APACHE by ET SPRAYERS

MAKE YOUR APPLICATION COUNT:

Sprayer Nozzle Selection – The right nozzle choice will create an improved, more effective application

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SPRAYER NOZZLE SELECTION

The right nozzles on your sprayer will ensure correct application coverage, cut down on pesticide drift and reduce operating costs, making it an important decision for your operation and your sprayer's return on investment (ROI).

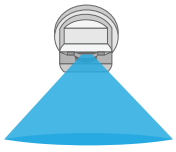
With so many factors to consider, picking the best sprayer nozzle can quickly become overwhelming. We will start off with a quick review of the most common nozzle types and the type of application and droplet size needed to help you break down the different aspects of selecting the right sprayer nozzle.

Nozzle Types

Nozzles come in a variety of options that can be customized for each application. Some of the more commonly used nozzles include flat-fan, cone and flooding tips. They can also contain special features such as air-induction and drift reducing qualities.

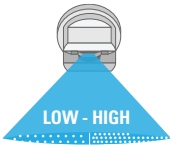
Looking at the most popular sprayer nozzle, the flat-fan nozzle further categorizes itself into several categories including:

- Standard Flat-Fan
- Extended Range Flat-Fan
- Even Flat-Fan
- Off-Center Flat-Fan
- Twin-Orifice Flat-Fan
- Air Induction Flat-Fan



Standard

A key attribute of the flat-fan nozzle is the tapered edge it produces, which requires the nozzle to be positioned for overlap of the output to create a uniform spray pattern.



Extended Range Flat-Fan

Extended range flat-fan nozzles are designed to work under a much larger range of pressure compared to a regular flat-fan nozzle. This nozzle is recommended for the grower who is looking for uniform distribution and wants more drift control at lower pressures.

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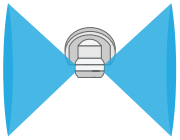
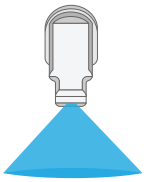


Twin-Orifice

Twin-orifice flat-fan nozzles produce two spray patterns with one orifice angled 30 degrees forward and the other orifice angled 30 degrees backward. This nozzle is noted for spraying smaller droplets in both spray patterns providing more penetration and coverage.

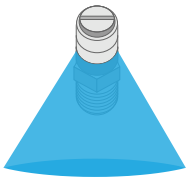
Even

Even flat-fan nozzles, on the other hand, do not produce a tapered edge and do not require overlap. The nozzle height and the spray angle both control the spray pattern width.



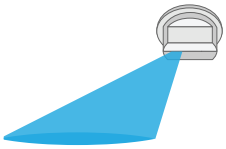
Air-Induction

The air-induction nozzle is noted for producing large drops through the use of a venture air aspirator. The venture draws the air into the nozzle, and then the air is mixed with the chemical to create larger spray droplets which reduce drift potential.



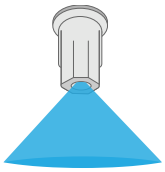
Flood

Flood nozzles are similar to full-cone nozzles in that they produce large droplets and their ideal overlap is 100 percent. The flood nozzle produces a spray pattern that is similar to the even flat-fan nozzle but emits larger droplets than the even flat-fan nozzle.



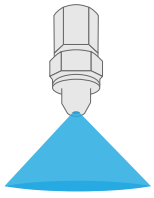
Off-Center Flat-Fan

Another new fan design is the off-center fan, which is used for boom-end nozzles so the swath is uniform from end-to-end and not tapered at the edges.



Hollow-Cone

Hollow cone nozzles provide more complete coverage of plants due to the smaller droplets it emits. Looking at the spray pattern, the hollow cone is formed by a circular orifice that creates a cone-shape.



Full-Cone

The full-cone nozzle utilizes the same circular-shaped orifice as the hollow cone except this nozzle produces output through the entire cone spray pattern, as opposed to the hollow cone. The full cone nozzle produces larger droplets making this nozzle more drift resistant.

Often, the chemical label for your application will include information that can help sort through the different types of nozzles. The label will indicate what the chemical controls, its application rates and the conditions needed to spray the chemical.

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Nozzle materials

Nozzles come in an assortment of materials including nylon, brass, stainless steel, thermoplastic, tungsten carbide and ceramic. While tungsten carbide and ceramic nozzles are often the most expensive, they are also known for their long-lasting qualities and their resistance to corrosion. Stainless steel nozzles last longer than brass or nylon in terms of spray uniformity capabilities. Nylon nozzles may be fitted with stainless steel inserts as an alternative to solid stainless steel nozzles at a reduced cost. Noted for good abrasion resistance, thermoplastic nozzles also have downfalls. Swelling is a problem when thermoplastic is mixed with certain chemicals, and these nozzles are easily damaged during cleaning; however, newer designs are proving to have a longer life span.

The life of a spray tip depends on the abrasiveness and corrosiveness of the spray solution. The added cost of purchasing a more durable nozzle such as a tungsten carbide, ceramic or stainless steel can pay for itself many times over by reducing nozzle wear damages.

Type of application and droplet size

The type of application you are applying, whether it is soil-incorporated, pre-emergence, post-emergence systemic or post-emergence contact, will determine the droplet size needed and ultimately the correct type of nozzle to use. Additionally, the type of application is then applied using either a broadcast, banded or direct application process which further sorts out the best type of nozzle for your application.

Different droplet sizes are recommended depending on the type of application and the application process, and these factors will influence your choice in nozzle tips. To understand the connection between these aspects of nozzle selection, it is important to understand droplet size and the classification system associated with droplet size.

Droplet size is one of the most influential factors related to drift, making it essential for applicators to understand the principles of droplet size and how it relates to selecting the best sprayer nozzle.

Spray droplets are categorized based on size, and they are measured in microns. One micron is equal to approximately 1/25,000 of an inch or .001 millimeters. A classification system was developed by the American Society of Agricultural and Biological Engineers which makes it easier to compare droplet size between manufacturers and different nozzles.

Droplet Size Classification Chart

CATEGORY	SYMBOL	COLOR CODE	VMD RANGE (IN MICRONS)
Very Fine	VF	Red	<150
Fine	F	Orange	150-250
Medium	M	Yellow	250-350
Coarse	C	Blue	350-450
Very Coarse	VC	Green	450-550
Extremely Coarse	XC	White	>550

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The VMD measurement is defined as the size of droplet that divides the spray volume into two equal parts by volume. Simply stated, this means half of the droplets have diameters smaller than the VMD and the other half of the droplets are larger than the VMD. Droplets are measured by the VMD because it is impossible to ensure that every droplet will be the exact same size.

A range of droplet sizes is the most efficient way to ensure complete coverage of a variety of plants and the different shapes and sizes found in the fields. The combination of chemicals used, size of plants and weather conditions will help determine the most appropriate droplet size; however, droplets smaller than 150 microns are more likely to move off-target and have very little function for most applications.

According to Tom Reed, a regional manager from TeeJet Technologies, the trend in spraying is moving towards using larger droplets to decrease the amount of drift. In reality, it is much easier to control droplets in the medium to extremely coarse ranges.

It is likely that you will need to purchase multiple nozzle types for different applications. Finding the best nozzle for your application is worth the investment of your time because it will ultimately allow you to reduce operating costs, use your chemicals more efficiently and cut down on pesticide drift.

Looking to get additional information or have any questions? Contact **service@etsprayers.com** to talk with an Application Specialist today!