

— AMERICAN —
FRUIT GROWER[®]

SPECIAL REPORT

Frost Protection



March 2024

A Meister Media Worldwide Brand
GrowingProduce.com

Avoid Frost Damage

It's not easy, especially in this age of climate change.

BY DAVID EDDY, EDITOR

In our annual State of the Industry survey of growers, few topics attract as many comments as the strange weather that growers around the country have cited in recent years. For example, some tree fruit growers have complained about increasing temperatures while noting that the netting they had bought for hailstorms is perhaps more valuable as shading to prevent sunburn of their fruit. Some hot-weather events are serious, such as the “Heat Dome” of 2021 in the Pacific Northwest, but none damage as much fruit each year across the U.S. as frost.

While our readers have been equally split on whether climate change is natural or manmade, few doubt the climate is changing. It has become routine to see records broken for most rainfall, highest temperature, you name it.

Worse still for growers of all types are abnormal weather events when the changes occur rapidly. Few things are worse for a Midwestern grower than a false “spring” in March, followed by a devastating freeze in May. What is more, it sure seems every part of this great country has been affected by this crazy weather in some way.



Photo: Orchard-Rite Ltd.

James Chinchiolo, Principal, Chinchiolo Farming, in Lodi, CA, describes an experience that taught the cherry grower a lesson:

“I personally was caught off-guard during the winter of 2022 by a wide fluctuation in temperatures, presumably caused in part by climate change. I experienced nearly 100% crop loss after an abnormally warm mid-February, immediately followed by an unusually cold late February,” he said. “Ultimately, I lost the crop after three-plus hours at plus-minus 24° F.”

Chinchiolo was responding on behalf of Ranch Systems to a survey we had sent to suppliers in the business of providing frost mitigation products. The editors at *American Fruit Grower* thought it might be a good idea to get some advice on the topic from those who deal with growers all the time. The 10 respondents answered the following questions:

In light of climate change, has the geography of frost-prone growers changed? Are you gaining fruit growers/clients who have been caught off guard?

■ “In some regions, warmer earlier springs are waking the trees too soon, and when the cold snap hits, there’s damage — the buds are further developed than you would want them as normal frost temperatures hit. Two years ago, snow-covered cherry blossoms were found across the Pacific Northwest, an extreme example of early warm conditions and the not completely unexpected late-winter storm, killing production.”

— **Bill Terry, Business Development Director, WaterPoint Irrigation Technologies**



Photo: Jurga Jot - stock.adobe.com

■ “The physical geography has grown — acreage that would have been considered “safe” from spring frost events 20 years ago has seen damage in recent years. To date, it seems that growers continue to see frost events as “normal,” not necessarily as a new normal. Coupled with abundant crops, and poor prices for the growers across most specialty crops, additional/new frost protection is not a higher priority than what we normally see. Frost protection measures are going in, but it is really a combination of primarily wind machines and under-tree sprinklers using the volume of water available from the drip system.”

— **Phil Ausra, President/Inside Sales, Trickl-Eez Irrigation**

■ “Climate change is reshuffling the map for frost-prone growers. We are seeing shifts in frost patterns, with areas previously considered safe experiencing unexpected late frosts or earlier ones in the season. This introduces us to new clients, often fruit growers caught off guard by these changes. Witnessing their potential losses is heartbreaking, yet it also fuels our mission to equip them with the tools to adapt and thrive.

One of our technology's main benefits is its flexibility, adaptability, and ability to build resilience against changes like weather and water scarcity."

— **Mark Yoshimoto**, *Sales and Marketing Director, WiseConn*

- "I have not noticed the geography of frost-prone areas changing due to climate change. However, if a fruit grower wants to expand, or if someone is new to the area, the most ideal ground for frost-free options is already planted. The topography of the location is significant because air can flow downhill on sloped ground, but on flat ground the air can pool up and fruit is more susceptible to frost."

— **Brian Hendricks**, *District Manager, Wilbur-Ellis*

- "Yes, and with most growers going to high-density planting, it is more difficult to get air movement through the blocks. Wind machines make a huge difference in bringing down the warmer air to increase bud temperature and keeping it moving. This has become particularly important in recent years in Western New York and Virginia and more recently in the far Northeast."

