

Preparing your blueberry frost protection system for the next freeze: suggestions for maintenance

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Frost protection systems are a tremendous benefit to the production of blueberry in Georgia. The systems deployed are expensive and usually configured as an overhead irrigation system (Fig. 1). For an overview of frost protection download 'Commercial Freeze Protection for Fruits and Vegetables' University of Georgia Extension B1479 (<http://extension.uga.edu/publications/detail.html?number=B1479>). For the system to provide protection, the system must operate when needed. The best recommendation is to perform a preventative maintenance service every late fall to early winter. This should be a comprehensive inspection and service.



Fig. 1. Active frost protection operating over southern highbush blueberry.



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

1.) 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. We do not want fish being applied to the blueberry plants. Remember; do not allow the inlet to sit on the bottom of the irrigation pond, elevating the suction pipe avoids introducing silt, microbes, and other debris from entering the system and clogging the screen (Fig. 2).

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 (Fig. 3).

a.) Well inspection: look at the condition, check for leaks, is corrosion or scale building up, note all damage, and critter nests. Clean out debris that has collected about 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.

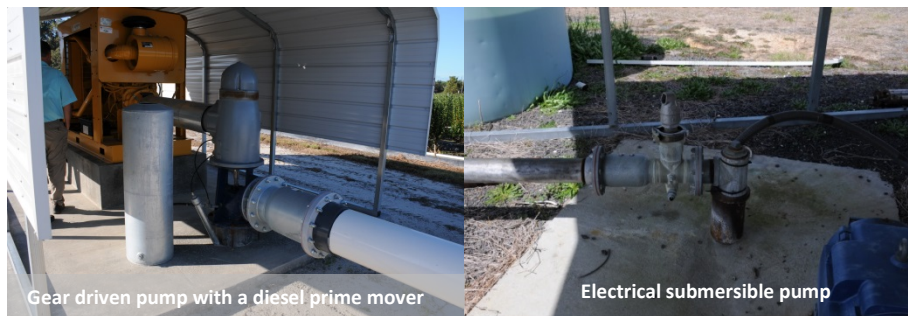


Fig. 3. Wellhead should be inspected prior to a freezing event.

b.) Test well discharge: 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

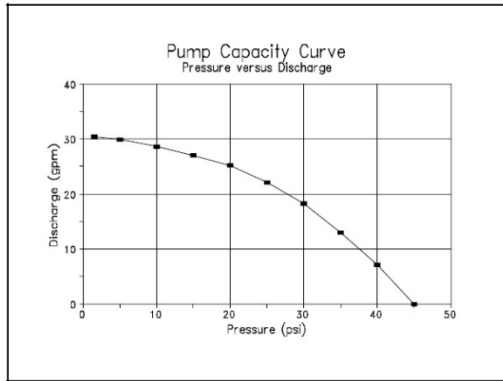


Fig.4. Pump capacity graph drawn from data collected from a head-discharge test. Tests are performed by certified well drillers and frequency of testing is dependent on water quality of the well. From EDIS CIR1133 University of Florida.

backflow valve, pressure gauge, flowmeter, and the discharge should be before any reduction valves. A valve at the point of discharge should be installed or the system 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. The pump is operated for a period of time, 10 – 15 minutes, and the discharge valve is opened and closed. Line pressure data points for pressure and discharge amount are recorded, these points are used to plot a pressure/flow curve graph and 6 to 8 points may be sufficient (Fig.4). 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 if 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. *Testing should be available from a certified well driller.* This test is suggested to be performed every few years and the frequency is dependent on water quality and its potential to cause scale buildup, sediment collection in the screens, or slime forming bacteria. Information on water quality for blueberry is available in ‘Blueberry irrigation water quality’ C1105 (<http://extension.uga.edu/publications/detail.html?number=C1105>) and how to sample irrigation water is in ‘Sampling irrigation water for blueberry production’ C1104 (<http://extension.uga.edu/publications/detail.html?number=C1104>). Keep records to determine pump efficiency losses and when the system is at 80% of manufacture specifications, corrective maintenance should be considered.

c.) Electrical inspection: Use a lock out/tag out procedure for safety. If this is not clear, please contact an electrician to conduct an inspection. Inspect wires, connection boxes, controllers, and components for corrosion, wear, critter damage, water infiltration, and general condition. In ‘Drip irrigation check list: winterization’ and ‘Drip irrigation system: start-up’ C1094 and C1093 (<http://extension.uga.edu/publications/detail.html?number=C1094>) and (<http://extension.uga.edu/publications/detail.html?number=C1093>), respectively, are overviews for



Fig. 5. Diesel powered prime movers for irrigation pumps.

general maintenance of electrical systems. Heat, sunlight, and critters 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 prime movers will need an inspection and maintenance (Fig. 5). This is a good time to change oil, check radiator coolant, change filters, and maintain the battery. If the prime movers are gasoline engines, inspect spark plugs, wires, and distributor caps. Clean, measure for proper 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 wiring, clean battery terminal posts, and look under enclosures for critter activity. Replace all damaged and worn parts. Fill fuel tanks.

Next inspect the irrigation system: 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 opportunity for lines to get cracked and sprinkler heads broken. 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. Remember to cap the outlets after draining.

Always follow manufacturer's 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. This ensures 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 at 0230. 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 inlet line from irrigation pond.
- 2) If irrigating from a well, inspect, clean, and repair around the wellhead.
- 3) Inspect, maintain to manufacturer's recommendations, and clean the pumping systems; electric motor (inspect connections, couplers, controllers, and check gear box oil levels if applicable) or combustion engine (change or inspect oil, filters, radiator coolant, and batteries).
- 4) Clean irrigation line filters.
- 5) Inspect 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 manufacturer's 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 an irrigation system, 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 weather monitoring devices in field, this is a good time to see if they are in working order (batteries at full charge, bird droppings removed from solar panels, thermometers in working order, wet-bulb water reservoirs and wicks in proper shape, etc).

This does not guarantee the system will run properly when needed, but you have ensured that the system is in good operating order going into a freeze event. If you have further questions, please contact your county extension agent.