Colorado Flower Growers Association, Inc.

IN COOPERATION WITH COLORADO STATE UNIVERSITY

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VENTILATOR OPERATION in the CSU TEMPERATURE HOUSE

by Joe J. Hanan

Reliable temperature regulation requires an operator in constant attendance or complete automatic control. Without proper ventilation, it is impossible to maintain accurate temperature control. In a previous paper (1), we described the basic heating and cooling systems used in the CSU Temperature House. Our purpose in this article is to explain the present automatic ventilator system which was installed 4 months ago.

Figure 1 shows the control box containing the timer, relays and limit switches which actuate the motor to open or close the ventilator. Thermostats operate on 25 volts to position the relays.

The timer determines the actual period of operation, or movement, of the ventilator when such action is required by the thermostats. The equipment was originally supplied with a three-minute timer, which because of slow ventilator operation, created wide temperature variations. Lengthening the "on" part of each cycle, and increasing the number of cycles per minute, made operation too fast and prevented the cooling and heating systems from stabilizing. The present timing interval is set to allow a ventilator movement of two inches per minute when there is demand from the thermostats. The 75°F. ventilator, however, has a movement of ½ inch per minute.

The ventilator controls have been connected in three different ways to the cooling system. The method currently in use utilizes 2 separate thermostats. The original cooling thermostat, in addition to starting the cooling fan also opens the ventilator. In this manner, air is assured for cooling and temperature regulation improved. Furthermore, the cooling system operates at a lower setting without the necessity of resetting the close-cycle thermostat.

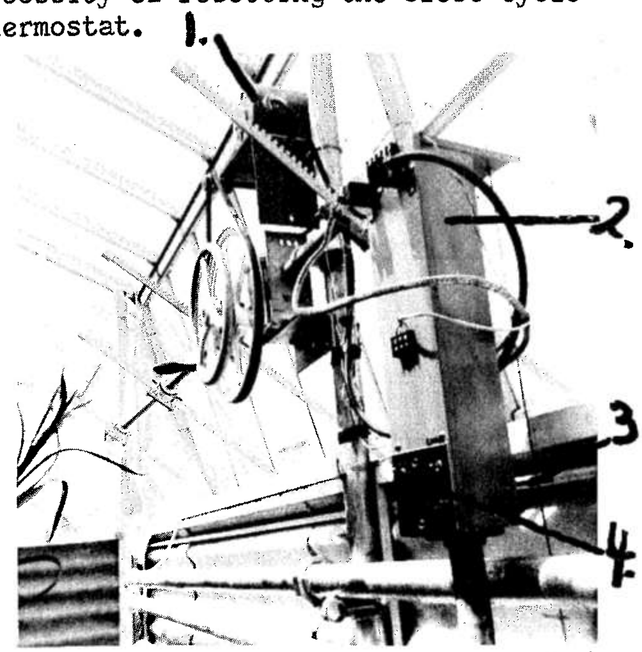

Fig. 1. Automatic ventilator control box: 1) Motor, 2) Control box containing relays, limit switches, and timer, 3) Limit control, 4) Manual control.

The close-cycle thermostat was supplied with the equipment. Because it must operate close to the cooling thermostat, the operating characteristics are different, variable conditions made it necessary to incorporate a relay which prevented a closing cycle at the same time as an opening cycle. This eliminates the possibility of damage to the ventilator controls. Under normal operation, the ventilator seeks a resting place where neither cooling or heating is needed. This type of operation greatly reduces wear on the machinery.

AUTOMATIC VENTILATOR OPERATION

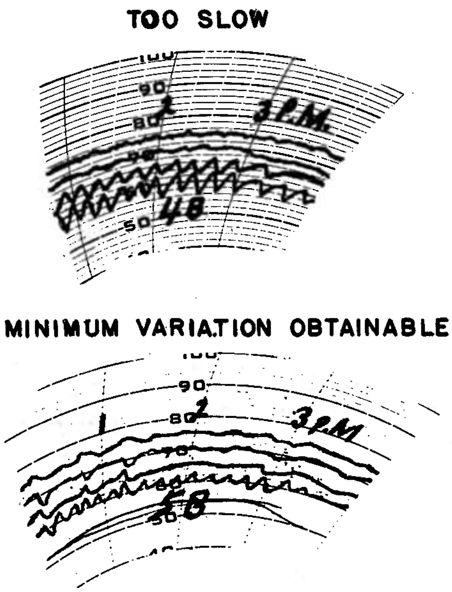

Fig. 2. Portions of temperature records showing unstable ventilator operation and minimum variation under very critical conditions.

