NOZZLE SELECTION MAKES THE DIFFERENCE

Reducing coverage gaps, chemical costs and drift are just some of the many benefits reaped from choosing the right nozzle for your sprayers.

by Steve Pearson, Ph.D.

Turf chemical sprayers, even when operated by the best people, are only as effective as the nozzles along the boom. Selecting the best nozzles for your particular chemicals and your application conditions is the key to safe, effective and profitable chemical use.

Can you afford gaps in the coverage of your turf chemical applications? Can you afford to have streaks from over-applied chemicals? Can you afford to have your chemicals drift off target and damage ornamental plantings? In almost every case your answer has got to be a definitive, No!

Nozzle selection

In the 1990s, it's more important than ever to assure that every chemical application is as accurate as possible. Budgets are being stretched, demand for high quality turf increases and environmental concerns are near an all-time high. Fine-tuning nozzle selection to the specific chemical and specific application situation will increase spraying accuracy, reduce chances of off-target movement of chemicals and save you time and money by getting chemical applications right the first time.

The most important thing to remember about spraying is that not every nozzle is ideal for every application situation. The nozzles you select for each chemical application need to be evaluated for their effectiveness and uniformity. Both of these characteristics must be matched against the specific application situation and the requirements of the chemical being applied.

The spray pattern is the most obvious differences between nozzles.

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For applicators who maintain susceptible plants near turf areas or who have environmentally sensitive areas nearby, chemical drift should be a primary concern.

CHART 1.

Nozzle selection for boomed sprayers

Nozzle Type	HERBICIDES		INSECTICIDES		FUNGICIDES		GROWTH REGULATORS
	Contact	Systemic	Contact	Systemic	Contact	Systemic	
Wide-Angle Full Cone		Excellent		Excellent		Excellent	
Extended-Range Flat Fan	Excellent	Good	Excellent	Good	Excellent	Good	Excellent
Standard Flat Fan	Good		Good		Good		Good
Wide-Angle Hollow Cone		Good		Good		Good	
Twin Flat	Excellent		Excellent				Good
Flooding Nozzles		Good		Good		Good	

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Spray patterns are a result of the way liquid leaves the nozzle. Terms like flat spray, flooding nozzle, full cone or hollow cone are typically used to describe patterns.

Spray pattern

Each nozzle pattern has a specific range of droplet sizes and specific type of coverage. Some nozzle patterns are more uniform, others offer finer droplets and some have both. Within each nozzle type there are various flow rates and operating pressures that influence the droplet size.

In addition to nozzle spray pattern, droplet size is a critical factor in most chemical applications. Selecting the optimum droplet size is often a balance of coverage versus drift. In many turf applications, uniform coverage of the target is vital.

The smaller the droplets, the more drops per square foot and the better the coverage. These small droplets, however, are easily effected by environmental conditions (like wind speed, temperature and humidity).

For applicators who must maintain susceptible plants near their turf areas, who have open water or environmentally sensitive areas nearby, chemical drift should be of concern.

Since chemical application can't always be limited to days when weather conditions are prefect, nozzle types that minimize drift are very important. Generally speaking, the higher the spray volume per 1,000 square feet and the lower the pressure, the larger the droplets and the smaller the chance that the droplets will drift-regardless of the nozzle type used (see chart 1).

Wide-angle nozzles

Wide-angle full cone nozzles provide a uniform, circular pattern at pressures from 15 to 40 psi. Droplets are larger than other nozzle types of the same capacity, making wide-angle full cone nozzles a good choice to reduce drift.

Wide-angle full cone nozzles are typically operated at pressures of 15 to 25 psi. At lower pressures, these nozzles produce excellent target coverage and uniformity along the boom. Lower operating pressure also results in less wear on pumps and valves.

When mounted at a 45 degree angle, wide-angle, full cone nozzles provide an excellent balance of uniform distribution and drift control.

