

CIP 392222.25: A Promising Potato Clone for Karnali Region of Nepal

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ABSTRACT

Farmers' Field Trial (FFT) on Potato was carried out for four consecutive years (2007/2008 to 2012/13) in order to identify suitable clones with good plant uniformity, tuber color, shape, drought, pest and diseases tolerant, high productivity and suitable for the Karnali region of Nepal. Based on the results and farmer's preference, clone 392222.25 is identified as high yielding drought tolerant variety, thus selected and recommended for cultivation in the Karnali region of Nepal.

Key words: Clone, drought, Karnali region, RCBD, tuber yield,

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 and 2nd in total production and 1st in productivity among the food crops such as rice, wheat, maize, millet and potato) grown in Nepal. Area under potato is 197234 ha and total production 2690421 mt with an average productivity of 13.64 t/ha (ABPSD, 2012/13). The area under potato in Jumla district is about 2,650 ha which is 1.3% of the total cultivated area, total production 26,000 Mt with average productivity of 9.81 mt/ha (DADO, Jumla, 2012/13) which is far below to national average (13/6 t/ha). Ministry of Agricultural Development considered potato as one of the important cash crop 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 19% is in the high hills and mountains, 44% in the mid hills and 37% in terai (NPRP, 2012/13).

In the recent years food security has become one of the biggest challenges of Nepal especially by the hills. Similar to other developing countries, food security situation has been affected in the country by the increasing population, changes in food habits and impacts of climate changes (Bista et. al 2013). Low productivity of potatoes in the Karnali region has been identified as core problem resulting from several limiting factors such as inadequate disease free, drought tolerant basic seed of recommended varieties of potatoes to flush out the degenerated seed potatoes, inadequate knowledge regarding the new varieties and inadequate availability of quality seed potatoes of recommended varieties. To overcome these problems, farmer's field trial on different clones of potato was conducted at outreach sites of Agriculture Research Station (ARS) Jumla.

MATERIALS AND METHODS

Seven different clones of potato were evaluated and compared in RCBD with eleven replications during 2007/08 to 2008/09 and 7 replication during 2012/13 whereas 13 different varieties in three replication (farmer per replication) during 2011/12 at Patmara VDC of Jumla. The plot size was assigned 7.2 m² (3m x 2.4m). The plots were fertilized with 20 ton compost/ha. Well sprouted tubers of 25-50g size were planted with 60 cm x 25 cm spacing. Planting and harvesting was done on the last week of Chaitra and last week of Bhadra, respectively. All the management practices were followed as per the recommendations. The necessary data for growth, yield and yield parameters were recorded and statistically analyzed.

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RESULTS AND DISCUSSIONS

During 2007/08 to 2008/09, seven different clones of potato were evaluated and compared with Khumal Seto -1 and Jumli Local. The tallest plants were measured in clone CIP 394037.103 and Jumli local (39 cm) where as lowest in Kufri Chipsona -2 (31 cm). The highest number of stem per plant was measured in CIP 392222.25 (5) where as lowest in L235-4. In respect to plant maturity, clone 392222.25, L235-4, Khumal seto 1 and TPS 7/67 (F1C1) were medium and others were late in maturity.

Regarding the shape of tested clones, Jumli local was found long tuber shaped whereas rest of the clones were found round shaped. Regarding color of tested clones, clone 394037.103 was found red skinned and rests were white. With respect to the yield and its attributes, Jumli local produced the highest number of tubers per plot (538) followed by L235-4 (351) and lowest in Khumal Seto -1 (290). Clone CIP 392222.25 produced the highest tuber yield (22.2 mt/ha) followed by HPS 7/67 (19.0 mt/ha) and lowest (14.3 mt/ha) in 394037.103 (Table 1 and 2).

Table 1: Characteristics of different potato clones tested at farmer's field of Jumla during the summer season of 2007/08

Clones	Plant ht (cm)	No. of main stem	No. of tubers/plot	Yield/plot (Kg)	Yield/ha (t/ha)	Maturity	Tuber characteristics	
							Color	Shape
392222.25	41	5	349	16.06	22.33	M	W	R
L235-4	34	3	345	13.18	18.3	M	W	R
Khumal Seto 1	35	4	290	10.65	14.79	M	W	R
K. Chipsona 2	31	4	345	10.66	14.81	L	W	R
HPS 7/67	37	4	321	13.56	18.84	M	W	R
394037.103	39	4	299	10.25	14.24	L	R	R
Jumli local (ch)	40	4	535	10.82	15.02	L	W	L
P	*	*	**	**	**			
CV (%)	16	20.5	25.5	23	23			
LSD (0.05)	5.9	0.8	91.3	2.83	3.93			

During 2011/12 thirteen different clones of potato were tested. Emergence was found non-significant among the tested clones. Highly uniform (5) plants were recorded in clones CIP 392222.25, PRP55861.7 and Khumal Seto 1 whereas, lowest (3) in CIP 395192.1.

