

Winter Maintenance for Greenhouse Equipment

By Patricia Dean

Integrate maintenance into your winter schedule for a more productive spring

Ask a grower about maintenance, and you'll learn volumes about their greenhouse range. Growers approach the job of maintenance in different ways; many find logged data, collected by the greenhouse controls and relayed by accompanying software, essential for gauging their equipment's performance, including energy usage, calibration and functionality. Other growers who personally service their equipment and have a smaller range may notice immediately when a heater is running hot, a vent is out of alignment or a curtain isn't sealing properly.

In either case, growers generally work from a maintenance checklist organized by greenhouse, season or component. While most agree that the middle of winter can be a chilly time for servicing equipment, they also find that with the new calendar year comes the opportunity to prepare for a productive springtime.

Take Joe McShaw at Honeymoon Acres in Wisconsin for example. He's an organized guy; he runs a mid-sized operation with a skeleton crew and a lot of



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planning. His maintenance months are October and January, since he grows seasonal plants and the spring is his busiest time. “I hate to do things in spring that I should have done in winter. It costs me time, and it’s foolish,” says McShaw.

Institutional growers also find autumn and winter to be the best months for maintenance on automated equipment. At Oregon State University, Jim Ervin runs two large-scale ranges with four full-time staff members and a student crew. They maintain all of the equipment, except the hard-wired electrical components. Summertime is spent on the outdoor projects and winter on the indoor projects.

Because of year-round growing at the big commercial ranges, maintenance needs to be

integrated within the production schedule. The houses are never completely empty, and the equipment runs continuously. Dave Volante at Volante Farms uses late October and early November for annual maintenance. He cleans and lubricates the racks on his vents and curtains twice a year, the second time occurring in April, just before they open. When it’s time for maintenance, “It’s all hands on deck,” says Volante.

Maintenance is more relevant today than ever before, and well functioning machinery and computers means longer equipment life and less energy consumption. The following is a rundown of proper maintenance for greenhouse equipment.

Environmental Controls

A control is only as accurate as the information it receives. Whether the system includes a simple thermostat, staged control or an integrated control, keeping your temperature sensors clean is imperative.

1) Aspirated temperature systems: clean the inside of the unit and rinse the filter with water monthly. Replace the filter as needed.

2) Check the calibration of the aspirator sensor using a high-quality electronic thermostat with a cable. Thermostat should be inserted into the aspirator box. Accurate thermostats save money and provide the best growing environment for your crop.

3) Simple thermostats: consider shading and aspirating to provide the most accurate reading. If a thermostat is running too warm, it can cause fans to run longer than necessary, adding to energy costs.

4) If each piece of equipment has its own thermostat, calibration is crucial. Thermostats are often off by as much of 5° F, which can cause heating and cooling to run simultaneously, wasting energy. The Department of Energy reports that for every one degree of accuracy, an operation can save 3 to 5 percent on their total energy cost.

Keep the controller running in empty greenhouses year round, but increase the dead band between heating and cooling. Example perimeters are heat on at 38° F and cooling at 95° F. Remember that in the summer extreme heat can damage environmental controls and the structure. This is especially important at educational facilities that are closed during summer months.

Proper maintenance of venting systems is essential; replacing a rack and pinion system can be quite costly.

Vent Machines

There are growers who have had the same rack and pinion for 30 years because of thorough annual cleaning, lubrication and immediate attention to signs of misalignment. Replacing a rack and pinion system that wasn't properly maintained includes high labor costs, and down time in that section of the greenhouse.

1) Check along the entire length of each closed vent to ensure a tight seal, and adjust for any gaps. Besides the obvious energy loss, misaligned vents

cause stress to the greenhouse structure and the rack and pinion itself.

2) Manually run the vent machine to be certain that the rack and pinions are aligned and running smoothly.

3) Clean the rack with a cloth to remove all dirt and apply a small amount of lubricant; excessive lubricant attracts dirt, which can disrupt smooth operation.

Chris Meyer at Walters Gardens grows small propagation plants through the winter. He



locks down pad vents and turns the toggle switches off on the vents in the late autumn. He considers this a second safety net, "If there was a glitch, and cold air rushed in, we'd be in trouble."

