INTERMITTENT MIST SYSTEM CONTROL DEVICES FOR PROPAGATING PLANTS

The purpose of misting cuttings is to prevent leaf temperatures from rising to a point where more water is lost from the leaf than can be replaced through the cut end of the stem. By maintaining a film of water over the surface, it is possible to keep leaf temperatures down and thereby keep internal vapor pressure low. The cooling action of mist arises from the cooling effect of evaporation of water from the leaf surface. In this way, the heat from the sun is counteracted and the leaf temperature remains low.

For successful cutting propagation, the misting rate should equal the rate of evaporation. Allowing cuttings to wilt reduces their ability to root. Excess moisture can reduce the amount of oxygen available to the newly-formed roots, reduce soil temperature and cause a drainage problem.

There are many devices used to control misting systems that can be adjusted to meet a wide variety of conditions. Some of these devices are relatively simple and low cost, while others are more expensive. All are devices that make or break an electric circuit that activates a solenoid valve in the water supply.

- **Program Repeating Timer**

  The most common device used is the program repeating timer. It consists of a timer motor that rotates a disk with adjustable tabs. As the disk rotates, the tabs that are set strike a micro switch completing an electrical circuit. As mist is usually applied for a few seconds every few minutes, it is important to select a timer that will give the desired cycle. The timer can be manually turned on in the morning and off at night or a 24-hour time clock can be installed to do this. Repeating timers cost from $75-$100.

- **Light Operated Timer Control**

  To prevent the mist system from operating on cloudy or foggy days, King Bros. Industries, 251 Powell Road, Fillmore, CA 93015 has developed Water Wizard. This device uses a photoelectric eye with adjustable sensitivity to activate a timer. It can be set to turn the timer on at a desired light level. One unit can be used to control several timers.

- **Multizone Mechanical Controller**
These units are based on time clock technology. A 12- or 24-hour clock starts the operation. Depending on the manufacturer, 1 to 40 zones are sequentially turned on. Length of on-time is usually adjustable. Omit switches allow the controller to skip through zones that do not have plants. Indicator lights show which zone is on. Some units have an interrupt without disrupting the normal cycle. Output to control the solenoid valves can be either 115 or 24 volts, the 24-volt giving a safer installation that can be hooked up with bell wire. Mechanical controller manufacturers include Batrow, Inc., P O Box 2276, Short Beach, CT 06405 and Wadsworth Control Systems, 5541 Marshall Street, Arvada, CO 80002.

- **Evaporation Simulator**

The Mist-a-Matic System utilizes a stainless steel screen to simulate a leaf. The screen is located on the propagation bed where it receives the same amount of mist as the plants. The screen is attached to a switch that activates the solenoid valve when it dries and shuts off the valve when it has collected enough moisture. Adjustments can be made in the amount of moisture needed to give the proper control. Power is supplied by a 110-volt outlet. A transformer is needed to operate the 24-volt solenoid valves.

- **Light Accumulators**

In the misting of cuttings, the requirement for water varies according to the brightness of the sun. On bright days, evaporation will be fairly rapid. On dark, cloudy days when the rate of evaporation is extremely low, there is little or no need for mist. Solatrol, manufactured by The Jornberg Johnsen Co., 31 Spice Hill Drive, Wallingford, CT 06492, uses a phototube that responds according to the brightness of the sunlight falling upon it. Energy is stored and triggers an adjustable counter. Frequency and duration of the misting can be easily adjusted. A soak switch can be used when cuttings are initially set.

- **Solid State Controllers**

Greater flexibility and reliability can be achieved with electronic components. Clocks have been replaced by electronic counters.

A six zone controller is available from Phytotronics, Inc., P O Box 59, St. Louis, MO 63166. With variable misting time (2 to 32 sec.) and variable interval time (2 to 128 minutes) on each zone, it is more versatile than clock-driven units. Neon lights are used to indicate which zone is in operation. A time clock or photoelectric switch is needed to automate daytime operation.

Digital clocks can be used to eliminate the timers. Controllers developed by Superior Controls Co. Inc., 417 W. Palmer Ave., Glendale, CA 91204 contain no moving parts. Misting period is variable from 1 to 165 sec and interval from 1 to 165 minutes. Cycling period can be programmed internally. Both single-station and four-station units are available.

A small computer is built into the controller manufactured by Davis Engineering, 8217 Corbin Ave., Canoga Park, CA 91306. The unit can be programmed to approximate the solar day with
reduced mist applied early in the morning and late in the afternoon. On cloudy days a reduced frequency can be used all day. With 8 zones of independent control and almost infinite variability, the unit is excellent where precise control is needed.

Additional features include a memory back-up for power failures and a self-test diagnostic program to isolate any problems.

**Maintaining Your Electric Controls**

Electric controls have become an integral part of our growing operation over the past few years. Most pieces of electric equipment that are used in the greenhouse have electric controls.

Maintenance of these controls, while usually very simple, is an essential part of keeping the equipment operating properly. The following is a list of the basic controls used and the recommended maintenance procedures.

- **All Controls**

  Frequently remove dust and dirt that accumulates on sensing elements, indicator faces, and housings. Check wires for wear or damage.

- **Thermostats**

  Check the thermostat for accuracy several times a year by comparing against a known thermometer. Shield the thermostat from direct sunlight with a piece of window screen or sheet metal painted white.

- **Timers and Controllers**

  Oil moving parts with a light instrument oil once a month.

- **Heater Stack Switch**

  Disassemble and remove carbon deposits once or twice a month during the operating season. Oil moving parts monthly.

- **Humidistats**

  Use a camel hair brush with ether to remove dust from hair sensing element, followed by a complete wetting with distilled water. Check for accuracy using a sling psychrometer.

- **Switches** - No general maintenance needed.

- **Safety Switches**
Check often to see that they are operating properly. Electronic controls are now being installed on some equipment. The most common one to date is the variable speed motor control being used on some fans. Several types of temperature controllers are now built with electronic components. Maintenance should be performed by a competent electronics technician.

1From: Connecticut Greenhouse Newsletter 149:10-12, April 1989

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