New technologies increase greenhouse efficiency

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5 places you can save money by reducing energy and labor costs.

By Neil Devaney

Have you established any technology goals for this year? How about for two to three years from now? What have you done to reduce your energy and labor costs? What are you planning to do to lower these costs in the future?

The old saying "If it isn't broke, don't fix it" may have application to some ways of doing things in your greenhouse. However, when it comes to economic change, other factors need to be considered for planning. Almost all greenhouse equipment requires a change in management to maximize its efficiency.

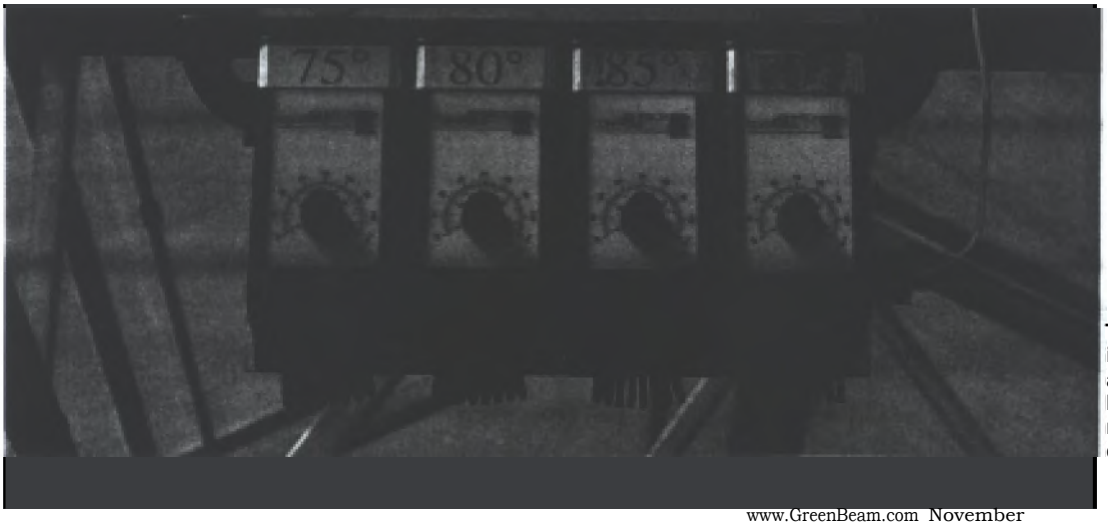
1. CONTROL SYSTEMS

Environmental-control systems can range from-simple thermostats to sophisticated computer controls.

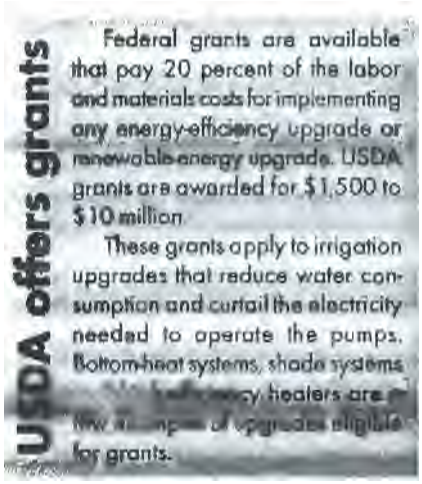
• **Tigermostat.** We initially inexpensive and simple to operate. But they also have their drawbacks. Multiple units are required, which can create microclimates. Over time, calibration can become an issue. The main culprit is usually high temperatures. Thermostats are not designed to operate at more than 125°E The practice of closing up a greenhouse after the spring season can be harmful to the equipment and coverings. Temperatures in the greenhouse can easily exceed 160°F during summer. Securing controls can also he a concern. Employees often change the settings for comfort reasons, which can result in fans and heaters operating simultaneously.

• **Microprocessor/staged controls** are the midlevel phase. These affordable units are designed for stand-alone operation in a greenhouse and have limited anticipatory features and few sensor options. Some controls can be connected to a remote computer.

A centralized/remote temperature sensor generally consists of an aspirated sensor placed in a light-colored housing that reduces heat gain from the sun. Separate day/night set points usually have multiple modes that allow a control system to mimic nature. Heating and cooling functions are divided into stages, which don't allow for simultaneous equipment operation. Some controls allow for proportional



Thermostats are initially inexpensive and simple to operate, but multiple units are required to create different microdsmates.



control, which is ideal for natural ventilated structures that include sidewall curtains and roof vents.

