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

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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 not only a waste of natural energy because we will have to replace the hose before its time, but also a human energy waste in that we will have to use it to repair or replace the hose. For the past several years we have eliminated this waste by simply using a ¼ turn valve attached to the end of the hose. This conserves on human energy by not having to walk back and forth to the faucet to adjust the water flow, but also by extending the life of the hose. When a person can make the necessary water adjustment where he is watering, it not only conserves on water, but we find that the watering job is much more efficient in that the person will not tend to underwater or overwater the plants.

Another human energy saver we find to be very effective is using the same valve with a hose nozzle attached to it for washing the glass inside, washing the drip grooves, actually using the water pressure to flake off peeling paint prior to painting, which eliminates approximately 85% of the hand scraping. By using this method, we are also washing away any accumulation of pesticide residue that has built up inside the greenhouse. We also use this valve to wash down the aisles, thereby preventing a buildup of soil or other foreign matter which could cause lost man-hours due to a slipping accident.

One of our greatest savers, of course, was the introduction of hydraulic digging machines which not only save human energy but, we believe, greatly insures the ability of the plants to survive after being dug.

In dealing with natural energy in today's rising costs we are naturally trying to get the most for our energy dollar. Over the past few years we think we have obtained this goal in our minimum heat storage houses. We are trying to utilize every square foot of space available with storage on the floor and 3 racks above that. We also install a temporary side bench to utilize that space. The 22′ × 80′ house is heated with a 150,000 LP propane heater. With pot sizes ranging from 2½″ to 1 and 2 gallon containers, we winter store approximately 77,000 plants in this house. Our total cost for heat for this house and one other the same size was $512 for the 1979-80 winter season.

Because of the tremendous amount of material being stored in these houses, we feel it is vital to have good air movement when the temperature reaches 60°F, as the top racks tend to be much too warm for winter storage. Therefore each house has temperature alarms and automatic vents.

As an energy saving device, we installed a 9″ stove pipe elbow through the end of the house and simply attach it to the heater with duct tape to keep out unwanted cold air when the heater is not running.