

PEST ALERT

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Citrus yellow vein clearing virus

Kishore Dey, Ph.D. and John McVay, Ph.D.; Bureau of Entomology, Nematology and Plant Pathology
DPIhelpline@FDACS.gov or 1-888-397-1517

INTRODUCTION

Citrus yellow vein clearing virus (CYVCV), Genus (*Mandarivirus*), family (*Alphaflexiviridae*) is an emerging plant pathogen with the potential to cause significant economic losses to citrus industries (Liu et al, 2020). CYVCV was first discovered in 1988 on lemon and sour orange trees in Pakistan. This virus has been restricted to Pakistan, India, Iran, Turkey and China where it has rapidly expanded to all citrus-producing provinces (Liu et al, 2020). CYVCV has more recently been detected in dooryard citrus in California.

HOSTS

CYVCV can infect most citrus species, cultivars and hybrids, particularly lemon (*C. limon* Burm. f.) and sour orange (*C. aurantium* L.). It has also been reported in grapes and herbaceous plants such as *Phaseolus vulgaris* var. *dermason* L. and *Vigna unguiculata* (L.) (Önelge et al., 2011b), and weed species including *Malva sylvestris* L., *Solanum nigrum* Acerbi ex Dunal, *Sinapis arvensis* L. and *Ranunculus arvensis* L. (Önelge et al., 2016). CYVCV is a single stranded positive sense RNA virus and found localized in phloem tissues.

SYMPTOMS

The typical symptoms of CYVCV infection in lemon or sour orange trees are yellow, clear veins and water-soaked appearance in leaves (Figure 1), which is consistent across different geographical regions. The leaves may also show crinkling and warping symptoms. In India, the symptoms are more diverse, with mosaic and irregular ringspot-like symptoms (Prasanna, 2017). However, symptoms induced by CYVCV can vary depending on numerous factors, most notably the properties of the viral isolate, citrus variety and environmental conditions especially temperature. In China, some cultivars of citrus are asymptomatic (Zhou et al., 2017) or less pronounced during summer months at high temperatures. In severe infection, fruits are malformed and trees die back, causing significant yield loss (Li et al., 2017). The symptoms in herbaceous plants range from mosaic-like patterns, chlorosis and necrosis observed in leaves. Infections in weeds have been noted as asymptomatic (Onelge et al., 2016). In 2020, wild grapevine exhibiting short internodes, reduced leaf size, chlorosis and necrosis, which were found climbing in citrus trees, also tested positive for CYVCV (Afloukou and Önelge, 2020).

TRANSMISSION

CYVCV is transmitted by aphids, *Aphis spiraecola* Patch, *Aphis craccivora* Koch, *Aphis gossypii* Glover and citrus whitefly *Dialeurodes citri* (Ashmead). Both *A. spiraecola* and *A. craccivora* can also transmit CYVCV from lemon to bean (*P. vulgaris* var. *Dermason*) and from bean to bean (Onelge 2002; Onelge et al. 2011). Infected budwood used for grafting is suspected for the initial spread of the virus to new locations; once established, dispersal by its insect vectors is responsible for rapid local spread. Although CYVCV has been detected in seed tissues, there is no evidence of it being transmitted by seeds (Zhou et al., 2015). Additionally, CYVCV is transmissible by contaminated tools (Zhang et al., 2018a).

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Figure 1. Typical symptom of vein clearing caused by citrus yellow vein clearing virus.
Photo by California Department of Food and Agriculture, Pest Diagnostic Center