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Studies on Viral Diseases and their Management on Potato

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ABSTRACT

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Eight potato germplasm viz., Kufri Chipsona-1, Kufri Chipsona-2, Kufri Chandramukhi, Kufri Jyoti, Kufri Anand, Atlantic, Kufri Surya and Kufri Pukhraj were studied for viral disease on different treatment. The experiment was on Randomized block design with three replications at Adisaptagram block seed farm, Hooghly, department of Agriculture, Govt. of West Bengal.

Introduction

Potato is one of the important Solanaceous vegetable, not only in India but also in all over world. In India potato is most popular vegetable. For the production of starch and alcohol potatoes are used as raw material in different industry. More or less all states growing potato.

This crop can grow in huge diversified agroclimatic zones. Due to high production potential per unit area and time with high material value. This crop has special significance to the developing countries. Potato is cultivated from about 1.4 million ha. Land with production of about 25 million tonnes and 17.86 tonnes per hectare productivity Panda and Sarkar (2005).

Sometime potato production is affected by various kinds of viruses. Multiplication of these viruses is very rapid under favourable condition, ultimately cause significant yield loss as well as economic damage.

Materials and Methods

The field experiment was conducted at Adisaptagram Block Seed Farm, Hooghly, West Bengal. In the present study eight germplasms were taken.

The experiment was laid out Randomized Block Design with three replications. The plot size were 6m × 2m with 60 cm row and 20 cm inter row spacing. The data were recorded on 10 randomly selected plants from per treatment per plots.

Results and Discussion

Eight potato germplasms were collected from different sources for this experiment. The detailed observation of different field experiments of potato are presented here in respective sub heads.

Incidence of viral disease on different potato germplasms

A number of viral disease viz, mild mosaic, severe mosaic and leaf roll were recorded to infect different potato germplasms in this locality. In the crop season i.e. from the month of November, 2007 to March, 2008, separate account for each viral disease was not mentioned. Only parent viral disease incidence on each germplasms was recorded. During the present investigation, the initial infection of viral disease were first observed in first and second week of January in Kufri Chandramukhi (1.00%), Atlantic (0.33%), Kufri Pukhraj (0.33%), Kufri Jyoti (1.00%) and end of January, almost all the germplasms were more or less infested by disease, except Kufri Chipsona-1 and Kufri Chipsona-2 (Table 1). In Kufri Chipsona-1 and Kufri Chipsona-2, the disease incidence was appeared during first and second week of February, respectively. However, the percentage disease incidence was increased with the growing age of the crop and thus reached the peak at the time of dehaulming. The viral disease incidence was found maximum in Kufri Pukhraj (36.66%) which was followed by Kufri Chandramukhi (25.00%), Atlantic (21.33%), Kufri Jyoti (18.00%), Kufri Surya (9.33%), Kufri Anand (8.66%), Kufri Chipsona-1 (6.00%) and Kufri Chipsona-2 (5.33%), respectively. More or less similar type of results were obtained when mean percent viral disease incidence was considered. The incidence of different viral disease was also varied from one germplasms to another. But the infection of leaf curl

disease was not found in all germplasms except Kufri Chandramukhi and Kufri Pukhraj but the intensity of infection was very low.

Similar type of incidence pattern of viral disease on potato in the plains of West Bengal also observed by Biswas *et al.*, (1990), Konar *et al.*, (2001), Paul and Konar (2003).

From the Table 1 it has been revealed that out of these eight potato germplasms, Kufri Pukhraj was most susceptible to various viral diseases by showing 36.66% infection, while Kufri Chipsona-2 was least susceptible (5.33% infection). In addition to this, Kufri Chandramukhi (25.00%), Atlantic (21.33%), and Kufri Jyoti (18.00%) were also found highly susceptible, Kufri Surya (9.33%) and Kufri Anand (8.66%) were moderately susceptible and Kufri Chipsona-1 (6.00%) was less susceptible to these viral disease. Lakra (2003) also reported that Kufri Badsha was more susceptible to apical leaf curl disease than Kufri Pukhraj.

Percent viral disease incidence on potato under different treatment schedules

Four different viral disease viz., mild mosaic, severe mosaic, leaf roll and apical leaf curl were found to infect the potato crop in this locality. In this experiment separate second for each viral disease was not maintained, only the percent viral disease infection under treatments were recorded for a crop growing season from the month of November, 2007 to March, 2008 and the results are presented in Table 2.

The Table 2 indicated that, all the treatment schedules were significantly superior over control in reducing the disease incidence. The main percentage of viral disease was maximum in T₁ i.e. control (6.89%), followed by T₅ (3.45%), T₄ (3.12%), T₂ (2.81%) and T₃ (2.04%), respectively.

