INSTALLING AN ENERGY/SHADE SCREEN BECOMES MORE ATTRACTIVE AS FUEL PRICES CONTINUE TO RISE.

By John W. Bartok Jr.

Reduce fuel costs with screens

ENERGY/SHADE SCREENS ARE ONE OF THE MOST POPULAR METHODS of reducing greenhouse fuel use. Often referred to as energy blankets or curtains, screens save energy by reducing the heat loss surface area, providing an extra insulation barrier and trapping an insulating layer of air on both sides of the screen material.

If the material contains some aluminum, the infrared part of the heat in the greenhouse will be reflected back toward the plants, reducing heat loss another few percent. The aluminum strips can also save energy in summer by reflecting the incoming heat back out of the greenhouse.

With a typical cost of $2-$2.50 per square foot installed, the payback usually works out to one to three years. This can be influenced by fuel costs, length of the heating season, climate and the night greenhouse temperature.

Select the right system

Although energy screens can be installed in free-standing greenhouses and hoop houses, they are most common in gutter-connected ranges. The standard system uses nylon monofilament or stainless-steel cables to support the screen material. The material can either rest on top of a network of cables or be suspended by hooks from the cables. Gear motors power a drum or rack and pinion that moves the leading edge of the screen material.

Energy/shade screens can be installed truss to truss or gutter to gutter. For the greatest energy savings, the screen should be installed at the gutter to create a smaller greenhouse volume that has to be heated. A lightweight truss below the screen (energy truss) can be installed to support heating, horizontal airflow, water, electrical and hanging basket systems. Where this is not possible due to greenhouse design, the screen can be installed just below the roof glazing. It is important when building a new greenhouse to anticipate the installation of the screen by keeping the truss area free of electrical, plumbing and other obstructions.

Some growers in Northern climates install two screen systems. The lower screen has a high energy rating and the upper one is mainly for shade but provides additional energy savings when extended at night. This may provide an additional 10-15 percent in fuel savings.

Sidewall screens are also becoming popular especially with taller, gutter-connected houses. These usually roll up under the gutter or at the purlins.

Screen systems are available that can be installed in hoop houses. These are usually more difficult to install due to the shape of the structure and the amount of overhead space available.

I have seen a simple system installed in a hoop house that uses a lightweight steel cable stretched horizontally at each bow at 8-9 feet above the floor. The cable is attached to the bow with band clamps. The screen material is attached to the hoops at one side and rolled on a piece of tubing across to the other side forming an insulating ceiling.

The inflated polyethylene film roof usually creates a seal at the sidewall. The ends of the screen roll over a fixed section of poly attached at the endwall and first cable to create a seal. Cost of this system is less than $1 per square foot for the materials.

Select the right material

The most common materials for energy screen are composite fabrics of alternating strips of clear and aluminized polyester or acrylic held together by a finely woven mesh of threads. Other materials available include knitted and woven bonded polyester, metalized high density polyethylene (HDPE) and polypropylene. Things to look for when selecting a material include the warranty (usually five to 10 years), strength and flexibility.

Many screen materials are designed to also provide shading during summer. For a comparison of materials, manufacturers list both the shade factor and the energy savings. Shade percentages from 10 to 100 percent and energy savings percentages from 20 to 75 percent are available.

Screens can also have an open or closed weave. The closed weave has a higher energy savings and is used in greenhouses with fan-ventilation systems. For natural ventilation, an open weave allows the heat to rise through the screen when it is extended. Some growers install a closed weave and then crack the screen open to allow the heat to escape up through the roof vents. Some porosity is desirable to prevent accumulation of moisture on top of the screen, and the thread used to sew the strips together usually provides this.

Installation and maintenance

Installation and maintenance are keys to energy savings. Closed-weave energy screens need to be installed to provide a tight seal all the way around the edges. There are several ways to get a good seal. In most screen installations, one edge is permanently attached to a truss or gutter. The leading edge usually

has a sealing flap. The side edges ride along a ledge of polycarbonate sheets, polystyrene or plastic.

Typical temperatures that would be observed in a heated greenhouse on a cold night might be 60°F under the screen and 35°F-40°F above. I have been in greenhouses where it was warmer above the screen than below showing that heat was escaping through holes, gaps or around the edges of the screen. Remember that heat supply pipes above the screen have to be insulated or moved lower.

Regular maintenance is needed to keep proper tension in the cable system. Pulleys and gear motors should be lubricated once or twice a year. Screen materials tend to wear on rub points and where they are supported by hooks. Repairs may have to be made at these points.

Controlling the screen

It is important to properly use an energy/shade screen. It has to be closed and opened at the right time based on weather conditions and the time of year. Operation can be done manually or automatically using a photocell or time clock.

Light-activated operation is most desirable and doesn't have to be changed with the seasons. A light level of 50 footcandles is a good threshold point. Most environment controllers and computers can be programmed to operate a blanket system.

Operation particulars

If a screen is opened rapidly, the cold air from the attic will flow down to the plants. Some plants are susceptible to damage from this cold air. Setting the controls to open the screen slowly over a half hour eliminates this problem. Some growers solve the problem by waiting for the sun to warm the attic before the screen is opened.

To prevent damage to the greenhouse structure, energy screens should remain open when snow is predicted. The heating system should be designed for the heat loss with the screen retracted.

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