

Questions and Answers About Vineyard Injury from Herbicide Drift

Q. Why grow grapes if the plants are so easily damaged by hormonal-type herbicides such as 2,4-D?

A. Those with an interest in agriculture may raise livestock, grow wheat or soybeans, or manage an agricultural business. Grape growers want to grow grapes because of the potentially high return compared to other crops. Grapes are a legitimate and highly valuable food crop.

Q. But why not grow grapes in grape-growing areas other than Kansas?

A. Kansas is a good grape-growing state. Grapes grew naturally in Kansas before European settlement. Kansas ranked among the top 10 states in grape production at one time. The summer temperatures, long growing season, and high light intensity are all conditions that help produce good grape crops.

Q. What happens when 2,4-D drifts onto grapevines?

A. Hormonal-type herbicides are easily absorbed and translocated in grapevines. The injury symptoms induced in plant species sensitive to hormonal-type herbicides are similar to symptoms induced by natural plant hormones. With increased dosage, symptoms include cupping and stunting of leaves, stem epinasty, and damage to the terminal growing points. (For illustrations see K-State Research and Extension Publication S-142, *Preventing Hormonal-Type Herbicide Damage to Kansas Grapes*.) Tissue proliferation along the length of the stem can result in disintegration or blockage of phloem and xylem tissue. Leaf malformation is most prominent on the youngest and fastest-growing leaves. Severe injury may kill the vines.

Q. How rapidly does this happen?

A. Hormonal-type herbicides are rapidly transported to meristematic tissues, that is, the new growing area. Symptoms normally appear within a few hours or

days depending on the level of exposure, although death may not occur for several weeks or months.

Q. Are young vines more sensitive to hormonal-type herbicide than mature vines?

A. Young vines are much more susceptible than mature vines to hormonal-type herbicide such as 2,4-D. In addition, mature vines have the ability to recover more rapidly from low-level exposure than young vines.

Q. Will the leaves outgrow these symptoms?

A. There is no definite answer. Herbicide, concentration, grape cultivar, age of vine, vine vigor, and weather conditions all influence recovery. With higher concentrations, the obvious damage is evident in new growth. In grapes, there are several (five to eight) developing leaves in the shoot apex or tip, as well as three to four expanding leaves below the apex. Grapes develop a canopy of leaves from shoots arising from canes, resulting in many developing leaves on the vine. Damage that occurs early in the season is multiplied by the presence of many growing points, reducing the photosynthetic activity and weakening the vine. If lower concentrations of 2,4-D drift onto the vine, the immature leaves may show injury symptoms, but leaves that emerge after exposure may show little or no injury.

Q. Does hormonal-type herbicide injury interfere with fruit or grape cluster development?

A. Yes, anything that interferes with photosynthesis will affect fruit development. Herbicide drift may reduce fruit size and weight. It also can result in "shot" or buckshot-size berries in a cluster. As the concentration increases, so does the development of "shot" berries. Hormonal-type

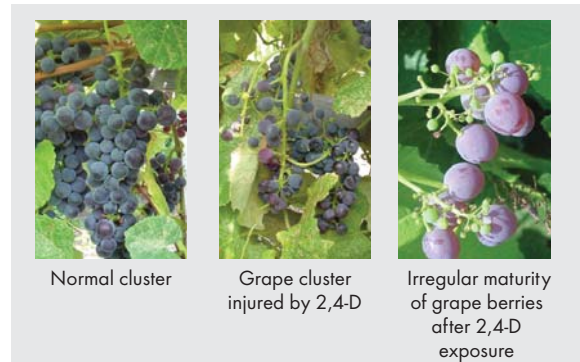
herbicides including 2,4-D also may delay ripening and cause uneven ripening of berries in the cluster.

