EVALUATION OF TRUE POTATO SEED (TPS) PROGENIES AND ITS ADAPTABILITY IN NEPAL

R. C. Adhikari[1], *B. B. Khatri*[1], *S. L. Shrestha*[1]
and
P. Karki[2]

ABSTRACT

TPS is a botanical seed and does not carry major virus diseases. It is less susceptible to late blight disease (*Phytophthora infestans*), easy to store and transport. It has become alternative for production of high quality planting materials in those areas where resource poor farmers are using degenerated tuber seeds. Since it has good potential in a country like Nepal, TPS families received from the International Potato Center, Lima, Peru were evaluated and compared with HPS II/67 for their adaptability at different agro-ecological conditions of Nepal during 1998/1999 to 2000.

In the trials, TPS Progenies MF II x TPS 67 i. e. HPS II/67 and Serrana x TPS 67 were the best in hills, where as MF I x TPS 67 and Serrana x TPS 67 were best in terai in terms of yield and farmers' acceptance. Performance of seedling tubers of MFII x TPS 67, MFI x TPS 67 and Serrana x TPS 67 were also superior to clonal varieties such as Desiree, Kufri Sindhuri and Kufri Jyoti and are recommended for further demonstration in farmer's field conditions.

INTRODUCTION

Unavailability of healthy clonal materials is the major constraint of potato production and productivity in Nepal (PRP, 1997), due to which, resource poor farmers are using degenerated tuber seed of local varieties as propagating materials. Seed is the most expensive component of raising a potato crop. It constitutes 40 – 60 percent of the total cost in raising potato crop (Nayar, 1992). Seed tubers are bulky and semi perishable and therefore, transportation of healthy seed tubers in hills and mountains has also been severely limited by geographical inaccessibility (Sadik, 1983). Seed tuber requires storage structures, which are not sufficient in terai of Nepal (NARC et al., 1996). For such areas, TPS of some promising families can supplement the requirement of costly disease free tuber seed. There are also other advantages in using TPS over tubers, such as substantial saving in effort, time and money in storage and transportation of seed if true seed is used in preference to tuber seed (Upadhaya and Thakur, 1989). TPS does not carry major viruses and nematodes. It is less susceptible to major potato diseases like late blight (*Phytophthora infestans*). It requires no fungicides at any stages of crop (Lama and Khatri, 1997) ultimately safeguarding the environment degradation and lowering cost of production (Wiersema, 1985).

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[1] Nepal Agricultural Research Council, Potato Research Program, Khumaltar, Lalitpur

[2] Regional Agricultural Research Station, Tarahara, Sunsari

Because of inherent limitations of the conventional seed schemes, the resource poor potato growers either do not have the access to or lack capability to pay for quality planting materials (Gaur and pandey, 1996). These farmers comprise major potato growers group in Nepal (Lama, 1999).

An alternative to the traditional seed production using clonal materials is the utilization of TPS (Li, 1983, Sadik, 1983). Depending upon germination and seedling survival, a handful of TPS (50 g) could replace up to two tons of perishable, bulky and costly seed tubers required to plant one hectare of land (Upadhya and Thakur, 1989). By using TPS as planting materials, about 18 percent of total edible potato production in developing countries can be saved for food (CIP, 1982).

To select location specific promising TPS progenies yielding at par or higher than recommended cultivars, and their adaptability in Nepal, series of studies were carried out in the country.

MATERIALS AND METHODS

TPS F1 progeny evaluation

This experiment was carried out in different agro-ecological conditions (terai, inner terai, and hills) of Nepal.

