

<https://doi.org/10.3176/biol.1978.1.07>

УДК 632.32

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A NEW LOCAL LESION HOST FOR THE POTATO VIRUS X

Potato virus X (PVX) is one of the most studied viruses. This virus is highly infectious and widespread in potato cultivars where it causes significant damage to the yield of potato. PVX is known as a virus with a wide host range, consisting of sixty-three species, according to the Index of Plant Virus Diseases (1966). Klinkowski (1968) named 122 species susceptible to this virus, including weeds, cultivated and decorative plants. Most of these species react to the infection of the PVX with systemic symptoms (in more cases mottle or mosaic); another group of susceptible plants show no visible symptoms, being latent hosts of the virus; the third group consists of plants with local reaction, showing lesions and necrosis on inoculated leaves. The last-named ones are of great importance in the experimental work of virologists, for the identification of the viruses and detection of the concentration of the infectious virus in plants. There are two more known and used local lesion hosts for PVX *Gomphrena globosa* L. and *Chenopodium amaranticolor* L., belonging to the *Amaranthaceae* and *Chenopodiaceae*, respectively; both react with necrotic bright spots on inoculated leaves. But the growing time for the species named from the seed to plant suitable to inoculate is very long, lasting no less than 1.5–2 months.

The present work was undertaken to test the susceptibility of some *Papilionaceae* (*Leguminosae*) species which are known as quickly sprouting and growing plants, to the PVX infection. The following species were studied: *Lathyrus odoratus* L. 'Kenneth', *Phaseolus vulgaris* L. 'Donskoi bely', *Pisum sativum* L. cultivars 'Aamissepa', 'Ammendamatu', 'Looming' and 'Torstag', *Vicia faba* L. 'Jõgeva' and *Vigna sinensis* Endl.

Three strains of PVX were used: X₁₇ — a severe strain with ringspot necrotic type of reaction in *Nicotiana glutinosa* L.; X₂₃ — a mild strain with mottle mosaic in *Nicotiana glutinosa* L.; X₃ — an intermediate strain (Aryp, 1977). The strains X₁₇ and X₂₃ were obtained from PVX (X₃) by electrophoretical fractionation (Хёдрярв и др., 1977). The viruses were maintained in *N. glutinosa*.

The seeds of leguminous test-species were planted in a greenhouse, in 10 cm pots at once. On the 10–14th day after planting the test plants were inoculated using glass spatula and carborundum. The inocula were prepared by grinding PVX-infected *N. glutinosa* leaves in a mortar and diluted with tap water (1 : 1). 10–20 plants of each species were used for inoculation. One part of plants were inoculated in same way with the sap of healthy *N. glutinosa*. The inoculated plants were kept under observation during one month, in order to determine and describe the

Reaction of leguminous plants to infection of PVX

Test plants	Strains		
	X ₁₇	X ₂₃	X ₃
<i>Lathyrus odoratus</i> L. 'Kenneth'	—*	—	o**
<i>Phaseolus vulgaris</i> L. 'Donskoi bely'	o	o	o
<i>Pisum sativum</i> L. 'Aæmissepä'	LN***	LN	LN
'Ammendamatu'	LN	LN	LN
'Looming'	LN	LN	LN
'Torstag'	LN	LN	LN
<i>Vicia faba</i> L. 'Jõgeva'	o	o	o
<i>Vigna sinensis</i> Endl.	o	o	o

* Not tested, ** no symptoms, *** local necrotic spots

symptoms. From inoculated plants not showing symptoms, back-inoculations were made to *N. glutinosa* for assay of latent infection. Susceptibility and reaction of leguminous species tested are shown in Table.

The table shows the results obtained when five species from different genera of the family *Papilionaceae* were inoculated with PVX strains. In four cases there were no symptoms of infection with PVX, but all cultivars of *Pisum sativum* L. used were susceptible to PVX and reacted with local



Necrotic spots on inoculated leaf of *Pisum sativum* L. cv. 'Aæmissepä' caused by PVX infection healthy leaf left.

necrosis. The brown necrosis with a diameter of 0.3—0.7 mm appeared on the 4th—6th day after inoculation (Figure). No systemic reaction was observed. There were noted some differences in the number of necrosis on inoculated leaves of different cultivars. The highest average number of necrosis per leaf was observed on inoculated leaves of *Pisum sativum* L. cultivars 'Looming' and 'Aamissepa', 18.9 and 17.7, respectively. The type and size of lesions on pea leaves caused by three strains of PVX used for inoculation was similar. During the course of this investigation, pea leaves of different type and age were used for inoculation, and here no markable differences were observed. The pea plant may be used for inoculations till it grows. We had no success in infecting the detached leaves in Petri dishes.

