

## OBČUTLJIVOST JUŽNOAMERIŠKIH VRST RODU SOLANUM NA OKUŽBE S KROMPIRJEVIM Y VIRUSOM

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### IZVLEČEK

Krompirjev Y virus (Potato virus Y (PVY)) je član rodu Potyvirus in družine Potyviridae, ki je gospodarsko (ekonomsko) najbolj pomembna družina rastlinskih virusov. Bolezen nekrotično virusno obročkavost gomoljev krompirja so prvič opisali leta 1984 na Madžarskem raziskovalci Beczner in njegovi sodelavci. V obdobju zadnjih dvajsetih let se je ta različek krompirjevega Y virusa razširil po vsem svetu. Povzročča velike izgube pridelka in ima veliko sposobnost premagovanja mehanizmov odpornosti gostiteljev, zato imajo raziskave rastlin, ki so vir genov za odpornost in raziskave novih gostiteljev tega virusa poseben pomen. V poskusu smo preučevali občutljivost potomcev (akcesij) petih divjih južnoameriških (*Solanum avilesii* PI. 498092, *S. candolleianum* PI. 498226, *S. clarum* PI. 283099, *S. mochiuense* PI.: 338616, *S. phureja* PI.: 320360) vrst iz rodu *Solanum* proti okužbam z NTN (PVY<sup>NTN</sup>) različkom krompirjevega Y virusa. Za okuževanje je bil uporabljen originalni izolat različka Maradona PVY<sup>NTN</sup>. Virusi PVY<sup>NTN</sup> uporabljeni za mehanično inokulacijo rastlin iz akcesij divjih južnoameriških vrst so bili razmnoženi na tobakovih rastlinah (*Nicotiana tabacum* cv. *Xanthi-nc*). Inokulacija je bila opravljena, ko so poskusne rastline imele razvitih 8 do 10 listov. Vsakič smo okužili sedem rastlin posamezne akcesije divjih rastlin rodu *Solanum*. Po okuževanju smo izvajali opazovanje pojavljanja značilnih znamenj okužbe. Pet tednov po okužbi so bile vse rastline testirane na zastopanost preučevanega virusa s serološko metodo z uporabo DAS-ELISA testa. Uporabljena oprema in material za izvedbo testiranja (KIT) je bila od proizvajalcev Loewe Biochemica in Boehringer Mannheim. Meritve absorbcije - ekstinkcije so bile izvedene pri valovni dolžini 405 nm s čitalcem proizvajalca LabSystem Multiscan ELISA reader. Vzorce smo obravnavali kot pozitivne, če so bile odčitane absorbcijske vrednosti dvakrat večje od tistih pri vzorcih iz neokuženih rastlin. Okužbe smo dodatno dokazovali z re-inokulacijo neokuženih rastlin tobaka (*Nicotiana tabacum* cv. *Xanthi-nc*) s sokom iz okuženih rastlin divjih *Solanum* vrst. Vse akcesije preučevanih divjih *Solanum* vrst so se izkazale kot občutljive na okužbe z preučevanim različkom PVY<sup>NTN</sup> saj so okužene rastline kazale znamenja značilnega mozaika, presvetlitve žil in nekroze žil. V poskusu smo dokazali možnost razvoja virusa PVY<sup>NTN</sup> v novih gostiteljih iz skupine divjih ameriških vrst rodu *Solanum* (nove kombinacije kompatibilnih gostiteljev in virusa).

Ključne besede: virus PVY<sup>NTN</sup>, odpornost, občutljivost, *Solanum* sp., DAS-ELISA, odnos gostitelj-patogen

### ABSTRACT

#### SUSCEPTIBILITY OF SOUTH AMERICAN WILD *SOLANUM* SPECIES TO *POTATO VIRUS Y* (PVY)

The NTN strain of *Potato virus Y* (PVY<sup>NTN</sup>) is economically the most important potato pathogen virus in Hungary.

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The susceptibility of 5 (*Solanum avilesii* PI. 498092, *S. candolleanum* PI. 498226, *S. clarum* PI. 283099, *S. mochiquense* PI.: 338616, *S. phureja* PI.: 320360) South American wild *Solanum* species and accessions to NTN strain of PVY (PVY<sup>NTN</sup>) were studied using symptomatology, DAS ELISA and biotest methods.