During 1997/98, seeds were sown in Khumaltar and Tarahara using 14 hybrid TPS families received from International Potato Center (CIP), Peru. HPS II/67 and HPS 7/67 were used as the check progenies. For tuberlet production, the plot size was 1m x 1m. Prior to sowing in nursery beds, TPS families were arranged in a randomized complete block design (RCBD), with 4 replications. Trenches of 15 cm deep were dug and topsoil was removed from each plot. These trenches were then filled with soil and farmyard manure at 1:1 ratio. At the time of seed sowing ½ cm layer of fine compost was broadcasted and seeds were sown in the holes prepared by marker board and covered with another ½ cm layer of fine compost. Since seeds were very delicate and sensitive, beds were mulched with paddy straw. Plots were watered daily until seeds germinated well. N: P: K was used at the rate of 150:100:60 kg/ha. One hundred seedlings were accommodated in 1 m^2 beds at 25 cm row to row x 4 cm within row. Excess plants were thinned out after germination. Insecticide was used as needed to protect the plants from aphids. Earthing-up was done twice, once at 40 days after sowing (DAS) and another at 60 DAS. During the early stage a solution of 0.2 percent urea was sprayed for foliage development. The crop was dehaulming 90 days after sowing. Harvesting was done 10 days after dehaulmed. Germination percentage after 30 days, plant height, vigor and canopy cover at 60 days, stolen length, maturity, percentage of seed sizes, (<10 g, 10-20 g, 20-40 g and >40 g), tuber uniformity (1-5) scale and yield were recorded in the studies. TPS tuberlets harvested from the progenies were kept in the cold store till the next planting season.

During 1998/99, 10 hybrid TPS progenies received from CIP, Peru were tested at Khumaltar. HPS II/67 produced in India was used as check progeny. All the practices in the nursery bed were followed as in 1997/98.

During 1999/00, TPS progenies promoted from on-station trials were further tested at Khumaltar and Tarahara research stations as well as on farmers' field in terai (Rupandehi), inner terai (Chitwan) and hill (Sindhupalchok). In all locations, a total of four progenies were tested in a randomized complete block design with three replications. Plot size for each progeny was 5 m^2. Plots were fertilized at the rate of 100:100:60 kg NPK and 20 ton FYM per hectare. In all conditions, other cultural practices were followed as done in on-station trials conducted in the previous years.

TPS F1C1 tuberlets evaluation in field

Seedling tubers produced from previous years nursery bed trials were tested at Khumaltar and Tarahara in the field during 1998/99. Basic seed of clonal varieties Desiree and Kufri Sindhuri were compared at Tarahara and Desiree and Kufri Jyoti at Khumaltar as check. Twenty days before planting the seedling tubers of different size of previous year were taken out from the cold store and kept in diffused light condition for sprouting. Seed tubers with 5-40 g size were planted on ridges by maintaining ridge to ridge 60 cm and plant to plant 20-cm distance in a randomized complete block design. Pre-planting application of NPK 100:100:60 and FYM 20 t/ha was applied in lines. Fungicide was not sprayed at any stages of crops and other management practices were followed as recommended for normal potato production by Potato Research Program, Khumaltar.

F1C1 tuberlets evaluation in Station

This trial was conducted using tuberlets from previous year's trial at Khumaltar (mid-hills) and Tarahara (terai) using tuberlets from previous year's nursery bed trial. F1C1 seedling tubers of 10 TPS families were planted at Tarahara where Desiree and Kufri Sindhuri were used as check varieties. Likewise in Khumaltar F1C1 tuberlets of 16 TPS families were planted and clonal varieties Kufri Jyoti and Desiree were used for comparison as the check.

In 1998/99 and 1999/00, nine TPS families were compared with Desiree and Kufri Jyoti varieties. Seed tubers with 20-40 g sizes were planted on ridges by maintaining ridge to ridge 60 cm and plant to plant 20 cm spacing. N: P: K was used at the rate of 100:100:60 kg with 20 t FYM/ha. Fungicide application and other management practices were followed as per PRP recommendation. Plant emergence percentage at 30 days after planting, stem/plant, canopy cover, plant uniformity, plant height, late blight disease in1-9 scale, total tuber yield in three grades were recorded at harvest.

