

Short Communication

Incidence of Potato Virus X (PVX), Potato Virus Y (PVY), Potato Virus S (PVS) on Potato Cultivars in Potato Growing Areas

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ABSTRACT

To assess the prevalence of Potato Virus X (PVX), Potato Virus Y (PVY) and Potato Virus S (PVS), 216 leaf samples of potato varieties viz: Cardinal, Diamont and Desiree were collected from three localities of Sahiwal, Pak Pattan and Faisalabad Districts during 2004 - 05, and analyzed using ELISA. Results indicated that PVX recovery (8.25 to 9.6%) was at par in samples from all districts, while PVY and PVS recovery were substantially higher in samples from Sahiwal compared to other districts. As regard varieties, maximum PVX was detected in samples of Diamont and Desiree irrespective to localities, Diamont and Cardinal had more PVS recovery, while PVY was highest in Cardinal, followed by Desiree.

Key Word: Potato viruses; PVX; PVY; PVS; Localities; Varieties; ELISA

INTRODUCTION

Potato (*Solanum tuberosum* L.) is one of the most important vegetable crops grown in extensive areas in the world by virtue of its high tonnage, nutritional value and enormous consumption. In Pakistan, potato is produced 1854.7 thousands tones from 112.7 thousands hectares (Anonymous, 2004 - 05) Almost 85% of potato area and production of Pakistan is achieved from Punjab from districts of Sahiwal, Pak Pattan, Faisalabad, Okara and Sialkot.

Low yield of Potato is attributed to many factors, of which potato viruses play an important role (Hussain *et al.*, 1997). Mughal and Khalid (1985) stated that 83% losses were due to viruses in Pakistan. Mughal *et al.* (1988) detected eight Potato viruses in Pakistan including PVX and PVY through ELISA. Ahmad and Ahmad (1995) found PVX, PVY and PVS as major viruses. Jan and Khan (1995) reported prevalence of PVX, PVY and PLRV infecting commercially grown potatoes in upper Kaghan valley of Pakistan. Ahmad *et al.* (2003) collected 1272 leaf samples from seven main potato growing districts of Punjab, 13.18% and 23.06% samples were found infected with PVX and PVY, respectively.

Use of virus infected seed always produces poor crop. With the use of diseased seed tuber perpetuated viruses increase rapidly and tubers also lose vigor. Previously a number of studies were carried out for the detection of viruses and their occurrence to overcome the problem of

low yield (Anwar & Mirza, 1984; Richter *et al.*, 1987; Jan *et al.*, 1994). The present study was designed to determine the prevailing situation of potato viruses on commercially grown cultivars in different potato growing areas of Punjab. This study would be helpful to monitor and identify the viruses in various cultivars of potato for a specific area.

MATERIALS AND METHODS

Two hundred and sixteen leaf samples of three varieties of potato i.e. Cardinal, Diamont and Desiree from three locations namely Sahiwal, Faisalabad and Pak Pattan were randomly collected under field conditions during 2004 - 05. There were 24 samples of each variety from the locations. The leaf samples were tested in laboratory of Federal Seed Certification and Registration Department, Sahiwal against PVX, PVY and PVS through Enzyme linked Immuno-Sorbent Assay (ELISA). The results were read as optical density at 405 nm using ELISA reader. The data were statistically analyzed by ANOVA and LSD test was applied to compare the means.

RESULTS AND DISCUSSION

Detection of PVX, PVY and PVS through ELISA. Potato virus X infection varied greatly among the varieties. Maximum PVX was detected from the samples collected from Sahiwal and Pak Pattan followed by Faisalabad (Table I). Desiree and Diamont were highly infected with PVX irrespective to localities. Maximum PVX was found in

Desiree samples, giving 20.8% infection from Sahiwal, 8.33% from each Faisalabad and Pak Pattan. Diamont had 8.33% virus recovery from Sahiwal, 12.5% from Faisalabad and 16.67% from Pak Pattan (Table I). Minimum (4.16%) PVX was recorded in cardinal from Faisalabad and Pak Pattan locations, while samples from Sahiwal were free from infection.

