DELAYED GROWTH PREVALENT IN VINEYARDS THIS SPRING

Bill Peacock

Poor bud break and delayed shoot growth are present every year in isolated vineyards. But, once in a while delayed growth is widespread and much more serious in the San Joaquin Valley. The spring of 2007 was such a year.

Delayed or erratic bud break and abnormal shoot growth is a disorder most often associated with low carbohydrate (starch and sugar) storage in dormant tissue. It is most prevalent with young vines that have less trunk volume and capacity for storing carbohydrates. It can also be associated with winter freeze damage, gibberellin toxicity, and other issues. With this disorder, bud break and shoot elongation occurs erratically on the vine. A vineyard seriously impacted by delayed growth will have vines that appear almost dead in early April, but normal growth eventually resumes from the head of the vine, and by June the vineyard canopy appears normal, see photos.

With delayed growth, young shoots struggle as they are inadequately supplied with carbohydrates. However, when shoots develop a few mature leaves they become self sufficient, no longer subsistent on trunk reserve, and begin to grow rapidly. Once a few shoots get to this point, the entire vine comes to life and begins a rapid recovery. By June the canopy appears normal, but the vine’s crop is reduced.

Yield is reduced on affected vines for a number of reasons. Buds that finally break and grow are usually base buds or latent buds. The more fruitful distal buds on spurs and those on canes often don’t grow. Many inflorescences (flower clusters) which begin to develop will eventually dry up from lack of nutritional support. The lack of crop invigorates the vine and this is prerequisite for a repeat of delayed growth the following spring. It can become a vicious cycle taking several years to straighten out. The problem is mostly associated with younger vineyards, and when vines become mature and develop larger trunks they settle down, and the issues of delayed growth are over for the most part.

In many cases, the presence of delayed growth is an indicator of high vigor and healthy young vines. It is usually more prevalent in vines planted on the better soil in the vineyard, or those vines on rootstocks. The pattern of affected vines can be peculiar with some vines afflicted and others not as you go down the row. It affects shoots developing from cane and spur alike, but is often worse on canes.

What follows are conditions that can lead to delayed growth:

- Vines that are trained up the stake and pushed hard with water and fertilizer and continue to grow into late fall can suffer from delayed growth the following spring. Affected vines do not harden off adequately by dormancy and have inadequate levels of carbohydrates stored in wood to support spring growth. In the worst case scenario, a vineyard may have to be retrained the following year as a result of poor bud break and dieback.

- Over cropping and/or delayed harvest, especially the first and second cropping years of a vineyard, can result in delayed growth, and some cultivars are more susceptible than others. Growers can get away with over cropping some years, but when conditions are right it can lead to serious delayed growth the following spring.
Redglobe, Selma Pete, Fiesta, Alicante, Chardonnay, Rubired, Carnelian and Centurian, are a few of the more susceptible cultivars. Over cropping and/or delayed harvest reduces dormant carbohydrate storage that supports early spring shoot growth.

- Strong, excessively vigorous vines that continue to actively grow late into the fall are subject to delayed growth. Thompson Seedless, Crimson Seedless, and Selma Pete are particularly susceptible.

Also, a vigorous rootstock (Harmony, Freedom, and Salt Creek) increases susceptibility. The shoot tip is a strong sink for carbohydrates, and when shoots are actively growing late in the season the flow of photosynthates is directed towards actively growing shoots. This takes away from carbohydrate storage in the permanent structures of the vine which is paramount for support of bud break and early season shoot growth.

- High water tables can result in vines continuing to grow late in the season. Even mature vineyards can be subject to delayed growth under this condition.

- Cold winter temperatures can kill or damage buds. Buds that have been killed become dry and are easily detected by visual examination, but this was not seen this year in the San Joaquin Valley. However, winter freeze may also cause subtle damage to the bud and conductive tissue which is not visually apparent. Winter freeze has been suggested to be a primary cause of delayed growth, but the distribution of delayed growth across the Valley suggests otherwise. Delayed growth was just as prevalent in vineyards located in warm winter areas as cold ones in the Valley.

- Inadequate fall irrigation has also been implicated as causing delayed growth, but there was no apparent correlation between fall irrigation and the incidence of delayed growth in many cases this spring. An example that comes to mind was a Selma Pete vineyard with delayed growth, even though the vineyard was thoroughly irrigated last October (48 hour run). Over cropping was the most likely cause of the delayed growth in this case. Other examples were Fiesta, Thompson Seedless, and Crimson Seedless vineyards all located along the Kings River and all subject to a high water table and a moist root system the year round. Yet all these vineyards suffer from delayed growth every year, and all had serious problems this year. In these cases, excessive late season shoot growth was most likely the culprit. Deficit irrigation is impossible because of the high water table.

- Other factors that can contribute to erratic bud break and delayed growth include: premature defoliation, excessive seasonal water stress, and gibberellin toxicity. Symptoms of gibberellin toxicity (the spring following application) include poor bud break, delayed shoot growth, reduced flower cluster counts, and smaller clusters; all symptoms in common with the delayed growth disorder. This suggests that gibberellin is strongly associated with the flux of carbohydrates within the vine. Redglobe and Crimson Seedless are commonly affected by gibberellin toxicity when excessive amounts are applied. Gibberellin applied to wine grapes prebloom to loosen clusters can also result in toxic symptoms the following spring when application amounts are excessive.

To avoid delayed growth, use viticulture practices that maximize carbohydrate storage in the trunk during dormancy. Do not allow vines to actively grow late in the season. Use deficit irrigation to slow or stop late season growth. This is especially important the year vines are trained up the stake. Avoid over cropping, especially with young vines. Don’t allow pests to prematurely defoliate vines, and avoid excessive water stress that results in vine defoliation in July or August. A healthy fall irrigation, in late October or early November, is a good idea for many reasons. Do not apply excessive amounts of gibberellin.

Delayed growth can be confused with Pierce's disease, phylloxera, and nematode damage. But, vines with delayed growth are usually the healthiest in the vineyard and they soon recover to their full glory. Vines impacted by disease and root pests don’t.
Delayed growth in young, spur pruned Crimson Seedless. Affected vines look nearly dead. Note normal growing vines a short distance away.

Gibberellin toxicity of Crimson Seedless shows delayed growth symptoms.
Overcropping/delayed harvest reduces carbohydrate reserves in trunk and roots contributing to delayed growth the following spring.
Grape Notes

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