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Effect of date of seedling transplanting and fertility levels on potato (*Solanum tuberosum*) grown through true potato seed under north-east hill conditions

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ABSTRACT

A field experiment was conducted during the summer season of 1992 and 1993 at Shillong to find out optimum time of true potato seed (TPS) seedling transplanting and its fertilzier requirements. Seedling survival of potato (*Solanum tuberosum* L.) was higher (90%) in April transplanting. Significant higher tuberlet production was obtained with 15 April transplanted seedlings than delayed transplanting. Every increase in fertility level significantly increased the tuberlet production. Linear response to fertility levels was observed on all the dates of seedling transplanting. The highest (274.4 q/ha) tuberlet production was obtained when seedling was transplanted on 15 April and supplemented with 160, 160 and 60 kg/ha of N, P_2O_5 and K_2O respectively. This treatment gave tuberlet production in ratio of 21 : 66 : 13 of large (> 80 g), medium (20–80 g) and small (< 20 g) respectively. The lowest (131.3 q/ha) tuberlet production was recorded when seedling was transplanted on 15 May and fertilized @ 80 kg N, 80 kg P_2O_5 and 60 kg K_2O/ha. Size of tuberlet production was recorded in ratio of 9 : 71 : 20 with this treatment. More than 80% tuberlets were of marketable size (> 20 g) in all the treatments.

Key words : Seedling transplanting, TPS, Fertility, Potato, Yield

Use of True Potato Seed (TPS) is emerging as a low-cost-supplemented technology for potato production (Upadhya *et al.*, 1986; Upadhya, 1994). TPS technology is a new introduction to North-Eastern region of India, hence there is no information available regarding time of seedling transplanting and fertilizer requirement of crop grown through TPS. Therefore the present study was undertaken to tackle these problems specially for north-east hilly region.

MATERIALS AND METHODS

The experiment was conducted at Upper Shillong during summer season (April–August) of 1992 and 1993. The soil was sandy loam, rich in organic matter (1.5%), with pH 5.3. The available N, P and K contents of the soil were 178, 8.7 and 240 kg/ha respectively. The seedlings of TPS hybrid 'HPS-II/67' was

raised in well-prepared nursery beds as per plan of date of transplanting. Four dates (15, 25 March, 5 and 15 May) of seedling transplanting were relegated in main plots and 3 fertility levels, low (80 : 80 : 60), medium (120 : 120 : 60) and high (160 : 160 : 60) of N, P_2O_5 and K_2O/ha, respectively, were kept in subplots. The experimental design was split plot with 4 replications; one-third of N and full P and K were applied with 10 tonnes FYM/ha at transplanting. Rest N was applied in 2 equal instalments — at first earthing time 25 days after seedling transplanting and second earthing after 55 days. Seedlings of about 10 cm height transplanted at 40 cm x 10 cm spacing. Just after transplanting water was applied through sprinkler. Plant-protection measures were adopted according to need. The survival of seedlings was recorded 20 days after transplanting. The crop was harvested after full maturity in the first week of September. The produce of each plot graded into 3 grades and number and weight of each grade was recorded separately.

RESULTS AND DISCUSSION

Seedling survival

Seedling survival varied from 81 to 92%. Seedling survival was higher (90%) when seedlings were transplanted during April than

Table 1. Effect of dates of seedling transplanting and fertility levels on the seedling survival and tuberlet production of potato

Fertility N : P : K (kg/ha)	Date of seedling transplanting				Mean
	15 April	25 April	5 May	15 May	
		Seedling survival (%)			
80 : 80 : 60	90	89	85	81	86
120 : 120 : 60	92	89	87	83	88
160 : 160 : 60	89	90	86	82	87
Mean	90	89	86	82	
		Tuber yield (q/ha)			
		1992			
80 : 80 : 60	232.1	180.4	174.2	152.1	184.7
120 : 120 : 60	274.6	209.6	192.9	162.5	209.9
160 : 160 : 60	295.0	236.7	205.8	180.4	229.5
Mean	267.2	208.9	191.0	165.0	
		1993			
80 : 80 : 60	192.5	182.5	150.0	110.4	158.9
120 : 120 : 60	235.0	203.8	169.2	130.8	184.7
160 : 160 : 60	253.8	236.7	207.5	157.1	213.8
Mean	227.1	207.6	175.6	132.8	
		Pooled yield (q/ha)			
80 : 80 : 60	212.3	181.5	162.1	131.5	171.8
120 : 120 : 60	254.8	206.7	181.0	146.7	197.3
160 : 160 : 60	274.4	236.7	206.7	168.8	221.7
Mean	247.2	208.3	183.3	148.9	
CD (P = 0.05)		Dates (D)	Fertility (F)	D x F	
Seedling survival		NS	NS	NS	
1992		40.4	17.8	NS	
1993		55.0	12.0	NS	
Pooled		31.7	10.5	NS	

May transplanting. Fertility levels had no much impact on the seedling establishment.

