

Original Research Article

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Evaluation of Potato Varieties for their Suitability under Northern Telangana Agro Climatic Conditions

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ABSTRACT

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An experiment was conducted to evaluate the performance of seven promising potato cultivars for growth, yield attributes, yield and grades under Northern Telangana Zone. The experiment was laid out in a randomized block design with three replications and seven treatments during rabi 2017-18 at Horticultural Research Station, Adilabad. There is significant variation among the varieties in the growth, yield attributes, yield and grades of potato. Highest per cent of plant emergence was reported in Kufri Chandramukhi and Kufri Jyothi (100%). Kufri Surya reported maximum plant height at 30, 60 and 90 DAP (45.23, 70.76 and 65.33 cm respectively). Kufri Chipsona-3 and Kufri Badshah reported maximum number of branches per plant at 60 and 90 DAP. Maximum number of compound leaves per plant were produced by Kufri Chipsona-3 at 60 and 90 DAP. Kufri Surya reported maximum fresh weight of tuber per plant (832 g) and tuber yield (29.86 t/ha). The highest per cent of Grade-B tubers were produced by Kufri Surya followed by Kufri Chandramukhi, Kufri Khyati and Kufri Chipsona-3. The results of the study indicate that Kufri Surya, Kufri Khyati and Kufri Chipsona-3 have the potential to grow successfully in Northern Telangana Zone.

Introduction

Potato (*Solanum tuberosum*) is one of the major non cereal food crops in the world, in the volume of world crops production it ranks fifth following sugarcane, maize, rice and wheat (FAOSTAT data 2014). India contributes 7.55% to the total world potato production. Potato is highly nutritious, easily digestible, wholesome food containing carbohydrates, proteins, minerals, vitamins and high quality dietary fibre. Potato contains substantial quantity of energy, edible protein-

2.8g, starch-16.3 g, total sugar-0.6 g, crude fibre-0.5 g, carbohydrate-22.6 g and vitamin-C 25 mg per 100 g fresh weight of tubers (Bhuwneshwari *et al.*, 2013).

The productivity of potato in India is quite low (183.3 q/ha) as compared to that of Belgium (490 q/ha), New Zealand (450 q/ha), UK (397 q/ha) and USA (383 q/ha). India needs to extend potato cultivation to non-traditional areas for meeting hefty target of producing 125 million tonnes potatoes by 2050 (Singh *et al.*, 2014). In South India, it is mainly grown

in Karnataka and parts of Southern Telangana (Indian Horticulture Database, NHB, 2013). Genetic makeup has great influence on yield and quality of potato tubers. Various varieties of potato having wide variation in their yield potential and quality attributes have been evolved (Marwaha *et al.*, 2010). These varieties further show variation in their attributes under different agro climatic conditions. The influence of location and cultivars on quality of potato tubers have been reported by researchers (Uppal and Paul, 2001; Kumar *et al.*, 2003).

Government of Telangana want self-sufficiency in vegetable production and started a programme ManaUru – ManaKuragayalu. In the Zonal Research and Extension Advisory meeting conducted at Hyderabad it was decided that the climate and soils of Adilabad are suitable for potato cultivation and wanted to promote the best variety and have crop colony of potato in Adilabad district. In view of this an experiment is initiated to test the performance of Seven promising varieties suitable for (Deccan plateau) at Adilabad which is a part of Northern Telangana Zone.

