

GRAPEVINE PROBLEMS

Leaf spots not caused by insects or disease

BY Fritz Westover, Texas A&M University; Jim Wolpert, University of California, Davis

Damage or disorders of grapevines can arise from a wide array of causal factors. Sometimes a spot on a leaf or berry can be caused by an insect or a biological plant pathogen such as a fungus or bacteria, and other times the spot can be produced by human or environmental factors. A disorder on a grapevine that is not caused by a living pest or pathogen is referred to as an abiotic disorder.

Diagnosing a disorder

Before diagnosing a grape problem as abiotic in nature, any potential grape pests or diseases that may have produced the symptom must be ruled out. Several guides such as the "Compendium of Grape Diseases" by APS Press or "The Vineyard Doctor," the upcoming online grapevine problem diagnostic tool for eViticulture, are useful tools for diagnosing pest or disease symptoms. Some pests or diseases will produce symptoms on grapes that are commonly confused with abiotic disorders, so it is important to consult your local agricultural extension agency (or licensed pest control advisor) to confirm a diagnosis prior to implementing treatment.

Chemical disorders

Leaf spots are one of the most commonly occurring symptoms of abiotic disorders. Leaf spots can be caused by unintentional drift or overspray of herbicides, or improper mixing of pesticides or fertilizers sprayed directly onto vines. Even when growers apply a product that was harmless in the past, fluctuations in weather or product rates can lead to unintended damage to vines. For example, many sulfur formulations can cause leaf scorch if applied during hot, humid conditions, whereas copper fungicides can cause similar injury if sprayed during cool, wet conditions. Also, failure to clean the spray tank before applying another product may lead to misapplication and leaf and cluster spotting.

Herbicide drift is likely the most common cause of leaf spots or misshapen leaf

growth. Contact herbicides such as glufosinate or paraquat can produce brown necrotic spots on leaves, but generally do not result in vine death if the contact is limited. Note that not all herbicide damage may be the result of grower applications.

Drift of systemic herbicides such as glyphosate can cause more severe damage, resulting in leaf distortion and possible vine death. Phenoxy herbicides such as 2,4-D can drift from agronomic crop fields in the vicinity of a vineyard, causing irreversible distortion to leaves and, in some cases, vine death.

If your vineyard is irrigated, test the water quality periodically for impurities. High salt content in irrigation water or salt buildup in soil also can cause leaf scorch or vine death if not detected early.

Environmental disorders

Environmental factors also may be the cause of spots on leaves. Ozone, for



Spotting on these pre-*véraison* grape berries resulted from inadequate cleaning of the spray tank before mixing a new fungicide and applying the product.

example, may cause oxidant stipple on the upper sides of leaves of susceptible grape varieties if atmospheric levels are elevated in the region surrounding a vineyard. Hydrogen fluoride also has caused leaf burn or necrosis in vineyards adjacent to industrial facilities where such atmospheric pollutants are produced. Drought is another environmental factor that can severely limit vine growth. Drought conditions can reduce nutrient uptake in vines, causing nutrient deficiencies and leaf discoloration. Long periods of drought can lead to death of vine shoot tips, stunted vine growth and delayed fruit maturation. Other environmental hazards include hail, sunburn, frost and freeze injury.

Nutritional imbalances

Grape leaf discoloration or deformation can also be caused by nutritional deficiencies or



Herbicide damage (clockwise from top left): Simazine, glyphosate and phenoxy (bottom two).



PATTY SKINKIS, OREGON STATE UNIVERSITY

toxicities. Nutrient deficiencies can be difficult to diagnose, especially if multiple nutrients are lacking. It is best to submit soil and plant tissue for analysis at a reputable testing lab and discuss the results with an extension specialist in your area or your crop consultant prior to diagnosing a nutrient-related disorder. An over-application of a fertilizer is often easier to diagnose, as the grower can review farm records with a professional to determine if a product was improperly applied. Also, soil tests may indicate other underlying factors that may predispose the vineyard to a nutrient imbalance.

Nutrient deficiencies and toxicities can cause discoloration and deformation of vine leaves and shoots.

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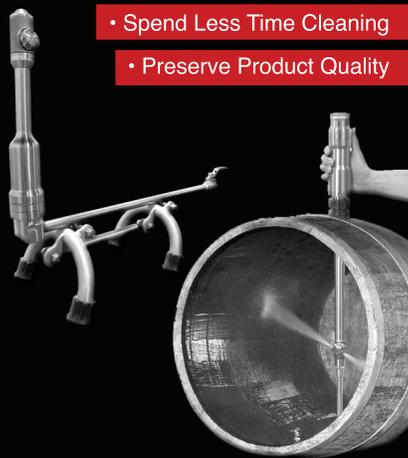
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Environmental disorders include shoot tip dieback caused by drought (top) and oxidant stipple (bottom) caused by ozone.



FRITZ WESTOVER, TEXAS A&M UNIVERSITY

Determining patterns

The pattern of symptom expression is often a key to understanding the nature of the disorder. Growers should try to answer these questions:

- Are leaf symptoms on basal, middle or apical leaves on a shoot?
- Are symptoms on exterior or interior leaves only?
- Are symptoms on some individual shoots or on all shoots of a vine?
- Are leaf symptoms on leaf margins or some other distinct pattern?
- Are vines with symptoms clustered together or scattered throughout the vineyard, or are they just on the edge rows or vines?
- Are vines associated with any topographic character of the site, such as a swale or hilltop?
- What is the time of year or growth stage when symptoms appear: spring as shoots are beginning to grow, early summer around flowering time, late summer as clusters begin ripening or fall at or after harvest?

Growers should document their observations with written notes and photographs, especially close-up photos of symptoms.

Summary

Grapevine disorders can be the result of both biological and abiotic factors. When determining the cause of a disorder symptom in the vineyard, all factors that could contribute to the problem must be



FRITZ WESTOVER, TEXAS A&M UNIVERSITY

Nutrient toxicities and deficiencies (clockwise from top left): Iron chlorosis on high-pH soil in wet conditions, boron spray toxicity and sulfur burn (bottom two).

considered. In some cases, the symptom may be caused by a chemical or fertilizer the grower has applied, or spray material that drifted from a neighboring field.

In other cases, the problem may be caused by an environmental pollutant or extreme weather. There are instances where a grapevine disorder can be remedied by grower intervention, but not all disorders will be within the control of the grower. Accurate and rapid diagnosis of a disorder is essential before a plan can be implemented to correct the problem and mitigate future recurrence. **PWV**

Reviewed by Patty Skinkis (Oregon State University) and Ed Hellman (Texas AgriLife Extension).

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Recommended Resources

"Compendium of Grape Diseases," 1988 American Phytopathological Society.

"Identifying Pests and Abiotic Disorders," University of California.

"Scouting Vineyards and Diagnosing Problems," Michigan State University.

Grape Disease Management Overview

Herbicide Injury on Grapevines

Hail Damage on Grapevines

Sunscald Damage to Grapes

Frost Injury, Frost Avoidance, and Frost Protection

Monitoring Grapevine Nutrition

Grapevine Nutrition – online learning module and diagnostic tool

Integrated Crop Management of Grapevines PowerPoint, Michigan State University

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