SHOULD HAF BE USED WITH VENTS OPEN?

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Tender rose leaves often burn on sunny days following a series of cloudy days. Shade will avert this. So will wetting down with water through a sprinkler system. It now appears that horizontal air flow (HAF) will also reduce burn.

Shading the glass during spring months may be beneficial on sunny days but it also decreases the light available for photosynthesis on cloudy days. Eliminating or reducing the shade is desirable except, perhaps, during summer heat when temperature reduction is needed.

Wetting down roses and other crops to alleviate the effects of intense light also has drawbacks. It may interrupt efficient work and foster diseases.

HAF appears to reduce burning by reducing leaf temperature. This is akin to the way it increases leaf temperature at night. The temperature of a leaf is determined by 1) the balance between radiant energy received and given off, 2) heat transferred to or from the air by the leaf and 3) the energy required to evaporate water.

Radiant energy loss at night cools leaves a bit below air temperature since less energy is radiated back to them by the cold roof. This loss of heat is replaced by heat from the slightly warmer air (the difference is not likely more than $2^{\circ}F$). Moving the air past the leaf hastens the transfer of heat to the leaf and decreases the net effect of radiation loss.

During sunny days the reverse is true. This radiation is also received by the tender young leaves and they become warmer than the air, as much as $1^{\circ}F$. They dispell the additional heat by radiating it, by warming the relatively cooler air and by evaporating water. Moving the air past the leaf increases the transfer of heat to the air and also speeds evaporation of water, cooling the leaf.

The advantages of HAF have been listed previously:

1) The cost of installation is only a fraction of that of other air movement systems.

2) Only 1/3 to 1/2 as much power is required, especially with permanent split capacitor (or split phase) fan motors.

3) Little maintenance is required.

4) Temperatures are uniform; both hot and cold spots are eliminated.

5) Stratification of warmed air is practically nonexistant, reducing the air temperature in the ridge and thereby reducing heat loss.

6) Humidity within the plant canopy is reduced.

7) Moisture condensation on plants is reduced aiding in disease control.

8) Carbon dioxide utilization is improved since the leaves are "scrubbed" by the air.

9) NO CO_2 distribution system is required.

10) Air infiltration (and heat loss) is reduced.

11) (and now add) Leaf temperatures under bright sunshine are reduced.

This reverses our previous thoughts on the use of HAF during ventilation periods. If the air in a greenhouse is circulating in a coherent horizontal pattern, less should be exiting through glass laps, holes or the open ventilators. Should HAF be used during ventilation? If fan/tube ventilation (exhaust fan induced ventilation through a convection tube, similar to a fan-jet without the blower and the tube connected directly to the outside air) is used, HAF may improve ventilation. Under cross ventilation, with fans and openings opposite the fans, HAF should not be used. With top vents, it appears that HAF may have merit until the temperatures are excessive and the vents are fully open. Perhaps HAF should then be turned off.

This concept has been developed over a period of more than thirty years. Using HAF during venting is a new concept. We will keep you informed regarding fine tuning the practice.