



By Erik Runkle



Installing Infrared Polyethylene Film to Save Energy

Plastic greenhouse glazing has many benefits growers should consider, including properties that will help reduce costs and energy losses.

Flexible film plastic is the most common glazing material for greenhouses. Most growers that heat their greenhouses use two, sometimes three, layers of polyethylene to reduce heat loss during cold weather, but other types of plastic film can also be used. Although each layer of film reduces light transmission, a properly inflated double-poly greenhouse loses approximately 60 percent less heat compared to a single layer of glass.

Infrared (IR) radiation is the energy, or heat, that we feel from sunlight, a radiator or a warm oven. Depending on their surface temperature, objects around us emit radiation, but since we can't see it, it is more difficult to quantify. Technically, IR radiation is a band of energy with a wavelength between 700 and 1,000,000 nanometers (1 nm equals a billionth of a meter). The waveband of radiation that we can see and plants use for photosynthesis ranges from 400 to 700 nm.

Production Benefits

Greenhouse plastic manufacturers are engineering materials to influence plastic properties, most notably their transmission of radiation. Plastics that reduce transmission of IR radiation can be particu-

larly useful to either reduce temperature increases in a greenhouse during the summer or reduce heat loss in the winter. These plastics reflect some of that energy and prevent it from being transmitted through the material.

the material as the inside layer. Some greenhouse experts recommend using IR films for both layers of a double-poly greenhouse, but it could be less expensive to use IR film as only the inside layer. Plastics can also have an anti-condensation (AC) coating, which reduces the amount of water vapor that accumulates on interior glazing surfaces. There are several benefits to decreased water droplet formation on plastics. For example, fewer water droplets fall on crops below (keeping the foliage dryer and preventing damage to young plants) and less light is blocked compared to a plastic film covered with water droplets. An AC coating enables water to condense as a thin layer, not as droplets. To work properly, the film must be installed so that the water can flow without interruption down to the edge of the film.

Money-Saving Benefits

Although IR-AC films are typically 15 percent more expensive than standard plastic films, recent greenhouse energy audits performed in Michigan indicate that the return on investment is typically one year or less. More specifically, it is projected that when it's time to replace the double poly, using an IR-AC plastic as the inside layer can reduce heating requirements by up to 20 percent and reduce water drip on crops when installed properly. With fuel prices soaring through the roof (pun intended), these IR films are increasingly attractive to growers that heat their greenhouses for a significant portion of the year.

Finally, the heat-saving advantage for using a double (or triple) poly film requires that the space between layers be properly inflated. An inflation pressure of ¼-inch of water gauge is recommended. Outside air should be used to inflate the space between the layers to reduce the potential for condensation. Whether using a standard or an IR-AC poly, be sure to check inflation fans regularly to ensure they are working properly.^[GPN]

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Growers who want to prevent a portion of IR radiation from entering the greenhouse would want the IR plastic on the exterior layer, and those who want to prevent it from leaving the greenhouse need