Effects on Plant Temperature Control

The consideration of CFM alone in cooling a greenhouse is not sufficient. The air velocity over the plants should be considered. This involves the total house volume and the distance between pad and fans. Thus, a greenhouse 34 x 100', with 9 foot eaves and a pitch of 30°, would have a total volume of 38,981 cubic feet. At an air change rate of 9 cu-ft per minute per square foot, there would be a total change of 30,600 CFM. With pads located at the opposite end of the house, the air velocity required to achieve the necessary CFM would be about 78 fpm. A false polyethylene ceiling would increase the wind speed to 100 fpm. If the same house were halved in length, the flow rate would be reduced to 39 fpm, and a false ceiling would increase it to 50 fpm. If the house were 50 x 100', all other dimensions the same, the air flow would be 56 fpm. The smaller the distance between fan and pads, the more difficult it becomes to maintain a reasonable air speed. Furthermove, air velocity as measured in the entire house should be maintained at some value in excess of the minimum. Resistance in the vicinity of the plants quite probably reduces air flow to some value less than theoretical.

In studies to date, only direct sunlight passing through various types of materials has been employed. With improvements, it may be possible for us to con-

sider the effects of various coverings in influencing heat load on flowers and leaves of plants. In the field, only about 5% of sunlight is used in producing food. Through proper manipulation of coverings, it might be possible to increase this efficiency. These results have suggested that improvements in carnation quality and yield under fiberglass in Colorado result from reduction in direct radiation on the flower, increased cooling efficiency of tighter houses and diffusing the light so that lower leaves of the plant are able to make more food.