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PERFORMANCE OF SEED POTATO PRODUCED FROM SPROUT CUTTING, STEM CUTTING AND CONVENTIONAL TUBER AGAINST PVY AND PLRV*

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Abstract

The performance of seed tubers harvested from potato plants grown from sprout cutting, stem cutting and conventional seed tubers against PVY and PLRV were investigated. Sprout cutting, stem cutting and conventional seed tubers of variety Diamant were planted and second and third generation seed tubers were harvested. The least incidence of PVY and PLRV was recorded when seed tubers from sprout cutting were used. Whereas, the highest incidence of the viruses was observed where conventional seed tubers wete planted. Incidence of PVY, PLRV and their mixed infection was lower in earlier generations as compared to later generations. Performance of seed tubers produced from sprout cutting was better in respect of plant growth, tuber number and tuber yield per hill as compared to seed tubers obtained from stem cutting or conventional method.

Key Words: Sprout cutting, stem cutting, PVY, PLRV, growth, yield, potato.

Introduction

Potato *(Solanum tuberosum* L.) is globally an important commercial crop grown almost all over the world. It is a staple food in some countries. Potato is used as a vegetable crop in many countries. As an industrial crop, potato is a raw material of various food and confectioneries. It is used to produce dextrose. Potato is the third largest food and vegetable crop in Bangladesh (Hussain, 1995).

Remarkable yield loss of potato is attributed to various diseases all over the world. The potato is known to be infected by as many as 175 diseases besides several physiological disorders (Wellman, 1972). Of which, virus diseases are regarded as the most important ones. As many as 25 important virus diseases have been reported to infect potato crop (Hooker, 1987). Among them, *Potato leaf roll virus* (PLRV), *Potato* virus *Y* (PVY), *Potato virus M* (PVM), *Potato virus A* (PVA) and *Tobacco mosaic virus* (TMV) are of immense importance in causing yield loss of potato all over the world (Singh, 1980; Hooker, 1987). In Bangladesh, at least seven viruses, namely PVY, PLRV, PVX, PVS, PVM, PVA and TMV infect potato (Ali and Khan, 1990). Out of seven viruses, PVY and PLRV have been found to be the two most important viruses affecting the yield

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and quality of potatoes (Hossain *et al,* 1994). The occurrence of PVY and PLRV in all the potato growing countries has been recognized as a severe menace of potato cultivation in all the potato growing regions of the world (Pushkarnath, 1976; Singh, 1980; Hooker, 1981; Bhandal and Naik, 1991). PVY is the second most important virus disease, which occur worldwide after PLRV (Anon., 2006). Both the viruses are tuber-borne resulting degeneration (Singh, 1980; Singh and Khurana, 1980; Hooker, 1987; Brunt *et al.,* 1990).

Yield loss in potato due to *PVY* and PLRV is a regular feature. In India, PVY and PLRV singly reduced potato yield up to 60-75% (Gupta *et al.,* 1985). Hoa *et al.* (1991) reported that moderate infection and severe infection due to PVY, respectively, caused 49% and 61% yield loss in the Philippines under low land field condition. Yield loss due to PVY raised upto 95% with severe infection in Bangladesh (Hossain and Ali, 1992). With 100% infection of PLRV, yield loss was recorded upto 78% (Hossain *et al.,* 1994) and only 30% infection with PVY in variety Cardinal may cause 35% yield loss (Hossain and Ali, 1993) in Bangladesh.

The degeneration problem of potato seed tubers due to PVY and PLRV is considered to be the most severe constraint of potato cultivation resulting spontaneous yield deterioration of the crop (Singh *et al.,* 1982). The degeneration became faster when aphids remained above the critical level throughout the cropping season (Sawicka, 1994). These two viruses have also been reported to be highly prevalent in Bangladesh (Rashid *et al.,* [986).