Q. Will the plants grow normally again the next year?

A. Vines may or may not survive. Damage to the vines increases with higher concentration of hormonal-type herbicide drift and repeated exposure. Herbicide drift may result in loss of the current year's grape harvest. It may weaken the vines so they are more susceptible to winter injury. Grapevines damaged by high concentrations of hormonal-type herbicides, especially late in the growing season, could continue to show visual symptoms the year after the initial damage occurred. If exposure to hormonal-type herbicide is light, there may be no further symptoms after the initial leaf symptoms. Normal growth may return in the absence of hormonal-type herbicide exposure if the vine is in good health.

Q. Does weather influence the extent of hormonal-type herbicide injury?

A. Yes, wind can be a major influence. Spraying when it is windy is inviting a lawsuit if there are grapes or other susceptible plants in the area. Wind velocity during herbicidal application should be less than 10 miles per hour unless otherwise stated on the label, and in a direction away from susceptible plants. In addition, herbicide sprayed in calm (no wind) conditions may result in significant herbicide drift



due to temperature inversion. High temperatures increase the risk of vapor drift of volatile herbicides, such as 2,4-D ester. High temperatures and humidity also promote greater hormonal-type herbicide uptake.

Q. What is a safe distance from a vineyard to spray hormonal-type herbicides?

A. More than one factor is involved here. Two forms of 2,4-D drift can damage grapevines. One is the drift of spray droplets: Small particles can move with the wind, land on grapes, and be absorbed into the grapevines through the cuticle on the leaf. The distance the droplets drift depends on the size of the droplets, wind velocity, and the height at which the herbicide is discharged. The smaller the droplet, the farther it will travel. The other form is vapor drift. Volatile herbicides may produce vapors that are carried several miles from the target area.

Q. What other crops beside grapes are sensitive to hormonal-type herbicide?

A. Legume crops, cotton, potatoes, tomatoes, other vegetables, many broadleaf ornamental trees, shrubs, and flowers.

Q. There are different formulations of 2,4-D and other hormonal-type herbicides. Is there a difference in their potential damage?

A. Yes, 2,4-D, triclopyr and clopyralid herbicides are formulated in ester or amine forms. Esters are more hazardous in terms of their volatility and potential to damage sensitive crops. The volatile ester formulations release vapors rapidly at about 80 degrees, therefore, nearby applicators can reduce vapor drift potential by choosing amine formulations rather than ester.

Q. Are all grape cultivars (varieties) damaged equally?

A. No, although all grape cultivars are susceptible to 2,4-D, there are differences between grape cultivars in susceptibility to 2,4-D injury. Table 1 shows the relative susceptibility of selected grape cultivars to 2,4-D.

Q. Why do growers plant cultivars that are easily damaged by 2,4-D?

A. Some of the most susceptible cultivars to 2,4-D have desirable qualities for wine production and may be the most

profitable. However, careful cultivar selection can help reduce the risk of herbicide drift problems without compromising plant vigor and quality.

Table 1. Grape cultivars as affected by 2,4-D exposure. Susceptibility to 2,4-D is based on field research, experience, and observation.

Less susceptible	More susceptible
Alden	Aurore
Baco 1	Bath
Bluebell	Beta
Bromariu	Campbell Early
Buffalo	Catawba
CAB FRA	Cayuga white
CAB SAU	Chambourcin
Canada Muscat	Chancellor
Canadice	Concord
Cascade	Delaware
Chardonnay	Einset
Chelois	Foch
De Chaunac	Fredonia
Edelweiss	Frontenac
Himrod	Golden Muscat
Horizon	Interlaken
Kay Gray	Ives
La Crescent	La Crosse
Melody	Leon Millot
Nero	Marquis
Pinot Noir	Mars
Plai	Niagara
Price	Norton/Cynthiana
Reliance	NY Muscat
Romulus	Ravat
Seyval Blanc	Reliance
Steuben	Seneca
Swanson Red	Sheridan
Toldi	Seibel 2653
Valiant	Siegfried
Ventura	St. Pepin
Vignoles	Steuben
Villard blanc	Sultana
Vincent	Seyval
	Thompson seedless
	Tokay
	Traminette
	Vidal blanc
	Villard noir
	Yates



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