The GMPRO John W. Bartok Jr. on Technology

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Melting greenhouse snow

When it snows, greenhouse light levels can be reduced for several days if it is not melted off of the glazing.

To change snow from its solid form to liquid water requires 144 Btu per pound. The weight of snow can vary considerably depending on whether it is wet snow or dry snow. Wet snow can be as much as four times heavier than dry snow.

Three inches of a wet snow or 12 inches of a dry snow is approximately equivalent to 1 inch of water when melted. One inch of water-equivalent snow over a square foot weighs 5.2 pounds. This multiplied by 144 Btu per pound = 750 Btu needed to melt it.

Converting it to a snowfall rate, dry snow falling at a rate of 1 inch per hour requires 62 Btu per hour to melt it. A wet snow falling at the same rate requires 250 Btu per hour to melt. Frequently snowfalls exceed the 1-inch rate.

It takes considerable heat to get rid of the snow that piles up on a greenhouse roof. Heat transfer through the glazing, air temperature, wind, cloud cover and site conditions influence melting rate. Evaporation after the snow melts requires additional heat.

Melting the snow

The typical method for melting the snow on a greenhouse is to open the energy blanket and turn the heat up before a storm starts. This warms the glazing so the snow melts on contact. If it snows faster than the rate that it melts, snow will start to build up.

Snow is a good insulator and it creates an insulation barrier, reducing heat loss and allowing snow to be changed to water that can run off. The heating system in most greenhouses is usually not large enough to provide the heat needed for the heaviest snowfall or a wet snow.

The problem with melting snow with the heat in the greenhouse is that many greenhouses have a double layer of glazing. Heat loss through this glazing material is reduced by about one-third over a single-thickness material. This slows heat transfer and the rate that the snow can be melted.

If the rate of heat transfer is not fast enough, snow may melt but then freeze as ice on the surface. This often occurs on poly houses. if it is windy, the ice breaks off and blows around and cuts the plastic.

Bridging

Bridging can be another problem. Snow often slides toward the gutter in ridge-and-furrow houses. When heated, the snow nearest the glazing and gutter melts and runs off leaving a hollow area underneath. Frequently there is not enough heat to allow the remaining snow to collapse.

Most recommendations are to place heat pipes or distribution tubing under the gutter to melt the snow. Moving these sideways, about 18 inches from the gutter, may help to concentrate heat where the bridge normally forms. This will allow it to collapse. Placing the heat pipes on a separate manual control allows this zone to he used only when snow is in the forecast.

Heating cables

Some growers place electric heating cables or hot water piping in the gutter to melt the snow and ice. These have limited effect as their heat output is small and concentrated in a very small area.

There is also considerable heat loss through the metal gutter. Usually they create a tunnel in the snow and prevent additional snow from sliding into the gutter.

Loading docks and walkways

If you are adding on to a greenhouse or building a new facility, consider including heat pipes in the concrete sidewalks and dock areas.

A typical system uses PEX tubing placed in a serpentine pattern on 6- to 10-inch centers, 2 inches below the surface of the concrete. Board-type insulation under and around the perimeter of the concrete will direct heat upward.

A separate boiler heating system loop with heat exchanger is used. Polyethylene glycol antifreeze is circulated instead of water to prevent freezing. The antifreeze is usually heated to 140°F-180°F.

Typically, these systems are installed with an output of 100 to 150 Btu per hour per square foot. This will handle normal snowfall rates.

Control of snow-melting systems can be manual or automatic. In an automatic system, sensors detect the outdoor temperature and humidity. They activate the system when the moisture level increases and the temperature is near freezing. They usually shut off when the temperature reaches 45°E

Typical installation costs arc $5 to $8 per square foot. Operating cost depends on the amount of snow that falls over the season but is usually in the 10-25 cents per square foot range.