Every year, Bangladesh Government imports E-class potato seed tuber from Holland by costing a huge amount of foreign currency, which is said to be virus free. Bangladesh Agricultural Development Coiporation (BADC) multiplies them to produce foundation and certified seeds. The certified potato seed tubers produced by BADC are distributed to the farmers for potato cultivation. However, recently BADC is trying to produce virus free seed potato by using sprout cutting and stem cutting from *E-class* seed. It has also been claimed by BADC that the seed potato tubers produced by sprout cutting and stem cutting are similar to E-class seed potato tubers imported from Holland in respect of *PVY* and PLRV infection. So the effects may be useful to avoid the import of large amount of E-class seed potato at the cost of huge amount of foreign exchange. Moreover, such efforts would also be highly sustainable for the production of potato *since* it might ensure the supply of virus free seed potato to the farmers on time. However, the seed potato tubers obtained from sprout cutting and stem cutting have not yet been properly evaluated against PVY and PLRV, the two important viruses of potato in Bangladesh. In view of the facts, the present study was undertaken to evaluate the performance of seed potato produced from sprout cutting, stem cutting and conventional tubers against PVY and PLRV infection.

Materials and Method

Second and third generation seed potato tubers produced from sprout cutting, stem cutting and conventional tubers of E-class seed were obtained from Foundation Seed Potato Production Farm, BADC, Domar. The variety was Diamant. The experiment was conducted at the experimental field of Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Salna, Gazipur, during 2004-05 using 2 and 3 generation seed tubers. It was repeated during 2005-06 using 3rd and 4th generation seed tubers produced and preserved in the previous year.

Fertilizers were applied at 350-250-270-120-120-106 kg/ha of urea, TSP, MP, gypsum, magnesium sulphate, zinc sulphate and borax, respectively, as recommended for Bangladesh (Anon., 2004). One half of urea and full dose of all other fertilizers were applied at the time of planting. Other half of urea was applied as side dressing after 35 days of planting when first earthing up was done. During land preparation, cowdung was applied at 10 t/ha. In both the years, seed tubers were planted on 23 November. During both the crop seasons of 2004-05 and 2005-06, seed tubers were preserved in the cold storage. Whole tubers were planted maintaining 60 cm row to row and 25 cm seed to seed distances. The experiment was laid out following randomized complete block design (RCBD) with four replications. The unit plot size was 3m × 3m. Intercultural operations, such as irrigation, weeding, mulching, and earthing up were done as and when necessary. Fungicide, Dithane M-45 was applied at 0.25% to protect the crop from fungal diseases. No insecticide was used in the field. Before haulm pulling, virus infected plants were identified studying symptoms of the diseases and confined using indicator plants (Hill, 1984) and DAS-ELISA following the fundamental protocol outlined by Clark and Adams (1977) and modified by Akanda *et al.* (1991). Symptoms appeared on infected plants were compared with standard symptoms of PVY and PLRV (Hooker, 1981). Ninety days after planting, the crop was harvested. Data on the incidence of PVY and PLRV, plant height, stem number, tuber number and tuber yield per plant were recorded. Subsequently, the tuber obtained from sprout cutting were designated as sprout cutting tuber, the tuber obtained from stem cutting as stem cutting tuber and those obtained from traditionally cultivated crop from seed were designated as conventional tuber.

Disease incidence and yield loss was calculated using the following formula:

Disease incidence (%) = (Number of infected plants /Total plants) × 100

Yield reduction (%) = (A-B) /An × 100, where A = Yield of healthy plant, B = Yield of diseased plant.

Data were analyzed using Duncan Multiple Range Test.

Results and Discussion

Incidence of PVY and PLRV

In 2004-05 crop season, incidence of PVY under different treatments ranged 1.72- 582% and that of PLRV ranged 1.67-4.46%. The lowest incidence of PVY was recorded under T_5, which was followed by T_3, T_6 and T_1. The differences in its incidence under those treatments were not significant. Significantly the highest incidence of PVY was found under T_2 and the second highest was under T_4. The minimum incidence of PLRV was recorded under T_3, which was statistically similar to T_1, T_5 and T_6. The highest incidence of PLRV was found under T_2, which was followed by T_4. Effect of the two treatments on this parameter was significantly different and higher as compared to other four treatments. In case of mixed infection with PVY and PLRV, the highest incidence of 2.2% was found under T_2. It was statistically similar to T_1, T_4 and T_6. Plant with mixed infection was not observed under treatments T_5 (Table I).

