

grow

College of Agricultural & Life Sciences
University of Wisconsin–Madison

High-Tech Eyes on Wisconsin Skies

UW's statewide network of weather stations ensures farmers aren't left twisting in the wind.

PAGE 20



STUDENTS GUIDE PATIENTS IN NEED 9
BETTER PLANTS FOR FEED AND FUEL 28
FARM REVIVAL VIA FERMENTATION 32

High-Tech Eyes on Fields and Skies

UW's statewide network of hyper-local weather stations gives Wisconsin farmers a powerful tool to reduce costs and improve yields.



CLOCKWISE FROM LEFT:

Wisonet instrumentation engineer Caitlin Wienkes installs a new weather station near Plymouth, Wis.

An aerial photo of Hillside Apples, an orchard in Casco, Wis., that hosts a Wisonet station.

David Bartling, co-owner of Bartling's Manitowish Cranberry Co. in Manitowish Waters, Wis., views data using the Wisonet website on his phone.

Cranberries float in the bed after being removed from the vines at Bartling's Manitowish Cranberry Co.

PHOTOS BY MICHAEL P. KING, TAYLOR WOLFRAM, AND ALTHEA DOTZOUR (2)



Precise Weather Data for Precision Agriculture

“When you dial down and focus on ways to support the farmers in our very diversified agricultural economy in Wisconsin, what they require feels familiar to a scientist,” says Chris Kucharik, a professor of plant and agroecosystem sciences at CALS. “It’s detailed information, different types of support tools, data-based models to help them guide their decision-making.”

Kucharik is the director of a team of meteorologists, engineers, web developers, and technicians building out Wisconet, a statewide network of high-quality weather stations that provide valuable, local data to farmers.

In Bartling’s case, it couldn’t be more local. In 2024, he and Michael O’Brien, a neighbor and general manager of Vilas Cranberry Company, agreed to allow Wisconet to install a station on a shared berm between their farms. Now, every few minutes, research-grade instruments take new measurements of air and soil temperature, humidity, precipitation, wind, and more within yards of their plants.

If you closed your eyes — and maybe if David Bartling BS’13 wasn’t trying to shout over the roar of harvesting machinery — you might guess he was talking about his software business or a chemistry lab. Not the weather on the farm.

“The more data, the better,” says Bartling, co-owner of Bartling’s Manitowish Cranberry Co. in Vilas County. “I have an engineering background, and an engineer likes data.”

Over the nearly 80 years and three generations the Bartling family has been growing cranberries in Wisconsin’s Northwoods, plenty has changed about the way farmers approach their work. In particular, understanding the growing environment — temperature and moisture, above ground and below, past and present and future — has taken on a decidedly modern edge.

CLOCKWISE FROM TOP LEFT:

