Fruit Varieties Journal 41(1):17-18 1987

Reactions of Crab Apples Considered As Potential Apple Pollinizers to Latent Virus Infection[1]

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Abstract

Responses of 36 crab apple cultivars (*Malus* spp.) to inoculation with the viruses apple chlorotic leaf spot (CLSV), apple stem pitting (SPV), and apple stem grooving (SGV) are given. SPV symptoms occurred in 19, CLSV symptoms in 11, and no external symptoms of SGV were observed. These results should be considered when selecting crab apple cultivars as interplanted pollinizers which could be endangered because of natural, root, graft transmission from virus infected apple cultivars.

The current trend to use crab apples as interplanted pollinizers in commercial apple orchards (3) presents an unknown potential for pathologic problems. Crab apples on common rootstocks frequently react severely to latent virus infection, and some react so severely that they are used commonly as virus indicators (4, 6). Virus transmission through natural root grafting is well known among fruit tree virologists (6). Thus, severe problems could develop in crab apples if natural root grafting occurred between the pollinizer crab apples and latent virus infected apple trees.

Accordingly a test was designed to determine the responses of 36 crab apple cultivars with pollinizer potential to inoculation with three common latent viruses. The crab apple names were determined from several sources (1, 2, 7).

Materials and Methods

Thirty-six groups of 12 field grown apple seedlings were budded with one each of 36 crab apple cultivars. Three seedlings budded to each cultivar were inoculated by double budding with bud inoculum from trees infected with apple chlorotic leaf spot virus (CLSV), apple stem pitting virus (SPV) (presumed to be a virus because of its behavioral properties) (5), and apple stem grooving virus (SGV). Each of the three sources of virus were determined free of detectable virus contaminations by extensive indexings. Three noninoculated apple seedlings budded with each crab apple cultivar were interspaced as healthy controls. Double budding consists of budding one or two inoculum containing buds of an infected apple below the indicator cultivar bud which allows the virus to pass through graft unions from the inoculum buds to the seedling and in turn to the indicator bud where symptoms are produced.

The following spring the seedlings were cut back to force the cultivar buds to grow. Symptoms and symptom severities were assessed empirically for the resulting trees. Symptoms for two viruses (CLSV, SPV) were generally expressed as stunting, and additionally as chlorotic leaf flecks for CLSV and epinasty and leaf curl for SPV.

Results

The SPV visually affected nineteen cultivars while only eleven were affected by CLSV. No external symptoms occurred on the SGV inoculated trees (Table 1). The reactions from

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Table 1. Relative symptom severities responses of crab apple cultivars inoculated with the viruses apple chlorotic leaf spot, apple stem pitting and apple stem grooving.[1]

Cultivar	Chlorotic Leaf Spot (CLSV)	Stem Pitting (SPV)	Stem Grooving (SGV)
Adams	—	S	—
Aldenhamensis	—	—	—
Almey	—	—	—
Calocarpa	I	I	—
Carmine	M	S	—
David	—	S	—
Dolgo	—	—	—
Donald Wyman	M	—	—
Eleyi	S	S	—
Evelyn	S	I	—
Flame	—	—	—
Hopa	—	—	—
Indian Magic	I	S	—
Indian Summer	—	—	—
Japanese Flowering	—	S	—
Jay Darling	I	S	—
Kelsey	—	—	—
Klehm's Improved Bechtel	—	M	—
Manchurian	—	—	—
Pink Spires	—	—	—
Pioneer Scarlet	—	—	—
Purple Wave	I	S	—
Radiant	—	VS	—
Red Jade	—	VS	—
Red Silver	S	S	—
Red Splendor	—	S	—
Royalty	—	—	—
Sargent (seedling)	M	M	—
Sargent (seedling)	I	V	—
Sheidecker	—	—	?
Simpson 10-35	—	K	—
Snowdrift	—	—	—
Sparkler	—	VS	—
Strathmore	—	—	—
Sugar Crab	—	—	—
Vanguard	—	—	—

[1]— = negative; M = mild; I = intermediate; S = severe; VS = very severe; K = killed from unknown cause; ? = no test.

SPV inoculation appeared to be more severe than those of CLSV.

Discussion

These results suggest the potential disease that could occur with latent virus transmission through natural root grafting and propagation among crab apple pollinizers and infected apple trees and rootstocks. Therefore, information of this kind should be useful as partial criterion when selecting specific cultivars of crab apples as pollinizers. This is especially important considering the modern trend toward single cultivar apple plantings, and the use of crab apples as pollinizers interplanted between the apple trees (4).

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