In crop season 2005-06, trends in incidence of the two viruses were almost similar as recorded during 2004-05. The disease incidence increased to some extent under all treatments. It ranged 2.52-14.16%, 1 .66-9.99% and 1.67-4.58% due to infrction of PVY and PLRV and their mixed infection, respectively. In all cases, significantly highest incidence was observed under T_2 and the lowest under T_5 (Table 2). In general, incidence of PVY was greater than PLRV (Table 1 and 2).

Table 1. Incidence of PVY, PLRV and their mixed infection on sprout cutting, stem cutting and conventional tubers during 2004-05 crop season.

Treatment	Incidence (%)		
	PVY	PLRV	Mixed infection (PVY and PLRV)
T_1= Conventional tuber of 2nd generation	2.61 bc (1.74)	1.74 c (1.49)	1.79 a (1.51)
T_2= Conventional tuber of 3rd generation	5.82 a (2.51)	4.46 a (2.22)	2.22 a (1.56)
T_3= Stem cutting tuber of 2nd generation	2.08 bc (1.59)	1.67 c (1.47)	0.00 b (0.71)
T_4= Stem cutting tuber of 3rd generation	3.47 b (1.97)	2.63 b (175)	1.69 a (1.09)
T_5= Sprout cutting tuber of 2nd generation	1.72 c (1.29)	1.74 c (1.5)	0.0 b (0.71)
T_6= Sprout cutting tuber of 3rd generation	2.20 bc (1.63)	I .75 c (1.50)	1.81 a (1.51)

Means within the same column having a common letter(s) do not differ significantly (p=005) by DMRT. Data in the parenthesis are transformed values obtained through.square root transformation {√(n+0.5)].

Table 2. Incidence of PVY, PLRV and their mixed infection on sprout cutting, stem cutting and conventional tubers during 2005-06 crop season.

Treatment	Incidence (%)		
	PVY	PLRV	Mixed infection (PVY and PLRV)
T_1= Conventiona1tuber of 3rd generation	4.99 b (2.33)	333 b (1.96)	1.66 b (1.47)
T_2= Conventional tuber of 4th generation	14.16 a (3.81)	9.99 a (3.23)	4.58 a (2.25)
T_3= Stem cutting tuber of 3rd generation	4.58 b (2.25)	2.49 b (1.71.)	2.07 b (1.59)
T_4= Stem cutting tuber of 4th generation	5.95 b (2.47)	3.18 b (1.87)	1.50 b (1.41)
T_5= Sprout cutting tuber of 3rd generation	2.52 b (1.72)	1.66 c (1.47)	1.67 b (1.47)
T_6= Sprout cutting tuber of 4th generation	4.21b (2.12)	2.96b (1.85)	1.72b (1.49)

Means within the same column having a common letter(s) do not differ significantly (p=(0.05) by DMRT. Data in the parenthesis are transformed values obtained through square root transformation [√(n+0.5)]

Plant height

During both 2004-05 and 2005-06 crop seasons, the maximum plant height was recorded under T_3, which was followed by T_5 and T_4, where healthy seeds were planted. The differences in plant height among those three treatments were significant. Significantly the lowest plant height was recorded under T_2, which was followed by T_1. Similar trends in plant height were found under different treatments when PVY or PLRV infected seed tubers were planted. However, the parameter under treatments T_1-T_6 planted with healthy seed tubers was significantly higher as compared to PVY or PLRV infected seed tubers (Table 3 and 4).

It revealed that PVY and PLRV infected seed tubers caused reduction in plant growth as compared to plants grown from healthy seed tubers. Reduction due to PVY infected seeds ranged 25.08-36.13% during 2004-05, but the differences under six various treatments were not significant. In the same year, minimum reduction in plant growth was caused by PLRV under T_1, which was followed *by* T_2, T_6, T_4, T_5 and T_3 (Table 3). During 2005-06, reduction in plant height ranged 27.83-36.28% and 24.66-35.35% due to infection with PVY and PLRV, respectively (Table 4).

Table 3. Plant height of potato raised from healthy, PVY and PLRV infected tubers of sprout cutting, stem cutting and conventional seed tuber during 2004- 05 crop season.