RESULTS AND DISCUSSION

TPS F1 progeny evaluation in nursery beds

Hills

At Khumaltar (1997-1999), highest germination (100%) was counted in progeny HPS II/67 followed by Atzimba x TPS 67 (97%) and LT 9 x TPS 67 (86%). Plant vigor was observed highest in progenies LT 9 x TPS 67, Serrana x TPS 67 and TPS 25 x TPS 67. Final canopy cover was measured highest in MFII x TPS 67 (90%) followed by LT 9 x TPS 67 (89%) whereas in I-1035 x TPS 13, it was only 50 percent. Plant height in most of the progenies was measured lower ranging from 27.0 (I 1035 x TPS 13) to 45.0 cm (I 931 x TPS 13). Progeny TPS 25 x TPS 67

matured late, whereas Atzimba x TPS 13, LT 9 x TPS 13, TS 5 x TPS 67 were early and rest were medium in maturity. Stolen length was measured from 14.0 cm on LT 9 x TPS 13 to 19.0 cm on MF I x TPS 67 and TS 5 x TPS 67. Stem number per plant was counted lowest with TPS 25 x TPS 67 (1.8) and highest on TS5 x TPS 67 (Table 1).

Yield data were found statistically significant among the TPS progenies evaluated. The highest tuber yield was obtained from MF II x TPS 67 (48.1 t/ha) followed by Serrana x TPS 13 (48.0 t/ha). Tuber grading result shows that the highest number of medium sized tuberlets (20-40 g) was obtained from LT 9 x TPS 13 (20.14%) followed by MF I x TPS 67 (20%). Progeny I 1035 x TPS 67 gave highest (24.0%) of > 40 g sized tubers followed by TPS 25 x TPS 67 (20%). Highest percentage of 20-40 g graded tubers was also recorded in progeny HPS II/67 (41%) followed by MF I x TPS 67 (40%). Highest percentage of small sized tubers <10 g were recorded in TS5 x TPS 67 (68%) and Atzimba x TPS 67 (65%). Except I 1035 x TPS 13 (24.2), LT 9 x TPS 13 (39.8) and TS 5 x TPS 13 (37.2 t/ha), all other families gave better yield but not significantly higher than the control, HPS II/67 (41.2 t/ha). Skin color in all the progenies were white however TS 5 x TPS 67, MF I x TPS 67 and MF II x TPS 67 had red patches in some tubers (Table 1).

In the studies of 1999/00, plants of LT8 x TPS 13 were tallest (45.0 cm) followed by Serrana x TPS 13 (44.0 cm) and MF II x TPS 67 (41.0 cm). All TPS families produced white to yellowish white skin color. The yield difference among the progenies were found statistically not significant (Table 2), however, MF II x TPS 67 gave the highest yield (35.04 t/ha) followed by Serrana x TPS 67 (30.05 t/ha). MF II x TPS 67 gave highest (11.50 %) number with > 40 g sized tubers followed by Serrana x TPS 13 (10.6 %). Likewise highest percentage of 20-40 g sized tubers were recorded in MF I x TPS 67 (30.4 %) followed by LT 8 x TPS13 (28.83 %) and highest percentage of small sized tubers (1-10 g) was recorded in Serrana x TPS 67 (46.68 %) and Serrana x TPS 13 (41.9 %) (Table 2).

At Nigale, Sindhuplachok during 1999/00 the highest tuber yield was recorded in LT8 x TPS 67 (49.1 t/ha) followed by MFII x TPS/67 (46.9 t/ha), but the yield differences among the progenies were found to be non significant (Table 3). Tuber grading showed that the highest number of medium sized tuberlets (20-40 g) were recorded from progeny LT 8 x TPS 67 (10.6%) followed by Serrana x TPS 13 (9.6 %). The total number of tubers were highest in MF II x TPS 67 (2506) in 5 m^2 area followed by Serrana x TPS 67 (1989). However, all the progenies have similar farmers' preference on foliage, yield, tuber shape and color (Table 3).

