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Present Status of Field Diseases and Morphological Characteristics of Recommended Potato Varieties in Bangladesh

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Abstract: A study was undertaken to determine the present status of ten recommended potato varieties in Bangladesh. It was found that incidence of potato leaf roll virus (PLRV), potato Y potyvirus (PYV), scab, tuber rot and cutworm were significantly different in different varieties. Similarly, dry matter and starch percentage, number of tuber per plant and yield per plant varied significantly with the varieties. The variety Ailsa showed lowest infection of PLRV followed by Dheera and Cardinal and the highest infection was recorded in Patrones. The varieties Arinda, Chamak, Dheera, Heera and Kuroda were free from PYV infection. Whereas, Multa showed the highest infection of PYV. Lowest infection of scab was recorded in the variety Dheera and it was highest in Ailsa. The appearance of foliage was good looking in all varieties except the varieties Multa, Patrones and Ailsa. Varieties Ailsa, Chamak and Dheera showed late maturity as compared to other varieties. The highest dry matter and starch content were recorded in variety Dheera and it was lowest in Kuroda. The highest yield per plant was obtained from Chamak followed by Ailsa, Dheera, Heera and Cardinal and it was lowest in variety Patrones. Considering all aspects in both the seasons, two varieties namely, Chamak and Dheera were noted best performers in terms of disease severity, plant growth and yield.

Key words: Morphological characteristics, potato varieties, Bangladesh

Introduction

Potato (*Solanum tuberosum* L.) is a widely grown vegetable crop in Bangladesh. The process of improvement of potato varieties have been started from early 1960s in the country (Rashid and Hossain, 1985; Rashid *et al.*, 1987; Hossain *et al.*, 1991; Rashid, 1991; Rasul *et al.*, 1993). At least 15 high yielding varieties have been recommended and released by the Tuber Crops Research Centre, Bangladesh Agricultural Research Institute (BARI) for cultivation in Bangladesh (Akhtar *et al.*, 1998). However, only a few of them are being accepted by the farmers. Many reasons for this and one of them was the unavailability of quality disease free seed tubers of those recommended varieties. A total of six virus diseases of potato have so far been recorded in Bangladesh (Ali and Khan, 1990; Khan *et al.*, 1991). Among the virus diseases, the most important two are potato Y potyvirus (PYV) and potato leaf roll virus (PLRV) respectively caused up to 95% (Hossain and Ali, 1992) and 78% (Hossain *et al.*, 1989) yield loss under severe infection. Late blight (*Phytophthora infestans*), scab (*Streptomyces scabies*) and bacterial wilt (*Ralstonia solanacearum*) also cause serious yield loss of potato in the country. To overcome this problem and to popularize the released potato varieties in Bangladesh the present experiment was undertaken to study the present status of field diseases and storability of the varieties recommended for cultivation.

Materials and Methods

Ten recommended potato varieties namely, Cardinal, Diamant, Ailsa, Dheera, Heera, Arinda, Multa, Kuroda, Chamak and Patrones

were planted in the field at Joydebpur on November 18 and 5 respectively, in 1997 and 1998. The experiment was laid out in randomized complete block design. The unit plot size was 3x3m² and the plant spacing was 60x25cm². Recommended doses of fertilizers were applied in the field before planting. Furadan 3G was used against cutworm. Irrigation, weeding and other agronomical practices were done as and when necessary. Data on incidence of PLRV, PYV, late blight, scab, tuber rot were recorded. Appearance of foliage growth (1-3 scale), tuber shape and tuber appearance (1-4 scale), tuber colour, over all grading in the natural store (1-9 scale), number of tuber and yield per plant, dry matter and starch percentage were recorded.

Results and Discussion

In 1997-98, PLRV infection varied significantly with varieties and the highest infection was observed in variety Patrones followed by Heera and it was the lowest in variety Ailsa. Five varieties namely, Arinda, Cardinal, Dheera, Heera and Kuroda were free from infection of PYV and the highest infection was recorded in variety Multa. Percent tuber infection by scab varied significantly with varieties and it was the highest in variety Ailsa, which was followed by Diamant and it was the lowest in variety Dheera. The incidence of tuber rot was very low and the range was 0-0.49% and six varieties were free from the disease. The range of cutworm infection was 1.22 to 8.75%, respectively in Chamak and Diamant. Most of the varieties had good looking foliage appearance except Ailsa, Multa and Patrones (Table 1). Tuber appearance was the best in variety Patrones and not good in variety Ailsa. The varieties Ailsa, Chamak and Dheera showed late maturity, Cardinal and Arinda showed medium maturity, whereas rest of the varieties showed early maturity (Table 2). The highest number of tuber per plant was observed in variety Chamak and the lowest was in variety Kuroda (Table 3). The range of the tuber yield per plant was 272 to 513.33 g and the highest yield was obtained from Chamak and the lowest was in Patrones. The highest dry matter and starch percentage was observed in Dheera. In 1998-99 crop season, the incidence of PLRV, PYV, scab, tuber rot, cut worm infestation and tuber yield, dry matter content and finally the over all grading of the tuber in the natural store were influenced by the varieties significantly. The lowest infection of PLRV was recorded in Ailsa and Dheera and it was the highest in Patrones. The lowest and highest PYV infection was recorded respectively in Arinda and Multa. The variety Multa showed the lowest infection of scab and the highest infection was found in Ailsa. Unlike 1997-98, cut worm infection was high in the season 1998-99 and the variety Kuroda showed the highest infection and it was the lowest in Chamak. In case of over all grading of tuber conditions in the natural store, Ailsa was the best, followed by Heera and Chamak. Three varieties namely Multa, Dheera and Patrones showed worse. The tuber yield of all varieties were comparatively low in 1998-99 due to unfavourable weather condition. In both the seasons, late blight was not observed at Joydebpur. Under infection pressure, the varieties Cardinal and