The percentage recovery of PVY also differed among the localities and varieties, and highest incidence of PVY was noted from Sahiwal followed by Pak Pattan and Faisalabad (Table I). Maximum PVY recovery (41.67%) was detected in the samples of each Cardinal and Desiree followed by Diamont from Sahiwal. Samples of Cardinal, Diamont and Desiree from Faisalabad showed similar PVY infection (12.5%). Samples of Cardinal and Diamont from Pak Pattan indicated 16.67% virus recovery followed by Desiree having 4.17% virus infection.

Potato virus S differed significantly among the localities and varieties. Samples from Sahiwal showed significantly higher PVS infection. PVS recovery was statistically similar from the samples of Pak Pattan and Faisalabad (Table I). The PVS infection was recorded 12.5% in the samples of Diamont and Desiree from Faisalabad and Desiree from Pak Pattan. Cardinal and Diamont from Pak Pattan showed 25% PVS followed by Cardinal from Faisalabad having 16.67%. Samples from Sahiwal indicated 41.67, 45.83 and 33.33% PVS infection in Cardinal, Diamont and Desiree, respectively (Table I).

Evaluation of seed potato against PVX, PVY and PVS. L. localities had non-significant variation for the presence of PVX. Maximum PVX (9.6%) was recovered from the samples of Sahiwal and Pak Pattan followed by 8.25% from Faisalabad. In case of PVY, localities had significant variation. Results indicated that samples from Sahiwal had higher PVY (34.6%). Samples collected from Faisalabad and Pak Pattan were at par statistically with 12.5% PVY (Table II). There was a significant variation among the locations for PVS. Samples from Sahiwal had also substantially higher PVS infection (40.25%), followed by Pak Pattan and Faisalabad i.e. 20.75% and 13.8%, respectively (Table II).

This study clearly showed that infection of PVX, PVY and PVS prevailed in all localities with different percentages. All potato varieties were infected with PVX, PVY and PVS. Similar results were reported by Mughal and Khalid (1985), who detected eight Potato viruses including PVX and PVY. Ahmad *et al.* (2003) also detected PVY and PVY at different percentage on different varieties. Burhan *et al.* (2006) reported prevalence of PVX, PVY in samples taken from three sources i.e., Punjab Seed Corporation, Ayub Agricultural Research Institute Faisalabad and National Institute for Biology and Genetic Engineering of potato seed production. It is concluded that to enhance the potato yield and quality, virus free potato seed must be produced and distributed among the growers by the responsible agencies.

Table I. Detection of PVX, PVY and PVS through ELISA from 24 samples

Varieties	Localities	Detection through ELISA			% age Recovery		
		PVX	PVY	PVS	PVX	PVY	PVS
Cardinal	Sahiwal	0	10	10	0	41.67	41.67
	Faisalabad	1	3	4	4.17	12.5	16.67
	Pak Pattan	1	4	6	4.17	16.67	25.00
Diamont	Sahiwal	2	5	11	8.33	20.83	45.83
	Faisalabad	3	3	3	12.50	12.50	12.50
	Pak Pattan	4	4	6	16.67	16.67	25.00
Desiree	Sahiwal	5	10	8	20.83	41.67	33.33
	Faisalabad	2	3	3	8.33	12.50	12.50
	Pak Pattan	2	1	3	8.33	4.17	12.50

Table II. Evaluation of seed potato against PVX, PVY and PVS

Localities	PVX		PVY		PVS	
	Mean	% recovery	Mean	% recovery	Mean	% recovery
Sahiwal	0.77 a	9.6	2.77 a	34.6	3.22 a	40.25
Faisalabad	0.66 a	8.25	1.00 b	12.5	1.11 b	13.8
Pak Pattan	0.77 a	9.6	1.00 b	12.5	1.66 b	20.75
LSD	0.81		1.28		0.898	

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