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Sour Rot of Grape

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Sour rot of grape is a disorder causing the microbial breakdown of ripening berries rendering them unsuitable for wine production. Sour rot is caused by insect associated microbes that expedite berry decay following entry through a wound. Many disorders, including sour rot, result in disease-like symptoms and can cause yield losses or reduce crop quality.

Sour Rot Development and Symptoms

Sour rot occurs on fruit only and causes fruit discoloration followed by berry shrivel and decomposition. White grape varieties afflicted with sour rot appear tan to light brown in color (Figure 1), while red grape varieties appear brownish-red or brick-colored (Figure 1). Symptoms of sour rot can look like fungal bunch rot diseases, such as black rot (Ivey, 2016) as shown in Figure 2 or Botrytis bunch rot (Ellis, 2016). However, a notable difference is that berries with sour rot have a strong vinegar-like smell and often attract high numbers of insects, including yellowjackets and flies.

Sour rot requires the presence of wounded fruit and the interaction of fruit flies, yeast, and bacteria for symptoms to develop. For example, when berries are injured by birds, hail, insects, or pruning, the subsequent open wounds attract fruit flies that transmit sour rot-associated microbes to the fruit. Two species of fruit flies are associated with sour rot development – the common fruit fly, *Drosophila melanogaster*, and the spotted-wing drosophila, *D. suzukii*. Common fruit flies can access fruits only after a wound has been inflicted but spotted-wing drosophila has a specialized egg-laying organ that can cut the berry skin and create a wound (Sepesy, 2019) that contributes to sour rot development. These flies introduce specialized bacteria (*Acetobacter spp*. and *Gluconobacter spp.*) into the wounds that interact with wild yeasts (*Saccharomyces spp*.) to produce acetic acid. Acetic acid is responsible for the distinctive vinegar-like odor associated with sour rot. The production of acetic acid further attracts fruit flies and other insects, contributing to the spread of sour rot within and between clusters.

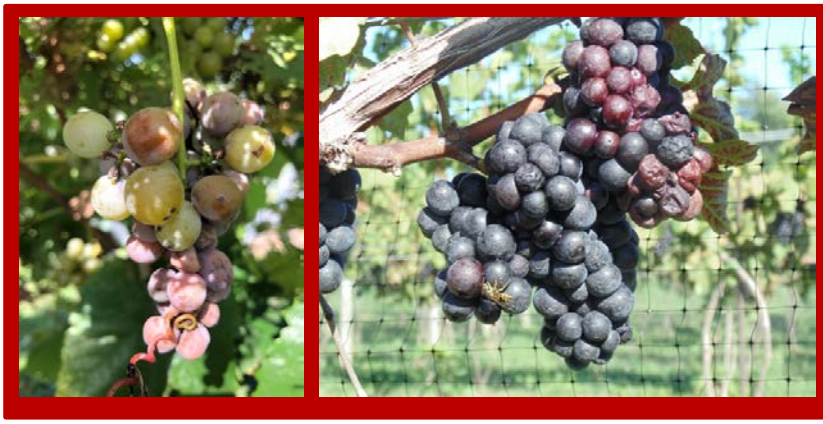

Figure 1. Left: Sour rot symptoms on white 'Traminette' grape berries. Right: Brick-colored berries are symptomatic of sour rot disorder on red berries such as 'Pinot Noir' grapes. Right photo B courtesy of Y. Woodworth, OSU- OSU-Ashtabula Agricultural Research Station.

Sour rot risk is greatest when the amount of sugar in the berries reach 15 °Brix, the temperature is warm (68°F to 77°F), and there is rain. As the temperature decreases, so does the risk of sour rot. At temperatures below 50°F the risk of sour rot is negligible . For this reason, late developing cultivars such as 'Catawba' are less likely to develop sour rot.

Management

Variety selection

All varieties of wine grapes can develop sour rot. However, early-maturing and tight cluster varieties are more likely to develop sour rot than late-maturing or loose cluster varieties (Table 1).

