



# *DRAMM*

## Selecting the Right Sprayer

### White Paper

Choosing the correct equipment for the job is an important skill. Often it depends on factors not normally thought of when spraying. This guide will help identify the questions and considerations involved in selecting the right sprayer.

## Choosing the Right Sprayer for the Job.

How often have you sprayed your greenhouse with the same method you have used for years and wondered if there was a more effective way to accomplish this task. This question is valid for so many reasons. Application of plant protectants and growth regulators require labor, planning and money. It is important to ensure you are getting the most for your investment.

Quite often, your time-tested method might not be the best way to attack your particular problem. Each pest, each greenhouse and each crop are all unique. Every different combination of these variables may be best approached with different methods for the best result. The different types of spray equipment available in the nursery industry all have strengths and weaknesses. They are each meant to excel at certain tasks. By learning these strengths and weaknesses and how to apply them to your specific problems you can maximize your efficacy.

Just like tools in a tool box, different spray equipment has different uses. A wrench is meant to thread a nut and bolt together. Just because you can use that wrench to pound a nail as well, doesn't mean you should.



## Different Types of Equipment

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 may 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. Remember, you should view your sprayers as tools in a toolbox. To complete different tasks you will need a number of basic tools.

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 their place in greenhouse chemical application. They all have advantages and disadvantages. By the learning 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. Typical hydraulic sprayers usually operate at pressures between 100-300psi, output between 2 and 4 gallons per minute and have average particle sizes between 200 $\mu$  (microns) and 400 $\mu$ . Some hydraulic sprayers offer lower volumes, usually under 2 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.

Choose sprayers that will make the job as easy as possible. Suited-up in a warm greenhouse, small sacrifices on good design or the wrong equipment will add up to increased frustration and more time spent spraying. Quite often, this means a reduction in quality as the applicator has to divert his focus from spraying to struggling with his equipment.

- **Make sure that your sprayer has enough volume to provide excellent agitation. Poor agitation can result in clogs that slow progress.**
- **Stay away from sprayers that can potentially tip over as they empty. With less weight in the tank, they may be easier to pull over when yanking on the hose.**
- **Flexible hoses and swivels on the gun will ease hose struggles.**
- **Pay attention to placement of critical components. Make sure that filters are easy to reach. When they are out of sight, they are out of mind and don’t get cleaned. Gauges and pressure regulators should be easy to see and adjust.**

### Things to look for when choosing a hydraulic sprayer:

**Gun flow rate:** Will the plants get too wet? Is the spray too coarse?

**Pump flow rate:** Is there enough left over for good agitation?

**Ease of use:** Is the sprayer easy to move, start, fill? Is the gun comfortable? Is it easy to clean? How do you drain the tank?

**Stability:** Many sprayers can be tippy or top-heavy as the tank empties.

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. Most 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 30 $\mu$  and 100 $\mu$ ), targeted low volume sprayers are intended to be directed at their target. This allows for spot



treatment and focused application in 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, like the Dramm Coldfogger, working at pressures of 3000psi, 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. These high-pressure sprayers are generally much faster than standard methods as they require less spray solution than wet sprays with 45 liters (12 gallons) treating 1 acre in 45 minutes of spray time.

Electrostatic systems work with much less pressure and speed but have the added benefit of an electrostatic charge imparted to the spray droplets as they 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

### 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 or ½ gallon per 10,000 sq. ft.) 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 and reducing or eliminating exposure during spraying. 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

#### Do you need more air circulation?

Sometimes Ultra Low Volume applications will miss certain areas due to poor or not enough air circulation.

Many greenhouse circulation fans cause too much turbulence for good air movement and good chemical distribution.

Some fan companies only provide general guidelines on fan placement, resulting in too few or too many fans used.

Work with a reputable company to design an air flow system customized for your greenhouse.

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 droplet 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 sq. ft 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 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.

**Structure related questions:**

<p>Is your greenhouse primarily smaller, individual zones such as quonset or ground-to-ground houses?</p>	<p>Select a sprayer that is portable. Narrow wheel base is important as these houses are generally packed tight.</p> <p>Consider a thermal fogger for speed in a variety of different greenhouses.</p> <p>If the number of zones is small (less than the number of days in your spray rotation schedule) consider an automatic fogger.</p>
<p>Do you have large, gutter connected greenhouses?</p>	<p>Select larger hydraulic sprayers.</p> <p>Both thermal foggers and automatic foggers will work well.</p> <p>Targeted Low Volume will allow for selective treatment of different plants in the large zones.</p>
<p>Are the zones extremely large?</p>	<p>Often, larger greenhouse and vegetable producers will have larger zones to aide in logistics. However, these zones may be too large for some equipment.</p> <p>Often automatic application is desired in these situations but will require many machines per zone.</p>

	<p>Thermal foggers can quickly cover large zones with less machines and operators.</p>
<p>Is the gutter height high or low?</p>	<p>Because automatic foggers are stationary, they are limited in the area they can cover. Most equipment will give a best-case area the machine will cover. Every impediment such as low gutters or many hanging baskets will reduce the coverage area.</p> <p>Thermal foggers, because they are attended and directed by an operator, tend to work better in difficult conditions as the grower can make decisions about coverage during the application.</p>
<p>Do you have concrete or gravel walkways both inside the greenhouse and between greenhouses?</p>	<p>Choose the wheel type based on your surface. Some sprayers offer different wheel options available. Check with the manufacturer.</p>
<p><b>Questions related to crop:</b></p> <p>What stage plants do you need to spray?</p>	<p>Different equipment may work better or different stages of plant growth.</p> <p>Targeted sprayers allow for more selective spraying of younger plants that are more densely packed into smaller areas.</p> <p>More dense canopies can be difficult for some equipment. Stock plants or a crop ready to ship may present more and more tightly packed foliage that might make automatic applications more difficult. Equipment manufacturers can help determine if your crop might be too dense.</p>
<p>What crops are you growing?</p>	<p>Crops vary in greenhouses. Plugs have less foliage to cover and more space around them. They are easy to spray with most equipment.</p>



Vegetables or cut flowers have additional foliage. While low volume methods work well, different strategies may apply.

**Questions related to logistics:**

Where are you in your crop cycle?

Early in the crop cycle there is time. Houses are closed, temperature is not generally an issue. Most equipment will work.

Later in the crop cycle, plants are shipping, the temperature is warmer and the greenhouse is often open. Quicker application methods might work best.

Automatic methods may have to be halted as it gets later in the season. With outside temperatures high, the greenhouse is often open until late. With all applications, the REI starts once the application has ended. Automatic machines and hydraulic sprays run for several hours. Consider thermal foggers and coldfoggers.