildfires burn it. Granted, it's only marginally better, but when one considers other advantages of animal agriculture and conversely, other disadvantages of widespread, uncontrolled fire, the conversation suddenly shifts.

"Even if cattle provided no other benefit to us, which certainly is not true, we can now make the case that they are helpful to us in yet another way," Mitloehner said.

Friends or foes?

It goes without saying that one would be hard pressed to find much good to say about wildfires, but that doesn't hold true for animal agriculture. The industry provides jobs and supports the economy in other ways as well. Plus, it is a major source of protein-rich food that is in increasing demand as the world's population continues on a trajectory toward 10 billion people by the year 2050.

Where global warming is concerned, the industry is in the unique position of being able to reach net-zero warming, also known as climate neutrality, if it continues to aggressively chip away at its methane emissions, which Mitloehner asserts is of critical importance to the planet. "Few other sectors can reduce its warming to net zero and still be of service to society, but agriculture can because of the way methane behaves in the atmosphere," he says.

To be clear, grazing cows are no match for wildfires. Yet, in addition to everything else the sector does for us, slowing the burn and keeping relatively more methane from entering the atmosphere are not nothing.

In addition to Mitloehner, authors of the study are Cooperative Extension advisors Sheila Barry, Devii Rao and Theresa Becchetti; Rowan Peterson, Ermias Kebreab and Minju Jung of UC Davis; and Felix Ratcliff and Kaveh Motamed of LD Ford.

This article was first published on the website of the CLEAR (Clarity and Leadership for Environmental Awareness and Research) Center at UC Davis.

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2024 World Ag Expo® Top-10 New Product Winners

Results are in for World Ag Expo's® 2024 Top-10 New Products Competition. The winners will be showcased February 13-15, 2024 during the World Ag Expo® in Tulare, California.

The impressive field of new products were submitted for the contest by exhibitors of the largest annual agricultural show of its kind. Products ranged from simple solutions to autonomous robots. The contest judges consisted of farmers, ranchers, and industry professionals.

Winners will be noted on show maps, marked with "Top-10 Winner" flags at the show, and recognized at an awards session at World Ag Expo® Opening Ceremonies on Tuesday, February 13, 2024.

The competition is conducted annually by the International Agri-Center® in conjunction with World Ag Expo®, which draws more than 1,200 exhibitors and an estimated annual average of 100,000 individuals from 60 countries. Exhibitors must nominate their products for judging by the October 31 deadline to be eligible.

For more information on the contest and winners, including contacts, please email media@farmshow.org.

Amiga V7 by Farm-ng

Watsonville, CA

Amiga V7 by Farm-ng is an electric, configurable, 1.3HP platform that allows farmers, developers, and researchers to haul, tow, spray, apply composts and assist in other essential roles. The platform is the erector set of farm tools where the same machine can be configured over the row, wide, narrow, with intelligence and tools that lift or rotate. The intelligence platform has an open API allowing students, developers and even elementary school students to code and configure the machine to collect data, integrate with other tools, and perform repeated robotic tasks. With the GPS guidance system, it can perform precision steering and weed the same plots it seeded earlier in the year with minimal or no operator intervention.



Space: U35, U37, U39, U41, T38, T40, T42 | farm-ng.com

Blue Spray by Bluewhite

Fresno, CA

BlueSpray brings autonomous precision spraying capabilities to growers in orchards and



vineyards. BlueSpray leverages Bluewhite's autonomous tractor sensing capabilities to provide plant-based spraying in high resolution that can integrate into any existing sprayers, adjusting spray volume and pressure in real-time based on plant size and density, reducing the amount of chemicals used and reducing spray drift without compromising on coverage. The BlueSpray data feeds into the Bluewhite data platform and is immediately available to the grower and to an agribusiness ecosystem for data insights, compliance, and business optimization.

