Which Sprayer Will Work For You?

By Kurt Becker

With all the equipment available, it can be hard to decide which items will best suit your situation. While you could make use of almost every sprayer out there, finding the most efficient is your goal.

Your old sprayer is on its final legs: the pump is wheezing as you fill the solution tank for possibly the final time. Maybe you are concerned with the time it takes to spray your greenhouse. Or, you may be wondering if you are getting the most efficacious application you can. All of these are reasons to consider purchasing a new sprayer. However, this task is different than in the past. There are many different types of chemical applicators available and there are many decisions you must make about your actual needs. Of all the equipment available only a few machines will be best suited to your situation. Certainly you could make use of almost every sprayer available, but the most efficient use is your goal. Most often, one type of sprayer will not be enough. You should view your sprayers as tools in a toolbox. A wrench works well for its intended use. It can be used to pound nails but not very well.

There are three basic types of chemical application equipment used in greenhouses today: High Volume Hydraulic Sprayer, Targeted Low Volume Sprayers, and Ultra Low Volume Sprayers. Each of these machines has its place in greenhouse chemical application. They all have advantages and disadvantages. By the characteristics of each type of equipment, it is easier to choose which is best for you.

High Volume Hydraulic Sprayers

Otherwise known as "ol' Trusty," the standard hydraulic sprayer has been around forever. Often it is the most effective way of treating an out of control problem. Because this is a useful tool for general application, spot treatments and the best option for plant growth regulators, the hydraulic sprayer is still a must in any greenhouse. Standard hydraulic sprayers usually operate at pressures between 100 and 300 psi, output between 2 and 4 gallons per minute and have average particle sizes between 200µ (microns) and 400µ. Some hydraulic sprayers offer lower volumes, usually under 1 gpm, and higher pressures over 500 psi. These are useful because they don't overwet the plants, they create a finer droplet spectrum, and they allow a more deliberate, controlled application. Because this is a useful tool for general application, spot treatments, and the best option for plant growth regulators, the hydraulic sprayer is still a must in any greenhouse.

One important consideration with any hydraulic spray system is the choice of gun and nozzle used.

Most often, the goal is to turn foliage with a turbulent and forward moving spray cloud. When choosing your spray gun, look for ones that allow for easy pattern adjustment and multiple nozzle choices. Quite often, the standard nozzle sold with a particular gun may not be the best choice for greenhouse chemical application. Look at the flow rate, pressure and pattern of all of your choices. Some nozzle producers offer data on particle size produced based on flow rate and pressure. Finally, look for a gun that is comfortable to use. Guns with awkward angles or overly strong springs in the trigger make a difficult job worse.

Targeted Low Volume Sprayers

Positioned somewhere between hydraulic sprayers and true aerosol foggers, the targeted low volume sprayers offer flexibility with better coverage. Typically characterized by lower flow rates (generally a liter per minute or less) and smaller particle sizes (between 30µ and 100µ), targeted low volume sprayers are intended to be directed at their target. This allows for spot treatment and focused application to problem areas. Because the particle size is not too small, targeted low volume sprayers can be used in shade houses or even outdoors in light wind conditions. Unlike ultra low volume systems, they allow the flexibility of spraying one bench or the entire house at a quicker pace than standard hydraulic sprayers. They can achieve this while retaining the benefits of low volume chemical application: little to no run off, more even coverage, and greatly reduced amounts of water.

Types of targeted low volume equipment include high pressure coldfoggers, electrostatic sprayers, mist blowers and rotary disk atomizers. Each is designed to propel a specific size of particle at a crop. Each has characteristics that help to achieve under-leaf as well as upper-leaf deposition.

High pressure systems, working at pressures of 3,000 psi, create fine droplets with high velocity. This velocity is easily diffused once the spray cloud hits the target, creating a swirling spray cloud with a tremendous amount of turbulence to turn the leaves.

Electrostatic systems work with much less pressure and speed but have the added benefit of an electrostatic charge imparted to the spray droplets as the leave the nozzle. This helps to atomize the droplets and creates an attraction to oppositely charged targets, such as the plant tissues. Because there is little velocity to the spray, this method is best used with young plants and crops that are well spaced. Electrostatic sprayers may need to be equipped with an additional air blast to help penetrate heavier plant canopies that would otherwise be impossible for them to cover adequately.