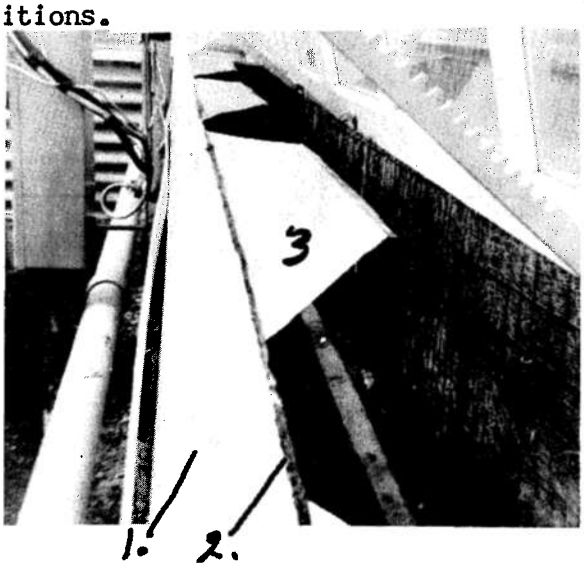

Fig. 3. Final modification of ventilator to reduce variation: 1) Original closed position of the ventilator, 2) New position, 3) Galvanized sheet metal to control rate of air entry.

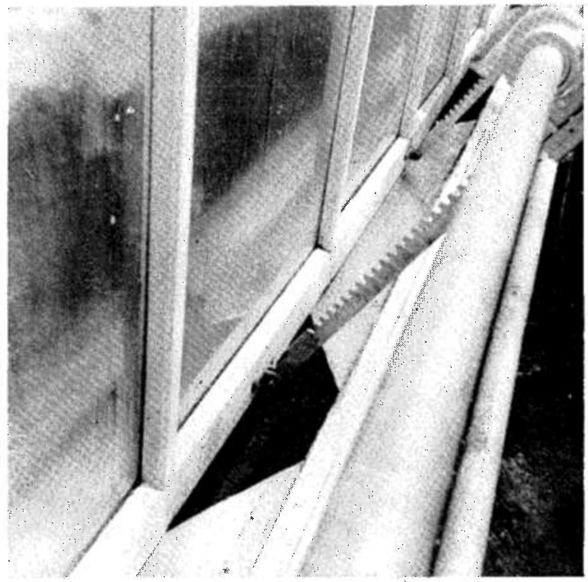

Fig. 4. Different view of ventilator modification.

Despite a shorter timing interval and almost instantaneous ventilator movement on demand, Figure 2a shows a period of excessive variation about the set-point. Such fluctuations occur during periods of intermittent sunshine, or particular combinations of external and internal temperatures, when the ventilator must operate between fully closed and partly opened positions. To remove a part of this variation, the ventilator was modified as shown in Figures 3 and 4. Moving the ventilator out to the edge of the sill allows immediate air entry on the first cycle. The V-shaped sheet metal strips prevent too much air from entering by extending the distance the ventilator must travel and controlling air flow in a linear fashion for the first 10 inches of movement. This system was suggested by Robert Boyd, engineer for the Automatic Controls Company. These modifications reduced variation to that shown in Figure 2b under similar conditions. We believe this regulation is adequate for present purposes. An attempt to remove these minor ripples would require a disproportionate increase in expense.

Rapid fluctuations in external conditions still cause slight variations within each compartment since ventilator operation is relatively slow. However, the operator can leave for extended periods, and each compartment will seek to maintain the desired temperature setting. Under manual control the heating or cooling systems would remain overloaded until the operator changed the ventilator manually.

Under steady atmospheric conditions, Figure 5 shows that automatic ventilation and manual control give equally good temperature regulation. However, the vagaries of human nature versus the reliability of automation is readily apparent.

