

Evaluation and Introduction of Apical Rooted Potato Saplings in Hassan District

Rajegowda, K. S. Lavanya, N. Bindu, G. N. Dhamodhar,
H. K. Pankaja, M. Shivashankar, T. Nagaraja,
Amarananjun deshwar

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ABSTRACT

The present investigation was carried out in different taluks of Hassan district and, India during *rabi*, 2020 - 2021 to study the relative performance of apical rooted cuttings of different genotypes of potato and to select suitable high yielding genotypes for growth, yield and quality traits for commercial cultivation in Hassan district. The experiment was carried out by adopting Randomized Complete Block Design (RCBD) with twenty replications and four treatment combinations with different genotypes.

Results indicated that among the ARC treatment combinations, Kufri Himalini-ARC (T_3) recorded significantly higher per cent of establishment (97.88 %), maximum plant height (90.49 cm), higher no. of stems (5.80), no. of leaves (82.03), no. of tubers per plant (8.58), tubers per plot (9162.90), total

tuber yield per plant (252.74 g), total tuber yield per plot (397.38 kg) and total tuber yield of 19.53 t/ha followed by Kufri Jyoti-ARC (T_1) with 97.79% of establishment, plant height (63.73 cm), no. of stems (4.59), no. of leaves (64.33), no. of tubers per plant (5.27), no. of tubers per plot (9129.65), total tuber yield per plant (242.53 g), total tuber yield per plot (356.51 kg) and total tuber yield of 17.45 t/ha. Higher B : C ratio was obtained from Kufri Himalini-ARC (T_3) (3.5) followed by Kufri Jyoti-ARC (T_1) (3.1) compared to other treatments.

Keywords Potato, Apical Rooted Cuttings (ARC), Growth, Yield.

INTRODUCTION

Potato (*Solanum tuberosum* L.) is one of the most important tuberous, starchy and versatile food crop belongs to family Solanaceae. It was originated and domesticated in Andes of South American Continent. Today Potato has become an integral part of much of the world's cuisine and in terms of total food production.

In India potato is grown in an area of 2.07 m hectares with a production of 48 M tonnes and a productivity of 23.19 Mt/ha. The major potato producing states in India are Uttar Pradesh, West Bengal, Bihar, Madhya Pradesh, Gujarat and Karnataka. In

Dr. Rajegowda, K. S. Lavanya, N. Bindu*, G. N. Dhamodhar,
Dr. H. K. Pankaja, Dr. M. Shivashankar, Dr. T. Nagaraja, Dr.
Amarananjun deshwar

ICAR- Krishi Vigyana Kendra, Kandali, Hassan University of Agricultural Sciences, GKVK, Bengaluru 560065, Karnataka, India
Email : bindunanjunda@gmail.com

*Corresponding author

Table 1. Establishment percentage in different genotypes of potato. ARC- apical rooted cuttings.

Sl. No.	Genotypes	Establishment (%) 20 DAP
1	Kufri Jyoti - ARC	97.79
2	Kufri Jyoti - tubers	93.48
3	Kufri Himalini - ARC	97.88
4	Kufri Himalini - tubers	93.69
	Mean	95.71
	SEm ±	0.15
	CD at 5%	0.43

Karnataka, the crop is grown in an area of 44,160 ha with an annual production of 5,89, 120 M tonnes and productivity of 13.34 t/ha (Anonymous 2014) and mainly grown in Hassan, Belgaum, Chikkaballapur and Kolar. Hassan district alone accounts for more than 41% of potato production in the state (Bhajantri 2011).

Potato is low in fat and rich in several micronutrients especially Vitamin C when eaten with its skin (Lutaladio and Castaldi 2009). It is a good source of vitamins B₁, B₃ and B₆ minerals.

Potato also contains dietary antioxidants, which helps in preventing diseases related to ageing. It is second in source of nutrition after egg. Basically potato prefers relatively mild temperature during early growth and cool weather during tuber development. It requires 25°C temperature at the time of sprouting, 20°C for vegetative growth and 17 to 20°C for tuber development. Tubers develop best on deep, fertile,

sandy to clay loam soils with good water retention capacity.

