EVALUATION OF TRUE POTATO SEED (TPS) FAMILIES FOR SEEDLING TUBER PRODUCTION UNDER JUMLA CONDITION

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ABSTRACT

On Station experiments were conducted at ARS (Horticulture), Rajikot, Jumla for two consecutive years (2010/11 and 2011/12) to identify TPS families for seedling tuber production under Jumla condition. Eleven TPS families were evaluated in RCBD with 3 replications. The results showed no significant difference among TPS families in vegetative characters during 2010/11 whereas they differed significantly on yield attributing characters. Number of tubers per plot was the highest (243.33) in No. 903027 and the lowest (72) in No. 902007. Tuber yield per plot was the highest (3.43 kg) in No. 903027 whereas the lowest (1.22 kg) in No. 988143. All the vegetative characters except plant height and yield attributing characters were highly significant during 2011/12. The highest emergence (100 %) was observed in No. 904013, 994014 and 988141 whereas the lowest (47.33%) in No. 902007. Ground coverage was the highest (98.33%) in 903035, 994013 and 994014 whereas the lowest (64.33%) in 902007. Number of main stem was observed the highest (3.33) in No. 902007 whereas the lowest (2) in 903027, 903051 and 903135. The highest number of tubers per plot (231.67) was produced by No. 994014 whereas the lowest by 902007 (87.33). The highest tuber yield per plot (4.67 kg) was observed in No. 994013 whereas the lowest (1.85 kg) in 902007. The result showed that the highest tuber yield (3.25 kg/plot) was obtained from 994013 followed by 903051 (3.24 kg/plot) and 903027 (3.15 kg/plot). Thus, yield potentiality of TPS progenies No. 994013, 903051 and 903027 should further be verified under farmer's field condition in order to draw conclusive results.

Key words: TPS, seedling tuber, vegetative and yield attributing characters.

INTRODUCTION

Potato (*Solanum tuberosum* L.) is one of the most important tuber crops of Nepal. It is utilized as a major vegetable in terai and mid hills and used as a vegetable and staple food in high hills. It occupies the 5th position in area coverage, 2nd in total production and 1st in productivity among the food crops grown in Nepal. Area under potato is 185,342 ha and total production 2517696 mt with an average productivity of 13.587 mt/ha (NPRP, 2011). The area under potato in Jumla district is about 2,650 ha (9.8% of the total cultivated area) and total production of 26,000 mt with an average productivity of 9.81 mt/ha (DADO, Jumla, 2012). Ministry of Agriculture has considered potato as one of the important cash crops of Nepal. However, potato serves as staple food in the high hills and plays a vital role in the food security in the Himalayan regions of the country. Out of total area under potato, around 17% is in the high hills and mountains, 43% in the mid hills and 40% in terai (ABPSD, 2010).

In Nepal, True Potato Seed (TPS) technology was started since 1978 but research activities geared up only after 1985. The area under TPS is 6000 ha. The productivity of potato from TPS is about 25 mt/ha while from conventional method it is half (NPDP, 2006). TPS is an alternate seed source for potato production. It is cost effective and equally or more productive as traditional method of potato production (Singh, 1998). Tuberlets are produced directly from botanical seed and are thus free from the degenerative diseases.

TPS is now one of the best alternative techniques in seed and ware potato production which has several benefits over conventional seed potato: very less amount of seed is required (100 gm/ha), saving of transportation cost of seed tuber, resistant to late blight disease and no post harvest losses.

Low productivity of potatoes in the Karnali region has been identified as core problem resulting from several limiting factors such as inadequate virus free basic seed of recommended varieties of potatoes to flush out the degenerated seed potatoes, inadequate knowledge regarding the TPS and inadequate availability of quality seed potatoes of recommended varieties. To overcome above problems, evaluation of TPS families for seedling tuber production was conducted at HRS, Jumla.