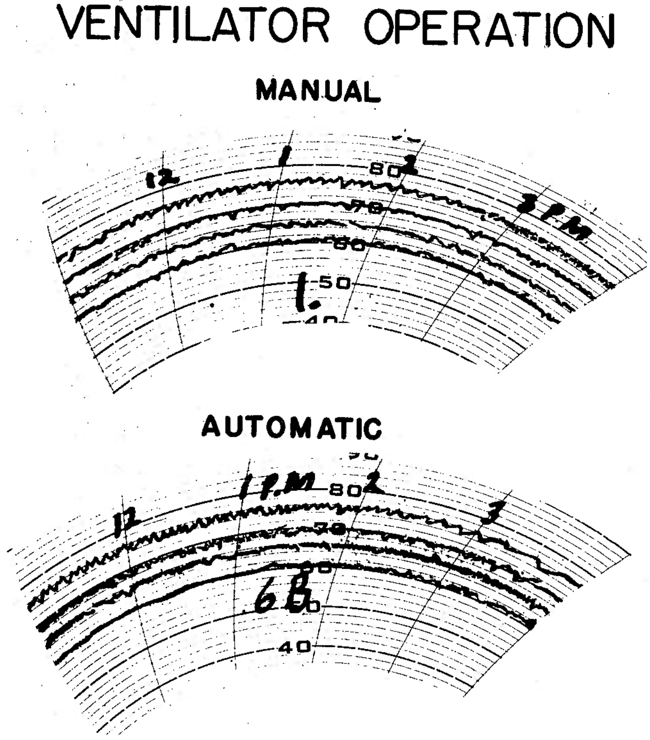

Fig. 5. Comparison between manual and automatic ventilator operation.

A grower should not attempt direct application of the ideas and methods expressed above. Our aim has been to help avoid expensive pitfalls when installing new equipment or modifying present control systems.

1. Hanan, J. Air Movement and Temperature Control. Colo. Flw. Gro. Assoc. Bul. 98, March, 1958.

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A Forward Look in Rose Growing

Colorado greenhouse roses are not matching carnations or chrysanthemums in income produced, hence the trend toward reduction in rose plantings. Your editor has given much thought to this problem because I firmly believe we need locally grown roses; in fact we should have more of them.

We can afford to have more roses in the future if we take stock of our shortcomings and think carefully of ways of 1) improving the rose we produce, and 2) producing more roses per unit of area. Most of the thoughts we should consider will help to accomplish both goals.

First, we should cut flowers from our rose plants 52 weeks of the year, not the 47 or less we have been producing. Our production, and our marketing, should be geared to production every day of the year. To do this, pruning as we have done in the past will have to go. In its place we can prune continually from February to September, (when light is plentiful). We are working out this system of pruning based on diameter of canes. With each succeeding flower cut a rose cane becomes smaller in diameter and produces a shorter rose. As the diameter of the cane reduces to 1/8" to 3/16" (depending upon the variety) it produces 9- or 12-inch roses. At this time the cane is cut back to good wood of large diameter. This not only reduces the number of roses in the lower grades, but allows a gradual and continuous renewal of the producing area on each plant. Wood on the top of the plant that becomes non-productive is also cut back to large wood whenever it is found. Only 4.3 active canes per square foot of bench area are required continuously to yield 40 blooms per square foot per year. Putting this another way, an average daily cut of 110 roses is required from each 1000 square feet of bench area to reach the $40/ft^2/$ year total. You don't need a lot of canes working but they have to be kept growing.

Air conditioning, both evaporative pad and mist cooling, has not increased greenhouse rose yields appreciably. The right temperature and humidity control by these methods helps us to grow a much finer rose during spring, summer, and fall, and to start the low light period with stronger plants. Greenhouse cooling certainly helps us to grow <u>better</u> roses, if we use it right.

By producing more roses per unit of area, a lot of those flowers will be produced during the summer months. With the aid of air conditioning and high incident light they are by far the best roses we can produce, <u>but</u> they are not necessarily the most expensive to produce. They do have the largest head size and the best keeping quality. Summer sales of <u>good</u> roses can be increased. Any progressive retail florist will confirm this.

When rose plants are allowed to produce steadily the year around, the summer yield is about twice that of winter. Some reduction of summer yield can be accomplished by 1) confining all replanting to the latter half of June and the first half of July, 2) selective soft pinching to build the weaker plants, and 3) soft pinching large canes to start cycle production for Christmas and Valentine's Day.

Summer planting of budded plants from storage has been done successfully in a number of instances. A portable low pressure mist system seems to be the key to good breaking of the dormant plants.

Selective soft pinching of the weaker plants will benefit any rose range. New growths are soft pinched to develop large and active new foliage. This foliage can work the best to strengthen the plant under the bright conditions of summer. To get maximum size to this new foliage, pinch or rub out the tips of canes in the earliest stage possible. Pinching after the leaves have matured in size is of less value to the developing plant.

Cycle production for Christmas and Valentine's Day should be started by soft pinching large canes only (minimum diameter 1/4 inch) on August 8 and September 15. Usually 1/2 cane per plant pinched on each date will assure a good cycle of flowers on November 1, December 20, February 10, and late March. Heavy holiday production of roses and the resulting scarcities between holidays has long been a curse of rose growing. In looking at our shortcomings we should certainly chew this one over. It's not possible to fill all the holiday orders and still be in business at other times. Why not produce a few extra holiday flowers and keep a steady production for the good business to be had every day?

These are just a few thoughts for greenhouse rose growers. To hold the financial position traditional to rose producers, better roses and more per square foot will certainly help.

Your editor,

W D Holley

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FIRST CLASS

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