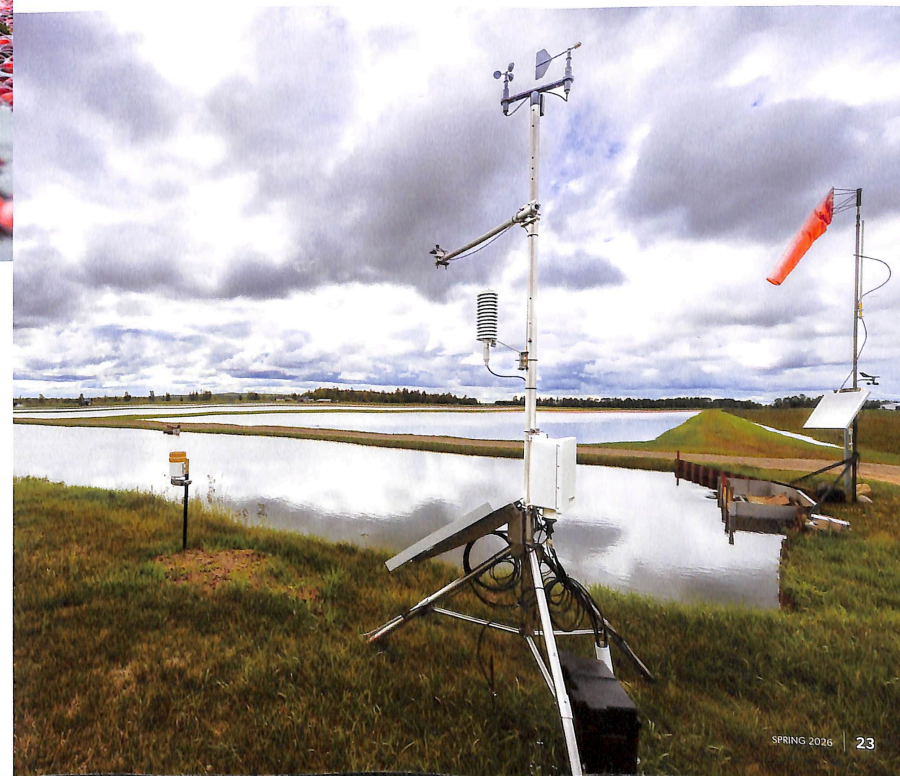
Co-owner David Bartling gathers a handful of cranberries at Bartling’s Manitowish Cranberry Co. in Manitowish Waters, Wis.

General manager Michael O’Brien poses for a portrait at Vilas Cranberry Company in Manitowish Waters, Wis.

A Wisconet station, which provides localized weather data for crop decisions, installed at Vilas Cranberry Company.

Workers monitor the flow of floating cranberries as they are sucked out of the cranberry bed by a berry pump at Bartling’s Manitowish Cranberry Co.

PHOTOS BY ALTHEA DOTZOUR



“When you’re applying fertilizer or treating for pests, to be able to do that according to data coming from right down the road from your own beds, that benefit is awesome,” says Bartling, who earned his CALS degree in biological systems engineering. “The rain gauge we had for 40 years was probably \$5 down at the hardware store. But if I forgot to drive by it and empty it after the last rain, well, Wisconet is a little more reliable.”

And, because each Wisconet site has a page on the network’s website reporting the latest (and historical) data, Bartling can check on his farm while he’s dropping his daughter at daycare in the morning or making a run to the supply store.

It’s not easy for owners of small farms to invest in data and analysis, according to O’Brien, which makes Wisconet an important resource — even to farms that don’t host a Wisconet station.

“You’d be surprised how many farmers don’t have access to that kind of information. The equipment and expertise is

expensive,” he says. “To my knowledge, all the growers around here use it. And we can look at surrounding stations to see what’s coming toward us or whether something is starting to move off.”

Better Decision-Making with On-Farm Data

Timely access is important to Bill Roethle, owner of Hillside Apples in Casco, just east of Green Bay. He jumped at the opportunity to relocate a Wisconet station from a nearby farm when its owner decided to retire. Roethle used to get his farm-relevant weather information by calling a recorded service in Sturgeon Bay, about 20 miles up the Lake Michigan shore.

“Sometimes, they’d have the same message on there for a week or so,” Roethle says. “Now, I can pull out my phone and look at it myself. Better decisions can be made because it’s right here, and it’s up-to-the-minute data.”

OPPOSITE PAGE: A Wisconet station at Hillside Apples in Casco, Wis.

BELOW: Bill Roethle, owner of Hillside Apples, inspects an apple tree for insect damage in his family-owned orchard.

PHOTOS BY ALTHEA DOTZOUR



“Better decisions can be made because it’s right here, and it’s up-to-the-minute data.”

— Bill Roethle, Hillside Apples



“Having specific and timely knowledge about their own area is a real economic advantage for Wisconsin farmers.”

