

## CIP 393280.64: A PROMISING POTATO CULTIVAR FOR CENTRAL TERAI

Surendra L. Shrestha\*, Raj L. Sah\* and Bhim B. Khatri\*  
\*Regional Agriculture Research Station, Parwanipur, Bara  
\*\*National Potato Research Program, Khumaltar

### ABSTRACT

*A large number of varieties were tested as initial evaluation trial, regional varietal trial and farmer's field trial from 2063 to 2067 at RARS Parwanipur and its command area. On the basis of overall desirable characteristics; yield, pest and disease resistance, post-harvest characteristics, and preferences of the farmers, clone CIP 393280.64 has been selected for the central terai. In the trials, the tuber yield with this clone was increased by 28.2% as compared to Kufri Sindhuri, a check variety. Other check varieties Khumal Rato-2, IPY-8 and Khumal Laxmi were even inferior to Kufri Sindhuri. In addition to that, storability of this clone was also highly superior and observed that farmers can store this variety in their farm house as ware potato for five to six months and use tuber as seed potato for planting on November as sprouted tubers.*

---

**Key words;** Central terai, late Blight, keeping quality, tuber yield

### INTRODUCTION

Potato is one of the important food crops of Nepal. At present it ranks fifth position in area, fourth in total production and first in productivity compared to the main staple food crops of rice, maize, wheat and millet (ABPSD, 2010). It is probably only the crop in Nepal which has increased both its areas and yield since many years. It has been brought about by adoption of high yielding varieties and improved cultural practices (Wells *et al.*, 1996).

Area under potato in Nepal is about 1,81,900 ha and total production 20,54,817 tons with an average productivity of 13.11 t/ha (NPDP, 2009). Out of the total area under potato, approximately 18% is in the high-hills and mountains, 42% in the mid-hills and 40% in terai (ABPSD, 2005). In central region terai, area under potato crop is 18,495 hectare, production 31,18,837 tons and productivity 16.86 tons per hectare (ABPSD, 2008). The yield is much lower than the neighboring country India (19.2 t/ha) (<http://cpri>). One of the reasons behind is lack of location specific suitable potato varieties. Among the potato diseases, late-blight causes substantially yield loss and finally adversely affect the livelihoods of potato growing farmers (NPRP, 2006). Farmers need resistant varieties to replace traditional and old improved varieties that are suitable to late-blight (Qunbao *et al.*, 1994).

NPRP has released and recommended some varieties; Kufri Sindhuri, Desiree, Cardinal, Janak Dev, Khumal Rato and IPY8 for terai and inner terai. However, these varieties could not be adopted widely in this region due to their LB susceptibility, and poor keeping quality. Farmers' desired characters are high yielding, LB resistant, red skinned tubers and good keeping quality.

### MATERIALS AND METHODS

Tubers of seventeen cultivars (12 improved and 5 improved checks) were evaluated in RARS Parwanipur and out-reach sites of this station. Ten cultivars (5 improved cultivars and 5 released varieties as local check) were planted in farmer's field of Bindhbasini and Belwa area of Parsa district, Fatehpur Dumberwana of Bara district, Isworpur of Sarlahi district and Belchanpur of Rautahat district. Likewise, 17 cultivars (12 improved, and 5 released) were planted in the station and evaluated. Planting was done in Kartik and harvesting in mid Magh to early Falgun from 2063 to 2067 with above mentioned cultivars. Field was prepared after paddy harvest and sprouted tubers were planted on ridges by maintaining ridge to ridge 60 cm and plant to plant 25 cm, fertilized with 100:100:60 NPK kg/ha. Field was laid out in Randomized Completed Block Design (RCBD) with plot size of 14.8 to 21.6 m<sup>2</sup>. Fungicides against late blight disease were sprayed during the cold wave period. All the cultural practices were according to the farmers practice.