Terai

At RARS Tarahara (1997/98), highest germination was counted in progeny HPS II/67 (100 %) followed by Atzimba x TPS 67 (97 %), I-1035 x TPS 67 and MFII x TPS 67 (78 %). Stolen length was measured from 9.2 cm (I 1035 x TPS 13) to 17.8 cm in HPS II/67. Tubers were not uniform in shape and color but skin color was creamy white in general (Table 4).

Grading data showed that the highest number of <10gm tubers were recorded in progeny TPS 25 x TPS 67 (87.93%) followed by Atzimba x TPS 67 (84.22%) and lowest in I1035 x TPS 13 (70.83). Highest number of >20 g tubers were harvested in HPS II/67 (9.54) followed by MF I x TPS 67 (8.51) and lowest in TPS 25 x TPS 67 (3.69%). No progeny gave better yield than check

HPS II/67 (45.3 t/ha) except MF II x TPS 67 (51.20 t/ha) which had also the same parents only the difference was seed source (Table 4).

Comparison of performance between TPS 13 and TPS 67 as a male parent with different female parents, showed that TPS 67 had the potentiality of giving better yield than TPS 13.

In Rupandehi, four TPS progenies were evaluated in the farmers' field of Rupandehi. MFII x TPS67 was the best with respect to yield, foliage, tuber shape and color (Table 5).

Results on tuber grading showed that LT8 x TPS13 gave highest number (17.5 %) of tubers with greater than 40 g weight followed by Serrana x TPS 13 (15.7 %). Highest weight percentage of small sized tubers of <10 g was recorded MF II x TPS 67 (17%) and number were harvested in Serrana x TPS 67 (65.02%) and lowest was recorded in LT8 x TPS 13 (44.72%).

Inner terai

In Chitwan, four progenies were evaluated in the different places of Chitwan. Among the evaluated progeny Serrana x TPS 67 was best in term of yield and farmer's preference for foliage yield shape and color (Table 6).

Tuber grading data showed that 18.70 percent tubers of LT8 x TPS 13 were greater than 40 g sized tubers followed by MFII x TPS 67 (10.30 %). Highest percentage of weight of small sized tubers (<10 g) was recorded in Serrana x TPS 67 (43.90 %) and least in Serrana x TPS 13 (31.90 %). Like wise highest percentage of numbers of >40 g size tubers were recorded in LT8 x TPS 13 (2.37%) and least in Serrana x TPS 67 (0.64%). Where as progeny Serrana x TPS 67 gave highest percentage (79.59%) of <10 g sized tuber and least in Serrana x TPS 13 (74.2%).

These results showed that highest numbers and weight of 20-40 g-graded tubers were found in MF II x HPS II/67. These TPS lines were selected for further verification at farmers' field. It indicates that seedling tubers derived from F1 progeny of HPS II/67 can be utilized as basic standard clonal seed tuber, as practiced by farmers. Similarly, tuberlets produced below 10 g size can be successfully used for potato production (Kadian et. al., 1988).

TPS F_1C_1 tuberlets evaluation

Hill

At Khumaltar, in 1999/00, plant emergence ranged from 83.3 to 100 percent (Table 7). TPS families were not uniform. Ground cover of Kufri Jyoti was the highest (85.0 %) followed by LT -9 x TPS 67 (83.75 %), and MF II x TPS 67 (82.5 %). Plants of Atzimba x TPS-67 were tallest (67.25 cm) followed by Atzimba x TPS13 (67.10 cm) and I931 x TPS13 (63.53 cm). However, LT-9 x TPS67, Serrana x TPS 13, TS5 x TPS 67, TPS 25 x TPS67, MF II x TPS 67 and Kufri Jyoti were higher than Desiree (30.05 cm). Moreover, MF II x TPS 67 and Kufri Jyoti had higher number of stems per plant (3.5) than those of Desiree (2.0). The yield was significantly different from the Desiree (32.2 t/ha) (Table 7). The highest percentage of over 50 g size tubers was recorded for TPS 25 x TPS 67 (51.7 %) followed by Serrana x TPS 67 (48.32%), Serrana x TPS 13 (43.5%).