Sanitation and Cultural Control

Practices that minimize berry injury are crucial to preventing sour rot. Care should be taken to avoid mechanical injury of the berries during canopy maintenance and spraying. Bird management, especially from véraison (ripening) through to harvest, is recommended. Netting grapevines (Figure 3) is the most consistently effective method for deterring birds, although scare tactics such as cannons, distress calls, mylar tape, and air dancers can deter birds in the short-term.

Cultural practices, such as leaf and cluster removal, can reduce sour rot incidence, severity, and spread. Leaf removal at trace bloom can reduce cluster tightness and increase air movement through the canopy, making the berries less susceptible to cracking and colonization by fruit flies that introduce *Acetobacter spp*. and *Gluconobacter spp.*

Routine scouting, removal, and disposal of symptomatic clusters at véraison will help slow the progression of sour rot through the vineyard. Symptomatic clusters should be removed from the vineyard rather than left on the ground below grapevines. This practice will also reduce problems with wasps, like yellowjackets and hornets, which are attracted to sugars in fruit juice and fruit debris. Cluster removal may not be feasible for large scale commercial producers, and thus pesticides are recommended.

Figure 2. Sour rot (blue circle) and black rot (orange circle) symptoms on a cluster of 'Traminette' grapes.

Figure 3. Netting grape vines from véraison through to harvest will deter birds from damaging grapes and reduce the risk of sour rot.

Table 1. Wine grape varieties grown in Ohio with their respective ripening season and cluster characteristics.

Grape Variety	Berry Color	Cluster Characteristics	Ripening Season	Relative Sour Rot Risk
Chardonel	White	Loose	Late	Low
Concord	Red	Moderate	Late	Low
Catawba	Red	Moderate	Late	Low
Traminette	White	Loose	Late midseason	Low
Vidal Blanc	White	Loose	Late midseason	Low
Riesling	White	Tight	Late	Low to Moderate
Cayuga White	White	Moderate	Midseason	Moderate
Seyval Blanc	White	Moderate	Early to midseason	Moderate
Vignoles	White	Tight	Midseason	High
Pinot Noir	Red	Tight	Early season	High

Chemical Control

Chemical control of sour rot focuses on reducing fruit fly populations in the vineyard, as well as the bacteria that contribute to acetic acid production.

To manage fruit flies, insecticides should be sprayed when berries reach 15 °Brix or when symptoms are first observed, whichever comes first. Spotted-wing drosophila populations should be monitored using baited traps to determine date of first detection so that insecticides can be timed to protect ripening berries (Sepesy, 2019). Although wasps can be problematic in the vineyard at harvest, management of these insects with insecticides is not recommended. Wasps are pests more because they sting humans than because they damage clusters. Wasps are attracted to the sugary juices from fruit and often appear after berries have already been damaged by birds or other environmental factors (Figure 4). Importantly, insecticides that are effective against wasps have pre-harvest intervals that prohibit their use several days before harvest and given that these insects live in colonies with thousands of individuals, new wasps readily take the place of those that are killed.

Commercial or homemade wasp traps (Shetlar, 2012) can be placed in the vineyard to reduce the number of foragers in the vicinity; however, these traps will not eliminate wasp colonies and are most useful if used throughout the season.

Figure 4. Yellowjackets feeding on grape berries with sour rot. Photo courtesy of Y. Woodworth, OSU-Ashtabula Agricultural Research Station.

To control the acetic acid-producing bacteria, a simultaneous application of an antimicrobial product containing hydrogen peroxide, peroxyacetic acid, or Banda de Lupinus albus doce (BLAD) is recommended. It is important to note that fungicides used to manage fungal diseases like Botrytis bunch rot, powdery mildew, and the fungal-like disease downy mildew are not effective against sour rot. Therefore, chemical control of sour rot associated bacteria must be carried out in addition to any fungicide spray program being used. For current microbial agent and pesticide recommendations please consult the Midwest Fruit Pest Management Guide.

References

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Useful Resources

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This factsheet was peer reviewed by Celeste Welty, Associate Professor, Department of Entomology, The Ohio State University and by Anna Testen, Research Plant Pathologist, United States Department of Agriculture – Agricultural Research Service , Wooster, Ohio.

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