Treatments	Plant height (cm)1			% Reduction[2]	
	Healthy	PVY	PLRV	PVY	PLRV
T_1= Conventional tuber of 2nd generation	61.55d	46.llfgh	47.22fg	25.08a	23.28bc
T_2= Conventional tuber of 3rd generation	58.33e	41.21i	44.06h	29.35á	24.45c
T_3= Stem cutting tuber of 2nd generation	74.24 a	47.42 fg	47.88 f	36.13 a	35.50 a
T_4= Stem cutting tuber of 3rd generation	64.44c	44.26h	45.57 fgh	31.31 a	29.27 b
T_5= Sprout cutting tuber of 2nd generation	71.11 b	45.66fgh	47.00fg	35.79 a	33.90 a
T_6= Sprout cutting tuber of 3rd generation	63.31 cd	44.14 h	45.22 gh	30.27 a	28.57 b

[1]Means within the same column and row having a common letter(s) do not differ significantly (p=0.05) by DMRT.

[2]Means within the same column having a common letter(s) do not differ significantly (P=0.05) by DMRT.

Table 4. Plant height of potato raised from healthy, PVY and PLRV infected tubers of sprout culling, stem cutting and conventional seed tuber during 2005- 06 crop season.

Treatments	Plant height (cm)[1]			% Reduction[2]	
	Healthy	PVY	PLRV	PVY	PLRV
T_1= Conventiona1tuber of 3rd generation	60.00 d	43.30 hi	44.25 ghi	27.83 c	26.24 bc
T_2= Conventional tuber of 4th generation	55.85 e	39.69j	42.08 i	28.93 c	24.66 c
T_3= Stem cutting tuber of 3rd generation	71.94 a	45.84 fg	46.47 f	36.28 a	35.40 a
T_4= Stem cutting tuber of 4th generation	62.60c	42.72 hi	43.71 ghi	31.75 abc	30.17 b
T_5= Sprout cutting tuber of 3rd generation	69.46b	44.94 fgh	44.90 fgh	35.30ab	35.35 a
T_6= Sprout cutting tuber of 4th generation	62.63 c	43.24 hi	43.14 hi	30.96 bc	31.11 ab

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Number of stems per hilt

During 2004-05 and 2005-06 crop seasons, number of stems per hill was higher in plants grown from healthy seed tubers as compared to PVY or PLRV infected seeds under all treatments. The differences under each of the treatments were significant (Table 5 and 6).

During 2004-05 crop season, stem number per hill grown from PVY or PLRV infected seed tubers under T_3 and T_5 was statistically similar but significantly higher as compared to other treatments. The lowest number was found under T_2, which was followed by T_4 and T_6. The reduction in stem number ranged 37.93-49.62% due to PVY infected tubers and 30.66-44.73% due to PLRV infected tubers under different treatments (Table 5).

During 2005-06, stem number under T_1, T_3 and T_5 was statistically similar but significantly higher as compared to rest of the treatments in case of PVY. When PLRV infected seed tubers were used, the lowest number of stems was recorded under T_2, which was statistically similar to T_4 and T_6. The treatments T_3 and T_5 produced significantly the highest number of stems (Table 6).

Table 5. Stem number of potato raised from healthy, PVY and PLRV infected tubers of sprout cutting, stem cutting and conventional seed tubers during 2004-05 crop season.

Treatments	Number of stems per hill[1]			% Reduction[2]	
	Healthy	PVY	PLRV	PVY	PLRV
T_1= Conventional tuber of 2nd generation	6.13 bc	3.75 fg	4.25 ef	38.82 ab	30.66 c
T_2= Conventional tuber of 3rd generation	5.56 c	2.81 h	3.25 gh	49.46 a	41.55 be
T_3= Stem cutting tuber of 2nd generation	7.25 a	4.50 de	4.75 de	37.93 ab	34.48 bc
T_4= Stem cutting tuber of 3rd generation	6.57 b	3.31 gh	3.75 fg	49.62 a	42.92 a
T_5= Sprout cutting tuber of 2nd generation	7.58 a	4.66 de	5.00 d	38.52 ab	34.04 bc
T_6= Sprout cutting tuber of 3rd generation	6.64 b	3.37 gh	3.67 fg	49.24 a	44.73 a

[1]Means within the same column and row having a common letter(s) do not differ significantly (p=0.05) by DMRT.

[2]Means within the same column having a common letter(s) do not differ significantly (p=0.05) by DMRT.

