

Tailgate Safety Training for Landscaping and Horticultural Services

Agricultural Safety Program, 590 Woody Hayes Drive, Columbus, OH 43210

Choosing Spray Nozzles

Objective: Choose and use nozzles properly and safely.

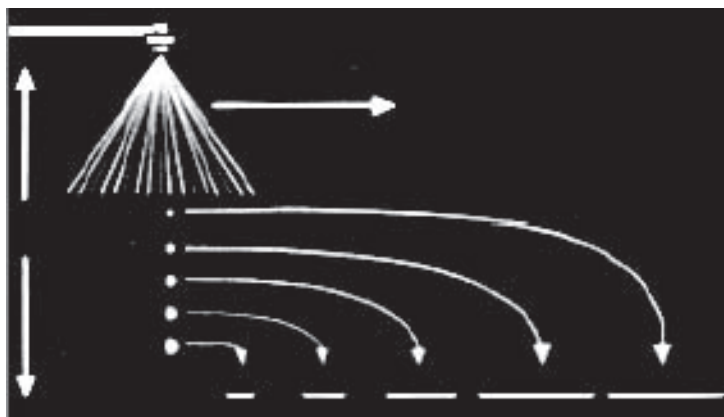
How to Use This Module

Spray nozzles play a big role in effective application and spray drift. For this module:

- Read about choosing and cleaning nozzles and reducing spray drift.
- Look at the differences between different spray nozzles.
- Ask your supervisor to demonstrate cleaning techniques.
- Practice cleaning techniques while your supervisor observes.
- Review the important points.
- Take the True/False quiz to check your learning.

Background

Nozzles regulate droplet size, spray flow, and spray pattern. The right spray nozzle is critical for safe spraying and effective application. The right nozzle causes less spray drift to unintended areas like other crops or backyards. Other safe techniques can also help reduce spray drift.



Flow regulation affects the application rate. Nozzle opening size and spray pressure affect the flow rate through nozzles. These factors can be varied by selecting a different nozzle size or adjusting the pressure.

Droplet size varies with several factors:

- Pressure
- Weather conditions
 - ◆ Temperature
 - ◆ Humidity
 - ◆ Wind speed and direction
- Nozzle size
- Spray angle
- Spray pattern shape

Usually, increasing nozzle pressure decreases droplet size. Increasing tip spray angle can also decrease droplet size. As shown in the figure on the previous page, smaller droplets drift longer distances.

Weather

Weather has a strong influence on spray drift. Wind direction and speed can cause spray to drift away from its target. The larger the droplet, the faster it falls toward its target, and the less likely it is to drift. However, high winds can cause large droplets to drift off target.

Nozzle Spray Patterns

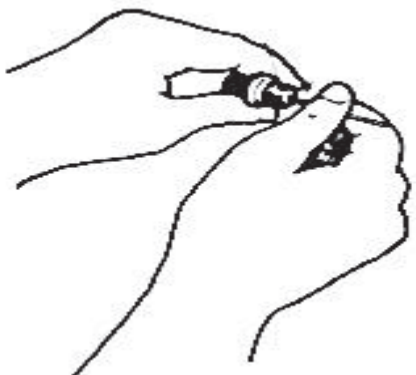
There are three basic nozzle spray patterns. Each is best for certain applications.

