

Evaluating the Effect of Grapevine Red Blotch-associated Virus Infection on Vine Nutrition

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A one year study in 2015 evaluated the differences in vine mineral nutrient levels as influenced by infection with *grapevine red blotch-associated virus* (GRBaV) in vines that were not co-infected with several other grapevine viruses. Nutrients were assessed in a Chardonnay and a Cabernet Sauvignon vineyard located in Sonoma and Napa Counties respectively. The two sites were selected based on extensive virus testing that had occurred in 2013 which identified 10 vines at each site that were GRBaV-positive and 10 vines that were GRBaV-negative.

The 20 vines selected at each site all tested negative for 10 grapevine leafroll-associated viruses, four nepoviruses [*Arabis mosaic virus*, *Grapevine fanleaf virus (GFLV)*, *Tobacco ringspot virus*, and *Tomato ringspot virus*]; and four vitiviruses [*Grapevine virus A*, *Grapevine virus B*, *Grapevine virus D*, and *Grapevine virus E*]. Of the 40 vines selected for the study, thirty-one tested positive for *grapevine rupestris-associated virus*. Virus testing conducted on samples collected in December 2015 confirmed that vines had remained negative for viruses known to be naturally spread by insects, as well as for GFLV. In addition, all vines previously determined to be GRBaV-negative remained uninfected.

Petioles were collected at bloom and veraison from each vine and tissue collected from an individual vine represented a single sample, thus for each cultivar on each sample date 10 samples were collected from vines that tested negative for GRBaV and 10 samples were collected from vines that tested positive for GRBaV. Petiole analyses on samples collected at bloom included total N, nitrate-N, total P, phosphate-P, extractable and total K, Ca, Mg, S, Zn, B, Fe, Mn and Cu. At veraison, petiole tissue was analyzed for total N and extractable K.

Chardonnay vines infected with GRBaV had significantly greater total N and total K at bloom and total N at veraison when compared to vines that were not infected. Extractable K was greater at bloom in infected vines but not at veraison. Nitrate-N and phosphorous were not affected by virus status in Chardonnay. Vines that tested GRBaV-negative had significantly greater Ca, Mg, Zn, Mn and Cu at bloom when compared to infected vines; however these minerals were at adequate levels regardless of virus status. Boron and iron were not affected by virus status in Chardonnay.

Cabernet Sauvignon vines infected with GRBaV had significantly greater phosphorous at bloom than did vines that were not infected. Nitrate-N was reduced in infected vines. Total N and potassium at both bloom and veraison were not affected by virus status. Vines that tested GRBaV-negative had significantly greater Ca and elevated Mg at bloom when compared to infected vines. Zinc, Mn and Cu were not affected; however in infected vines, boron was increased and iron levels decreased.

The results provide evidence that the metabolism of vines infected with GRBaV is modified from that of vines which are not infected. Fertilizer programs conducted at each location and independent from the study resulted in levels of mineral nutrients in grapevine petioles that were adequate regardless of virus status. Infected vines in each variety had greater or reduced levels of specific nutrients that did not appear to be associated with the application or lack of application of those minerals in the fertilizer programs.