

# Plant injury due to turfgrass broadleaf weed herbicides

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The herbicides 2,4-D, MCPP, and dicamba are used to selectively kill broadleaf or dicot weeds in the lawn—such as dandelion, plantain, chickweed, and ground ivy. These herbicides are available as individual herbicides or mixtures. They are sold as liquids, in granular form, and combined with fertilizers.

Because these herbicides selectively kill many broadleafed plants but do not kill turfgrass when applied at label rates, they are popular products for people who wish to rid their lawns of susceptible dicot weeds. However, careless herbicide application, wind drift, volatilization (evaporation), and other mistakes can cause herbicide injury to desirable broadleaf plants—including trees, shrubs, flowers, and vegetables. Grapes and box elder are especially susceptible. Tomatoes, beans, melons, roses, maple trees, and many other species are also sensitive to these herbicides.

Herbicide drift occurs when spraying takes place on windy days. Spray droplets are blown downwind, sometimes for great distances, and contact any plants in their path.

Some herbicides such as 2,4-D are available in ester formulations. Esters are volatile, so if the herbicide is applied in hot weather it may evaporate (volatilize) and move downwind as a vapor. The vapor enters plant stomates or leaf openings and injures sensitive plants.

Besides drift and volatilization, desirable plants can be injured if you use grass clippings as mulch from a

lawn recently treated with herbicide. Damage can occur if you fertilize flowers, vegetables, trees, or shrubs with fertilizers containing herbicides. Herbicide damage can also result from herbicide-contaminated clothes, gloves, pots and flats; applying insecticides or fungicides with a sprayer that is contaminated with a herbicide; or spilling herbicides on seeds and mulches.

## Symptoms

Broadleaf weed herbicides such as 2,4-D, MCPP, and dicamba usually do not kill plants at extremely low application rates. Instead, these herbicides act as growth-regulating substances. They disturb growth by affecting cell shape, cell size, and cell division. Some tissue ceases to grow while other tissue grows and expands—this results in a distorted plant.

The herbicide 2,4-D is the most commonly used broadleaf weed herbicide and its symptoms of injury are typical of these types of herbicides. These include:

- stem twists outward and downward (epinasty);
- stem thickens and flattens (fasciation);
- narrowing of leaves with elongated veins abnormally close together (strapulation)
- curling of the leaves
- excessive callus formation on roots and stems along with secondary root growth.

In some cases of plant damage due to broadleaf weed herbicides, elongating cells stop growing lengthwise but continue to expand. In other instances, young leaves no longer expand but the vascular tissue continues to grow—forming rough, leathery leaves.

These symptoms vary depending on how long plants are exposed to the herbicide and the amount to which they are exposed. Nontarget plants rarely die, since they do not get the lethal dose of herbicide directed at the weeds. Instead, the plant usually continues to grow normally above or beyond the distorted parts, unless tissue was damaged while it was still immature.

In addition to distorting plant structure, broadleaf weed herbicides affect photosynthesis and root absorption. The effect of these herbicides on such processes can kill a plant or weaken it so that competing plants, such as turf, kill it.

Although evidence of long-term injury due to herbicides such as 2,4-D and MCPP is not conclusive, damage from the herbicide dicamba may show up a year or so after application.

## Control

Although broadleaf weed herbicides usually do not kill nontarget plants, herbicide damage is not desirable when trying to get rid of weeds in the lawn. Thus, extreme care is needed when using this type of herbicide—either by itself or incorporated in a fertilizer.



**Effects of 2,4-D on geranium. These symptoms did not occur until a few weeks following exposure.**



**Cupping of maple leaves exposed to 2,4-D.**



**This rose was exposed to 2,4-D. Note the stem twisting out and down.**



**Cupping of maple leaves exposed to 2,4-D.**



**2,4-D injured this tomato plant, causing leaves to twist and curl.**



**Curling of yew needles caused by 2,4-D.**



**Grapes are especially sensitive to 2,4-D. The narrow leaves have veins that are abnormally close together.**



**2,4-D caused narrowing (strapulation) of these petunia leaves.**





**Zucchini leaves showing damage caused by a phenoxy-type herbicide.**



**Spruce damaged by 2,4-D. Although needles are not distorted, abnormal terminal growth occurred.**



**Phenoxy-type herbicides typically cause thickening and flattening of stems (fasciation).**



**Exposure to 2,4-D resulted in epinasty on this flowering crabapple.**



**Another example of fasciation caused by a phenoxy-type herbicide.**



**Leaf distortion on Euonymus resulting from 2,4-D.**



**Slight twisting of strawberry leaf due to 2,4-D.**



**Symptoms of phenoxy-type herbicide damage on alfalfa, dandelion, and burdock.**

The first step toward avoiding herbicide drift is to apply the chemical on a day that is not windy. Frequently it is calmer early in the morning or in the evening. If you use herbicide sprays, keep the spray nozzle head or boom close to the ground and aim it directly at the target weed. Spray under low pressure to minimize the amount of fine spray droplets. Also, use the amine form of the compound rather than the ester (check the label) to avoid volatilization. Do not spray in hot weather to avoid additional evaporation.

Follow these three basic rules when using herbicides to get best results and avoid damage to non-target plants:

1. Apply herbicides in May before you set bedding plants in the garden, or in September around the time of killing frosts.
2. Apply dry formulations of a herbicide with a drop spreader instead of a spinner or rotary spreader so the herbicide hits only target weeds.
3. Apply herbicides according to label directions and observe precautions regarding wind and temperature.

You can help control weeds in the lawn without depending solely on herbicides by integrating good management practices with herbicide applications. Successful lawn management results from controlling weeds by preventing them from getting a start.

- The best defense against invading weeds is a dense stand of perennial turfgrasses. Vigorous turfgrasses successfully compete with weeds for light, moisture, and soil nutrients. Use improved turfgrass cultivars that are disease resistant when planting or renovating.
- Mow tall—about 2 to 3 inches and don't remove any more than 30 to 40 percent of the grass plant at one time.
- Water correctly—grasses require about 1 inch of water per week. Water only once each week, and avoid frequent light watering because it encourages shallow rooting.
- Control insect pests and diseases before serious damage occurs.
- Establish red fescue in shady areas or use a ground cover where shade is too dense for grasses.
- Fertilize correctly—too much or too little fertilizer leads to weed problems.

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