Space: R37 and R39 | bluewhite.co

Burro Grande, plus Atlas Online Route Creation by Burro

Philadelphia, PA

As a fully autonomous robot powered by AI and outfitted with computer vision plus LiDAR, Burro Grande is the 'Big Brother' to the existing Burro platform and boasts a 5,000 lb towing capacity and 1,500 lb pallet



scale carry capacity. When paired with Atlas, Burro's online route creation platform, users can construct, manage, and share routes across their fleet. Whether towing, carrying, or following, Burro Grande allows your existing equipment operators to step away from the seat of a Tractor/UTV, saving valuable labor.

Space: P34 and P36 | burro.ai

Electric GUSS by GUSS Automation

Kingsburg, CA

Electric GUSS is an autonomous electric herbicide orchard sprayer manufactured by GUSS Automation in Kingsburg, California. Electric GUSS is the first electric autonomous herbicide orchard sprayer in the world and allows a



single employee to operate and monitor a combination of up to eight GUSS machines from the safety of his or her vehicle using a laptop computer. This driverless electric herbicide sprayer uses a combination of LiDAR, GPS, cameras, and more to safely and autonomously drive through the orchard, day or night, row after row reducing emissions and saving spray material.

Space: RD5 | gussag.com

EZ Cut Seal Remover by Country Enterprises

Lucan, MN

EZ Cut Seal Remover quickly and safely removes seals from most chemical containers without getting debris in the spray or sprayer. This item holds up to 25 seals and comes with an ejection tool to dispose of the seals without ever touching the chemical. Customizable decals are available for a great promotional item. This product was made by a farmer, for the farmer. A twist is all it takes!



Space: Corteva Agriscience Center 3827 | stores.countryent.net

Model B Smart Sprayer by Verdant Robotics

Hayward, CA

The Verdant Robotics Model B Smart Sprayer is the ultimate solution to eradicate weeds in specialty crops. The Model B works in any field, whether organic or conventional, no-till or cultivated. What sets it apart is Verdant Robotics' proprietary Bullseye Technology, delivering unmatched millimeter-level targeting of weeds in both high-density and low-density crops, over an extended operational window. This remarkable Smart Sprayer operates day or night, regardless of weather conditions. With its lightweight design, it swiftly accesses the field, and its formidable power takes on even the largest weeds.



Space: U35 | verdantrobotics.com

Oliver Colibri by Sutton Ag Enterprises

Salinas, CA

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Space: T31 | suttonag.com

Shark Wheel SWIFT Irrigation Wheel by Shark

Wheel Agriculture

Mission Viejo, CA

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Space: Pavilion B 2524 | sharkwheelag.com

Shockwave X by OMC Orchard Machinery Corp.

Yuba City, CA

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Space: M19, M21, and M25 | shakermaker.com

Standard PTO Kit by Tractor Protection Products

Blue Ridge, TX

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Space: Pavilion A 1014 | tractorprotection.com

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Bird owners urged to take precautions for avian flu



Poultry owners are urged to protect their birds from avian flu. 4-H ambassadors feed chickens at Elkus Ranch. Photo by Evett Kilmartin

By Pamela S Kan-Rice - Assistant Director, News and Information Outreach

A young woman and young man feed green plants to a flock of chickens outdoors in a pen.

Poultry owners are urged to protect their birds from avian flu. 4-H ambassadors feed chickens at Elkus Ranch. Photo by Evett Kilmartin

The highly contagious avian flu is being spread primarily by migratory birds, putting game birds, and backyard and commercial poultry at risk.

“Poultry owners should take precautions to prevent their birds from contacting waterfowl or the habitat that waterfowl frequent because this strain of avian influenza is highly contagious,” said Maurice Pitesky, UC Davis School of Veterinary Medicine associate professor of Cooperative Extension.

Infected waterfowl shed the highly pathogenic avian influenza virus in their feces and respiratory secretions, where the virus can remain viable for months in the envi-

ronment.

“If you can't confine your birds in a coop, focus on good sanitation and reducing contact with waterfowl and their habitat such as agricultural fields and ponds,” he said.

Pitesky urges commercial and backyard chicken owners to monitor their birds for the following symptoms:

- Reduced egg production
- Trouble breathing
- Clear, runny discharge from nose, mouth and eyes
- Lethargy or lack of energy
- Loss of appetite
- Drinking less
- Swollen eyes, head, wattles or combs
- Discolored or bruised comb, wattles or legs
- Sudden death

To prevent exposure to potentially infected waterfowl, Pitesky suggests reassessing and redoubling biosecurity efforts to prevent contact between

wild animals and domestic poultry.