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Table 1: Performance of ten recommended potato varieties in Bangladesh in relation to field diseases and tuber yield at Joydebpur, Gazipur during 1997-98

Variety	Disease incidence (% infected plants/tuber)				Cutworm infected tuber (%)	No. of tuber per plant	Yield/ plant (g)	Yield (tons/ha)
	PLRV	PYV	Scab	Tuber rot				
Ailsa	0.67a	4.67	52.68e	0.24	5.21cd	8.10a-c	483.33cd	29.00
Arinda	23.00d	0.00	11.91b	0.00	6.29c-e	8.81a-d	342.67b	20.56
Cardinal	2.67ab	5.00	21.02c	0.00	4.24bc	10.23c-e	462.33cd	27.74
Chamak	8.67c	0.00	10.94b	0.31	1.22a	12.10e	513.33d	30.80
Diamant	6.00bc	6.00	42.04d	0.49	8.75e	8.37a-c	434.67c	26.08
Dheera	1.00a	0.00	5.81a	0.00	1.97ab	9.77b-d	483.33cd	29.00
Heera	25.00d	0.00	6.67a	0.00	7.31de	7.63ab	471.33cd	28.28
Kuroda	8.67c	0.00	6.32a	0.00	6.71c-e	6.57a	422.67c	25.36
Multa	2.67ab	9.67	9.69ab	0.38	6.33c-e	8.43a-c	291.00ab	17.46
Patrones	26.67d	9.00	11.53b	0.00	5.31cd	10.90de	272.00a	16.32
Mean	10.50	3.43	16.86	0.14	5.33	9.09	417.67	25.06

Means followed by a common letters are not significantly different (P= 0.05)

Table 2: Characteristics of ten recommended potato varieties in Bangladesh during 1997-98

Variety	Foliage appearance	Tuber appearance	Tuber colour	Maturity	Dry matter (%)	Starch (%)
Ailsa	1.33	2	Whitish yellow	Late	19.13ab	13.13ab
Arinda	1.00	3	Whitish yellow	Medium	19.13ab	13.13ab
Cardinal	1.00	3	Red	Medium	20.50b	14.33ab
Chamak	1.00	3	Golden yellow	Late	20.33b	14.20ab
Diamant	1.00	3	Whitish yellow	Early	20.00ab	13.90ab
Dheera	1.00	2	Whitish yellow	Late	23.60c	17.40c
Heera	1.00	3	Whitish yellow	Early	19.80ab	13.77ab
Kuroda	1.00	3	Red	Early	18.77a	12.87a
Multa	2.33	3	Golden yellow	Early	19.47ab	13.37ab
Patrones	2.00	4	Golden yellow	Early	20.56b	14.33b
Mean	1.27	-	-	-	20.12	14.04

Means followed by a common letter are not significantly different at the 5% level by DMRT; Foliage appearance 1-3 scale, where 1= Good looking, 2= Medium looking, 3= Not good looking; Tuber appearance 1-4 scale, where 1= Not good looking, 2= good looking, 3= Better looking, 4= Best looking

Table 3: Performance of ten recommended potato varieties in Bangladesh in relation to diseases and tuber yield at Joydebpur, Gazipur during 1998-99

Variety	Disease incidence (% infected plants/tuber)			Cutworm infected tuber (%)	Rot infected tuber (%)	Overall grading at natural store	Yield/ plant (g)	% dry matter
	PLRV	PYV	Scab					
Ailsa	2.67a	3.67a	53.64c	23.37ab	0.67ab	1.33a	289.00c	18.57a
Arinda	22.00d	0.67a	23.89ab	17.99ab	2.33cd	4.67de	243.67a-c	19.60a-c
Cardinal	8.67b	10.00b	27.65ab	21.19ab	1.33abc	5.67e	334.33c	19.03ab
Chamak	8.67b	2.00a	15.00a	8.49a	2.67d	3.33bc	317.67c	21.13c
Dheera	2.67a	1.33a	13.52a	16.62ab	1.67bcd	8.33fg	284.33c	21.17c
Diamant	7.33b	8.67b	38.06bc	15.70ab	0.33a	7.33f	254.67a-c	20.33bc
Heera	28.00e	2.67a	25.57ab	20.61ab	10.33f	2.33ab	277.00c	19.03ab
Kuroda	33.33f	2.67a	16.48a	38.03b	4.00e	4.33cd	267.67bc	18.57a
Multa	12.67c	14.67c	13.31a	27.59ab	2.33cd	8.67g	169.67a	19.90a-c
Patrones	55.33g	10.00b	9.88a	18.31ab	2.67d	8.33fg	179.67ab	19.90a-c
Mean	18.13	5.63	23.70	20.79	2.83	5.43	261.77	19.72

Means followed by a common letters are not significantly different at the 5% level by DMRT; Overall grading (1-9 scale) at natural store conditions, where, 1= Best, 9 = Worse

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Diamant showed susceptible reaction to PVY at Joydebpur (Hossain and Ali, 1993). Similar trends were also observed in the present experiment without infection pressure of the disease. Lower incidence of PLRV infection was reported earlier in variety Cardinal and Diamant and higher PVY was in Multa (Bari *et al.*, 1998).

Considering the tuber yield, disease incidence, cut worm attack and storage performance, the varieties Chama and Dheera showed better performance and comparable to the popular varieties Cardinal and Diamant.

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