Preparing Your Blueberry Freeze Protection System

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EXTENSION

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Frost protection systems tremendously benefit commercial blueberry production in Georgia. These systems are expensive and usually configured as overhead irrigation systems (Figure 1). For the system to provide protection, it must operate as soon as it's needed. The best practice for maintaining a frost protection system is to perform preventative maintenance service every late fall or early winter. This should be a comprehensive inspection and service. To start with an overview of frost protection, see University of Georgia Extension Bulletin 1479, "Commercial Freeze Protection for Fruits and Vegetables."

Figure 1. An active frost protection system operates over southern highbush blueberry.

Inlet inspection

Begin at the water inlet. If using an irrigation pond, raise the inlet pipe, clean, repair, and look for obstructions of the pipe and screen. A few of the more common issues with inlets are fish and debris clogging the system. Remember, do not allow the inlet to sit on the bottom of the irrigation pond. Elevating the suction pipe avoids introducing silt, microbes (some of which may be plant pathogens), and other debris from entering the system and clogging the screen (Figure 2).

Figure 2. Inlet pipes run from irrigation ponds. Note the blue barrels that are keeping the ends of the pipe from sitting on the bottom of the pond.

If your system is drawing irrigation water from a well, this would be a great time to inspect your well head, test discharge, and inspect electrical wires and boxes (Figure 3).

Well inspection

Survey the condition of the well. Check for leaks, note whether corrosion or scale is building up, look for critter nests, and note all damage. Clean out debris that has collected around the wellhead. This is an excellent time to make repairs such as replacing seals and grouting the space between the bore hole and the casing.

Gear-driven pump with a diesel prime mover

Electrical submersible pump

Figure 3. The wellhead should be inspected prior to a freezing event.

Well discharge testing

Pump testing can be accomplished with an open discharge method. Using the open discharge method, the irrigation system is disconnected on the outlet side of the backflow valve, pressure gauge, flowmeter, and before any reduction valves. A valve at the point of discharge should be installed (or the system should be opened) at a point where a valve is presently in the system. If your system lacks a backflow valve, pressure gauge, flowmeter, and discharge valve, you may need to install them before performing the discharge test. Operate the pump for 10 to 15 min, and open and close the discharge valve. Then record data points for pressure and discharge. These points will be used to plot a pressure/flow curve graph and six to eight points may be sufficient (Figure 4).

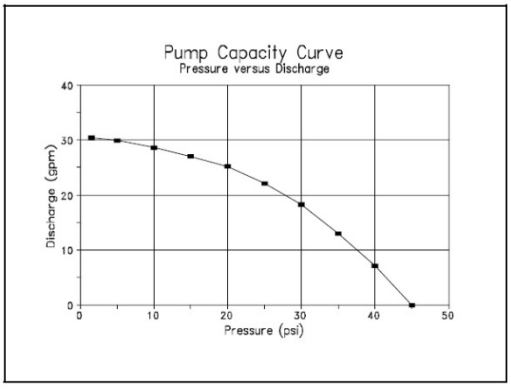

Figure 4. A pump capacity graph is drawn from data collected from a head-discharge test. Tests are performed by certified well drillers and the frequency of testing is dependent on the well's water quality.
Source: University of Florida EDIS, CIR1133

The static water level should be recorded with drawdown at each flow point. This procedure will identify the net positive suction pressure of the pump to determine whether the pump/suction line is deep enough to avoid cavitation from a lack of water. The discharge test identifies static well depth, draw down depth, and clogging of the system.

If you're unfamiliar with testing pump operation, a certified well driller should be able to perform this procedure. The pump should be tested every few years; the frequency is dependent on water quality and its potential to cause scale buildup, sediment collection in the screens, or slime-forming bacteria. For information on water quality for blueberry, see UGA Extension Circular 1105, "Blueberry Irrigation Water Quality," and for how to sample irrigation water, see UGA Extension Circular 1104, "Sampling Irrigation Water for Blueberry Production." Keep records to determine pump efficiency losses. When the system is at 80% of the manufacturer's specifications, corrective maintenance should be considered.

Electrical inspection

Use a lock out/tag out procedure for safety. If this is not clear, please contact an electrician to conduct the inspection. Inspect wires, connection boxes, controllers, and components for corrosion, wear, critter damage, water infiltration, and the general condition. For overviews on general maintenance of electrical systems, see UGA Extension Circular 1093, "Drip Irrigation Checklist: Start-Up," and UGA Extension Circular 1094, "Drip Irrigation Checklist: Winterization." Heat, sunlight, and animals can damage exposed wire insulation. Open controller boxes and, with the power off, inspect the condition. This would be a good time to replace cracked and degraded gaskets that seal the openings, replace silica gel packages, and tighten contacts. Loose wire connections can generate heat that may melt, short, and ignite during operation.

Pumping systems that have combustion engines as power units will need inspection and maintenance (Figure 5). This is a good time to change oil, check radiator coolant, change filters, and perform battery maintenance. If the power units are gasoline engines, inspect spark plugs, wires, and distributor caps. Clean and measure the plug gap, look for cracks in the wires and distributor cap, look for pitting of the rotor, and if the distributor has points, inspect for pitting, proper gap, and timing. Make inspections of the wiring, clean battery terminal posts, and look under enclosures for critter activity. Replace all damaged and worn parts. Fill fuel tanks.

Figure 5. Diesel-powered prime movers for irrigation pumps.

Irrigation system inspection

Look over all sprinkler heads, piping, and filters. Through the season, there has been considerable activity around the system such as harvest, hedging, weeding, and other farming practices. This provides plenty of opportunities for lines to crack and sprinkler heads to break. Clean the system's filters and operate the system. Check system pressure, look to see if all the sprinklers are delivering water, and check for leaks. Make repairs and allow the system to drain.

Always follow manufactures recommendations for maintenance of equipment. If wind machines are deployed in your planting, apply a scheduled maintenance and operate the system prior to a freeze event to ensure proper working order. Fill fuel tanks, charge batteries, change oil, and filters (air, fuel, and oil). Performing an inspection and maintenance now will give you the confidence to start the system in the early morning hours of a freeze. Below is a point by point maintenance and inspection reminder for frost protection systems.

Frost protection system check-up list:

1. If surface irrigating, inspect, clean, and repair the inlet line from the irrigation pond.
2. If irrigating from a well, inspect, clean, and repair around the wellhead.
3. Inspect, maintain to the manufacturer's recommendations, and clean the pumping systems. For an electric motor, inspect connections, couplers, controllers, and check gear box oil levels, if applicable. For a combustion engine, check the oil, filters, radiator coolant, and batteries.
4. Clean irrigation line filters.
5. Inspect the system for cracked pipes, broken sprinkler heads, and any other damage. Repair as needed.
6. If using wind machines or another type of frost protection system, maintain to manufacturers recommendations and have them ready to be deployed.
7. Operate the irrigation system or wind machine, inspect for proper operation. Repair as needed, drain water from the irrigation system, and then close/seal drain plugs.
8. After any maintenance, recheck your work to make sure the fittings are tight, plugs replaced, valves are in the correct position, and the system is in stand-by, ready for operation.
9. Top off the fuel tanks as needed.
10. If using in-field weather monitoring devices, this is a good time to see if they are in working order, with batteries fully charged, bird droppings removed from solar panels, thermometers in working order, and wet-bulb water reservoirs and wicks in the proper shape.

Following these steps ensures that the irrigation system will be in good operating order going into a freeze event. If you have questions, please contact your county Extension agent.

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