Specifically, he recommends keeping birds away from ponds and other open water where they may contact waterfowl, which are the primary reservoir of the disease. To prevent cross-contamination, use clothing and boots that stay on your property and avoid sharing equipment with other bird owners.

A local veterinarian or UC Cooperative Extension farm advisor may have more suggestions to reduce risk.

For more information about protecting birds from avian influenza, visit <https://ucanr.edu/sites/poultry/files/225352.pdf>.

Unusual or suspicious sick or dead domestic birds should be reported to the California Department of Food and Agriculture Sick Bird Hotline at (866) 922-2473.

Suspicious wild bird deaths can be reported to California Department of Fish and Wildlife (CDFW) at <https://wildlife.ca.gov/Conservation/Laboratories/Wildlife-Health/Monitoring/Mortality-Report>.

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Fifty Years of Water Research Projects in California



Dry Creek near Beale Falls, California

By Erik Christian Porse

Author - Director of the California Institute for Water Resources and Associate Cooperative Extension Specialist

For decades, California has supported research to improve water resources management. Within our archives at the California Institute for Water Resources (CIWR), we have records of nearly 250 funded research projects going back fifty years. This led us to ask, how have water research topics in California changed over time?

First, let's step back in history. In 1957, with State Water Project construction looming, the California State Legislature funded the first University of California Water Resources Center at UCLA to provide training and research for water planning. Soon after, in 1964, the federal Water Resources Research Act authorized water research institutes in each state. In California, the existing UC Water Resources Center became part of the new network of federal institutes. Located first at UCLA, then UC Davis and UC Riverside, the Water Resources Center coordinated research, extension, and education activities, and also maintained California's Water Resources Center Archives. In 2011, the WRC reopened as the California Institute for Water Resources (CIWR) within the UC Division of Agriculture and Natural Resources (UC ANR).

For decades, CIWR and its predecessors have offered grants for water research at California's universities. The focus and scope of funded projects have evolved. From 1970 to 1999, the California Water Resources Center typically funded a few projects each year by University of California (UC) researchers. From 1999–2008, the program grew with state support and funded 7–20 research projects across five categories including hydrology, ecosystems, water quality, management, and law & policy. Since 2011, the California Institute for Water Resources has funded research projects at UC (campuses and extension) and California State University campuses. CIWR has administered nearly \$2 million in federal funds, including \$1 million to early career researchers, which are all matched by state funding. While these grants are only a small part of water research in the state, the grants for early career academics are an indicator of emerging water research in California.

From the database of funded projects, we analyzed project titles going

back to 1970 using the keyword extraction model Keybert to identify keywords of projects in each decade from 1970 through 2025. We filtered the keywords for duplicate terms (i.e. hydrologic and hydrological) and removed geographic names (i.e. California). We analyzed the top keywords (up to 8 keywords) in each decade, then also grouped a larger set of keywords (40 keywords) using content analysis to evaluate broader research themes.

Groundwater is an area of recent high interest due to the Sustainable Groundwater Management Act (SGMA), but groundwater research has been prominent for decades. "Groundwater" was a top keyword from research topics in 5 of 6 decades. California has recognized groundwater management challenges for a long time. From 1970–2000, "sediment" and "aquatic" were prominent with increased research interests in water quality and habitat. After 1990, additional environmental keywords appeared, including "rivers", "salmon", and "ecosystem", reflecting growing interest in broader environmental restoration goals in California water management. The keyword analysis also identified how research is influenced by management realities, with "drought" being a noted research topic in the 1980's, 2000's, and 2010's corresponding with several major drought periods in California. Agricultural water research grew after 2010 with CIWR's relocation as a statewide organization in the University of California and UC ANR.

