



Let Your
Crops Tell
You What
They
Need

New technology is amplifying farmers' knowledge and proving their gut instincts, enabling them to make smarter decisions in the field, as well as save time and money.

AquaSpy®



If you had 180 days without rain,
you'd likely be thinking it was time to
irrigate your crops.

Any farmer would.

BUT WHAT IF YOU HAD THE DATA to show you that your vegetable crop was actually moist enough that the roots were happy and didn't need extra water? Would you believe it? What if it was trustworthy data from below ground at the depth of your vegetable roots that you could rely on to better guide your decision making?

That's especially important in 2021 – predicted to be one of the driest years in a millennium. Nearly half the U.S. – from the Pacific Coast to the Great Plains and upper Midwest – is experiencing moderate to exceptional drought conditions, with the western states taking the hardest hit. Reservoirs that store water are below normal and projected to hit historic lows.

A huge percentage of the nation's fruits and vegetables come from this increasingly arid West.

That's what makes the reality of reliable and easy-to-obtain and monitor crop and soil data crucial to crop success this year and into the future.

Next-gen solutions have come to the rescue with advanced technology to give you proven data that can enable you to save water, improve soil health, maximize fertility and prevent high salinity.

DIGGING DEEPER: UNDERSTANDING SOIL SPEAK

The example above is actually a true story.

A farmer was experimenting with using new regenerative farming techniques and testing cover crops as part of his sustainable crop rotations. Cover crops are known to slow erosion, boost soil health and nutrient-holding capacity, enhance water availability, control pests and diseases, and smother weeds.

It had been 180 days without rainfall, and this farmer was testing a multi-sensor intelligent soil moisture probe as part of his regenerative farming efforts. The probe data revealed that his soil was moist enough and didn't need additional water. He could barely believe it.

Yet after further exploration and testing, the data was telling the right story.

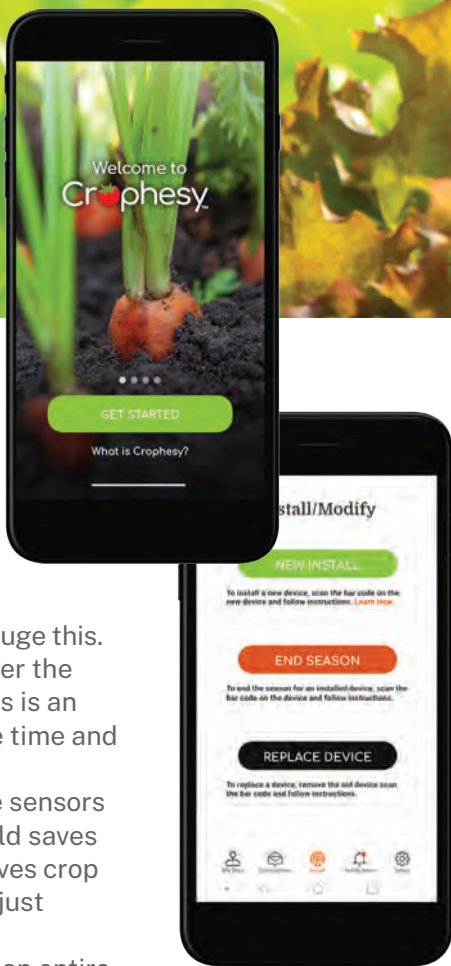
The cover crop was working to keep the soil cooler, enhance the soil's water-holding capacity, improve infiltration, and retain more water in the root zone – all things that the multi-sensor probe could tell him, in addition to whether this was a critical time in the crop season for irrigation. If he had watered, he'd likely have drown his plants and wasted water, paying the higher water bills that come with it. Only the insights from the sensor data gave him the information that defied the norms of what one might suspect after that many days without rain.

Finding innovative ways to assess vegetable crop health so farmers know precisely when to take action is on the rise. The idea isn't new – a number of innovations have made using intelligent crop-sensing technology in multiple locations throughout a field or across multiple types of vegetables. Sensors are smaller and lighter, powerful batteries eliminate the need for solar power, and cellular options are built right in. Combine that with crop-specific intelligence gained from years in the field and next-gen solutions are more powerful and easier to use with the data insights that are quickly viewable and easy to understand.

Take Crophesy from AquaSpy, for instance. Using the mobile app, farmers can use their smartphones to remotely monitor vegetable health. The Pay As You Grow™ app allows users to see daily stats on soil moisture, density, temperature, salinity and water consumption – without stepping foot in their fields. It all comes with a monthly subscription fee similar to a smartphone contract.

A rugged, 3-sensor, wireless, soil probe comes free with each mobile subscription. It's water-tight and weather-proof and can be easily pushed into any soil type in seconds. With a minimum five-year battery life, it will last multiple seasons without failure. And it logs data at either the 4-, 8- and 12-inch marks or the 8-, 12- and 16-inch marks.





LEARNING HOW TO TRUST THE DATA

Figuring out how much water a vegetable crop needs each year is both an art and a science. Many farmers, in fact, have their own methods they've used over the years to gauge this.

While that's worked for them many times over the years, taking the guesswork out of the process is an intriguing concept for farmers looking to save time and money while conserving limited resources.

Farmers are finding that using soil moisture sensors compared to watering how they normally would saves them time, water, and nutrients while it improves crop health and yield – and this is quality yield, not just quantity.

Sure, this sounds great after going through an entire season to see how the data works. But who wants to waste a season doubting whether these probes below the ground are giving them data they can count on?

To trust the data, you have to understand where it's coming from.