Terai

At Tarahara, In 1999/00 five TPS progenies' tuberlets were evaluated in the farmers' field with comparison to clonal basic-1seed of Desiree, Kufri Sindhuri and Achirina Inta (Table 8). There was 97.5percent emergence in Achirina Inta followed by MF I x TPS 67 and Desiree (96.7%). In all the TPS families, uniformity was good. LT8 x TPS 13 and Desiree had higher (4) number of stems per plant than other progenies. The highest yield (37.67t/ha) was obtained from MFI x TPS67 followed by TPS 25 x TPS 67 (37.11 t/ha). However, analysis of variance showed a non-significant difference between the treatments (Table 8). For seed sized tubers Kufri Sindhuri gave higher percentage of number of tubers (85.89%) followed by TPS progeny TPS 25 x TPS 67(42.27%).

This clearly indicates that yield performance of seedling tubers F_1C_1 is higher compared with Kufri Sindhuri and Desiree. Kadian et al (1988) have also reported equal or higher yield from seedling of selected TPS progenies than clonal varieties. Thus, TPS progenies have good yield potential under the different agroecological conditions of Nepal.

CONCLUSION

- TPS, an alternative to the traditional seed tubers is a cheap and environmentally safe for resource poor farmers who comprise the major potato growers group in Nepal.
- In hills, Serrana x TPS 67 and MF II x TPS 67 are promising families for seedling tuber production.
- In terai, MF I x TPS 67 and Serrana x TPS 67 are promising families.
- Seedling tubers of MF I x TPS 67, MF II x TPS 67 and Serrana x TPS 67 are promising lines for ware potato production under Tarahara condition.
- MF II x TPS 67 and Serrana x TPS 67 are best progenies for ware potato production at Khumaltar.

Table 1: Plant and tuber characteristics of TPS F1 progenies in nursery beds, Khumaltar, 1997/98 – 1998/99

Treatments	Germination (%)	Stem /plant (#)	Canopy Cover (%)	Plant height (cm)	Plant Vigor (1-5)	Stolon Length (cm)	Maturity •	% Tuber yield by number and weight								Yield (t/ha)
								<20		20-40		>40		Total		
								No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	
Atzimba x TPS 67	97	2.6	82	43	4	16	M	87.5	65	11.0	27	1.5	8	520	4.78	47.8
Atzimba x TPS 13	85	2.7	79	44	4	17	E	86.3	61	12.4	30	1.3	9	477	4.51	45.1
I-1035 x TPS 67	78	2.2	73	33	3	18	M	79.0	38	16.2	36	4.8	24	518	4.68	46.8♦
I-1035 x TPS 13	41	2.0	50	27	4	17	M	84.3	45	12.9	35	2.8	18	325	2.42	24.2♦
I –931 x TPS 13	76	2.0	78	45	4	19	M	80.9	52	16.0	33	3.1	15	382	4.49	44.9
LT-9 x TPS 13	60	2.0	64	31	4	14	E	73.9	38	20.1	39	6.0	11	303	3.98	39.8♦
LT-9 x TPS 67	86	2.6	89	39	4	15	M	85.7	60	13.1	37	1.2	3	572	4.41	44.1
Serrana x TPS 67	87	2.5	84	41	4	16	M	83.3	56	15.4	37	1.3	6	527	4.67	46.7
Serrana x TPS 13	67	2.5	85	40	4	14	M	76.8	44	19.5	39	3.7	17	406	4.80	48.0
TS-5 x TPS 67	75	3.1	83	40	4	17	E	89.1	68	9.8	28	1.1	5	625	4.19	41.9
TS-5 x TPS 13	51	2.3	76	33	4	19	M	83.0	46	14.0	35	3.0	4	508	3.72	37.2♦
MF-I x TPS 67	49	1.8	82	30	4	19	M	77.4	52	21.0	40	1.6	4	542	4.81	48.1♦
MF-II x TPS 67	89	2.9	90	42	4	16	M	80.1	54	17.1	33	2.8	13	427	4.65	46.5
TPS 25 x TPS 67	75	1.8	85	39	4	16	L	80.6	47	14.4	33	5.0	20	360	4.33	43.3
HPS II/67 (ch)	100	2.1	85	37	4	16	M	80.3	47	17.4	41	2.3	12	356	4.12	41.2
CV (%)																13.21
F-test																**
LSD (0.05)																0.84

