GROWERTALKS

Features

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Mist Systems for Propagation

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Mist systems are an important part of any greenhouse operation, as they play a vital role in the production of both seed and vegetative plant material. Their fundamental purpose is to deliver an intermittent source of water in low volumes to plant material being vegetatively propagated or to seeds being germinated. Mist systems, when compared to irrigation systems, typically deliver a smaller particle of water for shorter intervals of time. Depending on how a mist system is used and the type of crop it's being used on, the crop's production period can either be accelerated or slowed.

There are many types of mist systems available, including traditional in-line, upright mist nozzles; inverted mist nozzles with leak prevention devices; irrigation booms with mist heads; and water- or air-driven fogging nozzles. Mist systems can be operated manually or automatically.

Nozzle spacing

The most common mist systems used in greenhouses consist of a series of mist nozzles inserted into a water-supply pipe suspended over the propagation area, whether a bench or section of ground. A common misting diameter for nozzles is 6-ft. (1.8-m) wide, which can be delivered in a circle, half circle or oval spray pattern. Nozzle spacing is dependent on the size of the area you intend to cover, considering width as well as length. The objective is to achieve an ideal overlapping spray pattern of the mist nozzles to reach optimum uniformity and distribution of the water being delivered. It's important to follow each manufacturer's installation instructions for any nozzle you choose to determine the proper spacing of the nozzles.

Nozzles installed upright in a series are typically placed 6 to 12 in. (15 to 30 cm) above the crop. Although you need to consider which crops you'll be producing and the types of containers they'll be started in to determine a height that will accommodate all possible scenarios. Plant material or containers that obstruct the misting pattern can greatly influence the uniformity and distribution of the mist. It may be to your advantage to make your system height adjustable if you'll be misting crops with a variety of heights. However, if these crops will be mixed with one another throughout the production schedule, it's best to settle on a height that will accommodate all of them.

Attaching the nozzles

There are multiple ways to attach mist nozzles to the supply pipe and water pressure will influence which method you choose. Many nozzles have a male threaded end that can be directly screwed into the supply

pipe. It's fairly easy to drill and tap the holes yourself. This is most desirable under high-pressure situations—50 psi and up. Another option uses a rubber grommet that's inserted into a predrilled hole in the supply pipe. When the nozzle is screwed into the grommet, the grommet expands and holds the nozzle in place. There are also threaded adapters available that can be installed into threaded holes or grommets. The threaded adapters are used when the mist nozzle being used has a compression fitting. These two options should only be used when water pressure is 45 psi or less to avoid blowing the grommet out of the pipe.

Inverted nozzles

Another option for a fixed mist system uses inverted mist nozzles. These have the same considerations as upright nozzles as far as spacing is concerned, with the primary difference being they're mounted facing downward. With an inverted mist system, nozzle height above the crop is usually 3 to 4 ft. (0.9 to 1.2 m), which provides a height that will accommodate most crops being produced without any major adjustments needing to be made.

The nozzles can be directly inserted into the supply pipe using the same methods as the upright method. Some manufacturers also offer a hanging assembly to serve as a secondary water delivery tool. The hanging assemblies are available in varying lengths and will allow you to place your water supply pipe as far above the mist area, as you wish to avoid any unwanted obstruction. The hanging assembly is inserted into the water supply pipe at the same spacing recommended for the mist nozzles and the nozzles attach to the end of the hanging assembly.