— Chris Kucharik, Wisconet director and CALS professor

A Statewide Network for Farms, Forests, and Cities

With support from the Wisconsin Alumni Research Foundation, Wisconet has grown from 14 stations to nearly 80 since 2023. The pins marking stations on the state map in Chris Vagasky's office have quickly accumulated, multiplying Wisconet's benefits and making empty territory disappear.

“They're in a really diverse range of locations, including farms, forests, and built-up areas,” says Vagasky, a meteorologist and Wisconet program manager. “So, the data from these stations can be used at different scales — locally, regionally, or as a networked representation of the whole state — in ways that are useful for agriculture, for emergency management and research applications.”

Wisconet also shares its stations' data with the National Oceanic and Atmospheric Administration, contributing to services such as national severe weather forecasting and drought moni-

toring. Also, because the data is available to the public on Wisconet's website, anyone can find the closest station — or one in another corner of the state — to check current conditions or recent trends and even tools that map heat risk and storm severity.

Many other states have weather station networks, called mesonets, referring to observations taken on the mesoscale (around 1 mile to 150 miles in size). But Wisconet (Wisconsin Environmental Mesonet) stations go above and beyond for farmers by adding extra sensors to the typical mesonet station's array of equipment — including sensors that track soil moisture at intervals down several feet into the ground.

Funding from the U.S. Department of Agriculture-supported Wisconsin Rural Partnerships Institute has helped Wisconet developers turn the stream of data from the stations into tools specific to different types of crops grown around the state.



Explore Wisconet Online

The digital edition of this issue of *Grow* includes two videos that showcase the staff behind Wisconet, the farmers who use and benefit from the network, and the Wisconet dashboard in action. View them at go.wisc.edu/grow-wisconet.

Access Wisconet for highly localized weather and soil measurement data at wisconet.wisc.edu.

OPPOSITE PAGE: Wisconet instrumentation engineers Mikaela Martiros (background) and Caitlin Wienkes set up a new weather station near Plymouth, Wis. Wienkes connects to the control board as Martiros digs a hole for soil sensors.

BELOW: Chris Kucharik, professor of plant and agroecosystem sciences and Wisconet director, presents about the UW-managed mesonet at the 2025 Farm and Industry Short Course's AgForward program on the UW-Madison campus.

BELOW RIGHT: The top portion of a Wisconet station at Vilas Cranberry Co.

PHOTOS BY MICHAEL P. KING (2) AND ALTHEA DOTZOUR

“We can translate the stations' reports into alerts when the conditions are just right for a particular disease to spread through cherry trees or when it's almost been warm and wet enough for a pest that eats corn roots to emerge,” Kucharik says. “Having specific and timely knowledge about their own area is a real economic advantage for Wisconsin farmers.”

Many farmers fully understand the advantages Wisconet has over older methods of reading the weather to determine the best timing for certain practices. So, they're using it frequently, and they're spreading the word about its benefits.

Kevin Koepsel, whose Blind Cow Dairy covers about 97 acres near Kewaskum, spent decades relying on what he called “a not exactly scientific” way to kick off planting. “We've got a field-stone basement, and when the field stone warmed up to 50 degrees, we knew the rest of the soil was 50 degrees. That's when we started planting corn and soybeans,” he says. “Eventually, I thought

there's got to be a better way.”

That arrived in 2024 with a Wisconet station. “I'm glued to it,” Koepsel says. “I talk about it everywhere I go, point people to the website.”

That's important to the network, according to Kucharik, which requires ongoing support.

“If we just talk about agriculture, and if that data and those decision-support tools go away, our farmers suddenly become less competitive with our neighboring states,” he says.

“It was a learning experience for me,” says Phil Mueller, general manager of Star Valley Flowers near Soldiers Grove, which is also home to a Wisconet station. “I'd keep an eye on it after rain fell and watch that moisture move down 4 and 8 and 20 inches.”

And Star Valley's station has all kinds of fans.

“It wasn't long before we noticed a hole right next to the station,” Mueller says. “It turned out to be a badger. That seems like a pretty good endorsement.”