Materials and Methods

A field experiment was conducted at Horticultural Research Station, Adilabad during *Rabi* 2017-18. The experimental site is located in Northern Telangana Zone at an altitude of 264 meters above mean sea level on 79° 56' 03" E longitude and 19° 08' 09" N latitude. The soil is sandy clay loam texture, slightly acidic (6.31), low in nitrogen, medium in phosphorous and high in potassium content. Seven elite varieties KufriChandramukhi, KufriBadshah, KufriPukhraj, KufriJyothi, KufriKhyati, Kufri Surya and Kufri Chipsona-3 were procured from CPRI, Jalandar. The experiment was laid in randomized block design with three replications. Healthy, uniform sized tubers were planted at a spacing

of 60 x 30 cm on 6th November, 2017 and the crop was harvested on 5th February, 2018. 120-80-100 kg/ha of nitrogen, phosphorous and potassium were provided with urea, di ammonium phosphate and muriate of potash. Full quantity of phosphorous, potassium and half dose of nitrogen were applied as basal in furrows at the time of planting, while the remaining quantity of nitrogen was applied in two split doses. 1st at first earthen-up and 2nd at second earthen-up (25 and 45 days after planting respectively). Recommended package of practices were followed, need based plant protection measures were taken up (spraying of Ridomil gold (2 g/ lit water) to prevent infestation of late blight and Dimethoate (2.0 ml) and Fipronil (2.0 ml) per lit of water for control of sucking pest.

Five hills from each plot were randomly selected for data collection of plant height, number of branches per plant, number of compound leaves per plant, number of tubers per plant, fresh weight of tubers per plant. Plant height was measured from the base of the plant to the terminal bud at 30, 60 and 90 DAP. Tubers collected from each plot (30 plants in 4.5 m²) were weighed in kg for yield determination. The weight obtained per 4.5 m² was then converted to kg per hectare. Tubers collected from each plot were sorted and classified into three grades: Grade-C potatoes with a diameter less than 28 mm, Grade-B potatoes with a diameter between 28 and 55 mm and Grade-A potatoes with a diameter greater than 55 mm. Potatoes from each grade and plot were weighed (Wg). Wt is the weight of all tubers from the same plot. To determine the percentage of potatoes of each grade with in a plot the following formula was used: % of potatoes of grade M= (Wg M/ Wt) x 100. M= Grade A, B or C. For each plot, the sum of the percentages of all grades equals to 100. The data recorded under the study were subjected to statistical analysis as per standard procedure as suggested by Panse and Sukhatme (1985).

Results and Discussion

Growth Parameters

Plant emergence varied from 91.11 (KufriBadshah) to 100% (KufriChandramukhi and KufriJyothi). There is no significant difference in the percentage of plant emergence with regard to varieties. Statistical analysis indicates there is significant variation among the potato varieties in respect of plant height with advancement up-to 60 days after planting in early varieties KufriChandramukhi, KufriKhyati and Kufri Surya and up-to 90Days after planting in medium duration varieties KufriPukhraj, KufriJyothi and Kufri Chipsona-3and late variety KufriBadshah (Table 1).

Kufri Surya reported significantly higher plant height (45.23 cm) over other varieties but was at par with KufriKhyati and KufriBadshah at 30DAP reported significant higher plant height (70.76 cm) at 60 DAP and reported maximum plant height (65.33 cm) at 90 DAP but it was at par with KufriBadshah, Kufri Chipsona-3.

The variations in plant height among the different potato cultivars may be due to genetic and inherent characters of cultivars of potato which is in accordance with the findings of Kumar *et al.*, 2008 and Bhuwleshwari *et al.*, 2013.

Kufri Chipsona-3 reported maximum number of branches per plant at 60 days after planting but it was at par with KufriBadshah. KufriBadshah reported maximum number of branches per plant at 90 DAP and was at par with Kufri Chipsona-3, Kufri Surya and KufriJyothi. Varieties did not differ in the number of compound leaves at 30 DAP. Kufri Chipsona-3 reported significantly higher number of compound leaves (53.13 and 76.47) at 60 and 90 DAP but was at par with

KufriBadshah (Table 1). The variations in number of branches per plant and number of compound leaves per plant among the different potato cultivars may be due to different genetic make-up and better adoptability to prevailing environment conditions. Similar results were reported by Mehta (1987), Kumar *et al.*, 2008, Bhuwleshwari *et al.*, 2013 and Jatav *et al.*, 2017.