Table 6. Stem number of potato raised from healthy, PVY and PLRV infected tubers of sprout cutting, stem cutting and conventional seed tubers during 2005-06 crop season.

Treatments	Number of stems per hill[1]			% Reduction[2]	
	Healthy	PVY	PLRV	PVY	PLRV
T_1= Conventional tuber of 3rd generation	5.31 c	3.60 ef	3.75 ef	32.10 b	29.38b
T_2= Conventional tuber of 4th generation	4.56 d	2.76 g	2.81 g	39.47 ab	38.38 ab
T_3= Stem cutting tuber of 3rd generation	6.10 ab	4.00 de	4.00 de	34.43 ab	34.43 ab
T_4= Stem cutting tuber of 4th generation	5.63 bc	2.96 g	2.94 g	47.42 a	47.78 a
T_5= Sprout cutting tuber of 3rd generation	6.96 a	3.71 ef	4.00 de	46.70 a	42.53 ab
T_6= Sprout cutting tuber of 4th generation	5.57 bc	2.93 g	3.21 fg	47.40 a	42.37 ab

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[2]Means within the same column having a common letter(s) do not differ significantly (p=0.05) by DMRT.

Number of tubers per hill

Under each of the six treatments, plants from healthy seed tubers yielded significantly higher number of tubers per hill as compared to PVY as well as PLRV infected seed tubers irrespective of crop season (Table 7 and 8). In 2004-05, plants from healthy seeds under T_5 yielded significantly the highest number of tubers. The second highest tuber number was found under T_6, which was statistically similar to T_3. Tuber number under T_1 and T_2 was minimal and statistically similar to the tuber number recorded under T_4. In case of PVY infected seed tubers, number of tubers under T_3 and T_5 was statistically similar *but* significantly higher as compared to other four treatments. Least number of tubers was harvested from T_2, which was statistically similar to T_1 but significantly higher as compared to T_3 and T_6. The differences in tuber number under T_1, T_4 and T_6 were not significant. Almost similar trends in tuber number were found in case of PLRV infected seed tubers (Table 7).

In crop season 2005-06, number of tubers obtained from plants grown from healthy seed tubers under T_5 and T_6 was statistically similar but significantly bigher as compared to T_1, T_2, T_3 and T_4. Tuber number under those later four treatments was not significantly different. In case of PVY or PLRV infected seed

tuber, the maximum tuber number was recorded under T_5 which was followed by T_6, T_3, T_1 and T_4. Infection of seed tubers with PVY or PLRV caused significant reduction in tuber number. The reductIon ranged 42.53-56.82% due to infection with PVY and 29.48-50.30% due to PLRV infection (Table 8).

Table 7. Tuber number of potato grown from healthy, PVY and *PLRV* infected tubers of sprout cutting, stem cutting and conventional seed tubers during 2004-05 crop season.

Treatment	Number of stems per hill[1]			% Reduction[2]	
	Healthy	PVY	PLRV	PVY	PLRV
T_1= Conventional tuber of 2nd generation	878d	5.37hi	6.75ef	38.84ab	23.12d
T_2= Conventional tuber of 3rd generation	8.78 d	4.79 i	5.37 hi	45.44 a	38.84 a
T_3= Stem cutting tuber of 2nd generation	9.73 bc	6.75 ef	7.00 e	30.63 ab	28.06 cd
T_4= Stem cutting tuber of 3rd generation	9.12 cd	5.67 gh	6.25 fg	37.83 ab	31.47 bc
T_5= Sprout cutting tuber of 2nd generation	11.00a	7.00e	7.00e	36.36b	36.36ab
T_6= Sprout cutting tuber of 3rd generation	10.01 b	5.87 gh	6.00 gh	41.36 ab	40.06 a

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[2]Means within the same column having a common letter(s) do not differ significantly (p=0.05) by DMRT.

Table 8. Tuber number of potato grown from healthy, PVY and PLRV infected tubers of sprout cutting, stem cutting and conventional seed tubers during 2005-06 crop season.