Energy Curtains

Curtains cut energy costs year round, but in the winter a tear or poor seal can prove to be extremely expensive

1) Check to be sure the curtain closes fully, forming a tight seal along the entire edge.

2) The main curtain should be resting inside the perimeter seal, which runs along the sides of the greenhouse and prevents heat loss from side walls.

3) Repair tears to the curtain material using 3M double-sided tape and a piece of the curtain fabric.

4) Optimize the curtain settings in your integrated control allowing precision timing for covering and uncovering the greenhouse. Consider programming the curtain system to pause as it uncovers to avoid a rapid cold air spill onto your crop, and think about uncovering the curtain after sunrise, and covering prior to sunset to extend the time it insulates your house.

Heating Systems

There is a wide range of heaters used in greenhouses. Autumn is the ideal time to prepare your heater for the winter months.

- Furnaces should be cleaned
- Replace filters
- Lubricate pumps and motor bearings
- Check fan belts
- Check gas valves and ignition mechanisms
- Run a combustion efficiency test
- Vacuum radiators and heating pipes

Morris Brinks with True Leaf suggests real-time logging, which can compare heater function with anticipated consumption creating a base line for energy use.

Here are some winter tips from Randall Hill, greenhouse manager at the USDA, Beltsville, Md:

1) Empty all pad pump tanks, wet vacuum them out, flush and clean lines, completely clean tanks.

2) Set all the walkways and corridor set points to cooler temperatures than the greenhouse zones to save energy.

3) Allow perimeter gutter line heat to engage and open energy curtains when cold temperature and/or snow is detected by the weather station.

4) Adjust HID and photoperiod lights to counteract the shorter days and limited daylight.

When asked about his biggest challenge, Hill responded, "Firing and testing the heating system. With 44 zones, it's a huge task for one greenhouse manager to tackle." Wadsworth technicians visit twice a year to test all the mixing valves and water temperature probes in each control system throughout the complex.

Tom Hrivnak, director of horticulture at Stan Hywet Hall & Gardens in Akron, Ohio, has this advice for maintenance on back-up generators: "We auto test every Monday at 10 a.m. We're closed that day, and we have staff members on site to monitor and confirm that the generator is running the entire greenhouse complex, which includes two zones and several offices." The generator runs off the city's natural gas system and has no delay, so the VersiSTEP greenhouse controls and PCs don't skip a beat during testing.

Stan Hywet's poly houses also have a small generator that has a 30-second delay. The generator is activated when the temperature alarms go off, which is usually at 45° F, and during a power outage. Hrivnak shared this lesson: "Make sure your alarm contacts are set to be in the normally closed position when the greenhouses are working properly. Then, the alarm will move to the normally open position in the event of an alarm situation. I learned this the hard way. We lost \$40,000 in crop revenue because the alarm contacts corroded open, so when the alarm was supposed to go off, the contacts couldn't close." He also stresses that you need to be sure your alarms function when you lose power.

There is software that complements many of the automated components in today's greenhouses. Using logs to review greenhouse temperatures from various periods of time, weeks, months or the previous year, provides information on how well your equipment is functioning. Dave Volante relies heavily on his STEPsaver software for gauging how his range is operating. He can sign on from home to confirm temperatures, manually override settings and review logged data.

How often a grower does maintenance depends on equipment usage and climate. If you have a greenhouse that runs at full capacity year round, your vents and curtains will need more attention. If you live in a dry, windy area, you'll want to clean and lubricate more often.

Some growers prefer to have maintenance done by an outside source. Complex heating systems can require a specialist, whether it's a local HVAC company or someone from the greenhouse industry. Many years ago Rough Brothers began as a greenhouse maintenance company and expanded into design and manufacturing; today they still offer a full maintenance service. Ludy Greenhouses has highly experienced technicians ready and able to service your greenhouse and all associated equipment.

Wadsworth Control Systems offers a service package on either an annual or semi-annual basis that includes testing environmental controls, updating software, sensor calibration, aspirator maintenance and staff training.

Maintenance is the key to well-functioning equipment. Make a regular schedule, keep records,

and you'll find your greenhouses run more efficiently and your machinery lasts for many years. 

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