*Note: ♦ =only one-year results, •Maturity: M = Medium, E = Early and L = Late, ** Significant at 1% level.*

Table 2: Plant and yield characteristics of TPS F1 progeny evaluation trial at Khumaltar, 99/2000

Progenies	Plant height (cm)	Stems /Plant (N0.)	% Tuber yield by number and weight								Total		Yield (t/ha)
			<10 g		10-20 g		20-40 g		>40 g				
			No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No	Wt	
Serrana x TPS-67	34	2.0	79.2	46.7	14.9	30.3	5.7	21.3	0.2	1.7	1135	7.52	30.05
Serrana x TPS 13	44	2.0	77.0	41.9	15.5	26.8	6.7	20.6	0.8	10.6	922	7.04	28.10
LT8 x TPS 13	45	2.0	73.3	38.7	20.1	36.5	6.0	28.8	0.6	3.9	910	7.20	28.8
MFII x TPS 67	41	2.2	68.6	30	18.4	26.6	11.5	30.4	1.5	12.8	974	8.76	35.04
CV %													34.6
F-test													NS

Note: NS = Non significant

Table 3: Yield characteristics of TPS F1 progeny evaluation FFT trial at Nigale, Sindhupalchoke, 1999/2000

Progenies	% Tuber yield by number and weight										Yield (t/ha)	Farmers' preference			
	<10 g		10-20 g		20-40 g		> 40 g		Total			Folia ge	Yield	Shape	Color
	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No	Wt					
Serrana x TPS 13	62.3	28.1	25.8	35.0	9.6	25.0	2.3	11.9	1540	16.0	31.9	4	3	4	3
Serrana x TPS 67	63.9	30.9	32.1	34.8	7.4	20.8	2.7	13.5	1989	20.7	41.5	3	4	4	3
LT 8 x TPS 67	52.2	23.6	35.3	42.3	10.6	26.4	1.8	7.7	1807	24.6	49.1	3	4	4	3
MFII x TPS 67	69.9	39.2	21.8	32.8	6.1	17.0	2.1	11.1	2506	23.5	46.9	3	4	4	3
CV%											18.5				
F- test											NS				

Note: NS = Non significant, Farmer preference: 1= Unacceptable, 2= Fair, 3= Good, 4= Very good and 5= Excellent

Table 4: Plant and yield characteristics of TPS F1 progenies in nursery bed at Tarahara, 1997/1998