- Flat-spray, or flat-fan, nozzles spray droplets from a flat-spray tip. They form a fan-shaped pattern as they leave the nozzle opening.
 - ◆ A flat-spray nozzle is the only kind that puts out herbicide accurately and uniformly.
 - ◆ The edges of the pattern have a lower spray volume. So, patterns of adjacent nozzles must overlap to obtain uniform coverage.
 - ◆ Wider-angle nozzles produce smaller droplets.
 - ◆ Narrow-angle spray tips produce a more penetrating spray. They are also less likely to become clogged.
- Hollow-cone nozzles produce a spray pattern with the liquid on the outside of a cone.
 - ◆ These are best when penetration and coverage are critical.
 - ◆ The typical spray distribution is saddle-shaped. There is less liquid in the center of the distribution, tapering off rapidly at the edges.
 - ◆ It is not well suited for broadcast applications; proper overlap is difficult.
 - ◆ Generally produces the smallest droplets.
 - ◆ Spray drift can be high because of the many small droplets produced at the normal operating pressure of 40 pounds per square inch (psi) and above.
- Wide-angle full-cone nozzles produce large droplets distributed throughout a full cone.
 - ◆ These are good for soil-applied and systemic herbicides.
 - ◆ Maximum drift control at pressures of 15 to 20 psi is achieved.
 - ◆ The uniform spray pattern is maintained over a pressure range of 10 to 40 pounds per square inch (psi).
 - ◆ Droplets are larger than with other tip styles of equal capacity at similar pressures.

Cleaning Nozzles

- Use water that looks clean enough to drink when cleaning the sprayer. Foreign materials in the water can wear out nozzles.

- Watch the output pattern of nozzles periodically. Streaks in the pattern indicate foreign material inside the nozzles.
- Remove and clean nozzles. Use a soft brush for the tip and screen with strong detergent solution or kerosene.



- Use a wooden toothpick to unclog nozzle tips. A pin, a knife, or any other metal object can completely change the spray pattern capacity of the tip.

Spraying Tips to Reduce Drift

- Follow label recommendations to avoid drift with highly volatile pesticides.
- Use nozzles that produce coarser droplets on targets that do not require small, uniformly distributed droplets.
- Keep spray volume up.
- Use nozzles with larger orifices.
- Use nozzles with narrower spray-fan angles.
- Avoid spraying on extremely hot and dry days.
- Do not spray when wind speeds are higher than 5 miles per hour.
- Avoid spraying near sensitive crops downwind. Leave a buffer strip of 50 to 100 feet, and spray the strip later when the wind shifts.

Personal Protection Equipment (PPE)

Workers must wear proper Personal Protection Equipment (PPE) when working with any type of pesticide, herbicide, or spray. Consult the product label for equipment requirements, such as latex gloves. For more details, refer to the Tailgate Safety Training modules *Reading Pesticide Labels* and *Personal Protection Equipment (PPE) for Pesticides*.

Review These Important Points

- Nozzles regulate spray flow, droplet size, and spray pattern.
- Opening size and spray pressure affect flow rate through the nozzle.
- Droplet size varies due to pressure, climatic conditions, and nozzle size.
- There are three basic spray pattern shapes — flat-spray, hollow-cone, and full-cone.

About These Modules

The author team for the training modules in the landscape and horticultural tailgate training series includes Dee Jepsen, Program Director, Agricultural Safety and Health, Ohio State University Extension; Michael Wonacott, Research Specialist, Vocational Education; Peter Ling, Greenhouse Specialist; and Thomas Bean, Agricultural Safety Specialist. Modules were developed with funding from the Occupational Safety and Health Administration, U.S. Department of Labor, Grant Number 46E3-HT09.

Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the U.S. Department of Agriculture or the U.S. Department of Labor.

Answer Key: 1 = T, 2 = F, 3 = T, 4 = F, 5 = T.

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Keith L. Smith, Associate Vice President for Agricultural Administration and Director, Ohio State University Extension

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Name _____

True or False?

- | | | |
|--|---|---|
| 1. There are three basic nozzle spray patterns — flat-spray, hollow-cone, and full-cone patterns. | T | F |
| 2. Flow regulation has nothing to do with the application rate. | T | F |
| 3. Hollow-cone nozzles can result in high spray drift because of the many small droplets produced. | T | F |
| 4. Nozzles should be cleaned with a regular detergent and a pin or a knife. | T | F |
| 5. Streaks in the nozzle's output pattern means that foreign material is in the nozzle. | T | F |