

## Mini data sheet on grapevine red blotch virus

Grapevine red blotch virus was added to the EPPO A1 List in 2022. A full datasheet will be prepared, in the meantime you can view here the data which was previously available from the EPPO Alert List (added to the EPPO Alert List in 2015 - deleted in 2022).

### Grapevine red blotch virus (Grablovirus, Geminiviridae)

**Why:** Grapevine red blotch virus (GRBaV) is a newly identified virus of grapevine (*Vitis vinifera*) and a member of a new genus (Grablovirus) within the family Geminiviridae. This virus is associated with red blotch disease that was first reported in California in 2008, and then found in the major grape-growing areas in North America. As GRBV causes an emerging disease which affects the profitability of vineyards by substantially reducing fruit quality and ripening, the EPPO Panel on Phytosanitary Measures suggested its addition to the EPPO Alert List.

**Where:** initially, GRBV was only known to occur in North America but it was then found in Asia, in the Republic of Korea and India (on symptomless plants in Punjab). Recent surveys conducted in Switzerland confirmed the absence of GRBV from Swiss vineyards, but the virus was detected in a grapevine virus collection on 6 accessions (all originating from the USA) which were subsequently destroyed. A similar situation was recorded in Italy, where the virus was detected in two table grape accessions in a collection but not in commercial vineyards. Although of rather recent description, it is thought that GRBV has been present in North American vineyards for a long time. The symptom similarity to leafroll viruses probably explains the delay in recognizing and characterizing the causal agent of red blotch disease.

**EPPO region:** absent.

**Asia:** India (Punjab), Korea (Republic of).

**North America:** Canada (British Columbia, Nova Scotia, Ontario), Mexico, USA (Arizona, Arkansas, California, Georgia, Idaho, Maryland, Missouri, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, Texas, Tennessee, Virginia, Washington).

**South America:** Argentina.

**On which plants:** grapevine (*Vitis vinifera*). The disease affects red cultivars (e.g. Cabernet franc, Cabernet sauvignon, Malbec, Merlot, Mourvèdre, Petit Verdot, Petite Syrah, Pinot Noir, Zinfandel), white cultivars (e.g. Chardonnay, Riesling), as well as table grapes and some rootstocks. GRBV has been detected in grapevine collections, nursery stock and established vineyards.

**Damage:** in red grapevine cultivars, foliar symptoms consist of red blotches, marginal reddening, and red veins. In white cultivars, foliar disease symptoms are less conspicuous and generally involve irregular chlorotic areas that may become necrotic late in the season. Some white cultivars, such as Sauvignon Blanc may remain asymptomatic. Foliar symptoms first appear on older leaves at the base of the canopy in June and July and progressively move toward the top of the canopy in later months. Symptoms caused by GRBV resemble those of leafroll viruses, but GRBV does not cause leaf rolling, the red discolouration remains blotchy and irregular, and the smaller veins become red instead of remaining green. In addition to foliar symptoms, GRBV affects fruit quality by delaying fruit ripening and reducing sugar content at harvest (i.e. grapes are slow to develop sugar levels sufficient for winemaking and some never fully mature).

**Transmission:** GRBV is graft-transmissible and the most likely source of contamination of new vineyards is infected plant material. Although spread of GRBV by a vector has not been confirmed, the patchy distribution of infected vines in vineyards and the increase in the number of diseased vines over time suggests that a vector is involved in disease spread. Preliminary glasshouse experiments have shown that GRBV could be transmitted by *Erythroneura ziczac* (Hemiptera: Cicadellidae - Virginia creeper leafhopper) and by *Spissistilus festinus* (Hemiptera: Membracidae) from infected to healthy vines. Studies made in Californian vineyards suggest that the main vector is probably *S. festinus*. However, further studies are needed to understand how the virus is spread under field conditions and determine the role of insects in disease epidemiology.

**Pathway:** plants for planting of grapevine from countries where GRBV occurs.

**Possible risks:** grapevine is a crop of major economic importance in the EPP0 region. GRBV has been shown to negatively affect grapevine production and in particular, the quality of the berries. As the epidemiology of red blotch disease remains to be clarified, and in particular the role of possible vectors, the main control measures rely on the use of healthy planting material, and in some cases on the elimination of diseased plants. In a study conducted in the National Clonal Germplasm Repository (NCGR) in California, grapevine accessions originating from countries outside North America (including European countries) tested positive for the virus. It cannot be concluded from these results that the virus occurs in those countries, but it seems wise that grapevine-growing countries verify the presence or absence of GRBV in their crops, and eventually include this new virus in certification schemes to prevent its spread.