Grouping keywords into themes of research revealed additional insights. Across decades, top themes have remained relatively consistent. From 1970–2000, water quality and treatment were key themes. During this time, wastewater treatment research expanded significantly, while the state established research in salinity management programs. Starting in the 1990's, research focusing on ecosystems exploded, reflecting broader policy and management challenges that arose with aquatic species habitat and the San Francisco–San Joaquin Delta. Agricultural water management research increased after 2010, explained in part by the incorporation of UC Cooperative Extension research in CIWR projects, but this also reflects the growing interest in adapting California's agricultural practices to changing climate conditions and water availability. Climate and soils research is a consistent topic and has become more prominent since 2020. Recent projects in this area especially incorporate needs to understand climate change effects on water resources, as well as research to understand links between water management, availability, and soil science.

This approach helps consider how future research in California water can align with policy and management goals. For instance, recent project titles do not directly reflect current policy goals for resilience and adaptation, even though such goals may underlie outcomes of current studies. Recent interest in equity as a policy goal is also not reflected. Contemporary tools in both research methods and policy implementation are inadequate to address the ambitious goals sought by policies such as the Human Right to Water (Assembly Bill 685). More research, outreach, and extension are needed.

California is a laboratory for water management innovations. State and federal support for research are important drivers of innovation. Research being developed by California's current early career academics will forge the water management solutions implemented in future decades.

Erik Porse is the Director of the California Institute for Water Resources and an Associate Cooperative Extension Specialist in the University of California Division of Agriculture and Natural Resources.

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Google Weed View? Professor Trains Computer to Spot Invasive Weed

Algorithm for AI Enables Low-Cost Tracking of Invasive Plant



by Emily C. Dooley

A patch of johnsongrass identified using Google Street View. The yellow boxes were designated by artificial intelligence; the red boxes were drawn by human hand. (Mohsen Mesgaran / UC Davis)

To manage johnsongrass, a noxious weed that crowds out cotton and sickens horses, farmers have tried herbicides, burning and hand-pulling. Now, researchers at University of California, Davis, have developed a more high-tech weapon against the invasive weed: artificial intelligence and machine learning.

Using photos from Google's Street View database, UC Davis researchers have tracked down over 2,000 cases of johnsongrass in the Western United States for a fraction of the cost and time that it would take to do drive-by or other in-person surveys. They call their tool Google Weed View.

The advancement could help land managers easily and quickly survey for other problem plants.

"Once the model is trained, you can just go and run it on millions of images from Google Street View," said Mohsen Mesgaran, an assistant professor in the Department of Plant Sciences at UC Davis. "We have huge flexibility, and its capability can be scaled up very quickly."

The technique can easily be extended to other plant species. All that is needed is to label the new item in Street View photos and train the algorithm to identify that object in the images.

By providing location information, Google Weed View also offers an opportunity to examine how climate affects the growth and spread of weeds and invasive plants at very large scales.

"I think it can be both useful for management and for people with interests in more basic questions in ecology," Mesgaran said.

A colleague's query

Mesgaran began looking at using Google's photo database of roadways, streets and highways after Kassim Al-Khatib, a professor of Cooperative Extension in the same department, asked if he could survey Western states for johnsongrass.

Al-Khatib studies where johnsongrass grows, ways to man-

age it and how this perennial has evolved to be so prevalent and resilient. He's also working with scientists at the University of Georgia to decode the genome of johnsongrass, which is one of the top 10 most invasive weeds worldwide.

Johnsongrass can crowd out native plants, harbor pathogens and affect agriculture. It grows up to 7 feet tall with flowers that are green, violet, dark red or purplish brown depending on maturity, according to a UC Statewide Integrated Pest Management Program briefing page.

"Johnsongrass is a major weed not just in California but worldwide," Al-Khatib said. "It's very difficult to control. It's a problem on vineyards. It's a problem for cultivated crops. It's a problem on orchards."

Google Weed View allows for rapid, convenient scanning. It is continuously updated via everyday users with compatible cameras and images collected by Google. "Instead of a day of in-person driving, we can use AI to determine if johnsongrass is in a county or not," Al-Khatib said.

Setting the parameters

To find the weeds, Mesgaran went to Google Street View, which hosts billions of panoramic photos. It didn't take long to find johnsongrass.