— **Virgil Anders**, *Sales Representative, Cascade Wind Machine Sales*

- "The progression of frost-prone regions is slow. Initial changes in susceptibility to frost are hard to track because even in historically prone regions, damage does not happen every year. Growers that have been caught off-guard have to guess if it was the beginning of a new pattern that would justify investing in frost mitigation infrastructure or if it is just a once-in-a-decade event that was bad luck. The patterns of change are there, and forward-thinking growers will have to start to build up their resources to limit damage from untimely frost events."

— **Benjamin Smith**, *Lead Technical Irrigation Specialist, Semios*



Photo: Sbastien - stock.adobe.com

With many fruit growers relatively new to frost control, what one word of advice would you give them?

■ **“Homework**’ is the single word. Do your homework because growers need to understand what critical temperatures will damage their crops and when they might occur on their growing sites. Each growing site has its own microclimate during a frost event. Understanding wind speed and direction as well as expected low temperatures is critical to know. This leads to the first major decision, which is to choose between overhead and under-canopy frost protection. Normally under-canopy is the best approach because it requires less water, and it can be used in conjunction with wind machines.”

— **John Rowley**, *Rotator Product Manager, Nelson Irrigation*

■ **“Keep track of fruit bud development, critical temperature kill charts, and prior weather events of your crops to engage frost protection in a timely fashion.”**

— **Neil Hauff**, *President, H.F. Hauff Co.*

■ **“Do not wait.** Many farmers wait until they see frost coming. They should anticipate frost and have a frost protection plan in place. Wind machines require a foundation and a machine to be installed. This cannot happen overnight. If they are going to use a sprayer and have water available, they must have that system in place. Too many times I receive calls the night before frost — or even at 2 a.m. the day of — asking for a new wind machine.”

— **P.J. Method**, *National Sales Marketing Manager, Amarillo Gear*

■ **“There is only one word: protection!”**

— **Lee DeLeeuw**, *Sales Representative, Superior Wind Machine Sales*

■ **“Location (x3) — Location, Location, Location** before anything else. Otherwise look at combining frost protection options, including plant health/nutrition, and innovations like Washington State University’s cellulose nanocrystals.”

— **Ausra, Trickl-Eez**

■ **“Location is critical.** It matters what you are planting and where you are planting it. Newer varieties of apples, pears, and cherries can be more susceptible to frost, and the topography of the location is important. Air can flow downhill on sloped ground, but on flat ground the air can pool up, and fruit is more susceptible to frost. For those in susceptible lower-lying areas, be prepared to run wind machines, manage water applications, and consider heat sources.”

— **Hendricks, Wilbur-Ellis**

■ **“Dew point!** When the air is dry, temperatures can drop quickly. So, keep an eye on humidity, and if it’s low, begin work a couple of degrees earlier to stay ahead of the damage.”

— **Terry, WaterPoint**

■ **“Be prepared!** Climate change adds a layer of unpredictability, so proactive strategies are key. Invest in robust frost protection solutions, learn to interpret weather data closely, and have backup plans in place. Knowledge is your best defense against frost’s icy grip.”

— **Yoshimoto, WiseConn**

■ **“Just like it is important to understand the mode of action of a pesticide, they need to understand how different frost mitigation practices work to know if they will work in their situation.** For example, frost fans work very well in areas where frost events are accompanied by inversions. Running high-flow microsprinklers can help raise humidity and buffer the temperature, but low-flow designs and drip irrigation have little helpful effect. And finally, ice encapsulation is only helpful if water is running from above the canopy.”

— **Smith, Semios**



Photo: WaterPoint Irrigation Technologies

What is the one aspect of frost control that even veteran fruit growers may not realize?

■ “The literature I reviewed suggested when cherry buds are still closed and in the ‘first swelling’ or ‘side green’ phase, they are not as susceptible to freezing, and I believe I experienced the opposite in 2022, perhaps because the volume of flower material was small, and the cold could easily penetrate to the juvenile cherry. At 24° F, I was also led to believe that a percentage of the crop would be OK, and now I believe it is not so much the temperature of the sub-freezing event but the duration.”