Tuberlet production

Significantly higher tuberlet production was obtained when seedlings were transplanted on 15 April than subsequent dates of transplanting (Table 1). But production of tuber number/m² (Table 2) did not differ significantly with 25 April transplanting; however significant increase in yield was due to larger-size tuber production in early transplanting, significant reduction in tuberlet production was observed when transplanting was done on 15 May. Advancement in transplanting dates caused gradual reduction in tuberlet production. Every increase in fertility level significantly increased the tuberlet yields. Though tuberlets/m² were at par with medium and high fertility levels, the yield surpassed due to increase in tuber weight with higher fertility. Linear response to fertility levels were observed on all the dates of seedling transplanting. Similar trend for production was observed. The highest tuberlet production was obtained when seedling was transplanted on 15 April and supplemented with high fertility level, whereas lowest production was recorded with low fertility level when seedlings were transplanted on 15 May. Singh (1990) and Upadhya *et al.* (1990) also obtained good tuberlet production with well-manured TPS

Table 2. Effect of date of seedling transplanting and fertility levels on number and size of tuberlet production(q/ha) (mean data of 2 years)

Fertility N : P : K (kg/ha)	Date of seedling transplanting				
	15 April	25 April	5 May	15 May	Mean
			Tuberlet/m²		
80 : 80 : 60	87	79	75	65	77
120 : 120 : 60	108	98	89	77	93
160 : 160 : 60	117	106	93	86	101
Mean	104	94	86	76	
			Large (above 80 g)		
80 : 80 : 60	28.9	26.2	21.5	11.5	22.0
120 : 120 : 60	39.2	32.8	26.3	15.0	28.3
160 : 160 : 60	58.2	35.0	37.7	19.4	37.6
Mean	42.1	31.3	28.5	13.3	
			Medium (20–80 g)		
80 : 80 : 60	150.9	127.0	114.1	93.1	121.3
120 : 120 : 60	177.9	141.4	125.1	103.5	137.0
160 : 160 : 60	181.0	168.3	133.1	119.5	150.5
Mean	169.9	145.6	124.1	105.4	
			Small (below 20 g)		
80 : 80 : 60	32.5	28.3	26.5	26.7	28.5
120 : 120 : 60	37.7	32.3	29.0	28.2	32.0
160 : 160 : 60	35.2	33.4	35.9	29.9	33.6
Mean	35.1	31.3	30.7	28.3	
CD (P = 0.05)		Dates (D)	Fertility (F)	D x F	
Tuberlets/m²		21.0	13.7	NS	
Large		10.2	5.3	NS	
Medium		31.0	9.9	NS	
Small		NS	4.7	NS	

crop. Seedlings transplanted early and manured judiciously got long duration of growth period and well-developed yield-attributing plant characters caused higher tuberlet production than late transplanted crop grown with lower fertility levels.

Tuberlet size

The production of large (> 80 g) and medium (20–80 g) size tuberlets significantly reduced with the advancement of date of seedling transplanting, whereas small (< 20 g) size remained unaffected, but significant reduction in tuber number/m^2 production was recorded only in 15 May transplanting (Table 2). The yield of large-size tuberlet was significantly higher when transplanting was done on 15 April, but medium-size tuberlet yield was at par with that of transplanted on 25 April. The reason for higher production of large-sized tuberlet was that 15 April transplanting crop got longer duration for tuberlets than later dates of transplanting. Increasing fertility levels increased the tuberlet yield in all the 3 sizes significantly, but production of tuberlets/m^2 could not be affected. It was due to vigorous plant growth with increased fertility levels, causing higher yields of all the tuberlets sizes. The highest producing treatment gave tuberlet production in the ratio of 21 : 66 : 13 of large : medium : small sizes respectively, whereas lowest production treatment gave in the ratio of (9 : 71 : 20). Upadhya *et al.* (1986) also reported higher production of large-sized tuberlet with increased crop duration and fertility level. It is evident that more than 80% tuberlets were marketable size which corroborate the findings of Singh (1994). This is a good sign to grow commercial potato crop with true potato seed through direct transplanting in field under north-eastern hills conditions.

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