

Irrigation System Upgrades

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The Conard-Pyle Company has been propagating plants for many decades. Over the many years the department has grown little by little to 14 acres under cover. One of the difficulties encountered with growth is the need to add onto the existing structure while incorporating new systems at the same time. Often the result is awkward and cumbersome.

Starting about 3½ years ago, the company began a program to upgrade irrigation throughout the department. The first major step was to find and install a state-of-the-art control system for environment and irrigation. It would have to replace all the old control devices as well as expand with us into the next millennium. The Argus Control System was chosen for its versatility, expandability, and excellent software. The first phase was installed in late Spring 1997 to include most of the full-heat propagation houses and the outside mist huts. The second phase was begun in Spring 1999. When completed, the system will have control over all aspects of environment and irrigation throughout the department. It will have replaced seven controllers and dozens of thermostats. Every day we realize new advantages of centralized control and software designed to optimize equipment. We also have the opportunity to access the system from home. This allows for faster response as well as avoiding unnecessary trips to the nursery at night.

The next large upgrade involved the heart of the irrigation system; the well and pump house. Much of the equipment was in disrepair or functioning poorly. The well is capable of 200 gal min⁻¹ but the water has high iron. Liquid chlorine was injected just upstream from a pair of filters to precipitate and trap the iron. The main pump was turned on manually whenever irrigation was needed or the cistern emptied. Secondary pumps ran mist and inside water from the cistern. If not carefully monitored, the main pump would overpressurize the lines which created fatigue and breakage regularly. The chlorine injection wasn't accurate and was not given enough reaction time prior to filtration. The filters were also aging and required attention daily. The metal fittings and valves inside the pump house were corroded and leaky as well. The fertilizer and chemical injector was balky and expensive to repair also.

While searching for economical ways to make the system work, we came across several alternatives that made us decide to replumb the entire pump house. First, we installed a pressure control valve and eliminated the need to turn the pump on and off. This also stopped the damaging pressure spikes. We learned, however, that upstream pressures were high enough that we had to replace any plastic pipe between the well and the valve. We also replaced the old steel pipe in the well itself as a precaution. The end result of this upgrade is total freedom to run any volume of water from a single hose to several houses at once. The next big change came when we switched from chlorination and filtration to sequestering our iron. Using a bypass injector, we add a concentrated sequestering agent to the line and spin the water through several small filters to distribute the agent before the iron does any harm in the system. The first injector we bought was not capable of handling our operating pressures. The supplier replaced it with a sturdier unit that required

only minor modifications to serve our needs. The sequestering agent's formula is proprietary but it is based on the same principal used to make iron available in fertilizers.

The last change we made inside the pump house was to replace the fertilizer injector. We had access to four large Dosatron injectors no longer in use at our Maryland farm. We chose to install two of these in parallel to maintain our full flow capacity. Repair parts and the other two units are kept on standby. While installing these injectors, the remaining metal fittings and valves were replaced. Schedule 80 PVC was used wherever possible. We also installed a backflow prevention device to comply with pesticide labels and local regulations. Later we added a flow meter to monitor our usage for our records. Some changes, however, have not worked out. The solenoid valves we installed in line to switch from plain water to fertigation proved too slow and couldn't handle our varying flow rates effectively. We are currently investigating alternatives to gain better control of our fertilizer usage. The ultimate goal is exact house-by-house control as needed.

To further ensure an uninterrupted supply of water, we investigated two wells on the property that had been abandoned years before. One had poor recovery but the other produced a steady 25 gal min^{-1} of very good water. We now pump from this well directly into our cistern to supply water inside our full-heat houses for irrigation and mist. We also chose to use the main well to supply outside mist since that system is now under consistent pressure. This relieves the burden on the cistern and its pumps. The small well and municipal water provide ample backup in case of pump failure or other emergencies with the main well and pump house.

Another concern with the system was the nozzles used throughout the nursery. We had no resource for purchasing new ones of the same type and others had proven inferior. We are currently replacing inside nozzles with Senninger T-Spray nozzles. This gives us a reserve of the old type for outside irrigation.

At the same time we are investigating completely different irrigation systems as well. We have incorporated Netafim microsprinklers for mist and irrigation in our newest full-heat greenhouse. This also required modification of the delivery system for the selection of clear water or fertigation water. While some details still need to be worked out, overall the system serves very well.

Not all of the changes have involved automated systems. We have two employees dedicated to irrigation and mist. Many of the upgrades have made their responsibilities more manageable. Some changes were made to help them directly. Simple things like keeping an organized stock of parts and having the proper tools on hand can mean the difference between a quick repair and a day-long hassle. Other simple changes like a utility sink instead of a hose on the ground boost morale and help them to be efficient.

We have also begun hanging hoses with pulleys on cables wherever possible throughout the nursery. The savings on labor and damaged plants from dragging hoses are worth the investment. Hoses on the ground are also a safety hazard and a plant disease vector.

The result of all these improvements is better water delivered more efficiently and consistently with less labor. This allows the irrigation team to spend less time managing equipment and more time monitoring the plants. We will continue to seek out new ways to change and upgrade our irrigation system in an effort to improve quality and reduce losses throughout the nursery.