

Perry, R. L., J. E. Warneke and R. M. Perkins. 1972. Heat requirements and air distribution in a plastic greenhouse in a subtropical climate. *Intern. Conf. on Tropical and Subtropical Agric.* Honolulu, April, 1972. Spec. Publ. SP-01-72, ASAE. pp. 268-272.


The authors constructed a 32x36 foot greenhouse, with six 1/2-foot eaves and covered with a corrugated fiberglass. Comparative data was obtained on heat loss from three systems: 1) A unit gas-fired heater delivering air the length of the central aisle; 2) The same as 1), but with a 28-inch diameter polyethylene tube; and 3) two smaller heaters set in the corners of one end of the house which delivered air into 14-inch diameter plastic header ducts along the wall near the floor. The header ducts for the floor tubes had a sheet metal side-outlet reducing tee at each bed, from which a 7 5/8-inch diameter tube was extended between the rows of plants. The floor tubes were perforated with 1 5/16-inch holes, and on the other side with 1 1/2-inch tubes which directed air up into the plant foliage.

Tomatoes were grown in beds 32 inches wide and 140 inches long, seven beds to each side of the house, at right angles to the central aisle.

For the unit heater without tube (1), the heat transfer coefficient was more than twice that commonly reported and decreased as the temperature difference from outside to inside increased. The reason was that hot air tended to accumulate in the gable, so that the temperature just under the roof was noticeably higher than that in the plant growing region. When this was corrected, the transfer value was brought into accordance with the expected.

Heat loss was influenced by sky temperature and wind. Average temperature of the house differed with the three different systems. With the unit heater (1), the upper foliage ran 3 to 6 degrees F above the lower foliage. Beds close to the heater were cold, while those farthest from the heater were the warmest. This might change in a longer house. With the overhead tube (2), the bed closest to the heater was still the coldest. With the overhead tube and floor tubes (3), there was little difference between upper and lower foliage. Tubular systems were more economical as the gable temperatures were about the same as the plant zone temperatures. There was little difference between the beds with the floor system.

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