Progeny	Germination (%)	Stolen Length (cm)	Tuber Shape	% Tuber yield by number and weight						Total (No)	Total Yield ($Kg/m^{2)}$
				<10 g		10-20 g		>20 g			
				No.	Wt.	No.	Wt.	No.	Wt.		
Atzimba x TPS-67	97	16.6	R	84.22	53.32	10.48	26.78	5.31	19.67	735	4.22
Atzimba x TPS-13	69	10.8	Ob	73.96	37.50	19.01	35.98	7.03	26.52	384	3.28
I-1035 x TPS-67	78	14.3	R	74.22	36.73	17.71	32.94	8.30	30.03	446	3.43
I-1035 x TPS-13	26	9.2	Ob	70.83	24.81	16.67	45.11	12.5	28.57	144	1.33
I-931 x TPS-13	51	10.4	*R*	75.63	10.98	16.17	34.72	8.20	24.63	439	3.37
LT-9 x TPS-13	60	14.4	O	74.40	41.09	20.29	37.98	5.31	23.77	414	3.87
LT-9 x TPS-67	72	13.9	R	79.72	44.78	15.42	33.58	4.85	21.64	577	4.02
Serrana x TPS-67	74	15.0	R	84.03	52.83	11.02	25.31	5.11	21.62	627	4.07
Serrana x TPS-13	34	10.8	R	83.19	42.44	10.92	25.85	5.88	31.71	238	2.05
TS-5 x TPS-67	32	17.6	R	79.62	42.81	13.59	27.40	6.79	29.79	368	2.92
TS-5 x TPS-13	18	12.0	O	80.33	31.06	12.57	29.55	7.10	39.39	183	1.32
MF-I x TPS-67	49	21.2	R	74.48	36.96	17.01	30.12	8.51	32.88	435	4.41
MF-II x TPS-67	78	14.6	R	78.40	43.95	13.75	27.34	7.85	28.71	662	5.12
TPS-25 x TPS-67	50	13.9	R	87.93	59.59	8.37	22.38	3.69	18.02	406	3.44
HPS II/67 (Check)	100	17.8	R	76.50	47.02	13.96	22.74	9.54	30.24	566	4.53
CV (%)											18.8
F-test											**
LSD (0.05)											0.59

*** Significant at 1% level, R= Round. Ob = Oblong.*

Table 5: Yield characteristics of TPS F1 progeny FFT evaluation trial at Rupandehi, 1999/2000.

Progenies	% Tuber yield by number and weight										Farmers Acceptance			
	<10 g		10-20g		20-40 g		>40 g		Total					
	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt t/ha	Foli-	Yield	Shape	Color
SerranaxTPS67	65.02	30.1	23.64	40.5	9.14	18.2	2.20	11.0	3819	34.40	3.00	2.67	3.00	2.33
Serrana x TPS 13	47.06	21.6	41.56	38.5	8.51	24.1	2.87	15.7	3349	31.06	2.67	3.00	3.00	3.00
LT8xTPS13	44.72	24.7	41.74	43.1	9.64	22.4	3.90	17.5	2489	26.27	3.00	2.67	3.67	3.33
MF II x TPS 67 (ch)	53.58	17.0	35.06	39.0	8.76	22.0	2.60	14.0	3505	32.17	2.78	2.89	3.00	2.78
CV %										14.28				
F-test										NS				

Note: NS = Non significant, Farmer preference: 1= Unacceptable, 2= Fair, 3= Good, 4= Very good and 5= Excellent

Table 6: Yield characteristics of TPS F1 Progeny FFT evaluation trial at Chitwan, 1999/2000

Progenies	% Tuber yield by number and weight										Farmers preference			
	<10 g		10-20g		20-40 g		>40 g		Total					
	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt t/ha	Foliage	Yield	Shape	Color
Serrana x TPS67	79.59	43.90	11.45	23.20	8.32	28.90	0.64	4.00	2175	29.87	4.7	4.7	3.7	3.0
Serrana x TPS 13	74.20	31.90	16.11	30.00	8.41	28.90	1.27	9.20	1570	21.13	4.0	4.0	3.3	3.0
LT8 x TPS13	77.37	35.20	12.33	22.60	7.93	23.50	2.37	18.70	1476	24.93	4.3	4.3	3.7	3.0
MF I x TPS 67 (ch)	77.36	37.70	13.10	24.80	8.22	27.10	1.32	10.30	1740	23.13	4.3	4.3	3.6	3.0
CV %										34.27				
F- test										NS				

Note: NS = Non significant, Farmer preference: 1= Unacceptable, 2= Fair, 3= Good, 4= Very good and 5= Excellent

Table 7: Plant and yield characteristics of TPS F_1C_1 tuberlets evaluation at Khumaltar in 1999/2000