— **James Chincholo, Ranch Systems**

■ “The importance of real-time data. Our technology provides precise and timely information about local weather conditions, allowing growers to make informed decisions on frost-protection strategies. By leveraging this data, farmers can optimize the deployment of frost-control measures, minimizing the risk of damage to crops. Accessing and acting upon up-to-the-minute weather information is a crucial element that can enhance the effectiveness of frost control practices and ultimately contribute to better crop yields.”

— **Yoshimoto, WiseConn**

■ “Frost protection using sprinklers is generally more effective than wind machines or heat. Many growers do not fully realize the value of water storage. In addition to providing adequate water volume for effective frost control, water storage settles sediment out of dirty water. Water storage can be a very important production tool that helps improve crop yield and quality because it provides on-demand irrigation and crop cooling capacity at critical times.”

— **Rowley, Nelson**

■ “Traditional frost modeling charts may not be as accurate with new planting systems and varieties because they can be more sensitive. I encourage growers to reach out to consultants they work with. Proper nutrition is a critical element to keeping plants healthy all year long and better able to withstand stressors like frost. At Wilbur-Ellis we help our growers consider their decisions by providing insights into temperature data and guidance on resource management. For example, we help them determine temperature sensitivity by running cuttings through a freezer chamber. That helps them make decisions on timing of management practices when colder weather patterns are on their way.”

— **Hendricks, Wilbur-Ellis**



Photo: WaterPoint Irrigation Technologies

■ “Dew point is a measurement that is not widely applied to frost protection, but it should be first on one’s list in monitoring and applying frost protection techniques. The higher the dew point, the longer it takes for frost to occur. The lower the dew point, the less time to react to the speed of temperature drop and implementing frost control measures before critical frost.”

— **Hauff, H.F. Hauff**

■ “In extreme frost or freeze events, run under-tree micros sprinklers in concert with wind machines. The 40° F water can affect both temp and humidity, and wind machines draw warm air down, from above the cold inversion layer, and blow it across the blocks. You may be missing a diamond in the rough when shopping for wind machines. Check out performance specs, they are not all the same.”

— **Terry, WaterPoint**

■ “Veteran fruit growers KNOW the importance of frost control. They know!”

— **Anders, Cascade**

■ “Frost mitigation starts the day before the frost event. Wetting the soil, making it darker and wetter, increases the soil’s ability to capture and hold heat that will be released at night and will have one of the largest effects on ambient and bud temperatures. The main caveat is that this practice works best on bare soil, and not as well when ground cover is in place.”

— **Smith, Semios**

■ “Frost protection is not cheap. Like everything, costs are going up. When a grove or vineyard is being developed, and frost could be an issue, that is the time to install frost protection equipment.”

— **Method, Amarillo Gear**



Photo: Orchard-Rite Ltd.

Automating Frost Control with WiseConn

While irrigation control has become a routine practice for many DropControl users, managing water for frost control remains heavily reliant on manual labor in the field. This crucial practice, especially during critical phenological stages of plant development, significantly impacts fruit yield, quality, and overall condition.



DropControl introduces the **RF-V1**, a groundbreaking solution that automates frost control when combined with the existing M1 and C1 nodes. This innovative system offers several key benefits:

Eliminate Manual Valve Opening: Forget the days of waiting for potential frost and manually opening valves at night. The RF-V1 allows you to pre-program valve opening and closing based on either your irrigation schedule or the temperature monitored by a DropControl weather station. This eliminates the need for manual intervention, saving you time and effort.

Reduce Costs: The RF-V1 presents a cost-effective alternative for automating frost control valves. Compared to traditional methods, this solution offers a significant financial advantage for growers.

Greater Flexibility: The system allows you to program different frost control strategies based on the specific needs of your crops. This flexibility ensures you can tailor the system to your unique requirements, optimizing frost protection for your specific crops.

Seamless Integration: The RF-V1 seamlessly integrates with the existing DropControl family of equipment:

M1: Transmits weather station data to the C1. **C1:** Activates the pump to initiate frost control. **V1:** Opens the corresponding valves.