"The pictures are really good quality," he said. "You can see plants and flowers."

Street View's photos offer a 360-degree view, so in his request Mesgaran set parameters, based on street direction (bearing), to only see the side view. He also specified latitude and longitude, and other factors. To train the deep, or machine learning model, he chose Texas, where johnsongrass is prevalent.

A student sorted through over 20,000 images from that request to find pictures with johnsongrass and drew rectangular shapes around the weeds. They located 1,000 images.

The labeled photos were fed into a computer to train a deep learning algorithm capable of identifying johnsongrass in Google's images. The model was run again to capture potentially more images containing johnsongrass. These additional images were then labeled and used to further refine the model. With each iteration, the algorithm learned and became more accurate.

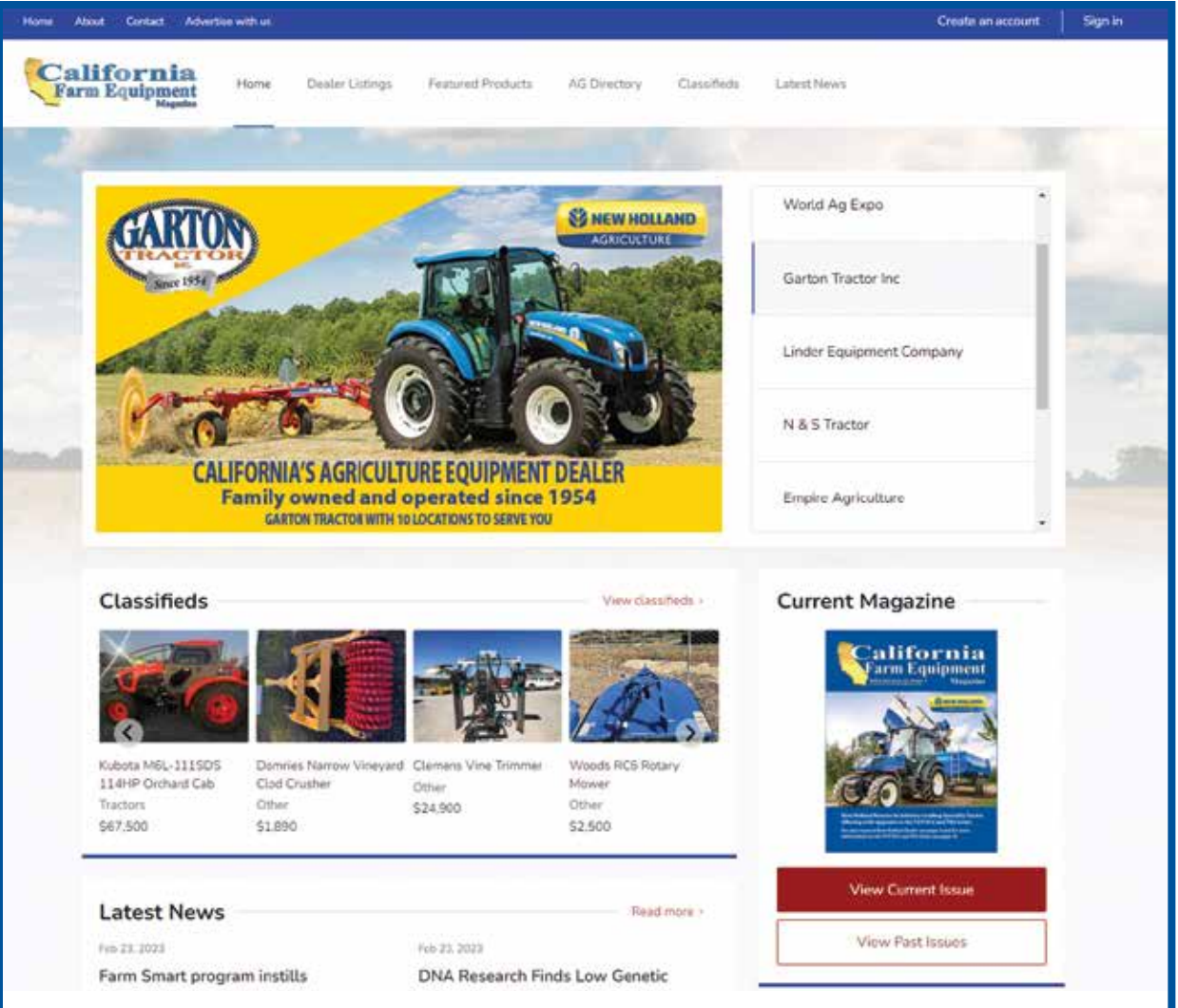
"This deep learning model was trained by these images," Mesgaran said. "Once we had a semi-working model, we ran it against about 300,000 images."