Nozzle spray pattern and droplet size are critical factors in chemical applications.

Wide-angle full cone nozzles provide excellent coverage for all systemic pesticides. When used to apply contact pesticides, these nozzles are often used with larger spray volumes to improve coverage of the target (see illustration 1).

Flat fan nozzles

Extended-range flat fan nozzles produce a tapered pattern similar to standard flat fan nozzles but are designed to operate over a wider range of pressures. The recommended pressure range for extended-range nozzles is 15 to 60 psi compared to 30 to 60 psi for standard flat fan nozzles.

Standard flat fan nozzles are good for applying all contact pesticides and growth regulators. The lower pressure capability makes the extended-range tip excellent for systemic pesticides as well as contact pesticides and growth regulators.

The nozzle is a good choice for drift control since it provides uniform coverage at pressures as low as 15 psi. The nozzle is also ideal for sprayers equipped with automatic sprayer controls since it allows a wider range of operating pressure without changing the spray pattern.

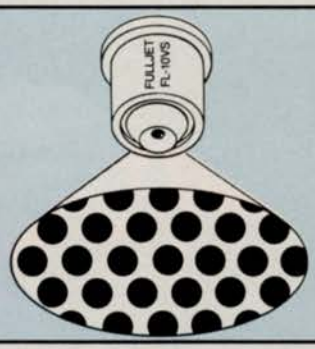
Extended-range nozzles can also

(TEEJET)

Illustration 1

Spray pattern: The wide-angle full cone nozzle has a circular pattern of relatively large droplets and is designed for pressures from 15-40 psi.

Best application: When used at 15-25 psi, wide-angle full cone nozzles are an excellent choice to reduce drift with systemic pesticide applications. At these lower pressures, these nozzles produce excellent target coverage and uniformity along the boom. Lower operating pressure results in less wear.



(XR TEEJET)

Illustration 2

Spray pattern: Flat fan nozzles produce medium sized droplets within a tapered pattern which is ideally suited for overlapping along the boom to achieve uniform broadcast coverage. Extended-range nozzles are designed to operate over a wider range of pressures than standard flat fan nozzles (15-60 psi for extended-range and 30-60 psi for standard flat fan nozzles).

Best application: Excellent for applying contact and systemic pesticides as well as growth regulators.

DELAVAN RAINDROP

Spray pattern: Delavan's Raindrop nozzle has a wide-angle (120°), hollow-cone spray pattern and is designed for drift reduction. Its patented swirl chamber produces fewer driftable "fines", as less than one percent of the spray volume consists of droplets under 200 microns.

Best application: Raindrop nozzles should be positioned at a 45° tilt for a uniform spray pattern. Also, spray should overlap 100 percent for most consistent coverage. Pressures should be 30 to 40 psi.

Illustration 3

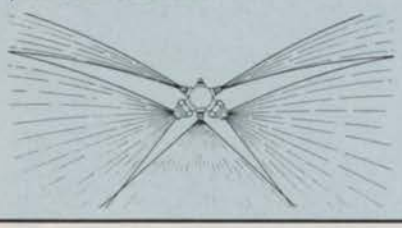
(BOOMJET)

Spray pattern: Boomless nozzles use a combination of up to five nozzles to produce an overall wide swath flat spray. These nozzles should be 100-percent overlapped on successive passes to achieve uniform distribution. Boomless nozzles can be used at pressures from 20-40 psi and achieve swaths of 30-60 feet when mounted at three feet off the ground.

Best application: Boomless nozzles are a good choice when terrain or obstructions make boom sprayers impractical. Spray

Illustration 4

distributions are not as even as a properly operated boom sprayer. Boomless sprayers should be operated at the lowest pressure possible to reduce drift.

