VACUUM VENTILATION OF PLANT PROPAGATION STRUCTURES[1]

CARL ORNDORFF

Kalmia Farms Nursery
Clarksville, Maryland 21029

The principle of using vacuum ventilation for propagating structures has been used for several decades and is not a new innovation. When one sees the inefficiency of some of the ventilating systems being used and the incorrect use of some vacuum systems now in use, it would seem a review of the merits of this system would be in order.

The vacuum system is of most value to early summer softwood cuttings of deciduous shrubs and trees, plus certain broadleaf evergreens. It may be efficiently employed for all types of plants at all times of the year.

This is a low cost installation consisting of a thermostatic controlled input louver for the admission of outside ambient air into a large diameter punched plastic tube for the entire length of the structure. The flow of air into the louver and tube is created by a vacuum made by a termostatic controlled large slow speed exhaust fan on the same end of the structure as the input louver.

Many structures ventilated by vacuum systems use fans of too high speed, too small louvers, and too small punched tubes. The air moves too fast causing excessive evaporation and therefore, the dehydration of cuttings.

Large belt driven fans, 30 or 36 inches in diameter, with large drive wheels are normally used. Dual or multiple speed electric motors, with small drive pulleys, are more easily speed adjusted. Initial calibration adjustments are made by changing the size of the small drive pulley on the motor. Direct driven fans, mounted on the motor drive shaft, are too fast and unadjustable. Input louvers and punched tubes are usually 24 or 30 inches in diameter. Tubes with two inch holes, spaced two foot apart, in two rows spaced at the three and nine o'clock positions are best. Too large or too many port-holes fail to draw air uniformly the full length of the tube.

Calibration and adjustment are the most important factor involved. Houses vary in many ways so that a uniform scientific formula is almost impossible. Houses are different in length, width, air leakage, type of construction, type of equipment, and placement of equipment. Terms such as *cubic feet per minute*, or *revolutions per minute* cannot be used.

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[1] Vacuum ventilation is also referred to as negative pressure ventilation.

Simple adjustments may be made by checking the airflow through a door on the end of the house opposite the fan and input louver. With all doors closed the input tube should be firmly and uniformly filled the full length. A door crack of six or eight inches should completely deflat a filled tube in fifteen to twenty seconds. If it does not the fan speed should be decreased. Increase or decrease the fan speed until the tube will deflate at the air leakage caused by the door crack. Changing the motor drive pulley size by one-half or one inch diameter is usually all that is necessary. Increasing the motor drive pulley size increases speed of the fan. Decreasing the pulley lowers the fan speed. The use of multiple speed or slow speed motors, if available, should make adjustment easier.

Excessively wide houses may have two input louvers and tubes, but only one fan. The input tube should be placed at the highest possible point and the fan also high if possible. The automatic mist systems are used in the conventional way to maintain humidity. Twenty-four hour time clocks should be used to avoid continuous air conditioning during excessively hot nights. Flame-proof type polypropylene net shading, preferably about fifty percent shading, will still be necessary during the summer period from April to October. In 90°F weather, inside and outside temperature differences of under 10°F are normal.

Some systems use variations of the wind tunnel principle, not good engineering for plant propagation. One type uses cooling pads, moistened continuously with water at the input and with an exhaust fan at the opposite end of the structure. This is more expensive in installation, operation, and maintenance for both materials and labor. Results are good, but questionable as to being superior over vacuum ventilation for softwood cutting propagation. A smoke generator used about the propagation house may offer considerations for ventilation design.

HUMAN AND NATURAL ENERGY SAVERS

CLAYTON W. FULLER
Bigelow Nurseries, Inc.
Northborough, Massachusetts 01532

I believe that we must continually strive to find ways in which to conserve our natural and human energy resources. Therefore I present to you these few ideas which may or may not be useful in your operations.

How many times over the years have we been guilty of this little trick? Kinking the hose single or in a double kink. This is