

Pattern of development of viral diseases of potato in indo-gangetic plains of West Bengal

A. CHAKRABORTY¹ AND B.K. DE²

¹AICRP on Potato, Directorate of Research, BCKV, Kalyani 741235, Nadia, West Bengal and ²Department of Plant pathology, Bidhanchandra krishi Viswavidyalaya, Mohanpur, 741252, Nadia, West Bengal

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After the initial appearance of symptoms of mild mosaic (PVX), severe mosaic (PVY) and leaf roll (PLRV), the increment of PVX, PVY and PLRV incidence increased up to three succeeding weeks in all the varieties namely K. Ashoka, K. Pukhraj, K. Pushkar, K. Surya and Atlantic. The rate per week increment of disease incidence varied depending upon variety. During 2nd and 3rd week, after the initial appearance of PVX, PVY and PLRV symptoms, the disease increased at increasing rate. During 4th week the disease increased at decreasing rate and stopped in all the varieties at the last stage.

Key words: Developmental pattern, Viral diseases, West Bengal

INTRODUCTION

Potato is the main food crop in West Bengal next to cereals. At present West Bengal ranks second in production in India next to U.P. But not a single variety can maintain its full yield potential year after year. This is mainly due to viral diseases. The losses in potato yield due to one or more viruses may vary from low to very high (Khurana and Singh, 1986). Reduction in yield of K. Chandramukhi due to PVX, PVY and PLRV was found to be 25.9 to 48.6%, 59.6 to 77.9% and 59.6 to 68.7% respectively in the plains of West Bengal (Biswas *et al.*, 2003). Continuous use of same seed stocks for several years in the areas with high aphid population and lack of adopting practices for management of virus result in 100 per cent infection of the seed stock in 3-4 years and lowering down their yield potential to almost 50% (Khurana and Garg, 1992). It has been reported that PLRV affect different yield components with 50% reduction in the number of tubers, 46-73% reduction in tuber diameter and 45.15% loss in tuber weight (Devi, 2002). Keeping all these views in mind the present investigation has been carried out to find out the weekly increment of potato viruses (PVX, PVY and PLRV) so that adjustment in date of planting can be made in such a way that the crop attains its full growth stage before the per cent incidence of disease reaches at its peak.

MATERIALS AND METHODS

The present experiment was conducted at Adisaptagram Block seed Farm, Hooghly during 2006-07 and 2007-08 crop season. Five varieties viz. K. Ashoka, K. Pukhraj, K. Pushkar, K. Surya and Atlantic were selected for this experiment and each variety was planted in separate plot measuring 5 m × 4m. The spacing was maintained at 60 cm × 20 cm. The potato seed tubers were planted during 26th of November each year.

The disease incidence (%) on five different varieties i.e. K. Ashoka, K. Pukhraj, K. Pushkar, K. Surya and Atlantic were recorded carefully during 2006-07 and 2007-08 crop season. The incidence (%) of virus diseases (PVX, PVY and PLRV) was recorded at weekly interval on the basis of visible symptoms after the first appearance of the disease due to infection of viruses. The first observation was taken 45 days after planting of seed tubers and this process of recording disease incidence (%) was continued up to 75 days after planting i.e. nearing maturity. The percentage of disease incidence was calculated by using the following formula :

$$\text{Disease incidence(\%)} = \frac{\text{Number of infected plants}}{\text{Total number of plants observed}} \times 100$$

RESULTS AND DISCUSSION

The weekly increment of PVX, PVY and PLRV with respect of different varieties are presented in Table 1. PVX incidence of K. Ashoka, K. Pukhraj and K. Surya increased at increasing rate followed by increase at decreasing rate i.e. (0.48% → 1.44% → 2.88% → 1.44%, 0.51% → 1.02% → 2.04% → 1.02% and 0.00% → 1.61% → 1.07% respectively. PVX incidence on K. Pushkar increased at increasing rate, then increased at constant rate followed by increase at decreasing rate i.e., 0.63% → 1.26 → 1.26% → 1.02%. But PVX incidence on variety Atlantic increased at constant rate followed by increase at decreasing rate i.e., 0.00% → 1.06% → 1.06 → 0.53%.

PVY incidence on K. Ashoka increased at constant rate for two weeks after initial appearance of symptoms and then increased at increasing rate followed by increase at decreasing rate (1.44% → 1.44% → 1.92% → 0.96%). similar pattern of development was noted in case of K. Pukhraj

(1.02% → 1.53% → 1.53% → 1.02%). In K. Pushkar variety PVY appeared late and after first appearance disease increased at increasing rate followed by increase at decreasing rate 0.00% → 1.89% → 2.53% → 0.63%). PVY incidence on K. Surya variety increased at increasing rate after initial appearance of disease and rate of increase remained constant for two weeks followed by increased at increasing rate (0.53% → 1.07% → 1.07% → 1.61%). In K. Ashoka, K. Pukhraj, K. Pushkar, K. Surya and Atlantic the rate of PLRV incidence increased at increasing rate up to 3rd week after initial appearance of disease followed by increase at decreasing rate, i.e. 1.44% → 1.44% → 1.92% → 0.96%, 0.51% → 1.02% → 2.04% → 1.02%, 0.00% → 1.89% → 2.53% → 0.63%, 1.07% → 2.68% → 3.22% → 1.07% and 1.60% → 4.25% → 6.40% → 2.12% respectively.

From the above experiment it can be concluded that pattern of development of three viral diseases namely mild mosaic (PVX), severe mosaic (PVY) and leaf roll (PLRV) was slow at initial stage then

Table 1 : Weekly increment of mild mosaic (PVX), severe mosaic (PVY) and Leaf roll (PLRV) diseases on different varieties of potato (pooled data of 2006-07 and 2007-08)

Week of observation	Increase of disease incidence (%) after first appearance of symptoms on different varieties														
	K. Ashoka			K. Pukhraj			K. Pushkar			K. Surya			Atlantic		
	PVX	PVY	PLRV	PVX	PVY	PLRV	PVX	PVY	PLRV	PVX	PVY	PLRV	PVX	PVY	PLRV
Jan II - Jan III	0.48	1.44	1.44	0.51	1.02	0.51	0.63	0.00	0.00	0.00	0.53	1.07	0.00	0.00	1.60
Jan III - Jan IV	1.44	1.44	1.44	1.02	1.53	1.02	1.26	1.89	1.89	0.00	1.07	2.68	1.06	0.53	4.25
Jan IV - Jan V	2.88	1.92	1.92	2.04	1.53	2.04	1.26	2.53	2.53	1.61	1.07	3.22	1.06	1.06	6.40
Feb I - Feb II	1.44	0.96	0.96	1.02	1.02	1.02	0.63	0.63	0.63	1.07	1.61	1.07	0.53	1.06	2.12

disease increased rapidly and continued up to mid growth stage of the crop. After that development of disease declined and stopped in between 70-75 days after planting and this may be due to matured plant resistance.

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