MATERIALS AND METHODS

Eleven TPS families were evaluated and compared in RCBD with three replications at Agricultural Research Station (Horticulture), Rajikot, Jumla. Well decomposed FYM @ 4 kg/plot was used. Seeds were sown in 15 cm raised nursery bed containing a mixture of soil and FYM (1:1 ratio). At the time of seed sowing 0.5 cm layer of fine compost was broadcasted and seeds were sown in furrow prepared by sharp bamboo stick and covered with further 0.5 cm layer of fine compost. The beds were mulched with dry grass and watered daily until seeds germinated well. Excess plants were thinned out after germination; hundred seedlings were accommodated in $1m^2$ beds with 25 cm x 4 cm spacing. Earthling up was done twice, once at 45 DAS and another at 60 DAS. Harvesting was done on the 2nd week of Aswin at full maturity stage. The necessary data for growth, yield and yield parameters were recorded and statistically analyzed.

RESULTS AND DISCUSSIONS

Emergence

Emergence was found statistically highly significant among the tested TPS progenies. The highest emergence (86.5%) was recorded from 903035 which was statistically at par with 903051(85.5%) followed by 988141 (85%) whereas the lowest (34%) emergence was recorded from 902007 (Table 3).

Uniformity

Uniformity among the tested TPS progenies was not significant. However, highly uniform plants (4.85) were found in 903035, 988141 and 988143 followed by 902014 (4.7) whereas the lowest (3.65) in 902007 (Table 3).

Ground coverage

Ground coverage was found significant among the tested TPS progenies. The highest (93%) ground coverage was found in 903027 followed by 903035 (92.5%) whereas the lowest (70.15%) in 902007 (Table 3).

Number of main stem/plant

Number of main stem/plant among the tested TPS families were found non significant. However, 988143 produced the highest (2.85) number of main stem followed by 902007 (2.8) whereas the lowest (2) in HPS II/67 (Table 3).

Plant height

Non significant results among the tested TPS families were observed on plant height. However, the tallest (72.5 cm) plants were observed in 903051 followed by 903027 (70.85 cm) whereas the dwarfest (52.65 cm) in HPS II/67 (Table 3).

Number of tubers per plot

Significant results among the tested TPS families were observed on number of tubers per plot. 903027 produced the highest (216.5) number of tubers per plot followed by 903051 (188.15) whereas the lowest (79.65) in 902007 (Table 3).

Tuber yield per plot

Highly significant results were found among the tested TPS progenies on tuber yield per plot of 1 m^2. The highest (3.245 kg) tuber yield was recorded in 994013 which was statistically at par with 903051 (3.240 kg) followed by 903027 (3.15 kg) whereas the lowest (1.695 kg) in 902007 (Table 3).

Table 1: Characteristics of different TPS families tested at HRS, Jumla during the summer season of 2010/11

Treatments	Emergence (%)	Uniformity (1-5)	Ground coverage (%)	Main stem (no.)	Plant height (cm)	No. of tuber/plot	Yield/plot (kg)
902007	20.67	4	76	2.33	57.33	72 e	1.54 cd
902014	66	4.67	90	2.33	54	122.67 cde	1.84 bcd
903027	68.33	4.67	91	3.33	70.67	243.33 a	3.43 a
903035	75.33	4.67	86.67	3	56	192.33 ab	2.32 bc
903051	73.33	5	90	3	55.33	159 bcd	2.75 ab
903135	59	4	76.67	2.33	53.67	76.67 e	1.43 cd
994013	56	4	71.67	2.33	50.33	89.33 e	1.82 bcd
994014	62	4	78.33	2.33	48	118 cde	1.5 cd
988141	70.33	4.67	78.33	2.33	52	165.33 bc	2.07 bcd
988143	55.67	4.67	71.67	3	49.33	106.33 de	1.22 d
HPS II/67	60.67	4.33	73.33	2	39.33	145 bcd	1.55 cd
Mean	60.67	4.42	80.33	2.57	53.27	135.46	1.95
EMS	286.38	0.24	98.88	0.81	105.006	996.142	0.33
P	Ns	ns	ns	ns	ns	<0.001	0.004
LSD						53.76	0.98
CV%	27.89	11.13	12.33	34.99	19.24	23.3	29.44

Table 2: Characteristics of different TPS families tested at HRS, Jumla during the summer season of 2011/12