Yield attributes

Significant differences in the number of tubers per plant were noticed among the varieties. Kufri Chipsona-3 and KufriBadshah reported significantly higher number of tubers per plant (19.53 and 17.33). There is no significance difference between the other varieties Kufri Surya, KufriChandramukhi, KufriKhyati, KufriPukhraj and KufriJyothi (Table 2). Significant variations were observed in tuber weight per plant among the varieties. The average weight of tuber per plant ranged from 495 to 832 g.

Kufri Surya reported maximum fresh weight of tubers per plant (0.832 kg) which was at par with KufriKhyati, KufriPukhraj and KufriBadshah. Variations among different varieties in regard to number of tubers per plant and fresh weight of tubers per plant may be due to genetic differences or agro ecological conditions.

Yield

Significant variations in the yield of tuber per hectare were observed among the varieties investigated. Kufri Surya reported significantly higher tuber yield per plot (13.451 kg) and tuber yield per hectare (29.86 t) which was at par with KufriKhyati and Kufri Chipsona-3 (Table 2). KufriJyothi reported least tuber yield per plot (8.832 kg) and tuber yield per hectare (19.627 t/ha).

Table.1 Performance of promising potato varieties on different growth parameters during rabi season

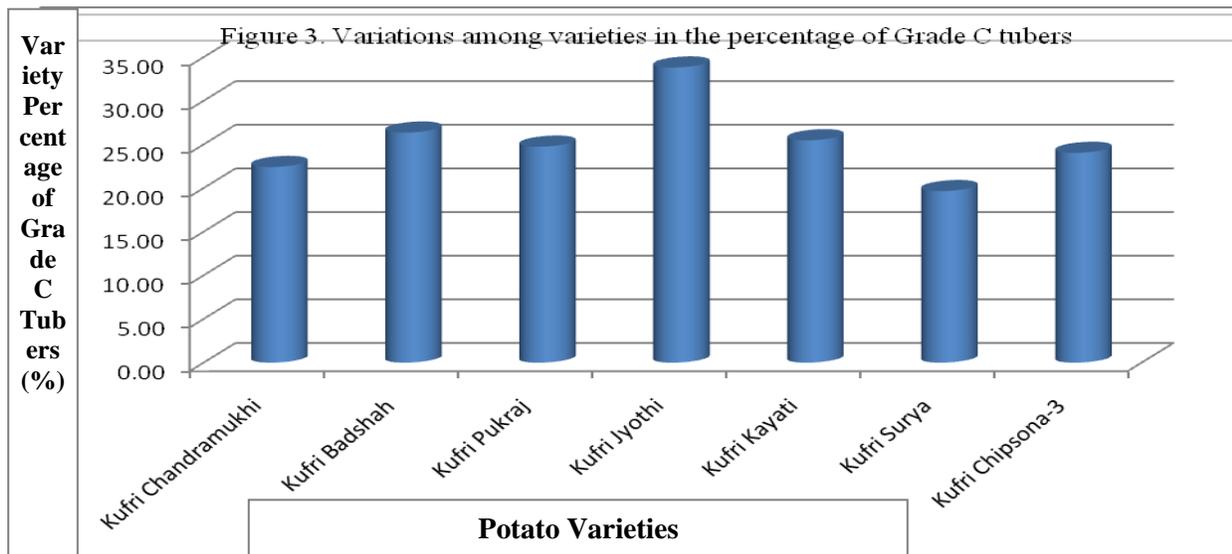
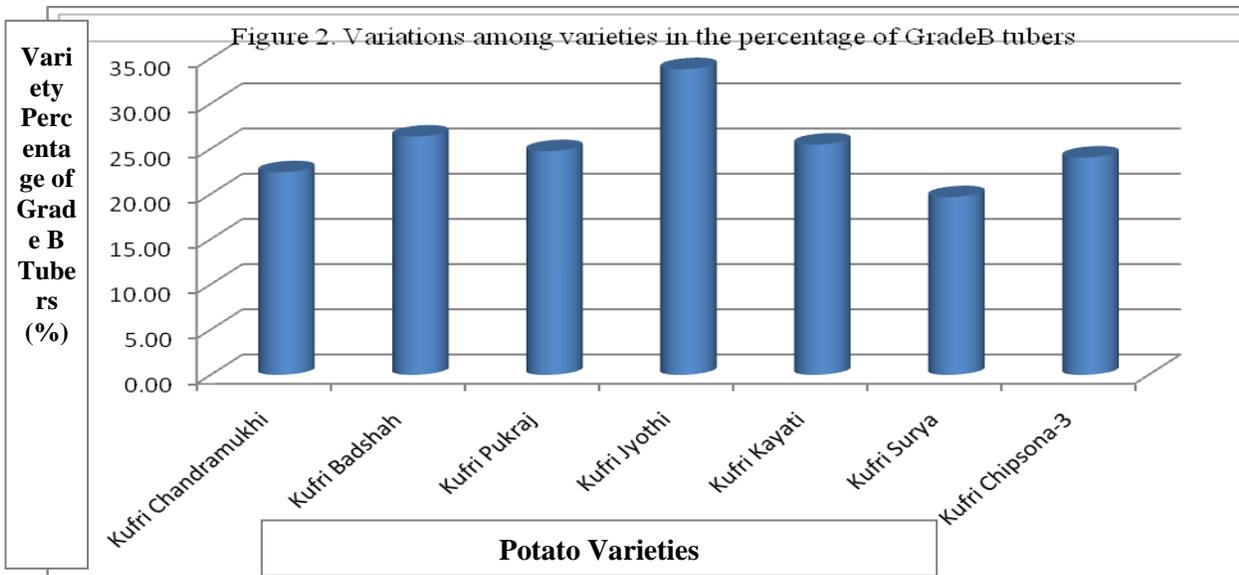
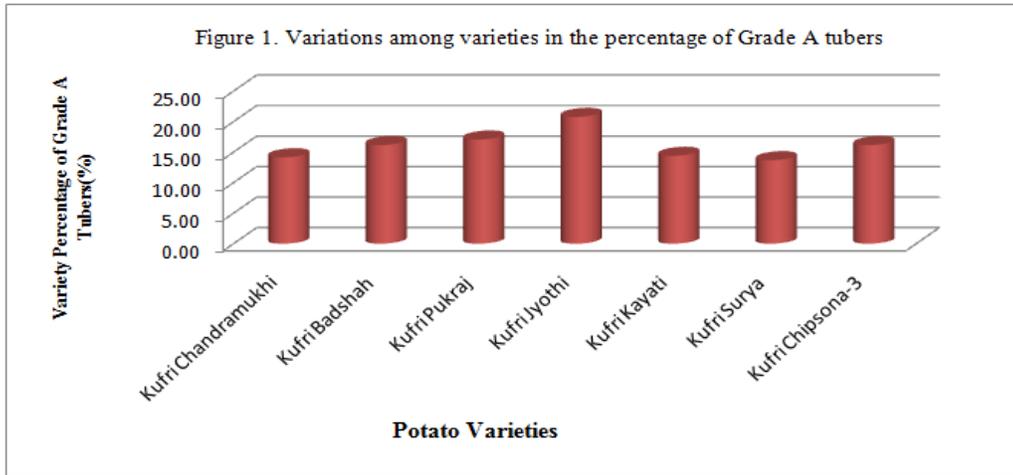
	Variety	Germination %	Plant height (cm)			No. of branches/plant		No. of compound leaves/plant		
			30 DAP	60 DAP	90 DAP	60 DAP	90 DAP	30 DAP	60 DAP	90 DAP
1	KufriChandramukhi	100.00	38.95	54.13	53.49	3.00	4.73	12.73	41.20	61.00
2	KufriBadshah	91.11	41.57	61.88	64.09	5.80	7.80	11.07	48.60	72.30
3	KufriPukhraj	98.89	37.11	44.91	48.43	1.67	4.40	10.07	25.67	57.87
4	KufriJyothi	100.00	38.09	47.53	49.11	3.73	6.00	11.73	37.47	57.13
5	KufriKhyati	97.78	43.40	57.42	55.21	5.13	5.60	10.80	39.13	66.93
6	Kufri Surya	98.89	45.23	70.76	65.33	5.23	7.33	12.33	44.80	61.33
7	Kufri Chipsona-3	96.67	39.29	59.71	61.55	6.53	7.47	12.00	53.13	76.47
	SE(m)	2.82	1.51	2.37	2.34	0.40	0.59	0.61	1.71	2.85
	C.D.	NS	4.71	7.37	7.30	1.26	1.83	NS	5.32	8.88