The highest ground (88.3%) coverage was observed in Khumal Seto -1 and lowest (70%) in clone 395192.1. Clone 395192.1 showed the tallest (60.4 cm) plants and shortest (30.47 cm) plants in CIP 393574.61. Though number of main stems per plant were statistically non-significant, the highest number (4.7) were recorded in CIP 394050.11 followed by clone CIP 392222.25 (4.4) and lowest (2.8) in CIP 393574.61. The highest number of tubers per plot (338) was counted in PRP55861.7 followed by CIP 392222.25 (333.3) whereas the lowest (141.7) in PRP 55861.8. Highest tuber yield (20.95 t/ha) was recorded in clone CIP 392222.25 followed by CIP 394050.11(16.95 t/ha) and lowest (4.48 t/ha) in Jumli local (Table 3).

Table 2: Characteristics of different potato clones tested at farmer's field of Jumla during the summer season of 2008/09

Clones	Plant ht (cm)	Main stem/plt (#)	No. of tubers/plot	Yield/plot (Kg)	Yield/ha (t/ha)	Maturity	Tuber characteristics	
							Color	Shape
392222.25	33	4	344	15.9	22.08	M	W	R
L235-4	32	3	357	13	18.06	M	W	R
Khupal Seto 1	35	4	290	10.7	14.87	M	W	R
Kufri Chipsona 2	31	4	351	10.8	15	L	W	R
HPS 7/67	38	4	330	13.8	19.21	M	W	R
394037.103	38	4	305	10.4	14.33	L	R	R
Jumla local	38	4	541	10.8	14.95	L	W	L
P	*	NS	**	*	*			
CV (%)	14.8	24.7	24.9	24.2	24.2			
LSD (0.05)	5.3		90.4	2.9	4.14			

Note: Color: W-white, R-Red Shape: R-Round, OL-Oblong, L-Long, O-Oval Maturity: M-medium, L-Late

Table 3: Characteristics of different potato clones tested at farmer's field of Jumla during the summer season of 2011/12

Clones	Uniformity (1-5)	Ground coverage (%)	Plant height (cm)	Main stem (no.)	No. of tuber/plot	Yield/plot (kg)	Yield/ha (ton)	Maturity	Tuber	
									colour	shape
392222.25	5	85	54.33	4.4	333.3	15.07	20.94	M	W	R
PRP55861.7	5	80	43.93	3.5	338	5.07	7.04	L	R	O
K Seto 1	5	88.3	36.2	4.1	243.7	7.47	10.37	M	W	R
Cax27/40.5	4	80	41.1	3.8	171.7	8.29	11.51	M	R	OL
394050.11	4	85	48.2	4.7	290	12.2	16.95	L	W	R
35861.18	4	80	48.2	3.5	169.7	7.75	10.77	L	W	O
395192.1	3	70	60.4	3.1	228.3	12.4	16.85	L	W	R
397077.16	4	75	48.67	2.5	195.3	12.19	16.93	L	W	L
PRP55861.6	4.67	85	53.67	3.8	193	8.51	11.82	L	R	L
PRP55861.8	4	80	49.13	3.1	141.7	5.58	7.75	L	R	L
393574.61	4	75	30.47	2.8	181.7	5.88	8.17	L	R	OL
K chipsona2	3.33	75	52.6	5.2	290.3	11.18	15.53	L	W	R
Jumli local (ch)	4	85	30.57	3.4	193.7	3.22	4.48	L	W	L
EMS	0.222	23.71	62.72	1.009	2982	6.447	12.462			
P	**	**	**	ns	**	**	**			
LSD	0.79	8.20	13.35		92.02	4.279	5.949			
CV%	11.35	6.07	17.24	27.28	25.65	28.76	28.84			

Note: Color: W-white, R-Red Shape: R-Round, OL-Oblong, L-Long, O-Oval Maturity: M-medium, L-Late

Table 4: Characteristics of different potato clones tested at farmer's field of Jumla during the summer season of 2012/13