For Al-Khatib's request, researchers focused on 84,000 miles of main roads in California, Nevada, Oregon and Washington states. The team discovered 2,000 locations with johnsongrass.

Google Weed View cost less than \$2,000 to purchase the images and teach the model. A traditional car survey to cover the same area would cost an estimated \$40,000 in gas, hotel, food and other costs.

"In a matter of months, we came up with 2,000 records and I can do it for the whole U.S.," Mesgaran said.

Next up? The entire United States.



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UPCOMING EVENTS

FEBRUARY 2024

6-7: 2024 California Plant and Soil Conference. DoubleTree by Hilton Convention Center, 2233 Ventura Street, Fresno CA. The annual conference provides an opportunity for students, professionals, and other attendees to increase their knowledge of current topics of agronomic importance in California. For more information: <https://na.eventscloud.com/website/58588/>

6-8: Colusa Farm Show. For 58 years, the Colusa Farm Show has meant one-stop shopping for all farm services. The purpose of this showcase is to acquaint agriculturalist with the latest in modern farming equipment and techniques. Year-in, year-out, it is attended by farmers and suppliers from all over the world. For information call: (530) 458-2641.

13-15: World Ag Expo® is one of the largest Agricultural Expositions in the world with more than 1,200 exhibitors on 2.6 million square feet of exhibit space! The show offers a wide range of agricultural-related exhibitors and seminars. While you can learn more about innovative agricultural projects, you can also network, try, and buy. See the future of agriculture at World Ag Expo®! For more information go to: worldagexpo.com

15-16: USDA's 100th Annual Agricultural Outlook Forum, "Cultivating the Future" will take place at the Crystal City Gateway Marriott in Arlington, Virginia. More info at: <https://www.facebook.com/USDA>

28-March 1: The Agricultural Industry Electronics Foundation will hold its annual North American Plugfest at the upcoming Commodity Classic at George R. Brown Convention Center, Houston, TX. For more information email: america@aef-online.org

MARCH 2024

5-6: 2024 California Poultry Federation (CPF) Winter Board of Directors Meeting at the Hyatt Regency Sacramento, CA. Any questions please call the CPF office at (209) 576-6355 or email: info@cpif.org if you have any questions or concerns. Thank you. We hope you can join us at this special event.

APRIL 2024

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CDFA Announces Grant Funding For Healthy Soils Program

CDFA is pleased to announce the availability of approximately \$12 million in grant funding for Healthy Soils Program Incentive Grants. The objectives of the program are to increase statewide implementation of conservation management practices that improve soil health, sequester carbon, and reduce atmospheric greenhouse gases.

California farmers, ranchers, business entities, California Native American tribes, and non-profit organizations can apply for awards. Applicants may request up to \$100,000 per project. Priority will be given to applicants who are considered Socially Disadvantaged Farmers and Ranchers.

The program is currently accepting grant applications and will continue to do so until 5 p.m. PST, Friday, February 9, 2024.

"The Healthy Soils Program was developed to partner with farmers and ranchers and facilitate their preferred methods to draw down carbon onto their lands and store it in our soils," said CDFA Secretary Karen Ross. "Building up soil's organic matter and biodiversity promotes its lasting health and productivity, while also reducing the possibility for erosion. With tremendous thanks to our Governor and the California Legislature for their ongoing support, the Healthy Soils Program has awarded more than \$105 million to fund more than 1,500 projects over its lifetime, resulting in a combined greenhouse gas reduction of more than 1.1 million metric tons of carbon dioxide emissions over the projects' lifespans. That's like removing 24,000 gas-powered cars from the road for 10 years."