Table.2 Performance of promising potato varieties on yield attributes and yield during rabi season

	Variety	No. of tubers/plant	Fresh weight of tubers/plant (kg)	Tuber yield/plot (kg)	Tuber yield (t/ha)
1	KufriChandramukhi	14.13	0.672	10.327	22.947
2	KufriBadshah	17.33	0.718	10.909	24.243
3	KufriPukraj	14.07	0.746	10.573	23.493
4	KufriJyothi	13.73	0.495	8.832	19.627
5	KufriKhyati	14.13	0.753	12.656	28.123
6	Kufri Surya	14.60	0.832	13.451	29.86
7	Kufri Chipsona-3	19.53	0.616	11.791	26.200
	SE (m)	0.91	0.05	0.543	1.206
	CD	2.84	0.159	1.690	3.757

Table.3 Variety percentage by weight of different grades of tuber

	Variety	Percentage by Weight of Tubers (%)		
		Grade-A	Grade-B	Grade-C
1	KufriChandramukhi	14.17	63.42	22.42
2	KufriBadshah	16.17	57.47	26.36
3	KufriPukraj	17.07	58.18	24.75
4	KufriJyothi	20.78	45.40	33.82
5	KufriKhyati	14.40	60.11	25.48
6	Kufri Surya	13.69	66.65	19.66
7	Kufri Chipsona-3	16.16	59.80	24.04



The results are in agreement with other researchers who investigated that tuber yield varies significantly with variety, location and genotypes x environment interaction (Elfinesh, 2008, Gebreselassie *et al.*, 2016, Pandey *et al.*, 2004 and Kumar *et al.*, 2007)

Grades of Tuber

Medium size tubers (28-55 mm diameter) (Grade-B) are desirable for better storage. Significant variations were observed among the seven varieties tested in the number and production percentage of different grades of tubers (Table 3).

The highest percentage of Grade-A tubers was produced by KufriJyothi (Table 3 and Fig. 1). The percentage of Grade-B potatoes (Table 3 and Fig. 2) was higher in all the varieties than the percentage of Grade-A or Grade-C potatoes. The range of weight of Grade-B tubers was between 45.40 and 66.65 of total weight of all grades of same variety. The highest percentage of Grade-B tubers was produced by Kufri Surya followed by KufriChandramukhi, KufriKhyati and Kufri Chipsona-3. Highest percentage of Grade-C tubers was produced by KufriJyothi (Table 3 and Fig. 3) and lowest percentage of Grade-C tubers was produced by Kufri Surya. These differences in the percentage of different grades among the varieties might be due to genetic variations or adoptability of the variety to the climatic conditions of the experimental site.

Among the seven promising varieties tested at Horticultural Research Station, Adilabad, Kufri Surya produced the tallest plants, maximum fresh weight of tuber per plant, tuber yield per plot and tuber yield per hectare and it has produced greatest per cent of medium sized potatoes in comparison to other varieties. Kufri Chipsona-3 has produced more number of tubers per plant and on par

yields with Kufri Surya and Khyati. The results of the study indicate that Kufri Surya, KufriKhyati and Kufri Chipsona-3 have the potential to grow successfully in Northern Telangana Zone.

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