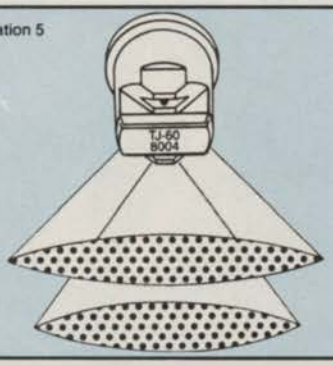


(TWINJET)

Spray pattern: Twin flat spray tips provide two flat fan nozzles offset by 60 degrees. When used at pressures of 30-60 psi these nozzles produce excellent coverage with smaller droplets.

Best application: The smaller droplets offer excellent coverage for contact herbicides and insecticides. Twin flat spray nozzles are not recommended when drift is a concern.

Illustration 5

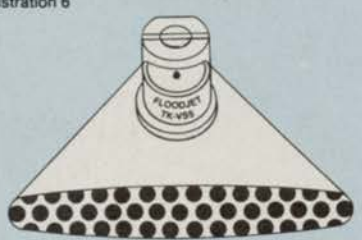


(FLOODJET)

Spray pattern: Flooding nozzles have a wide pattern with heavier edges and are typically used at pressures of 10-25 psi.

Best application: Sometimes used for systemic pesticide application if drift is a concern. Heavier pattern edges require double-overlap to improve uniformity.

Illustration 6



DELAVAN LFR COLOR JET

Spray Pattern: Delavan's LFR Color Jet tip is a 110° flat fan pattern tip that maintains a good pattern across the 15 to 60 psi range.

Best Application: An overlap of 50 percent is recommended for flat fan patterns, and the angle of delivery should be slightly skewed to avoid spray impingement.

Illustration 7

be operated at higher pressures (30 to 60 psi) to produce smaller droplets and better coverage (see illustration 2).

Hollow cone nozzles

Wide-angle hollow cone spray nozzles are also used on many turf sprayers. The large nozzle orifice reduces clogging and a dual chambered nozzle design produces larger droplets to minimize drift. The wide-angle hollow cone nozzle operates at a pressure range of 20 to 50 psi. The circular pattern is not as uniform as full cone spray tips of the same size.

Wide-angle hollow cone nozzles can be used for all systemic pesticides. When used to apply contact pesticides, these nozzles should be used with larger spray volumes to improve coverage of the target (see illustration 3).

Boomless nozzles

Boomless nozzles are a good choice for application situations where terrain or obstructions make it impractical to use a boom sprayer. Typically boomless nozzles, or cluster nozzles, are mounted at the rear of the sprayer and operate at pressures of 20 to 40 psi.

These nozzles can deliver a swath of 30 to 60 feet. This assembly of up to five separate nozzles produces a wide, flat spray pattern.

Mounting the assembly at an angle lowers the nozzle height and decreases the drifting effect of wind on the pattern without reducing pattern width. Since boomless nozzles must project droplets over a much wider distance than most other nozzles, spray distribution is not as uniform as a boom sprayer.

Double overlapping can improve coverage to some degree, but remember, this doubles the total spraying time and the amount of spray material per square foot (see illustration 4).

Twin flat tips

Twin flat spray tips offer excellent coverage for contact herbicides and insecticides and are also a good choice for growth regulators. The twin flat nozzle design incorporates two flat fan nozzles, one 30 degrees forward, one 30 degrees backward, into one nozzle body. The dual angle of attack improves spray coverage.

Recommended for use at pressures of 30 to 60 psi, the twin flat nozzle produces small droplets for more thorough coverage (see illustration 5).

Flooding nozzles, or wide angle flat spray tips, are sometimes used for systemic pesticide application. With a

With today's heightened awareness of the environment, it's important to make sure that every chemical application is as accurate as possible.

typical operating pressure of 10 to 25 psi, these nozzles produce large droplets that resist drift.

The large, circular orifice of a flooding nozzle reduces clogging. The large outer droplets in a flooding nozzle pattern create heavy spray pattern edges and necessitate 100 percent overlap to improve application uniformity (see illustration 6). **LM**

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