Tuber									
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Treatments	Emergence (%)	Uniformity (1-5)	Ground coverage (%)	Plant height (cm)	Main stem (no.)	No. of tuber/plot	Yield/plot (kg)	Yield/ha (ton)	Maturity	Color	Shape
392222.25	92.2	5	80	71.1	5.3	317.86	15.13	21.01	M	W	R
NPI106	92.2	4.57	76	78.5	4.1	316.43	13.97	19.41	L	W	R
Desiree	89.9	5	75	57.4	5.0	182.14	9.8	13.63	E	R	L
K Seto 1	94.0	5	90	69.1	4.8	311.71	13.98	19.42	M	W	R
Jumla local	90.6	3.57	82	78.8	4.6	293.86	12.37	17.18	L	W	L
HPS II/67	90.7	4.43	87	84.1	4.2	162.71	6.65	9.23	L	W	R
HPS7/67	86.3	4.43	81	80.2	4.7	164.71	4.56	6.34	L	W	R
EMS	34.7	0.167	22.2	125	1.1	4198.5	10.117	19.51			
P	ns	**	**	**	ns	**	**	**			
LSD		0.676	5.1	12.1		70.24	3.448	4.789			
CV%	6.5	8.93	5.8	15.0	22.	25.93	29.11	29.12			

Note: Color: W-white, R-Red Shape: R-Round, OL-Oblong, L-Long, O-Oval Maturity: M-medium, L-Late

During 2012/13 seven different clones of potato were evaluated. Emergence of potato clones was non-significant among them. Highly uniform plants were recorded in clone 392222.25, Desiree, K Seto 1 whereas the lowest in Jumla local. Ground coverage was found highest (90%) in clone K Seto 1 and lowest (75.71%) in Desiree. Tallest plants (84.14 cm) were recorded from HPS II/67 followed by HPS 7/67 (80.43 cm) where as the dwarfest (57.43 cm) plants were recorded from Desiree. Though number of main stem among the clones was non-significant, clone 392222.25 produced the highest (5.37) number of the main stem followed by Desiree (5), Khumal seto 1 (4.89) and lowest in NPI 106 (4.14). Highest number (317.86) of tubers per plot was produced from 392222.25 followed by NPI 106 (316.43) and Khumal seto 1 (311.71) where as lowest (162.71) number of tubers were produced from HPS II/67. Tuber yield was recorded highest (21.01 t/ha) in clone 392222.25 followed by Khumal seto 1 (19.41 t/ha) and NPI 106 (19.40 t/ha) where as the lowest (6.33 t/ha) in HPS 7/67 (Table 4).

In all the years of on-farm studies from 2007/08 to 2012/13, farmers' preferences on tested clones along with the check varieties was scored as good (G), fairly good (FG) and very good (VG) in the parameters such as plant appearance, tuber appearance and taste at the harvest. In addition, the response of tested clones against drought was also assessed as tolerant (T) and susceptible (S) at the time of vegetative stage. The results are presented in Table 5 below.

Results showed that plants of clones CIP 39222.25, HPS 7/67 and Khumal seto-1 were ranked as very good by the participants in all the three years of assessment, whereas remaining 2 clones as good (G) (Table 5). Tuber appearances of clones 392222.25 and Khumal seto -1 also ranked as very good. Taste of clone 392222.25, Khumal seto-1 and Jumli local ranked as very good. Clone CIP 392222.25 was observed as drought tolerant and all other as susceptible in all the three years.

Table 5: Farmer's rating on potato clones tested during 2007/08-2008/09

Clones	Overall farmers preference											
	Plant			Tuber			Taste			Tolerant to drought		
	2007/ 08	2011/ 12	2012/ 13	2007/ 08	2011/ 12	2012/ 13	2007/ 08	2011/ 12	2012/ 13	2007/ 08	2011/ 12	2012/ 13
39222 2.25	VG	VG	VG	VG	VG	VG	VG	VG	VG	T	T	T
Khuma l Seto 1 (ch)	VG	VG	VG	VG	VG	VG	VG	VG	VG	S	S	S
Kufri Chipso na 2	G	G	G	VG h)	VG	G	G	G	G	S	S	S
HPS 7/67	VG	VG	VG	VG	G	G	VG	G	G	S	S	S
Jumli local (ch)	G	G	G	G	G	G	VG	VG	VG	S	S	S

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of four consecutive years and farmer's preference, clone 39222.25 is identified as uniform, high yielding and drought tolerant variety, thus selected and recommended for cultivation in the Karnali region of Nepal.

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