Free technical assistance (TA) is available to applicants.

TA providers' contact information, and other details, can be found at: https://www.cdfa.ca.gov/oefi/technical/docs/2023_hsp_taps.pdf and <https://ciwr.ucanr.edu/Programs/ClimateSmartAg/TechnicalAssistanceProviders/>.

Available TA Providers include providers from the University of California Cooperative Extension Community Education Specialists (UCCS CESs), through their Climate Smart Agriculture Program.

"Through our strong relationships with diverse farming communities, our team supports the implementation of practices that build soil health, use water more efficiently, and provide an alternative for manure management," said Amber Butland, a TA Provider who works through the CES group. "We strive to provide the best assistance possible by offering translation services, grant application support, computer access, and one-on-one farm visits."

The Healthy Soils Program stems from the California Healthy Soils Initiative, a collaboration of state agencies and departments that promotes the development of healthy soils on California's farmlands and ranchlands.

The Healthy Soils Program is part of California Climate Investments, a statewide program that puts billions of Cap-and-Trade dollars to work reducing GHG emissions, strengthening the economy, and improving public health and the environment – particularly in disadvantaged communities. For information on eligibility and program requirements, prospective applicants should visit the HSP Incentive Grants website at www.cdfa.ca.gov/oefi/healthysouls/incentivesprogram.html.

USDA Signs Agreement with Agriculture Future of America to Prepare Young People for Careers in Agriculture

U.S. Department of Agriculture (USDA) Secretary Tom Vilsack has signed a Memorandum of Understanding (MOU) with Agriculture Future of America (AFA), formalizing a partnership to promote the common goals of strengthening the future competitiveness and sustainability of the U.S. agriculture industry by preparing more young people for careers in agriculture.

"This partnership will enhance USDA's involvement with AFA and its leadership development and education mission," said Secretary Vilsack. "This agreement reinforces USDA's commitment to preparing students for future careers in agriculture with an emphasis on federal sector employment."

USDA and AFA will continue to collaborate on leadership development efforts, and link these young leaders with career opportunities in food, agricultural science, natural resources, and related fields. Under the MOU, USDA commits to advancing opportunities for AFA delegates to participate in USDA programs, including internships. AFA will provide occasions for USDA to meet with AFA delegates to share information about these opportunities.

The MOU will be administered by USDA's Office of Partnerships and Public Engagement (OPPE), which develops and

maintains partnerships focused on solutions to challenges facing rural and underserved communities and connects those communities to the education, tools, and resources available to them through USDA programs and initiatives.

"Our collaboration with USDA signifies a shared vision for the future of American agriculture," said Mark Stewart, President and CEO of AFA. "This MOU is not just a document; it's a commitment to bridging the gap between talent and opportunity. This agreement reinforces our belief that connecting young leaders with USDA initiatives will enrich their careers and contribute to a more resilient and competitive agriculture industry."

AFA builds bridges for young leaders to foster engagement and innovation in food and agriculture through premier leader and career development experiences. With program participation increasing 28% in the last five years, AFA has provided 26,000 leader development experiences to college leaders and young professionals from more than 200 colleges and universities throughout 43 states since its inception in 1996. AFA has awarded more than \$11 million in academic and leader development scholarships. For more information about AFA, visit www.agfuture.org.

USDA to kick off the National Agricultural Classification Survey

Already preparing for the 2027 Census of Agriculture, USDA's National Agricultural Statistics Service (NASS) will conduct the National Agricultural Classification Survey (NACS) starting Jan. 24. The survey, an important step in determining who should receive a 2027 Census of Agriculture questionnaire, will go to approximately 250,000 recipients to ask if they conduct agricultural activity. The results of the survey will ensure that every U.S. producer, no matter how large or small their operation, has a voice and is counted in the highly anticipated and influential agricultural census data.