**Treatments/cultivars**

Improved cultivars: LBR 40, CIP 388764.26LB, CIP 392280.64, BR 63.65, Kufri Badsah, Andinita, CIP 389660.9, RW 8201.19, CIP 392258.11, Kinigi, CIP 800947, CIP 392261.18

Released cultivars: Janak Dev, Khumal Rato-2, Kufri Sindhuri, Khumal Laxmi and IPY-8

Data were collected on vegetative parameters, pest and disease aspect, tuber yield characteristics and post-harvest parameters. All other cultural practices were followed as per the recommendation.

**RESULT AND DISCUSSION**

In the studies clone CIP 393280.64 in farmer's field trial at outreach sites of central terai of RARS Parwanipur during 2063 to 2067 gave higher yield as compared to check released varieties (Khumal Laxmi, Khumal Rato-2, Kufri Sindhuri, IPY-8, and Janak Dev). In 2064, the tuber yield of this variety was 28.03 tons per hectare which was significantly higher than Kufri Sindhuri (19.05 t/ha) and in 2067, the tuber yield (25.54 t/ha) was significantly higher than IPY-8 (18.20 t/ha) and Janak Dev (16.79 t/ha), respectively (Table 1).

**Table 1.** Tuber yield performance of potato cultivars in farmer's field

Clones	2063	2064	2065	2067	Mean
CIP 388764.26 LB	22.50 a	23.48	13.48	33.90	23.33 (4)
CIP 393280.64	20.57 ab	28.03	13.89	25.54	22.01 (4)
BR 63/65	18.04 abc	-	13.66	-	15.85 (2)
Kufri Badsah	16.15 bc	-	18.34	-	17.24 (2)
Kinigi	-	27.97	13.14	22.55	21.22 (3)
Khumal Laxmi	20.35 ab	-	-	-	20.35 (1)
Khumal Rato	17.24 abc	-	-	-	17.24 (1)
Kufri Sindhuri	18.26 ab	19.05	12.09	-	16.47 (3)
IPY-8	-	-	-	18.20	18.20 (1)
Janak Dev	-	-	-	16.79	16.79 (1)
CV%	26.9	20.4	21.99	23.9	
F-test (0.05)	**	**	ns	**	
LSD (0.05)	6.31	6.71	5.53		

In on-station conditions during 2065 to 2067, CIP 393280.64 gave higher yield (21.63 t/ha) as compared to Kufri Sindhuri (21.09 t/ha) whereas all the other released varieties; Khumal Laxmi (19.4t/ha), IPY8 (16.7 t/ha), and Khumal Red (16.06 t/ha) were inferior in tuber yield as compared to Kufri Sindhuri (Table 2).

**Table 2.** Tuber yield (t/ha) performance of potato cultivars in station (RARS Parwanipur)

Clones	2065	2066	2067	Mean
LBR 40	28.70	18.70	18.44	21.97
BR 63/65	36.17	17.20	18.42	18.20
CIP 388764.26LB	25.54	16.49	21.65	21.23
CIP 800947	44.96	14.63	17.12	25.57
Kinigi	30.96	17.87	17.95	22.26
CIP 389660.9	24.13	19.20	23.33	22.22
Kufri Badsah	39.65	20.58	23.82	28.02
RW8201.19	40.37	14.86	19.58	24.93
Andinita	30.51	21.01	24.65	25.39
<b>CIP 393280.64</b>	<b>29.95</b>	<b>15.63</b>	<b>19.31</b>	<b>21.63</b>
CIP 392261.18	42.73	8.20	11.30	20.74
CIP 392258.11	32.40	16.20	19.77	22.79
Khumal Laxmi	19.36	8.32	7.96	11.88
IPY-8	25.32	10.72	14.03	16.69
Khumal Rato-2	25.66	10.07	12.46	16.06
Kufri Sindhuri (ch)	29.34	15.87	18.07	21.09
CV%	21.3	20.63	11.96	
F-test (0.05)	*	**	**	
LSD (0.05)	2.88	5.02	3.51	

Overall yield performance of cv. CIP 393280.64 was superior (21.85 t/ha) compared to released check varieties; Kufri Sindhuri (18.78 t/ha), Khumal Rato-2 (16.36 t/ha), IPY-8 (17.07 t/ha), Khumal Laxmi (14.00 t/ha) and Janak Dev (16.79 t/ha). Regarding yield increment (%), the tuber yield of this cv. was 11.42% higher than the check Kufri Sindhuri and with Khumal Laxmi, IPY 8, Khumal Rato-2 and Janak Dev; 56.1%, 28.0%, 33.5% and 30.1% respectively (Table 3).

