

The Plant Doctor

How to Spray Fungicides to Protect Your Home Landscape, Garden, & Turf



Background

Fungicides work best as protectants. This means it is best to apply fungicides before a plant is exposed to a pathogen. After a plant has become diseased, applying the correct type of fungicide may stop the spread of the disease or even put it into remission, but the plant will stay diseased. In the right environment, the disease will reappear. It is important to learn how to apply fungicides properly to prevent and limit disease.

Types of Fungicides

There are two broad categories of fungicides: topicals and penetrants.

Topical fungicides work like a raincoat—they remain on the outside of the plant and prevent the shower of fungal spores from infecting the plant. Topical fungicides are also called contact fungicides or protectants.

Penetrant type fungicides move into the plant and kill or immobilize the fungus during or after infection. Penetrants may move very little or a fair amount once inside the plant. The amount of movement depends upon the particular fungicide and method of application. Regardless of the type of fungicide, effective control of fungi depends upon correct application.

Ornamental fungicides are mostly penetrants, with some topicals. Fruit fungicides are a mixture of both topicals and penetrants. Most vegetable fungicides available to the homeowner are topicals. Some examples are given in **Table 1**.

Spray Basics for Fungicides

When applying a fungicide spray, three factors are essential: 1) the volume of spray solution applied in a given area (for example, 20 foot length of row, an acre, or per thousand square feet), 2) type of nozzle, and 3) spray pressure. All three are varied in order to make the correct spray pattern for the crop and the fungicide being applied.

Since many diseases begin on the lower leaves of the plant, the spray solution must penetrate the plant canopy and reach these lower leaves. Furthermore, the solution must coat the underside of the plant leaves if good protection is to be obtained. The primary factor influencing penetration of the plant canopy and coating of the plant parts is the amount of spray solution or volume used in a given area.

Increasing the volume improves both penetration of the plant canopy and coverage of the plant. Spray volumes suitable for some herbicides (e.g., 1 gallon per 5,000 square feet) are not reasonable for fungicides. In general, you will need to apply a volume equal to about 2.5–3.0 gallons per 1,000 square feet for turf. The volume of spray solution may be more, depending on the type of crop (such as for Irish potatoes), but less is not a good idea.

Spray nozzles break up the stream of solution coming from the sprayer into a distinct pattern of droplets. The more uniform the droplet placement and size, the better the plant coverage. Droplet size influences how it penetrates the plant canopy, moves in the air currents, and is attracted to the plant surface.

Table 1. Some common fungicides labeled for residential landscapes.

Fungicide name (active ingredient)	Trade name(s)	Types of crops for which the active ingredient has a label	Type of activity
captan	Hi-Yield Captan	azaleas, camellias, chrysanthemums, roses, apples, peaches, plums, strawberries	topical
chlorothalonil	Bravo, Daconil, Echo, and many brands using the words "All Purpose"	vegetables, ornamentals, some fruits, trees	topical
mancozeb	Dithane, Dithane M45, Mancozeb, Fore	ornamentals, trees, commercial vegetables	topical
myclobutanil	Spectracide Immunox Multi-Purpose	turf, ornamentals, cucurbits, tomatoes, snapbeans, strawberries, apples, mayhaws, berries (such as blackberries but not blueberries), peaches, nectarines, plums, strawberries	penetrant
thiophanate-methyl	Southern Ag Thiomyl	turf, ornamentals, some fruits	penetrant
tebuconazole	Bayer Advanced Disease Control for Roses, Flowers and Shrubs; Bonide Rose Rx Systemic Drench	ornamentals	penetrant

Small droplets provide better leaf coverage but lack the force to penetrate the plant canopy. A lot of work has gone into determining the optimal droplet size for fungicides. While there is still some disagreement as to the perfect size, droplet sizes of about 0.01 inch (250 μm) seem to be favored as a happy medium.

Different nozzle patterns are suited for different types of fungicide applications, but perhaps the single best nozzle for fungicides, especially for topical fungicides, is the hollow cone. Select a yellow-colored hollow-cone nozzle, which will produce droplets in the medium fine range of about 0.01 inch.

Spray pressure affects both droplet size and canopy penetration. Low pressure (about 15 pounds per square inch) produces large droplets, some of which merge, creating some blobs. Fungicide solutions applied at low pressures have problems penetrating plant canopies. Higher pressure (about 60 pounds per square inch) produces smaller droplets and often creates turbulent air patterns, which allow better coating of plant parts, including the lower sides of leaves. **Figure 1** shows the pattern created by a hollow-cone nozzle at two different pressures.

Information on calibrating your sprayer may be found in MSU Extension publication M1179 *Sprayer Calibration*. Further examples, including specific calculations, may be found in Publication 1532 *Weed Control Guidelines*.

