New technology improves greenhouse, plant microclimates

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A study in *HortTechnology* featured a new technology that improved greenhouse climates by reducing solar heat radiation and temperatures during the hot summer season. The study, published by a team of Canadian researchers, was the first investigation into the effects of application of the liquid foam technology as a shading method. Results showed that the technology improved greenhouse and plant microclimates and decreased air temperature more than conventional shading curtains traditionally used by greenhouse growers.

Excess temperature, solar radiation, and high vapor pressure deficit are major greenhouse concerns during the summer season. These extreme conditions increase plant stress and decrease crop productivity and fruit quality. Methods such as cooling pads and fogging systems have been used to prevent plant heat stress during the day, and various shading techniques are often used by growers to decrease solar radiation and reduce air and leaf temperatures. Shade cloths reduce the amount of solar energy entering the greenhouse and consequently decreased air temperature by partially cutting the heat portion of the solar radiation, but this incoming energy usually contains more than 50% heat (infrared radiation), which is not useful for plant growth in the summer.

Sunarc of Canada, Inc. developed an innovative new shading technology that generates retractable liquid foam and distributes it between two layers of polyethylene film used as a greenhouse covering material. The Canadian research team set out to determine the effects of different shading strategies using the liquid foam technology on greenhouse and

plant microclimates. The research was conducted over 2 years in two different areas of Canada, where experimental greenhouses were retrofitted with the new technology. Tomato and sweet pepper plants were used with two shading strategies: a conventional nonmovable shading curtain compared to the liquid foam shading system based only on outside global solar radiation, and foam shading applications based on both outside global solar radiation and greenhouse air temperature. The team recorded data on the greenhouse microclimate (global solar radiation, air temperature, and relative humidity), the canopy microclimate (leaf and bottom fruit temperatures), and ventilation (opening/closing).

"This study showed that the retractable liquid foam technology improved greenhouse climate", noted Kamal Aberkani, lead author of the report. "Under very sunny, very hot conditions, a difference of up to 6 ºC in air temperature was noted between the unshaded and shaded greenhouses as a result of liquid foam application at 40-65% shading."

According to the report, additional benefits of the technology included an increase of up to 12% in greenhouse relative humidity, a decrease in the frequency of roof ventilation operation, and an increase in the length of time bottom fruit temperature remained cool after shading ended.

More information: horttech.ashspublications.org/ … nt/abstract/20/2/283

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