As far as dry matter is concerned, the highest dry matter content was recorded in this cultivar (24.5%) among the tested all seventeen cultivars whereas the check released varieties; Khumal Laxmi, IPY8, Khumal Rato, and Kufri Sindhuri have 22.8%, 17.2%, 18.6%, and 21.3% respectively (Table 3). Similarly, this cultivar has highest tuber yield in dry matter aspects (5353 kg/ha) among the tested all cultivars whereas Kufri Sindhuri has 4177 kg/ha. Hence, by cultivating this cultivar, 28.2% tuber yield was increased in dry matter aspect. Among the check released varieties, Kufri Sindhuri had highest yield but this cultivar 393280.64 was more superior to that.

Clone 393280.64 is medium in plant height. Late-blight susceptibility is fair that is more resistant compared to released varieties. Days to maturity are late at par to Kufri Sindhuri. In one year's record during harvesting, no any tubers had symptom of common scab. Tuber shape is round, medium size with medium eye depth and red in skin tubers. The flesh color is yellow (Table 3). Farmers have also given high score in the acceptance test.

**Table 3.** Tuber yield (t/ha) performance of potato cultivars in Central Terai from 2063-2067

Clones	OR site	On-station	Mean	Yield increment (%) <sup>z</sup>	Dry matter (%)	Yield in dry matter	Yield increment (%) <sup>z</sup>
LBR 40	-	21.97 (3)	21.97	+12.0	20.4	4482	+7.3
BR 63.65	15.85 (2)	18.20 (3)	17.24	-12.1	19.7	3396	-18.7
CIP	23.33 (4)	21.23 (3)	22.42	+14.3	18.1	4058	-2.8
388764.26LB							
CIP 800947		25.57 (3)	25.57	+30.4	19.3	4935	+18.1
Kinigi	21.22 (3)	22.26 (3)	21.74	+10.9	21.9	4761	+14.0
CIP 389660.9		22.22 (3)	22.22	+13.3	23.0	5110	+22.3
Kufri Badsah	17.24 (2)	28.02 (3)	23.71	+20.9	18.5	4386	+18.6
RW8201.19		24.93 (3)	24.93	+27.1	22.2	5659	+35.5
Andinita		25.39 (3)	25.39	+29.5	21.3	5408	+29.5
<b>393280.64</b>	<b>22.01 (4)</b>	<b>21.63 (3)</b>	<b>21.85</b>	<b>+11.42</b>	<b>24.5</b>	<b>5353</b>	<b>+28.2</b>
392261.18		20.74 (3)	20.74	+5.8	22.2	4604	+10.2
392258.11		22.79 (3)	22.79	+16.2	17.4	3965	-5.1
Khumal Laxmi	20.35 (1)	11.88 (3)	14.00	-40.1	22.8	3192	-23.6
IPY-8	18.20 (1)	16.69 (3)	17.07	-14.9	17.2	2936	-29.7
Khumal Rato-2	17.24 (1)	16.06 (3)	16.36	-16.6	18.6	3043	-27.1
Kufri Sindhuri	16.47 (3)	21.09 (3)	18.78	0	21.3	4177	0.0
(ch)							
Janak Dev (ch)	16.79 (1)	-	16.79	-14.4	-21.5	3610	-13.6