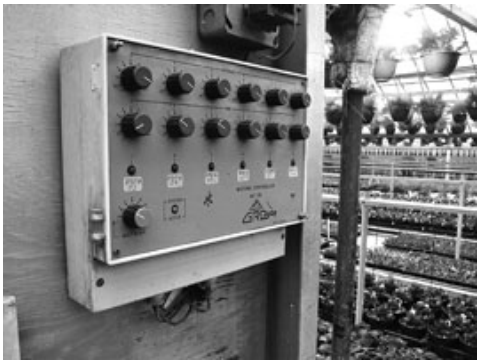
Mist nozzles for any stationary application are available with and without a leak-prevention device. A leak-prevention device serves as a shut-off for the nozzle when the mist is turned off to prevent water from draining from the pipe and dripping onto the plant material below. It's advantageous to select a nozzle with a leak-prevention device for any inverted mist system. For upright mist systems, a pressure-relief valve can be used to drain water from the water supply pipe after the mist cycle has been terminated. Pressure-relief valves operate on water pressure alone and are located at the end of the water supply pipe. To work properly, the water supply pipe is usually sloped to one end and the pressure-relief valve is located on the low end. When the mist cycle begins and water pressure increases, the valve closes, allowing water to be forced through the mist nozzles. When the mist cycle ends and water pressure drops, the valve opens, allowing any water remaining in the water supply pipe to be drained away. This prevents the water from dribbling out of the nozzles onto the crop below. A pressure-relief valve can be used on an inverted mist system; however, any water remaining in the hanging assembly won't be carried away and will dribble onto the plant material below.

Costs and options

Mist systems are relatively inexpensive to install. Piping can be the greatest contributing factor to their cost based on the type of pipe you select. Polyethylene tubing is the least expensive, but should only be used for inverted systems that utilize a hanging assembly and should always have proper support to prevent sagging. Schedule 40 or schedule 80 PVC and galvanized pipe are options for all mist systems and would cost more, respectively. Taking these factors into consideration, costs could range from $0.25–$0.75/sq. ft. ($2.75–$8.00/sq. m).

Regardless of which mist system you choose, there are several requirements and options that all mist systems have. Since the orifice of a mist nozzle is very small, most manufacturers require water to be filtered

by a 140–200 mesh screen prior to the mist system to prevent clogging. Filters range in price from $15–$300, depending on the volume of water they need to accommodate. Some nozzles have a recommended operating pressure and may require a pressure regulator. Pressure regulators range from $5–$50, depending on the style and size your operation requires.



Controlling the mist

Operation of your mist system is the single greatest consideration. There are many options for operation. The least expensive, as well as the least efficient, would be using a manual ball valve to turn the system on when mist is desired. This requires constant monitoring and allows little room for error. Forgetting to turn on the mist one time could be the end of your crop.

Mist controllers range from simple time clocks to sophisticated computer controls.

The most practical method is to use a low-voltage solenoid valve wired to a time clock that will automatically turn the mist on and off. Solenoid valves are inexpensive, costing $15 and up, and are available in a variety of sizes to match the size of your system's piping. Time clocks vary greatly in price. A simple lamp timer may be used to turn the mist on or off at predetermined times, but allows the least flexibility in mist cycle time and duration.

There are controls available that are specifically for mist systems that range from $200–$500 and can accommodate one or more mist zones. These controls usually have a 24-hour time clock and allow the flexibility of choosing the amount of time between mist cycles in minutes as well as hours. They also allow mist cycle times from a few seconds to several minutes. Some have a built-in sun sensor that automatically turns the mist off at night, if mist is undesirable.

Most computer environmental controls are capable of managing mist systems and inputs for mist cycle occurrences and duration are limitless. Unless you're currently using one, computer environmental controls can run into the thousands of dollars by the time they're installed and offer the most expensive alternative to mist control.

Booms and fog

Traveling booms with mist nozzles can be useful for misting large areas. Programming and stop/start magnets can be used to control the mist cycles in the same manner that stationary boom irrigation is performed.

For crops requiring an ultra-fine mist, fog nozzles may be used. Fog nozzles provide the smallest water particle size available. Fog nozzles usually have a smaller fogging diameter than mist nozzles and require much higher water pressure—usually 800–1,000 psi, generated by a high-pressure pump—to obtain their very small particle size. Fog nozzles may be water-pressure driven, which is the common type used in greenhouse bench or floor systems, or air driven, the type used in seed germination rooms where high humidity is desired and an air source is easily added. Fog systems can be controlled using the same timers

as mist systems or by using a humidistat. A humidistat can be a simple wall-mount type that triggers a solenoid valve to open a water or air source when a drop in humidity occurs or using a humidity sensor integrated into a computer environmental control system that has multiple set points. **GT**

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