Table.1 Percent viral disease incidence on different potato germplasms during 2007 – 2008

Different germplasms	Population of the pest on different dates of observation													
	December, 2007				January, 2008				February, 2008				March, 2008	Mean
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	
Kufri Chipsona-1	0	0	0	0	0.00 (4.05)	0.00 (4.05)	0.00 (4.05)	0.00 (4.05)	0.33 (5.04)	2.33 (8.74)	3.66 (11.02)	4.33 (11.99)	6.00 (14.15)	1.28
Kufri Chipsona-2	0	0	0	0	0.00 (4.05)	0.00 (4.05)	0.00 (4.05)	0.00 (4.05)	0.00 (4.05)	1.66 (7.33)	3.33 (10.49)	4.00 (11.48)	5.33 (13.34)	1.10
Kufri Chandramukhi	0	0	0	0	1.00 (7.03)	2.33 (9.66)	5.00 (13.53)	9.66 (18.56)	12.66 (21.25)	16.00 (23.75)	18.33 (25.35)	21.66 (27.74)	25.00 (29.99)	8.58
Kufri Jyoti	0	0	0	0	0.00 (4.05)	1.00 (7.03)	2.33 (9.66)	4.66 (13.12)	6.33 (15.09)	9.66 (18.11)	13.00 (21.12)	17.33 (24.60)	18.00 (25.09)	5.56
Kufri Anand	0	0	0	0	0.00 (4.05)	0.00 (4.05)	0.66 (6.04)	1.33 (7.72)	2.66 (10.22)	3.00 (9.88)	5.66 (13.75)	8.00 (16.40)	8.66 (17.08)	2.30
Atlantic	0	0	0	0	0.33 (5.05)	2.00 (8.97)	3.66 (11.76)	5.33 (13.97)	10.00 (18.89)	12.66 (20.84)	16.33 (28.83)	19.00 (25.84)	21.33 (27.51)	6.97
Kufri Surya	0	0	0	0	0.00 (4.05)	0.00 (4.05)	1.00 (7.03)	2.66 (10.22)	3.33 (11.27)	4.66 (12.46)	5.33 (13.34)	7.00 (15.32)	9.33 (17.78)	2.56
Kufri Pukhraj	0	0	0	0	0.33 (5.05)	3.66 (11.76)	7.00 (15.87)	9.66 (18.59)	13.33 (21.83)	17.66 (24.85)	24.00 (29.33)	31.33 (34.04)	35.66 (37.27)	11.04
Source of variation														
	Date of observation				Variety				Date of observation and variety					
SEm(±)	0.21				0.29				0.58					
CD 0.05	0.57				0.81				1.62					

Table.2 Percent viral disease incidence on potato under different treatment schedules during 2007 – 2008

Treatment Schedules	Population of the pest on different dates of observation													Mean	Percent decrease over control
	December, 2007				January, 2008				February, 2008						
	I	II	III	IV	I	II	III	IV	I	II	III	IV			
T ₁	0	0	0	4.20 (4.79)	2.00 (9.01)	3.25 (10.29)	6.50 (14.76)	8.25 (16.64)	10.75 (19.13)	15.00 (22.78)	17.50 (24.72)	19.25 (26.01)	6.89	-	
T ₂	0	0	0	0.00 (4.05)	1.00 (7.03)	2.25 (8.59)	3.25 (10.29)	4.25 (11.84)	5.00 (12.89)	5.50 (13.49)	6.00 (14.15)	6.50 (14.76)	2.91	59.21	
T ₃	0	0	0	0.00 (4.05)	0.00 (4.05)	2.00 (7.99)	2.50 (9.05)	3.00 (9.90)	3.50 (10.64)	4.00 (11.49)	4.50 (12.15)	5.00 (12.89)	2.04	70.39	
T ₄	0	0	0	0.00 (4.05)	1.50 (8.06)	2.50 (9.05)	3.75 (11.10)	5.00 (12.89)	5.75 (13.84)	5.50 (13.49)	6.00 (14.15)	7.50 (15.85)	3.12	54.71	
T ₅	0	0	0	0.00 (4.05)	1.75 (8.58)	2.75 (9.51)	3.75 (11.10)	5.25 (13.20)	6.00 (14.15)	6.25 (14.45)	7.25 (15.61)	8.50 (16.92)	3.45	49.93	
SEm(±)	-	-	-	0.06	0.53	0.64	0.69	0.68	0.67	0.72	0.62	0.65	-	-	
CD 0.05	-	-	-	0.19	1.65	1.99	2.12	2.09	2.08	2.21	1.91	1.99	-	-	

Figures in parenthesis are angular transformed values

The lowest percentage of viral disease incidence was recorded in T₃ (5.0%), followed by T₂ (6.5%), T₄ (7.5%), T₅ (8.5%) and T₁ (19.52%), respectively. Where as in case percentage of decrease of disease was found maximum in T₃ (70.39%), which was followed by T₂ (59.21%), T₄ (54.71%) and T₅ (49.93%) respectively.

It is evident from the Table 2 that all the treatments were significantly superior over control in reducing the viral disease infection. The peak percentage of viral disease incidence was obtained minimum in T₃ (5.0%) and T₂ (6.5%) than other treatments Hence, it can be inferred that in the plots treated with either only chemical or non-chemical insecticides, the viral disease incidence was lowest than the plots. Which were mainly treated with non chemical insecticides. It is due to lower population of virus vector i.e. sever mosaic and leaf roll and white fly for apical leaf curl disease in chemical insecticides treated plots. Verma *et al.*, (1998), Biswas *et al.*, (2004) & Paul and Konar (2006) also recorded lower infection rate of viral disease on potato crop, when treated with chemical insecticides as they maintained the vector population under control.

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