Rotary disk atomizers produce their spray droplets by dripping solution onto a rapidly spinning disk. This creates very even particles and is often the best choice when a specific particle size is required. To propel the droplets to the target, rotary disk atomizers utilize a fan. Once the droplets are created, the

fan directs the spray at the plant, causing some turbulence and swirling to the spray. The units are limited by their tank capacity as they are hand carried with no hoses. As a result, they make terrific spot application tools.

It is important to consider the entire greenhouse — structure, environment and crops — when choosing a chemical applicator.

Ultra Low Volume (ULV) Chemical Application

These are the machines most commonly called foggers. ULV equipment generally uses very small quantities of water (2 liters per 10,000 square feet) and generates spray droplets smaller than 25µ in diameter. Because of the small particle size, ULV sprayers need to be used in an enclosed space to contain the spray solution. For best results with this method, proper air circulation is necessary. Generally, ULV systems reduce application time by operating very quickly or automatically, eliminating the need for an applicator. Even though they use dramatically less water, they create billions of small particles that cover plant surfaces evenly. ULV foggers can be very effective as a preventative tool. They are easy to use and because of the time savings, they get used more regularly. For best results, droplets created by ULV systems should move laterally. This allows the droplets to deposit on the undersides of the leaves as they slowly drop.

ULV equipment generally includes timer-controlled stationary foggers, total release aerosol canisters and thermal foggers. Each system generates similarly sized particles but do so differently. Automatic foggers most commonly use an air source, such as a compressor or a blower motor to funnel air at a specific pressure and rate through a venturi nozzle. The resulting low pressure created at the nozzle tip syphons chemical into the air stream where it is atomized. The most precise of these systems can create extremely even particle sizes, while less precise will often create a wide spectrum of droplets creating uneven coverage throughout the greenhouse.

Thermal foggers use jet propulsion as their air source. Combustion of gasoline or other fuels creates pulse jet explosions inside of a resonator. The resonator channels this force down the barrel to the nozzles where the velocity of the air stream atomizes the droplets. Additionally, heat from the combustion helps to create the fog by thermally exciting the spray droplets. This thermo-kinetic atomization method produces a thick fog, very rapidly. The defining characteristic of thermal foggers is their speed and ability to cover large areas quickly. The largest units can propel the fog hundreds of feet from the machine in seconds, treating areas as large as 50,000 square feet in less than 15 minutes.

A drawback to thermal fogging is that the atomization method is sloppy and creates a wide spectrum of droplets. Additionally, the resulting heat from the combustion can evaporate the spray droplets more quickly than desired. To overcome these drawbacks, thermal foggers usually require the use of specific chemical formulations or additional carrier solutions added to the spray tank. Finally, total release aerosol canisters create small droplets by filling the canister with propellant. Once a canister is activated, this propellant forces the spray solution through the nozzle atomizing solution into a cloud. Because these systems have no lateral movement created by the canister, they must rely heavily on horizontal air flow fans to provide even coverage on all plant surfaces. Otherwise the droplets deposit disproportionately on the top leaf surfaces as the fall.

Choosing the Right Equipment

With a basic understanding of each type of equipment it is easier to determine the best fit for any greenhouse. Consider the crop, structure and environment. A grower with two dozen Quonset hut greenhouses will have a difficult time using automatic ULV equipment as they require several hours to expel their chemical and often sit in the treatment area overnight. A thermal fogger would be better. This would allow the grower to stand at the doorway and propel the fog the length of the greenhouse in a matter of minutes, finishing the entire farm in less than an hour.

Another grower with a garden center containing tomatoes, herbs, geraniums and begonias may prefer the automatic ULV approach, it is not as practical as a targeted sprayer. Because the ULV fogger treats everything in the house, the grower would be limited to the pesticides available for use on the edible crops. This may not be the best solution for the thrips in the geraniums. A targeted low volume sprayer would allow flexibility of different pesticides with the benefits of low volume spraying and a reduction in application time from hydraulic application.

It is important to consider the entire greenhouse — structure, environment and crops — when choosing a chemical applicator. While there are more choices in sprayers than in the past, each type is more focused on specific benefits. By understanding these benefits along with the disadvantages associated with them, growers can make better decisions choosing the right sprayer for the job. g

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