% Tuber yield by number and weight	Emergence (%)	Plant height (cm)	Uniformity (1-5)	GC (%)	Stems/hill (#)	LB (1-9)	Plant harvest (%)	% Tuber yield by number and weight								Yield (t/ha)
								Under size		Seed size		Over size		Total		
								No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	
Atzimba x	99	67	1.8	77.5	3.3	1	94.0	26.94	7.60	63.73	68.00	9.33	24.4	386	13.3	53.1
TPS67	99	67	2.3	70.0	2.5	1	91.7	35.87	11.10	50.54	51.70	13.59	37.3	368	13.4	53.8
Atzimba x TPS 13	83	63	2.7	61.3	2.8	1	95.0	33.44	7.80	52.01	54.90	17.03	41.4	323	14.2	53.7
I 931 x TPS13	98	61	2.0	83.8	2.8	1	95.8	33.43	8.40	51.56	55.30	15.01	39.7	353	13.8	55.2
LT-9 x TPS13	100	59	2.0	78.8	2.0	1	96.7	27.56	9.60	52.56	45.80	19.89	48.3	352	15.6	62.6
Serrana x TPS67	97.5	60.2	1.8	70.0	2.8	1	90.0	28.03	6.10	53.82	50.40	18.15	43.6	314	14.2	56.9
Serrana x TPS 13	98.3	59.0	2.0	75.0	2.8	1	88.3	35.38	10.90	52.05	55.10	12.57	34.1	342	13.3	53.4
TS 5 x TPS 67	100.0	59.5	2.0	75.0	3.3	1	91.7	14.63	6.70	57.72	41.60	27.64	51.7	246	14.6	58.6
TPS 25 x TPS 67	99.2	56.8	2.3	82.5	3.5	1	90.8	31.99	9.90	51.52	51.20	16.50	39.0	397	12.9	50.6
MF II x TPS 67	100.0	35.0	1.0	85.0	3.5	1	80.8	34.40	10.10	53.70	55.80	11.90	34.4	311	12.8	51.2
K. Jyoti	100.0	30.1	1.5	60.0	2.0	2	75.8	32.94	8.90	47.06	52.10	20.00	39.0	170	18.6	34.2
Desiree																
CV %																10.72
F- test																*
LSD (0.05)																2.28

Note: Significant at 5% level, LB = Late blight, GC = Ground cover.

Table 8: Plant and yield characteristics of TPS tuberlets farmers' field at Tarahara, 1999/2000

TPS Progenies	Emer-genc (%)	Unifo -rmity (1-5)	Stems / plant (N0.)	Late Blight (1-9)	% Tuber yield by number and weight								Yield (t/ha)
					< 25 g		25-50 g		> 50 g		Total		
					No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	
TPS25 x TPS67	85.8	5	3	1	21.65	3.74	42.27	28.67	36.08	67.59	291	13.36	37.11
LT9 x TPS 67	90.8	5	3	1	21.37	4.24	38.46	25.89	40.17	69.86	234	11.78	32.72
LT8 x TPS 13	91.7	5	4	1	21.34	4.37	38.08	23.98	40.59	71.64	239	13.26	36.83
MFI x TPS 67	96.7	5	3	1	21.56	4.65	41.13	27.14	37.36	68.22	265	13.56	37.67
HPS II/67	96.0	5	3	1	20.00	3.77	35.92	21.51	44.08	74.72	245	13.25	36.81
Desiree	96.7	5	4	1	14.11	2.40	30.67	16.30	55.21	81.30	163	11.66	32.39
Kufri Sindhuri (ch)	92.5	4	3	1	66.87	11.12	85.89	40.82	39.88	48.06	314	9.26	25.72
Achirana Inta (ch)	97.5	5	3	1	32.65	5.26	6.12	22.43	61.22	72.31	196	12.93	35.92
CV%													34.4
F-test													NS

Note: NS = Non significant

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