All of studied *Solanum* accessions were susceptible to PVY<sup>NTN</sup> showing mosaic, vein clearing and vein necrosis symptoms. In our experiments new compatible host-virus relations among *Solanum* accession and PVY<sup>NTN</sup> have been found.

**Key words:** *Potato virus Y*, *Solanum* species, susceptibility, DAS-ELISA

## 1. INTRODUCTION

*Potato virus Y* (PVY) is the type member of *Potyvirus* genus in the family Potyviridae, which is economically the most important family of plant viruses (Shukla *et al.*, 1994). The potato tuber necrotic ring spot disease (PTNRD) was first described in Hungary by Beczner *et al.*, (1984). The new strain was named by Horváth (1992) which was accepted by the Virology Section of EAPR (European Association for Potato Research). The acronym of this new strain is: PVY<sup>N(cw) T(uber) N(ecrosis)</sup>=PVY<sup>NTN</sup>. During the past twenty years the virus strain distributed all over the world (Takács 2001). In Hungary the most common PVY strain is the PVY<sup>NTN</sup> (Wolf and Horváth 2000). Due to the destructive and resistance breaking nature of potato tuber necrotic ring spot strain, the search of resistance sources and for new host species has special importance (Kerlan 1993, Horváth 2003). The objective of this study was to identify potential resistance sources or new host species among the wild *Solanum* species.

## 2. MATERIAL AND METHODS

The susceptibility of 5 (*Solanum avilesii* PI. 498092, *S. candolleanum* PI. 498226, *S. clarum* PI. 283099, *S. mochiquense* PI.: 338616, *S. phureja* PI.: 320360) South American wild *Solanum* species and accessions to NTN strain of PVY (PVY<sup>NTN</sup>) were studied.

The original Maradona isolate of PVY<sup>NTN</sup> was used for infection. PVY<sup>NTN</sup> was propagated previously on *Nicotiana tabacum* cv. *Xanthi-nc* plants. *Solanum* species and their accessions were mechanically inoculated at 8-10 leaves stage with PVY<sup>NTN</sup>. Seven plants of each accession were inoculated in each time. The inoculated plants were symptomatologically checked after inoculation. Five weeks after mechanical inoculation, accessions were tested serologically by DAS-ELISA (Clark and Adams 1977). Kits for ELISA derived from Loewe Biochemica and Boehringer Mannheim. Substrate absorbance was measured at 405 nm on Labsystem Multiscan ELISA reader. Back inoculation (biotest) was also made to *Nicotiana tabacum* cv. *Xanthi-nc* plants. Accessions were considered extreme resistant, if the symptoms could not be seen, biological tests were unsuccessful and the absorbance values of the infected samples did not exceed twice those of the healthy control ones.

## 3. RESULTS AND DISCUSSION

All of studied *Solanum* accessions were susceptible to PVY<sup>NTN</sup> showing mosaic, vein clearing and vein necrosis symptoms (Table 1.). In our experiments new compatible host-virus relations among *Solanum* accession and PVY<sup>NTN</sup> have been found.

Table 1. PVY susceptibility of the wild *Solanum* species

<i>Solanum</i> species	Accessions	Symptoms*		Absorbance	Biotest
		Local	Systemic		
<i>Solanum avilesii</i>	498092	-	M	1,779	+
<i>Solanum candolleianum</i>	498226	-	M	1,378	+
<i>Solanum clarum</i>	283099	-	M	1,713	+
<i>Solanum mochiquense</i>	338616	-	M	1,758	+
<i>Solanum phureja</i>	320360	Vn	Vc	2,341	+
+ Control				2,152	
- Control				0,129	

\*M: mosaic, Vc: vein clearing, Vn vein necrosis

In earlier studies of wild *Solanum* species there were found some local hypersensitive and extreme resistant accessions. That could be used as sources of resistance and study of the PVY resistance genes for the potato breeding (Horváth 1968, 1988, Horváth, 1994, Horváth and Wolf, 1991, 1994, 1995, Bősze *et al.*, 1996, Takács 2001). Reaction of some wild *Solanum* species and accessions to different viruses is unknown so far, therefore further studies are necessary in this respect.

#### 4. ACKNOWLEDGMENT

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