

**PASSIONFRUIT WOODINESS VIRUS INFECTIVITY IN *PHASEOLUS VULGARIS*
AND SOURCES OF RESISTANCE**

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Common bean (*Phaseolus vulgaris*) has been reported to be a host of a number of potyviruses, including bean common mosaic (BCMV), bean yellow mosaic (BYMV), blackeye cowpea mosaic (BICMV), clover yellow vein (CYVV), cowpea aphid-borne mosaic (CABMV), passionfruit woodiness (PWV), pea mosaic (PeMV), peanut mottle (PMV), soybean mosaic (SoMV), and watermelon mosaic 2 (WMV-2). Some of these viruses are widely distributed and cause serious losses; others are considered of minor importance, or restricted to certain areas of the world. All these potyviruses are mechanically transmissible, but in nature are spread by a number of aphids in the non-persistent manner (stylet-borne). However, a few of them are also seedborne in common bean (e. g. BCMV and SoMV). In the past, several of these viruses easily escaped detection because they cause symptoms that mimic those incited by better known viruses. For example, plants infected with SoMV exhibit symptoms that could be attributed to BCMV infections (3), whereas those caused by WMV-2 are similar to those incited by BYMV (1).

PWV is considered one of the major viruses affecting *Passiflora* spp., in which it causes foliar mosaic and fruit woodiness. The host range of this virus also includes a large number of legumes, and it has been recovered from naturally infected plants of *Arachis hypogaea*, *Centrosema pubescens*, *Crotalaria usaramoensis*, *Glycine max*, and *Phaseolus atropurpureus* (5). Susceptible plants of *P. vulgaris* react to PWV infection with a variety of foliar symptoms which include green mottle, veinbanding, blisters, distortion, and plant stunting. Most of the flowers tend to abort, hence seed production is drastically reduced. However, very little is known regarding the occurrence and distribution of PWV in the bean crops grown in the tropical and subtropical regions of the world.

Recently, we compared the reaction of a number of bean cultivars to three strains of PWV, which had derived from *Passiflora edules* grown in Australia (PWV-K), Puerto Rico (PWV-PR), and Thailand (PWV-TH). Our findings can be summarized as follows:

- 1) Symptoms caused by PWV-PR were the most prominent when compared with those incited by the other two strains. Infected plants exhibited short internodes and small, mottled, distorted leaves with prominent dark green blisters. Symptoms caused by PWV-K and PWV-TH resembled those incited by most strains of BCMV.
- 2) From the data presented in TABLE 1, it is evident that PWV-K can infect more bean cultivars than the other two strains. PWV-TH can be differentiated from PWV-PR by causing systemic necrotic reaction in some cultivars. Conversely, PWV-PR infects the cv. Sanilac, which is resistant to PWV-TH. In *P. vulgaris*, PWV-TH seems to behave as the NL-8 strain of BCMV (2).
- 3) In crosses between the susceptible Black Turtle 2 and Black Turtle 1, which is resistant to PWV-K and PWV-PR, this resistance was found to be controlled by a single dominant factor, that appears to be closely linked or similar to the *II* gene for BCMV (4). Similarly, the resistance in Great Northern 1140 to PWV-PR is conferred by another single dominant gene (4).

It may also be noted that these strains can be easily differentiated using cultivars of *Pisum*

sativum. Our tests have shown that all pea cultivars tested were infected by PWV-TH, none by PWV-PR, and some were susceptible and others resistant to PWV-K. This resistance in pea to the Australian strain appears to be controlled by a single recessive factor (4). It would be advantageous to assess the occurrence, distribution, and the economical impact of PWV strains to the bean crop in regions where this virus is known to be present.

Literature Cited

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TABLE 1 - Reaction of bean cultivars to three strains of passionfruit woodiness virus: PWV-K (Australia), PWV-PR (Puerto Rico), and PWV-TH (Thailand).

Cultivar	PWV -K	PWV -PR	PWV -TH	Cultivar	PWV -K	PWV -PR	PWV -TH
Alliance	R	R	N	Great Northern 1140	S	R	R
Antigua	S	S	S	King Horn Wax	R	R	R
Arriaga	S	S	S	Lasson	S	R	R
Black Turtle 1	R	R	N	Labrador	R	R	R
Black Turtle 2	S	S	S	Manitou	S	R	R
Benton	R	R	R	Midnight	R	R	N
Bonanza Wax	R	R	R	Missouri Wonder	S	R	R
Bounty	R	R	R	Pioneer	S	S	S
Bush Blue Lake 47	R	R	R	Redcloud	R	R	R
CA Light Red Kidney	S	R	R	Redkote	R	R	R
CA Dark Red Kidney	S	R	R	Royal Red	R	R	R
Canario 107	S	R	R	Sacramento	S	R	R
Charlevoix	S	R	R	Sanilac	R	S	R
Clipper	R	R	R	Soldier	S	R	R
Commodore	S	R	R	Sulphur	S	S	S
Great Northern 31	R	R	R	Vitagreen	R	R	R

R = Resistant (Free of systemic infection); S = Susceptible (Mosaic); N = Necrosis (Local necrotic lesions, apical and stem necrosis, and death). Data based on 16 plants of each cultivar for each strain of the virus. All the resistant plants were determined to be locally infected.