• **Computer controls** allow for more accurate control and can be used on single or multiple zones. They operate most equipment and can be connected to a computer for remote access. The computer allows for anticipatory needs by using outside conditions, time of day and data history. Programmable controls allow for maximum flexibility but require skill and time to learn their full benefits. Sophisticated computer controls are not for everyone or every application. Too much or too little control can cost money. Also, planning for upgrades is easier to implement from the start. If you plan to install a shade system or bottom heat, design the control system with that in mind.

2. ENERGY/SHADE CURTAINS

Energy/shade curtain systems are gaining in popularity because they provide shade during periods of high light lowering temperatures by

Internal energy/shade curtains can reduce energy consumption by 25-40 percent.

air to flow thru for natural-ventilation structures. This material provides 25 percent energy savings for heat retention.

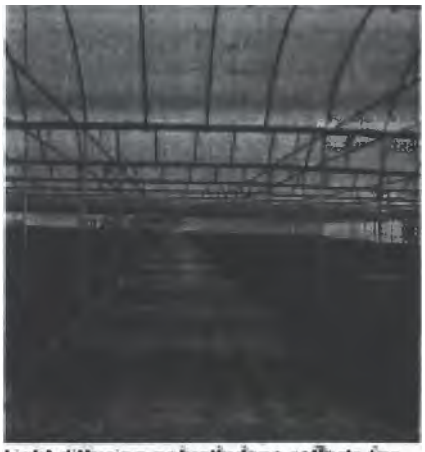
Another aluminized shade fabric that is a closed allows for maximum heat retention and is more commonly installed on mechanically controlled greenhouse structures.

Shade systems provide the most benefits of any energy conserving device and the ability to control the **environment** for the plants. The cost starts at around $0.75 per square foot for the motorized systems.

Aluminum shade material installed outside the greenhouse can reduce the interior temperature by up to 12°F compared to black shade cloth. The fabrics with flat aluminum strips to reflect the maximum amount of heat energy away from the structure appear to be the most effective, The cost for these aluminum fabrics is generally two to three times the cost of regular black shade cloth.

Greenhouse polyethylene film has not changed much. Manufacturers developed infrared poly film for conserving heat loss during winter. Most companies now offer infrared film with anti-condensate properties. These films are installed as the bottom layer of the roof covering to take advantage of the additives.

Another material that has been around for approximately 10 years is light diffusing polyethylene. Some films reflect far red light above 700 nanometers to provide lower temperatures during summer.



Light-diffusing polyethylene reflects far red light, providing lower temperatures in summer.

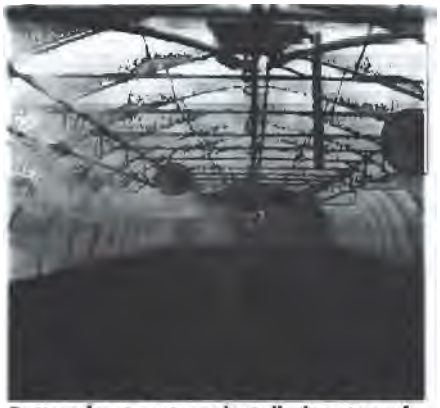
4. IRRIGATION SYSTEMS

Irrigation systems are one of the biggest labor-saving tools available to growers. Pressure-compensating drippers and spray stakes are an easy upgrade to older irrigation systems and provide the same amount of output at the end as the beginning of the line. Pressure-compensating drippers and spray stakes provide better irrigation control with lower chemical and fertilizer use, which can lead to better plant quality.

Most irrigation controls are stand-alone units. However, irrigation control is available through computerized controls. The controls and valves add to the upfront costs of irrigation systems, but are necessary for automatic control. Buy an irrigation control unit designed for greenhouse and nursery use.

5. BOTTOM-HEAT SYSTEMS

Bottom-heat systems provide the heat directly where it counts — to the plant root zone. This is done



Bottom-heat systems installed on top of the bench can reduce fuel consumption by up to 25 percent.

with radiation material that is installed on top of the bench, under the bench or in the ground. Fuel consumption can be reduced by up to 25 percent with bottom heat. Plant growth and production are increased with these systems, which increases the number of crop turns.

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