Cherry Rasp Leaf Virus

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

Cherry rasp leaf virus, CRLV - Genus *Cheravirus*, Family *Secoviridae*, Order *Picornavirales.*
Synonym(s) - Cherry rasp leaf, Flat apple virus

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

Crop hosts: Apple (*Malus domestica)*, stone fruits (*Prunus* spp.), plantain (*Plantago major*), red raspberry (*Rubus*), tomato (*Solanum lycopersicum* L.), elderberry (*Sambucus nigra* L. subsp. *Caerulea*), and potato *(Solanum tuberosum)* (Bodine and Newton 1942; Bratsch *et al*. 2020; Hansen *et al*. 1974; Jones 1987; Osman 2017).
Other non-crop hosts include dandelion (*Taraxacum officinale*), balsamroot (*Balsamorhiza sagittata*), and *Malva* spp., and experimental hosts, *Chenopodium quinoa, C. murale, C. amaranticolor, Cucumis sativus, Phaseolus vulgaris, Cucurbita maxima* Duchesne, *Nicotiana benthamiana*, *Solanum sisymbriifolium* Lam. (Hansen *et al.* 1974).

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

Prunus (rasp leaf disease)
Cherry - CRLV spreads slowly, initially presenting symptoms in only one or two limbs typically on the lower part of the tree. Symptoms typically develop erratically and non-uniformly, with reduced terminal growth, leaves will present enations or prominent leafy outgrowths on the surface as well as distort but remain green. Infection by CRLV contributes to the decline of cherry and can significantly reduce fruit production. In cases of mixed infection symptoms increase severity. In young trees, development is significantly delayed and the tree may die.
Peach - CRLV symptoms in peach include severe dwarfing of shoots, shortened internodes, and general decline of the tree. The leaves narrow and produce extensive enations and the trunk displays cankering.
Apple (flat apple disease) - CRLV can reduce fruit production and kill young trees. Symptoms are not uniform in the tree, and typically spread slowly. During early infection, symptoms appear on lower branches, including enations on undersides of leaves, and a rough texture on upper surfaces. Diseased trees are dwarfed and bushy, as the terminal growth is reduced, and fruit may be smaller, and misshapen or flattened vertically. Symptoms vary between cultivars, from mild (Fuji, Empire, Granny Smith) to severe (Red Delicious, Golden Delicious, Jonagold and Gala) (Hansen and Parish, 1990; NRSP5, 1999).

Rubus - Infection is normally symptomless (Jones, 1987). However, the presence of this virus can contribute to raspberry decline.

Symptoms on most herbaceous hosts vary wildly based on time of year, best expressed in spring and fall. on herbaceous indicator symptoms are similar to other nepoviruses, including necrosis/necrotic lesions, systemic mottling, and systemic chlorotic vein clearing.

d. Geographic distribution:

CRLV has been detected in the western United States, specifically, California, Colorado (Bodine and Newton 1942), Minnesota (Bratsch *et al*. 2020), Oregon, Washington (Blodgett *et al.* 1963; James *et al.* 2001). CRLV has also been reported in Canada, British Columbia and Quebec (Brown *et al.* 1993; James *et al.* 2001). Recently, CRLV infection in cherry has been reported in China (Ma *et al.* 2014).

e. Means of spread:

Natural transmission is by the nematodes *Xiphinema americanum*, *X. californicum*, and *X. ravesi* Transmission is also possible by grafting and by mechanical means to susceptible herbaceous hosts.
Transmission by seed at low rates has been shown in dandelion and *C. quinoa* (Hansen et al. 1973)

f. Recognized diagnostic tests with cited references:

RT-qPCR (Osman et al. 2017)
RT-PCR (Villamor & Eastwell 2016)
Biological indexing on herbaceous and woody hosts (Hansen et al. 1974)

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

Sap from symptomatic tissue (leaves, buds) should be sampled from bud-break until early summer to increase chances of detection.

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

Growers should ensure their planting material is coming from certified virus-tested propagation stock to prevent introduction of CRLV to the field. Due to CRLV spread by nematodes, management strategies should be the same as other nematode-borne viruses. Minimize soil movement to reduce possible spread, and soil fumigation can reduce the nematode populations and therefore reduce transmission. Control broadleaf weeds to eliminate alternative hosts in the field. Infection typically happens in oval patches across the orchard. If symptoms are present, confirm infection status and remove infected trees, as well as those adjacent, immediately. If a field has a history of high CRLV incidence, consider planting a non-host for the virus.

i. References

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