Crophey, for instance, uses its field-proven Yield Efficiency Score (YES!) Score data powered by its AgSpy intelligence to determine whether a crop is “in the green”

range – between a 350 and 850 score. Over the season, the higher the score, the healthier the crop.

Crophey's probe sensors independently send out electrical signals through the layers of soil at the different sensor marks. Then, AgSpy intelligent algorithms turn those signal readings into actionable metrics and graphs. The YES! Score adjusts hourly and reflects what the plant is dynamically telling the grower at

that moment in a particular layer of soil: what the roots need to optimize stalk and fruit potential.

The data is coming from more than 10 years of gathering and analyzing plant and soil profiles for a wide





variety of crops. The AgSpy algorithm is continuously learning, building crop-specific information and feeding it to the CropHesy app every day.

And while it can sound like it might take earning a technical degree to read these graphs, luckily the algorithm does it for you, translating the data into easy-to-read charts that tell you how deep each of your irrigations were to date, whether each sensor is at field capacity or refill, and the daily consumption rate of the plant's roots. Each crop type has its own signature, which guides the farm for more precise irrigation.

HOW DATA CAN IMPROVE YOUR DECISION-MAKING

As the CropHesy app learns, it can turn your guesses into actionable steps.

Trends over time educate you on the needs of specific crops, providing you with crop-maximizing activities you can follow.

Looking at corn, for instance, AgSpy reviewed data across the U.S. to determine what trends can improve yield, coming up with a recipe for success.

When it came to irrigation infiltration, data showed that shallow irrigation is good in March and April to promote germination and early root growth. But after that, shallow irrigation can negatively impact root growth and yield.

Deeper irrigation is essential from early May to July to encourage that deeper root growth that corn needs.

Here's how data helps you know if you're watering deep enough: If you step out into the field, you might feel that your soil is moist when you're irrigating at a shallow depth. You can see this with

your eyes and even feel it with your hand as you reach into the soil. In fact, old school soil moisture readers or tensiometers probes may show you that as well.

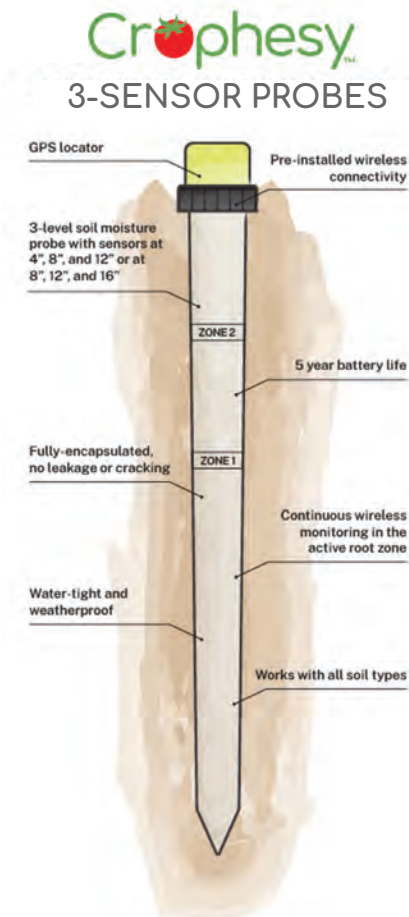
This may appear good on the surface. But AgSpy data analysis will actually give this shallow moisture reading negative points if the moisture level is only detected in that shallow area and not deeper along the depth of the roots.

That's because deeper irrigation consistently means improved yield when combined with the knowledge that the crop is consuming the available moisture. Without seeing that data below ground, you may continue watering at a shallow depth without knowing that you can improve your yield by switching up your irrigation at this critical time in the crop's growth.

Then, allowing the crop time to partially deplete the moisture in the active root zones before irrigating deeply again can ensure soil isn't too soggy for roots to consistently drink water, which produces great corn.

When it comes to EC, or the amount of salts in the soil, avoiding high levels in the first half of the season is critical for corn, the data shows. EC impacts various vegetable crops in different ways, so this data will change based on the crop you're growing.

Then by mid-September, deep irrigation can't help you because your yield has already been determined, data reveals. In fact, it can become detrimental to the crop to irrigate too much at this time. Not to mention, you're also wasting thousands of dollars in water that you don't need to produce a great crop.





BEYOND YIELD: Why Quality Matters

There's no doubt about it: Vegetable crop yield is influenced by the soil.

From pH levels to available nutrients and organic matter content to texture to moisture and weather and climate factors, as well as pests and diseases, there is a delicate balance that effects crop yield positively or negatively.

Water stress from either too little or too much water is a leading cause of poor quality, Purdue University reports. A shortage of water coupled with high transpiration rates can produce blossom end rot in tomatoes, peppers, melons and squash, as well as tip burn in lettuce and cabbage. The same condition can produce curved cucumbers. Sweet corn will have poor tip fill if water stress happens during ear development. Cauliflower is very sensitive to excess water in its root zone.

Then watering too much during later stages of fruit development can cause cracked tomatoes, peppers, cabbage and melons, as well as allow pathogens to sneak their way in. That's because the excessive rain leaches the nutrients necessary to finish developing the crops.

That's just looking at water. Soil minerals and nutrients can impact crops, too. Fertilization can impact flavor, texture, color, size, shelf life and nutrient content. Excesses or deficiencies will reduce vegetable and fruit quality.



YOUR CROP ROOTS ARE TALKING. Are You Listening?

Listening to what your soil is telling you can be determinantal to each decision you make next in the life of your vegetable crop.

Trusting your gut has gotten you this far. Now take your wealth of knowledge and prove it with scientific data to refine what you've learned and continue growing into the next season — and every season beyond.

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