<sup>z</sup> Yield increment (%) as compared to Kufri Sindhuri

**Table 4.** Vegetative and tuber characteristics of potato cultivars in central terai

Cultivars	Plant ht.	LB susceptible	Maturity <sup>w</sup>	Scab %	Sprout size	Tuber characteristics				
						Size	Shape <sup>x</sup>	Color <sup>y</sup>	Eye depth	Flesh color <sup>z</sup>
LBR 40	Med	Res	M	0	3	M-B	R	W	M	W
BR 63.65	Med	High	E	0	5	Small	R	R*	Deep	C
CIP 388764.26LB	Tall	Fair	M	0	4	Med	R	Bl	Med	W
CIP 800947	Med	Sus	E	0	5	Med	O	W	Shallow	C
Kinigi	Short	Fair	M	1	-	Med	R	R*	Deep	C
CIP 389660.9	Med	Res	L	0.7	4	Big	L	W	Shallow	W
Kufri Badsah	Med	High	E	1.5	-	Med	Of	W	Shallow	C
RW8201.19	Med	Med	M	0	3	Med	O	R	Shallow	C
Andinita	Med	Res	M	0	3	Big	O	W	Shallow	W
<b>CIP 393280.64</b>	<b>Med</b>	<b>Fair</b>	<b>M</b>	<b>0</b>	<b>1</b>	<b>Med</b>	<b>Rf</b>	<b>R*</b>	<b>Med</b>	<b>Y</b>
CIP 392261.18	Tall	Med	M	15.6	-	Med	O	R*	Sus	W
CIP 392258.11	Med	Med	M	0	3	Big	Rf	W	Med	C
Khumal Laxmi	Tall	Med	L	1.8	2	Med	R	R*	Med	Y
IPY-8	Med	Med	L	0	3	Sus	O	Y*	Med	Y
Khumal Rato-2	Med	Med	M	2.6	4	Med	R	R	Deep	C
K. Sindhuri (ch)	Tall	Med	L	2.6	3	Med	R	R	Deep	W
Janak Dev (ch)	Tall	Med	M	-	4	M-B	L	R	Med	C

<sup>w</sup>W: white, C: cream, CW: creamy white, Y: yellow <sup>y</sup>W: white, R: red, Pp: purple, Bl: blue, \*: deep red eye

<sup>x</sup>L: long, R: round, O: oval, Rf: round flat, Of: oval flat <sup>w</sup>E: early, M: medium, L: late

#### CONCLUSION AND RECOMMENDATIONS

In the plains of Nepal, potatoes are harvested in February/March and price of potato increases from May onward. Since with the increased temperature, sprouting, weight loss and rotting problems occur on the tubers, all the harvest goes to the cold store for ware and seed purpose. Cold stored potatoes are not tasty for consumption due to the increased sugar content. Price of seed potato also increases due to cold store charges. Varieties having good keeping quality are highly required for the farmers in terai for saving money, energy (transportation and electricity) and for sustainable potato production.

On the basis of over all performances and farmers' preferences, cv. CIP 393280.64 has been selected and recommended for the cultivation in central terai condition. Clean seed of this cultivar is necessary to improve the yield and keeping quality, both.

#### REFERENCES

- ABPSD. 2005. Agri-business Promotion and Statistics Division. Statistical Information on Nepalese Agriculture, 2005/2006. Ministry of Agriculture, Singh Durbar, Kathmandu.
- ABPSD. 2008. Agri-business Promotion and Statistics Division. Statistical Information on Nepalese Agriculture, 2008/2009. Ministry of Agriculture, Singh Durbar, Kathmandu.
- ABPSD. 2010. Agri-business Promotion and Statistics Division. Statistical Information on Nepalese Agriculture, 2009/2010. Ministry of Agriculture, Singh Durbar, Kathmandu.
- Wells, G.j., S. Schultz and M. Ranjit. 1996. Final report of the National Potato Research and Development Program, Phase IV, SA for Dev and Cop. Nepal.
- NPRP. 2006. Annual Report. National Potato Research Program, Nepal Agricultural Research Council, Khumaltar, Lalitpur, Nepal.
- Qunbao, H., W. Jun, S. Bofu, and E.Chujoy. 1994. Evaluation of potato germplasm for resistance to *Phytophthora infestans* in Yunnan, China. In: Proceedings of the Fourth APA Triennial Conference, 5-7, July, Vol 2, pp. 193.