Treatments	Emergence (%)	Uniformity (1-5)	Ground coverage (%)	Main stem (no.)	Plant height (cm)	No. of tuber/plot	Yield /plot (kg)
902007	47.33 b	3.33 d	64.33 d	3.33 a	77	87.33 d	1.85 d
902014	91.67 a	4.67 ab	81.67 c	2.33 bc	80.67	152 c	2.51 cd
903027	83.33 a	4 c	95 ab	2 c	71	189.67 abc	2.87 bcd
903035	98.33 a	5,a	98.33 a	2 c	50.33	157.67 c	2.87 bcd
903051	98.33 a	4.33 bc	95 ab	2 c	89.67	217.33 ab	3.73 ab
903135	85 a	4.33 bc	88.33 bc	2 c	65	149.33 c	2.5 cd
994013	100 a	5,a	98.33 a	3 ab	77.67	190.67 abc	4.67 a
994014	100 a	5,a	98.33 a	2.33 bc	76	231.67 a	4.17 a
988141	100 a	5,a	95 ab	2.67 abc	64.33	180.67 bc	3.1 bc
988143	95 a	5,a	96.67 a	2.67 abc	68	181 bc	2.43 cd
HPS II/67	93.33 a	4.67 ab	95 ab	2 c	66	148.67 c	2.5 cd
HPS 7/67	95 a	5,a	96.67 a	2.67 abc	61.33	187 abc	2.43 cd
Mean	90.61	4.61	91.89	2.42	70.58	172.75	2.97
EMS	175.98	0.149	17.49	0.21	158.538	740.114	0.394
F value	0.004	0.003	<0.001	0.01	0.07	<0.001	<0.001
LSD	22.46	0.65	7.08	0.77		46.07	1.063
CV%	14.64	8.37	4.55	18.71	17.84	15.75	21.14

Table 3: Mean characteristics of different TPS families tested at HRS, Jumla during the summer season of 2010/11-2011/12

Treatments	Emergence (%)	Uniformity (1-5)	Ground coverage (%)	Main stem (no.)	Plant height (cm)	No. of tubers/plot	Yield /plot (kg)
902007	34 c	3.65	70.15 b	2.8	67.15	79.65 c	1.695 b
902014	79 ab	4.7	85.85 ab	2.3	67.35	137.35 abc	2.175 ab
903027	75.5 ab	4.35	93 a	2.65	70.85	216.5 a	3.150 ab
903035	86.5 a	4.85	92.5 ab	2.5	53.15	175 ab	2.595 ab
903051	85.5 a	4.65	92.5 ab	2.5	72.5	188.15 ab	3.240 a
903135	72 b	4.15	82.5 ab	2.15	59.35	113 bc	1.965 ab
994013	78 ab	4.5	85 ab	2.65	64	140 abc	3.245 a
994014	81 ab	4.5	88.3 ab	2.3	62	174.85 ab	2.835 ab
988141	85 ab	4.85	86.65 ab	2.5	58.15	173 ab	2.585 ab
988143	75.5 ab	4.85	84.2 ab	2.85	58.65	143.65 abc	1.825 ab
HPS II/67	77	4.5	84.15 ab	2	52.65	146.85 abc	2.025 ab
Mean	75.36	4.5	85.89	2.47	62.35	153.46	2.49
EMS	34.44	0.189	82.035	0.26	78.207	1430.127	0.472
F value	0.0000	0.4792	0.0165	0.4701	0.4207	0.0495	0.0045
LSD	13.08	ns	20.18	Ns	Ns	84.26	1.531
CV%	7.79	9.66	10.55	20.67	14.18	26.64	27.64

CONCLUSIONS AND RECOMMENDATIONS

Based on the above results, it can be concluded that TPS families 994013, 903051, 903027, 994014, 903035 and 988141 are promising and late blight tolerant, suitable for seedling tuber production under Jumla condition and areas having similar agro-climatic zones of Nepal. However, these varieties should be further promoted only after verification and validation of seedling tuber production of promising varieties under farmer's field condition.

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