Beyond Frost Control, WiseConn offers the most complete and comprehensive irrigation management solution. The RF-V1 offers even more benefits beyond automating frost control. It brings advanced efficiency and overall irrigation system control, optimizing water usage throughout your operation:

Real-time data: Access at-a-glance information on flow, pressure, and soil moisture through advanced sensors.

Easy installation: Leverage NFC technology for quick and easy setup.

Mobile management: Manage and control your irrigation system from anywhere, anytime using the intuitive mobile application.

Flexible power options: The RF-V1 can operate with battery, solar, or traditional electric services, allowing you to choose the most suitable power source for your needs.

Long-range connectivity: The system utilizes the LoRa network, enabling minimal energy consumption and a range of up to five miles, ensuring reliable communication across your fields.

WiseConn and the Future of Irrigation Management

WiseConn, the company behind DropControl, introduces the RF-V1 to empower growers with significantly powerful yet easy-to-manage control at unmatched cost-effectiveness. This solution goes beyond being a mere product; it represents a paradigm shift in irrigation system management. By using the RF-V1, you can:

Reduce operating costs: Eliminate the need for manual labor and optimize water usage.

Increase irrigation system management: Gain real-time data and remote control capabilities.

Meet sustainability needs: Conserve water and minimize environmental impact.

Improve yield optimization: Protect your crops from frost damage and ensure optimal growing conditions.

The RF-V1 signifies a leap forward in water management, empowering growers and ranchers to step into the future of sustainable and efficient agriculture.



(559) 326-7613

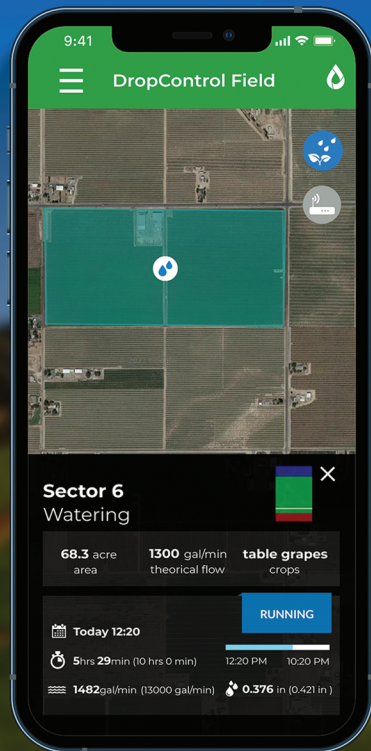
Website: www.WISECONN.COM INFO@WISECONN.COM



IRRIGATION AUTOMATION SYSTEMS

WiseConn[®]

IRRIGATE PRECISELY



ADVANCED IRRIGATION & FERTIGATION
MANAGEMENT TOOLS



SOIL MOISTURE, WEATHER, & PLANT HEALTH
VISUALIZATION



WIRELESS PUMP AND VALVE CONTROL



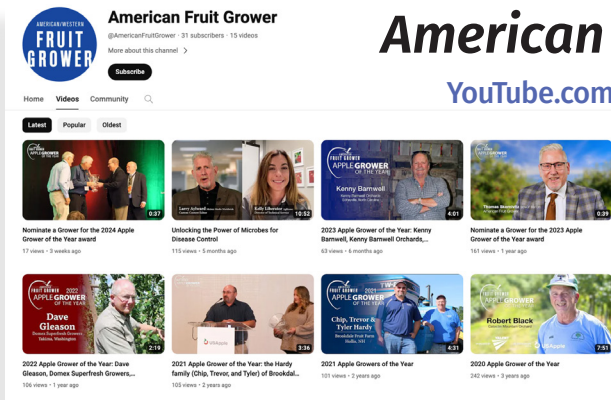
RESERVOIR, WELL, POND & BOOSTER PUMP AUTOMATION



FOR MORE INFORMATION, VISIT OUR SITE:
WWW.WISECONN.COM

CONTACT US:
INFO@WISECONN.COM
(559) 326-7613

Additional Resources



American Fruit Grower Videos

[YouTube.com/@AmericanFruitGrower/Videos](https://www.youtube.com/@AmericanFruitGrower/Videos)



American Fruit Grower eNewsletters

GrowingProduce.com/Subscribe/



Digital Issues

GrowingProduce.com/American-Fruit-Grower-Magazine/

Social Media