Treatment	Number of stems per hill[1]			% Reduction[2]	
	Healthy	PVY	PLRV	PVY	PLRV
T_1= Conventiona1tuber of 3rd generation	8.16b	4.l2ghi	5.25de	49.5labc	35.66b
T_2= Conventional tuber of 4th generation	8.29b	3.58 i	4.12 ghi	56.82 a	50.30 a
T_3= Stem cutting tuber of 3rd generation	8.51 b	4.49 fgh	5.75 d	47.24 bc	32.43 b
T_4= Stem cutting tuber of 4th generation	8.51b	3.93 hi	5.16 def	53.82 ab	39.37 b
T_5= Sprout cutting tuber of 3rd generation	9.57 a	5.50 de	6.75 e	42.53 c	29.48 b
T_6= Sprout cutting tuber of 4th generation	9.23 a	4.80 efg	5.87 d	48.00 bc	36.40 b

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Tuber yield (g/hill)

In both the crop seasons, significantly higher tuber yield (g/hill) was obtained from plots planted with healthy seed tubers as compared to PVY or PLRV infected seed tubers. Irrespective of healthy, PVY and PLRV infected seed tubers and cropping seasons, the maximum tuber yield was found under T_5 and the lowest under T_2 (Table 9 and 10). In 2004-05, when healthy seeds were planted, the second highest tuber yield was found under T_6, which was followed by T_3, T_4 and T_1. In case of PVY and PLRV infected seed tubers, the second highest yield was found under T_3, which was followed by T_6, T_4 and T_3 (Table 9). In 2005-06, the second highest tuber yield was recorded under T_6, which was followed by T_3, T_4 and T_1, when seed tubers were infected with PVY or PLRV (Table 10).

Results presented in Table 9 and 10 indicate that infection of seed tubers with the viruses caused sIgnificant reduction in tuber yield. Effect of PVY infection on reduction of tuber yield was appreciably higher as compared to PLRV under all treatments. Yield reduction ranged 41.16-72.53% and 32.83-61.00% due to infection of PVY and PLRV, respectively, in 2004-05 (Table 9). In crop season 2005-06, the range of reduction in tuber yield due to PVY was 59.31-80.60% and due to infection of PLRV, the reduction was 42.86-75.93%. The rate of reduction was higher in 2005-06, where 3rd and 4th generations' seed tubers were planted, as compared to 2004-05 where 2nd and 3rd generations' seed tubers were used (Table 9 and 10).

Table 9. Yield of seed potato grown from healthy, PVY and PLRV infected tubers of sprout cutting, stem cutting and conventional seed tubers during 2004-05 crop season.

Treatments	Yield (g/hill)			% Reduction[2]	
	Healthy	PVY	PLRV	PVY	PLRV
T_1= Conventiona1tuber of 2nd generation	5l7.50cd	l79.30j	284.80hi	65.35ab	44.97b
T_2= Conventional tuber of 3rd generation	498.90 de	137.00k	164.60jk	72.53 a	67.00 a
T_3= Stem cutting tuber of 2nd generation	576.20 abc	304.30 gh	367.80 fg	47.19 bc	36.17 bc
T_4= Stem cutting tuber of 3rd generation	544.20 cd	199.30jk	325.30 gh	63.37 ab	40.27 ab
T_5= Sprout cutting tuber of 2nd generation	640.20a	376,67gh	430.00ef	41.16c	32.83c
T_6= Sprout cutting tuber of 3rd generation	598.20 ab	229.10 ij	336.67 gh	61.78 abc	43.72 bc

[1]Means within the same column and row having a common letter(s) do not differ significantly (p=0.05) by DMRT.

[2]Means within the same column haing a common letter(s) do not differ significantly (p=0.05) by DMRT.

Table 10. Yield of seed potato grown from healthy, PVY and PLRV infected tubers of sprout cutting, stem cutting and conventional seed tubers during 2005-06 crop season.

Treatments	Yield (g/hill)			% Reduction[2]	
	Healthy	PVY	PLRV	PVY	PLRV
T_1= Conventiona1tuber of 3rd generation	467.l0cd	129.90 ij	175.00 hi	72.19 a	62.53b
T_2= Conventional tuber of 4th generation	449.20 d	87.14j	108.l0j	80.60 a	75.93 a
T_3= Stem cutting tuber of 3rd generation	531.30 ab	137.50 hij	258.30 f	74.12 a	51.38 bc
T_4= Stem cutting tuber of 4th generation	500.10bc	10710j	183.80gh	78.58a	63.25ab
T_5= Sprout cutting tuber of 3rd generation	565.30 a	230.00 fg	323.00 e	59.31 b	42.86 c
T_6= Sprout cutting tuber of 4th generation	544,00 ab	158.90 hi	264.30 f	70.79 a	51,41 bc

[1]Means within the same column and row having a common letter(s) do not differ significantly (p=0.05) by DMRT.

