

Winter Ventilation of Greenhouses

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The problem of introducing fresh air into the greenhouse under winter conditions is primarily that of avoiding cold drafts on the growing plants. In glass greenhouses, low speed exhaust fans can usually pull enough air through the laps of the glass to provide some cooling. In plastic covered greenhouses no such laps exist and outside air must be introduced.

On bright sunny days greenhouse temperatures can quickly rise to greater than desired. If the outside temperature is below freezing, even cracking some air on, provided the vents are not frozen shut, may result in chilling blasts.

The use of polyethylene tubing for introducing cold air found favor rapidly in Colorado carnation ranges. Since its introduction many growers have adopted this method of ventilating to their own ranges. We thought you might be interested in our experiences at Cornell.

Last fall, we installed two 18-inch polyethylene tubes in one of our research greenhouses. Figure 1 shows one of the inflated ducts inside the 36x75 foot house. Figure 2 is the arrangement for admitting air. One 24-inch exhaust fan is sufficient to inflate both ducts although we are presently using two fans. A conventional L & B ventilator thermostat was modified to control exhaust fans and south overhead ventilator and placed in an aspirated control shelter. An interlock prevents steam admittance while fans are in operation, and locks the north overhead vent closed until the south vent is fully open. The exhaust fans operate until the south vent is open about four inches and then convection ventilation takes over.



Figure 1. One of the polyethylene ducts inflated. Air enters at the far end. The exhaust fans are located diagonally opposite the corner shown in the picture. The tube is supported by a wire run lengthwise through the tube.

The system has been in operation since October, 1962. During the first of January, 60 MPH winds hit Ithaca,

and for about two days during that period, we were unable to maintain 70°F day temperatures. However, other greenhouses in the range did not maintain set temperatures. With this one exception, we have been able to maintain 60 nights and 70 days in -20° weather, even though the two intake ducts (Fig. 2) have no provision for closing off the tubes to the interior of the house.

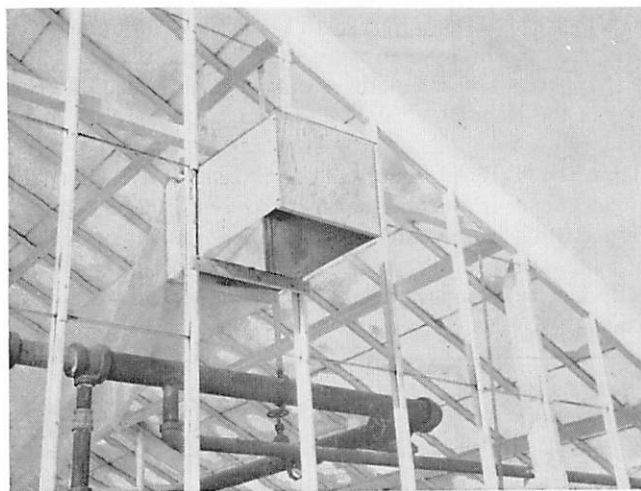


Figure 2. One of the two air-intake ducts. The main purpose of the intake box is to prevent direct entry of snow and rain into the tube. No louvres for closing the tube were provided or have been needed.

Operation of the system has been satisfactory. Air is admitted uniformly throughout the greenhouse without the presence of cold drafts commonly associated with overhead vent operation. To the best of our knowledge, the ventilators in this house have not opened during December and January. Temperature control has been improved. We have since installed similar tubing in three of our temperature controlled compartments, used in conjunction with side wall vent operation and fan-and-pad cooling.

It makes little difference where the exhaust fans and air intakes are located in relation to each other, provided exhaust air is not directed into the intake. In installing the tubes, our procedure has been to compute the number of holes of certain size that can be placed in the tube without exceeding the cross-sectional area of the air intake. Holes have then been punched with the sharpened end of a 2-inch pipe, equally-spaced throughout the length of the tube. Colorado (C.F.G.A. Bul. 154) has suggested cutting the holes in the tube after mounting, using a ring of the same diameter as the desired hole, attached to a soldering iron. Either method is satisfactory.

Incoming cold air is usually directed toward the roof where it mixes with warm air before striking the plants.

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Bends up to 30° may be made without seriously impeding air flow. It is a simple matter to raise the tube above an obstruction by cutting a hole in the top and attaching a wire to the supporting wire inside the tube.

About the only problem that may occur is that too many holes are placed in the tube. The capacity of the air intake will be exceeded and the tube may not inflate properly. Some growers have solved problems of long runs by bringing air into both ends of the duct. Since a 500 yard roll of 18-inch polyethylene tubing may be purchased for less than \$40.00 F.O.B., mistakes are not usually disastrous. The air intake in Figure 2 was put together with materials on hand for about \$15.00, counting labor.

This system is well worth consideration for late-fall, winter, early-spring ventilation of greenhouses.

