Blackberry Calico Virus

a. Virus/pathogen name, including accepted acronyms and synonyms

Blackberry Calico Virus, BCV

BCV is an *Allexivirus* related to blackberry virus E (Fager et al., 2026). Elongated particles have been observed by electron microscopy. This virus is transmissible and able to induce consistent symptoms.

b. Host range, including resistance or tolerance within the crop hosts, alternate hosts

BCV has no other known natural host other than *Rubus* spp., it occurs in wild Pacific Coast trailing blackberry (*Rubus ursinus*) and several Pacific Coast trailing blackberry cultivars, such as ‘Chehalem’, ‘Marion’, ‘Olallie’, and ‘Waldo’, and blackberry– raspberry hybrids, such as the cultivars ‘Boysen’, ‘Logan’, and the mutant ‘Thornless Logan’. BCV has also been reported infecting *R. laciniatus* cv. ‘Thornless Evergreen’. As an experimental host range, it has been transmitted mechanically to *Nicotiana occidentalis* subsp. *oblique*. This virus has been poorly studied so additional natural and experimental hosts may exist.

c. Symptoms on crop host including varietal differences with images of symptoms when available

BCV is widespread in blackberry plantings, producing an oakleaf pattern and a very striking yellow line on the leaves, however infected plants appear to flower and fruit normally. The impact of this virus in mixed infections with other viruses is unknown. ‘Marion’ blackberry when infected with BCV, experience a reduced fruit yield (up to 14%) and produce fewer and less vigorous primocanes. Furthermore in

‘Marion’ blackberry, BCV symptoms appear to be unevenly distributed among and within canes of an infected plant.

Usually in the field, blackberry or blackberry– raspberry hybrids which are infected with BCV, start showing symptoms at first on floricane leaves at flowering time. On primocanes similar symptoms develops on mature leaves during hot summer weather. Young leaves, which are not fully expanded are symptomless. As mention above BCV symptom production is very uneven among primocanes and floricanes of an infected plant and along individual canes. Once symptoms appear, they remain present for the rest of the growing season. Most hosts show milder symptoms or remain symptomless when the weather is cool and cloudy, whereas during hot and dry weather leaves may present severe calico symptoms. Severe calico symptoms occur when leaf chlorosis becomes severe, leading to red pigmentation, bleaching and necrosis. The symptoms produced by BCV in the known herbaceous indicator, *Nicotiana occidentalis* subsp*. oblique*, are small chlorotic–necrotic lesions on the inoculated leaves.

d. Geographic distribution:

So far the virus appears to be widespread along the coast of Oregon and California. BCV has occurred naturally in the Netherlands infecting the blackberry (*R. lacinatus*) cultivar ‘Thornless Evergreen’ (Converse, 1987, Converse & Martin, 2017).

e. Means of spread:

Currently there is no information regarding the transmission of BCV but based on its placement in the genus *Allexivirus* eriophyid mites are probable vectors. Even though the virus has no known vector, it can spread very rapidly in the field.

f. Recognized diagnostic tests with cited references:

Fager et al. (2026) have developed robust conventional and q RT-PCR protocols for the virus. BCV can also be experimentally transmitted to ‘Marion’ blackberry by approach graft, symptoms in the greenhouse usually develop very slow (6-24 months) (Converse & Martin, 2017, Converse, 1987). Sap and graft transmissions should be done in the early spring and one should use young vigorous indicator plants for graft assays. Bioassays using sap transmission in berry crops are not reliable due to inhibitors.

g. Sampling recommendations for each pathogen including timing and tissue to be sampled

As symptoms are more conspicuous during hot weather, spring and fall might be the ideal seasons for sampling. Preferably, the samples should be taken from leaves that are symptomatic and young but fully matured leaves.

h. Management strategies for the pathogen and the vector(s) of the pathogen

There is very little effort at controlling Blackberry calico virus other than the use of certified stock. Generally, growers and nurseries disregard blackberry calico when propagating field-grown plants. Approaches like heat treatment of 'Thornless Logan' plants at 37°C for 17 days does not eliminate the virus, but when the treatment is extended for a total of 35 days and combined with meristem culture, BCV-free plants were obtained (Converse, 1987). Other control measures are not warranted since BCV losses are unknown in modern cultivars.

i. References

Converse R.H, 1987. Blackberry Calico. In: Converse Rh, ed. *Virus Diseases of Small Fruits.* U.S. Government Printing Office, Washington, D.C., 245-6.

Converse R.H, Martin R.R, 2017. Blackberry Calico. In: Robert R. Martin Mae, Brian Williamson, Roger N. Williams, ed. *Compedium of raspberry and blacKberry diseases and pests.* APS press.

Fager, D., Stockwell, V., Grinstead, S. and Mollov, D., 2026. Genomic and biological characterization of blackberry calico virus. *Plant Disease*, *110*(6), pp.2259-2266.

Macfarlane S, Mcgavin W, Tzanetakis I, 2015. Virus Testing by PCR and RT-PCR Amplification in Berry Fruit. In: Lacomme C, ed. *Plant Pathology .* New York, NY: Humana Press, 227-48. (Methods in Molecular Biology; vol. 1302.)

Martin R.R, 2002, Virus diseases of rubus and strategies for their control, *Acta Hortic.* 585, 265-270

Martin R.R, Macfarlane S, Sabanadzovic S, Quito D, Poudel B, Tzanetakis I.E, 2013. Viruses and Virus Diseases of Rubus. *Plant Disease* 97, 168-82.

Van Der Meer F.A, 1989. *Nicotiana occidentalis*, a suitable test plant in research on viruses of small fruit crops.*Acta Hortic.* 236, 27-36

Names of reviewers: Ioannis E. Tzanetakis

Date of last update: July 2026