[2]Means within the same column having a common letter(s) do not diflèr significantly (p=0.05) by DMRT.

Results of the present investigation reveal that in both the years, significantly the highest incidence of PVY and PLRV was observed where 3rd or 4th generation conventional seed tubers (T_2) were planted. The least incidence of the viruses was recorded when 2nd or 3rd generation seed tubers (T_5) from sprout cutting were used. incidence was not significantly different under other treatments (Table 1 and 2). In 2004-05, the mean incidence of PVY and PLRV was 2.98% and 2.33%, respectively. The difference was not much appreciable (Table 1). In 2005-06, the mean incidence of PVY was 22.74% and that of PLRV was 3.94%. The difference was remarkable (Table 2). It indicated that with the advancement of generation, incidence of PVY increased abruptly. Results shown in Fig. 1 reveal that due to infection of PVY as well as PLRV the average red ion in plant height and stem number per hill was not much different in both seasons. But percent reduction in tuber number per hill and tuber yield (g/plant) was comparatively high under PVY infected seed tubers as compared to PLRV infected seed tubers. The mean reduction was more in 2005-06 crop season than that of 2004-05.

Impact of PVY and PLRV on seed potato has been investigated by other researchers (Singh, 1980; Hossain *et al.*, 1994; Halim, 1999; Hossain, 1999; Sher *et al.*, 2000; Choueiri *et al.*, 2004). But there is no work on seed potato

production by sprout cutting and stem cutting against PVY and P1RV. Results of the present investigation demonstrated that incidence of PVY, PLRV and their mixed infection was low in sprout cutting tuber as compared to stem cutting and conventional tuber. Performance of seed tubers obtained from sprout cutting was better in respect of growth parameters, yield and yield contributing characters as compared to stem cutting and conventional tubers. Therefore, attempt may be made to produce virus free seeds by sprout cutting procedure from E-class seeds in a nethousc. It will be effective to avoid import of E-class seeds from abroad every year and a huge amount of foreign currency may be saved.

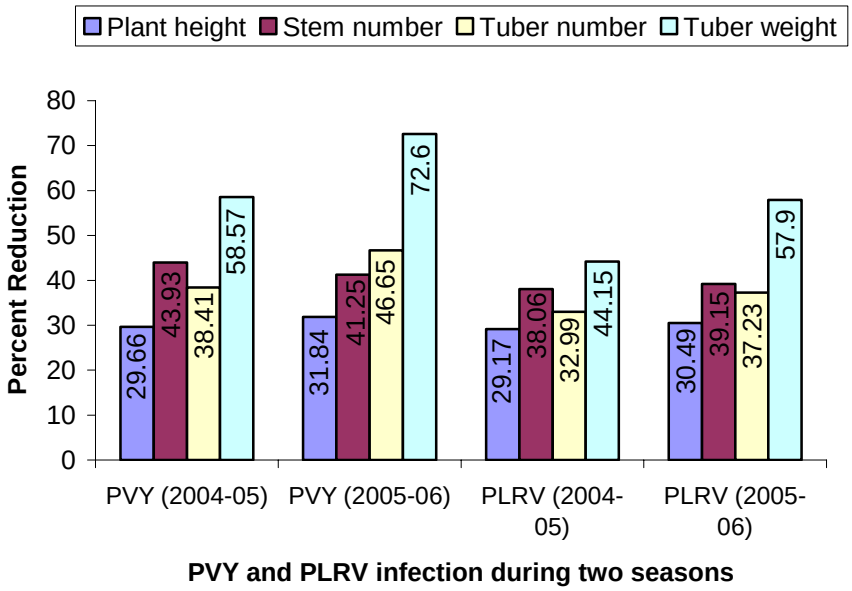

Fig. 1. Percentage of reduction in plant growth and yield parameters of potato due to infection of PVY and PLRV during 2004-05 and 2005-06 crop seasons.

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