"This survey helps illustrate the breadth of American agriculture and enables USDA to get a complete count of all farmers and ranchers," said NASS Administrator Hubert Hamer. "Every response matters. Even if a recipient believes that the survey does not apply to them, we ask that they respond to the few screening questions."

NASS encourages recipients to respond securely online at www.agcounts.usda.gov, using the unique survey code mailed with the survey. Completed questionnaires may also be mailed back in the prepaid

envelope provided. NASS requests that each person who receives the survey respond promptly.

"The NACS ensures that everyone who produces and sells, or normally would sell, \$1000 or more of agricultural products in a calendar year are represented in these vital data," said Hamer.

Referenced by countless national, state, and local decision-makers, researchers, farm organizations, and more, the once-every-five-year Census of Agriculture remains the most comprehensive source of data on American agriculture. The data tell the story of American farmers, ranchers, and growers over time, and inform agricultural policies and programs that impact operations across America. USDA will release the 2022 Census of Agriculture data in February 2024.

If a producer did not receive the 2022 Census of Agriculture or the NACS, NASS encourages them to sign up to be counted at www.agcounts.usda.gov/getcounted. All information reported by individuals will be kept confidential, as required by federal law. For more information about the NACS, visit www.nass.usda.gov/go/nacs. For assistance with the survey, call 888-424-7828.

Agricultural Industry Electronics Foundation Annual North American Plugfest

The Agricultural Industry Electronics Foundation (AEF) will hold its annual North American Plugfest at the upcoming Commodity Classic in Houston, February 28 - March 1st.

This is an important testing ground for teams of software engineers from across the global ag industry to try out new products under development, and also work with future technologies like High Speed ISOBUS, and digital camera communication. The event has grown from its beginning in 2001 with only a handful of engineers to today,

where hundreds of experts have the opportunity to meet twice a year to test compatibility and correct ISOBUS communication between the devices.

It's a cool event to come see - a bit like engineers speed dating. You can also see the future being developed in a transparent way. If you are attending the event, let me know if you would like to have a Plugfest tour and an opportunity to speak with this interesting non-profit that is truly making a difference to help our world move seamlessly into the future.

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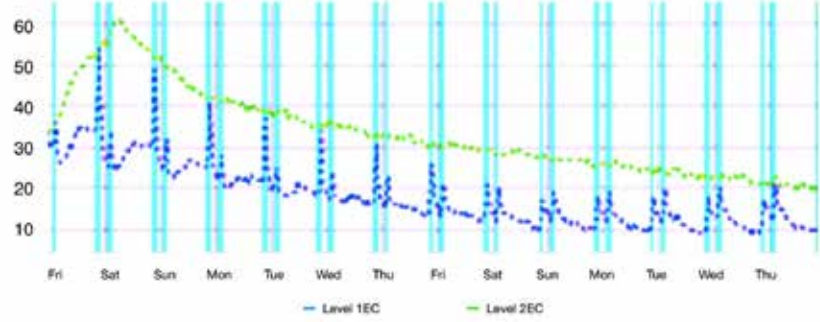
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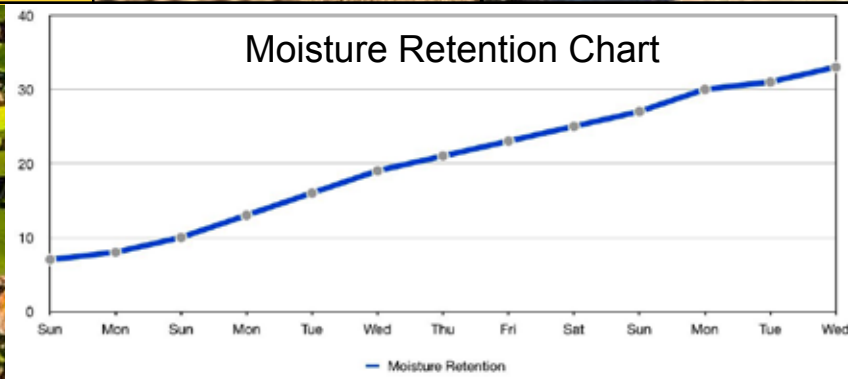
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