The virus was isolated back from inoculated leaves of *Pisum sativum* L. (all cultivars tested) and *Vigna sinensis* Endl. The latter was a latent local lesion host for PVX. The virus could in no case be got from the young leaves of tested species.

Legumes have been tested for finding susceptible hosts for PVX previously, too. Andersen (1958) indicated that the leguminous species *Cassia tora* and *C. occidentalis* produced local lesions when inoculated with PVX. Fribourg and de Zoeten (1975) tested five genera of the family *Leguminosae* (*Papilionaceae*) and stated that some of these (*Canavalia*, *Crotalaria*, *Phaseolus* and *Vigna*) react to infection with one isolate of PVX with local symptoms.

On the basis of results presented above, it was concluded that a new local lesion host for the potato virus X — *Pisum sativum* L. — is found. *Pisum sativum* L. is well suited for the identification of potato virus X infection since, according to our results, this plant species did not produce local lesions when inoculated with other potato viruses, such as M, S, Y, or with the viruses of the *Cucumovirus* group, such as the potato virus N (Agur, 1975) and tomato aspermy virus (Villemson, 1974). Smith (1957) did not name *Pisum sativum* L. among the plant species susceptible to potato viruses. Klinkowski (1968) marked this plant species to be susceptible to potato stem mottle virus (syn. tobacco rattle virus), potato bouquet virus (syn. tomato black ring virus) and potato aucuba mosaic. By Sommereyns (1962), *Pisum sativum* is susceptible to potato stem mottle virus only from viruses infecting potato. The local lesion reaction in *Pisum sativum* was marked in no case.

Pisum sativum is a useful indicator plant. This plant species can be widely used, since its seed production is not affected and its growing is easy and quick; besides, it is known as a good test-plant for the water-culture method. Symmetrically paired leaves make *Pisum sativum* also suitable for the detection of the concentration of infectious virus.

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Received
April 19, 1977

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KARTULI X-VIIRUSE UUS LOKAALREAKTSIOONIGA PEREMEESTAIMELIIK

Resümee

Kartuli X-viirusega (tüved KX₃V, KX₁₇V ja KX₂₃V) nakatati viit taimeliiki liblikõieliste sugukonnast. Katsete tulemusena selgus nimetatud viiruse uus lokaalreaktsiooniga peremeestaimeliik — harilik hernes (*Pisum sativum* L.). Kõigil neljal katses olnud hernesordil ('Aamissepa', 'Ammendamatu', 'Looming' ja 'Torstag') tekkisid inokuleeritud lehtedel X-viirusega nakatumise tagajärjel pruunid nekroosid (läbimõõt 0,3—0,7 mm). X-viiruse määramiseks varem kasutatud lokaalindikaatoritega (*Chenopodium amaranticolor* L. ja *Gomphrena globosa* L.) võrreldes on liigi *Pisum sativum* L. eelisteks kiire kasv ja pikaajaline kasutatavus.

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Toimetusse saabunud
19. IV 1977

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НОВЫЙ ИНДИКАТОРНЫЙ ВИД С ЛОКАЛЬНОЙ РЕАКЦИЕЙ ДЛЯ ВИРУСА X КАРТОФЕЛЯ

Резюме

Приведены данные о заражении 5 видов растений из семейства мотыльковых (*Papilionaceae*) штаммами вируса X картофеля (BX₃K, BX₂₃K и BX₁₇K). В результате опытов выяснено, что *Pisum sativum* L. (в опытах использовались четыре сорта) может служить для вируса X картофеля новым индикаторным видом с локальной реакцией. Во всех случаях на инокулированных листьях этого вида образовались четкие коричневые некрозы диаметром 0,3—0,7 мм. *P. sativum* отличается от ранее использованных индикаторных видов с локальной реакцией быстрым ростом и долговременностью использования.

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Поступила в редакцию
19/IV 1977