### Sources

- Al Rwahnih M, Dave A, Anderson MM, Rowhani M, Uyemoto JK, Sudarshana MR (2013) Association of a DNA virus with grapevines affected by red blotch disease in California. *Phytopathology* **103**(10), 1069-1076.
- Al Rwahnih M, Rowhani A, Golino DA, Islas CM, Preece JE, Sudarshana MR (2015) Detection and genetic diversity of Grapevine red blotch-associated virus isolates in table grape accessions in the National Clonal Germplasm Repository in California. *Canadian Journal of Plant Pathology* **37**(1), 130-135.
- Bahder BW, Zalom FG, Jayanth M, Sudarshana MR (2016) Phylogeny of Geminivirus coat protein sequences and digital PCR aid in identifying *Spissistilus festinus* as a vector of Grapevine red blotch-associated virus. *Phytopathology* **106**(10), 1223-1230.
- Bertazon N, Migliaro D, Rossa A, Filippin L, Casarin S, Giust M, Brancadoro L, Crespan M, Angelini E (2021) Grapevine red blotch virus is sporadically present in a germplasm collection in Northern Italy. *Journal of Plant Diseases and Protection*. <https://doi.org/10.1007/s41348-021-00468-5>
- Cieniewicz EJ, Pethybridge SJ, Loeb G, Perry K, Fuchs M (2018) Insights into the ecology of Grapevine red blotch virus in a diseased vineyard. *Phytopathology* **108**(1), 94-102.
- Gasparin-Bulbarela J, Licea-Navarro AF, Pino-Villar C, Hernández-Martínez R, Carrillo-Tripp J (2019) First report of Grapevine red blotch virus in Mexico. *Plant Disease* **103**(2), p 381.
- INTERNET
- Cornell University. Cieniewicz E, Fuchs M (2014) Grapevine red blotch disease. [http://nysipm.cornell.edu/nysipm/factsheets/grapes/diseases/gv\\_red\\_blotch.pdf](http://nysipm.cornell.edu/nysipm/factsheets/grapes/diseases/gv_red_blotch.pdf)
  - Ontario (CA). Ministry of Agriculture, Food and Rural Affairs. Grapevine red blotch associated virus: A newly identified disease in vineyards. <http://www.omafra.gov.on.ca/english/crops/hort/news/hortmatt/2013/22hrt13a1.htm>
  - University of California Cooperative Extension. Mendocino county. Fact Sheet. National Clean Plant Network. <http://cemendocino.ucanr.edu/files/165430.pdf>
- Krenz B, Thompson JR, Fuchs M, Perry KL (2012) Complete genome sequence of a new circular DNA virus from grapevine. *Journal of Virology* **86**(14), p 7715.
- Krenz B, Thompson JR, McLane HL, Fuchs M, Perry KL (2014) Grapevine red blotch-associated virus is widespread in the United States. *Phytopathology* **104**(11), 1232-1240.
- Lim S, Igori D, Zhao F, Moon JS, Cho IS, Choi GS (2016) First report of *Grapevine red blotch-associated virus* on grapevine in Korea. *Plant Disease* **100**(9), p 1957.

- Luna F, Debat H, Moyano S, Zavallo D, Asurmendi S, Gomez-Talquenca S (2019) First report of grapevine red blotch virus infecting grapevine in Argentina. *Journal of Plant Pathology* **101**, p 1239. <https://doi.org/10.1007/s42161-019-00298-3>
- Marwal A, Kumar R, Khurana SMP, Gaur RK (2018) Complete nucleotide sequence of a new geminivirus isolated from *Vitis vinifera* in India: a symptomless host of *Grapevine red blotch virus*. *VirusDisease*. <https://doi.org/10.1007/s13337-018-0477-x>
- Poojari S, Alabi OJ, Fofanov VY, Naidu RA (2013) A leafhopper-transmissible DNA virus with novel evolutionary lineage in the family Geminiviridae implicated in grapevine redleaf disease by next-generation sequencing. *PLoS One* **8**(6), e64194. doi: 10.1371/journal.pone.0064194
- ProMed posting (no. 20191029.6750913) of 2019-10-29. Leafroll & red blotch, grapevine - Canada: (NS). <http://www.promedmail.org/post/6750913>
- Reynard JS, Brodard J, Dubuis N, Zufferey V, Schumpp O, Schaerer S, Gugerli P (2018) *Grapevine red blotch virus*: absence in Swiss vineyards and analysis of potential detrimental effect on viticultural performance. *Plant Disease* **102**(3), 651-655.
- Schoelz JE, Adhab M, Qiu W, Petersen S, Volenberg D (2019) First report of Grapevine red blotch virus in hybrid grapes in Missouri. *Plant Disease* **103**(2), p 379.
- Soltani N, Hu R, Hensley DD, Lockwood DL, Perry KL, Hajimorad MR (2020) A survey for nine major viruses of grapevines in Tennessee vineyards. *Plant Health Progress* 157-161. <https://doi.org/10.1094/PHP-03-20-0018-RS>
- Stamp JA, Wei A (2013) The impact of Grapevine red blotch virus. *Wine Business Monthly* **3**, 56-67.
- Stamp JA, Wei A (2014) Red blotch disease and the virus status of CDFA-certified grapevine stock. *Wine Business Monthly* **8**, 1-10.
- Sudarshana MR, Perry KL, Fuchs MF (2015) Grapevine red blotch-associated virus, an emerging threat to the grapevine industry. *Phytopathology* **105**(7), 1026-1032.
- Yao XL, Han J, Domier LL, Qu F, Lewis Ivey ML (2018) First report of *Grapevine red blotch virus* in Ohio vineyards. *Plant Disease* **102**(2), p 463.
- Yepes LM, Cieniewicz E, Krenz B, McLane H, Thompson JR, Perry KL, Fuchs M (2018) Causative role of grapevine red blotch virus in red blotch disease. *Phytopathology* **108**(7), 902-909.