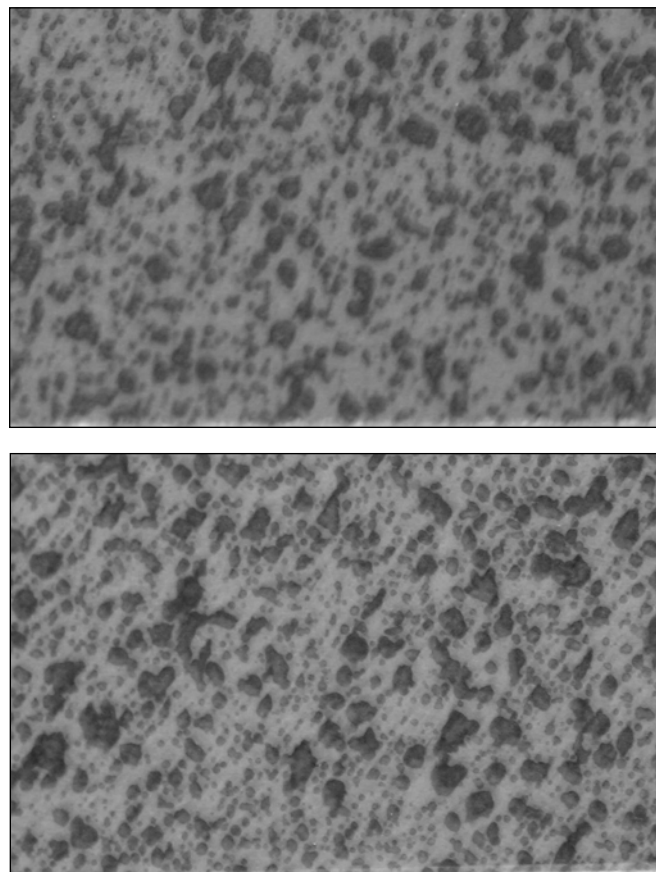


Figure 1. Spray pattern created by the same hollow-cone nozzle at 40 psi (pounds per square inch) (top) and 60 psi (bottom). Coverage provided by 40 psi is adequate in this case, but you can see the difference that 20 psi makes in the coverage.

Application of Fungicides

Topical fungicides stay on the outside of the plant and prevent fungal spores from infecting the plant. Fungal spores are extremely small, so topical fungicides must be evenly applied over the entire plant to effectively do their job. The trick is in getting an even application with droplets close enough to each other that a fungal spore falling between them will still be killed.

Figure 2 shows both a good spray distribution pattern (left) and a poor, oversprayed pattern (right). An application of a topical or penetrant fungicide made similarly to that of the left image will provide good protection to the plant. Unless you have specific instructions to do otherwise, you should use a hollow-cone nozzle, a pressure of 40–60 pounds per square inch, and a volume of spray solution equivalent to ½ gallon per 1,000 square feet for crops with a canopy or 2.5–3.0 gallons per 1,000 square feet for turf.

Different sprayer types may use compressed air or carbon dioxide as their propellant. The common residential sprayer uses a hand pump to compress the air. Do NOT use a carbon dioxide sprayer to apply biologically based fungicides (fungicides that contain bacteria, fungi, or nematodes), as it may injure them.

Many fungicide labels, especially for some of the topical fungicides, have some wording that reads something like “spray to run off.” This does not actually mean that you should continue to spray the plant until the spray solution starts to drip onto the ground. It means that the spray volume should sufficiently cover the target to the point where the individual droplets may just start to run.

A major problem in home vegetable gardens is that people do not spray topical fungicides frequently enough. Too many people spray only a few times per season and wonder why they lose their tomatoes to disease or why the large patch in their St. Augustine-grass lawn is not controlled.

Topical fungicides sit on the outside of the plant and do not redistribute to new growth. Many vegetables (for example, some tomatoes and especially cucurbits) grow rapidly enough that a substantial portion of the plant may have grown in the 7 days since the last fungicide application. That new growth is not covered by a fungicide, especially by topical fungicides. Therefore, topical and some penetrant fungicides should be reapplied every 7–10 days to protect new growth. Apply fungicides more frequently during wet weather and when the plants are rapidly growing and disease is more active; apply them less frequently during dry weather.

Turf is different because it grows from the bottom up, so every time the lawn is mowed, a good part of the fungicide is removed. If the pathogen attacks the base of the plant (e.g., large patch, take-all), the turf plant becomes exposed to the pathogen even more rapidly. Make frequent reapplications of fungicides to lawns during times that are favorable to the pathogen.

Before spraying a fungicide, you must know what disease you are targeting so you can select the appropriate product to protect your plants. The best way to do this is to have the plant disease professionally diagnosed and receive a full management recommendation for a minor fee. For more information on submitting a sample, please see <http://msucares.com/lab>.

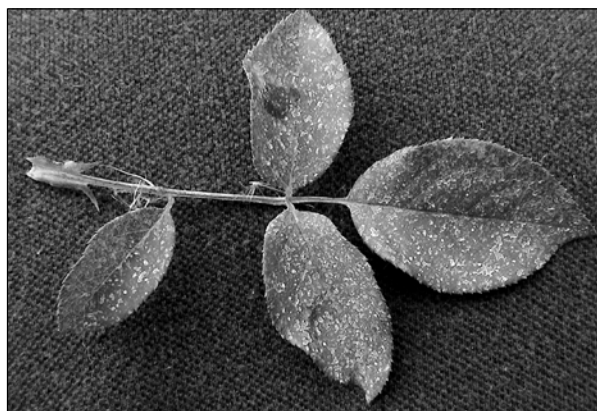


Figure 2. A good spray distribution pattern on a rose leaf (left) and an oversprayed leaf (right).

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Publication 2705 (POD-10-15)

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Extension Service of Mississippi State University, cooperating with U.S. Department of Agriculture. Published in furtherance of Acts of Congress, May 8 and June 30, 1914. GARY B. JACKSON, Director