Hassan district is more suitable for production of quality potato. In 1990 the area under potato was 40,000 ha, now it has drastically reduced to 8,000 ha due to various reasons like timely non-availability of quality planting materials, early and late blight disease outbreak, non-availability of suitable technologies, less productivity, higher cost of production and less profitability. The availability of quality seed materials is the major problem. It is the great set back for the area of production. Farmers are entirely depending on the potato seed seller or agent who usually brings the potato seeds from Punjab which are of 6th and 7th generation potato seeds where the potentiality is very low. Moreover selling of poor quality potato seeds and also table purpose seeds from seller reduced the productivity which in turn reduced the profitability to the farmer. So there was an urgent need to provide quality planting materials like tubers/saplings to the farmers along with providing the technical inputs. Vietnam producing potato seed tubers by using apical rooted cuttings (ARC)/ apical stem cuttings is also called apical rooted saplings, since 25 years. Keeping in view of the above facts, the present investigation was carried out to evaluate and introduce apical rooted potato saplings in Hassan district.

MATERIALS AND METHODS

The experiment was conducted at farmer's field in different taluks of Hassan district viz., Hassan, Arakalgud, Arasikere, Alur and Holenaraseepura

Table 2. Plant height, number of stems and number of leaves in different genotypes of potato at various stages of plant growth. ARC- apical rooted cuttings.

Sl. No.	Genotypes'	Plant height (cm)		Number of stems per plant @ 60 DAP	Number of leaves per plant @ 60 DAP
		45 DAP	60 DAP		
1	Kufri Jyoti – ARC	53.62	63.73	4.59	64.33
2	Kufri Jyoti - tubers	52.35	62.44	3.59	55.83
3	Kufri Himalini -ARC	55.70	90.49	5.80	82.03
4	Kufri Himalini - tubers	53.31	82.47	4.74	72.67
	Mean	53.75	74.78	4.68	68.71
	SEm ±	0.20	0.17	0.02	0.18
	CD at 5%	0.57	0.49	0.07	0.53

Table 3. Performance of different genotypes of potato for yield characters. ARC– apical rooted cuttings.

Sl. No.	Genotypes	No. of tubers per plant	No. of tubers per plot (200 sqm)	Total yield per plant (g)	Total yield per plot (200 sqm) (kg)	Total yield (t/ha)
1	Kufri Jyoti - ARC	5.27	9129.65	242.53	356.51	17.45
2	Kufri Jyoti - tubers	4.32	8945.40	216.11	329.28	16.46
3	Kufri Himalini – ARC	8.58	9162.90	252.74	397.38	19.53
4	Kufri Himalini - tubers	7.50	9156.45	242.94	386.10	19.24
	Mean	6.42	9098.60	238.58	367.32	18.17
	SEm ±	0.06	16.80	0.35	0.96	0.08
	CD at 5%	0.19	47.58	1.00	2.73	0.25

and at KVK in Hassan district. Tubers are sown at a spacing of 60 cm × 20 cm apart. The experiment was laid out in Randomized Complete Block Design (RCBD) with 20 replications and four treatments. The treatments in each replication were allotted randomly using random number Table 1. Each farmer is considered as replication. The treatment details are given below :

T₁ : Kufri Jyoti-ARC

T₂ : Kufri Jyoti-tubers

T₃ : Kufri Himalini-ARC

T₄ : Kufri Himalini-tubers

RESULTS AND DISCUSSION

Growth and yield parameters

Results indicated that among the four treatments, Kufri Himalini-ARC (T₃) recorded significantly higher

per cent of establishment (97.88 %), maximum plant height (90.49 cm), higher no. of stems (5.80), no. of leaves (82.03), no. of tubers per plant (8.58), no. of tubers per plot (9162.90), total tuber yield per plant (252.74 g), total tuber yield per plot (397.38 kg) and total tuber yield of 19.53 t/ha followed by Kufri Jyoti-ARC (T₁) with 97.79 % of establishment, plant height (63.73 cm), no. of stems (4.59), no. of leaves (64.33), no. of tubers per plant (5.27), no. of tubers per plot (9129.65), total tuber yield per plant (242.53 g), total tuber yield per plot (356.51 kg) and total tuber yield of 17.45 t/ha.

The lower per cent of establishment (93.48 %), lower plant height (62.44 cm), no. of stems (3.59), no. of leaves (55.83), no. of tubers per plant (4.32), no. of tubers per plot (8945.40), total tuber yield per plant (216.11 g), total tuber yield per plot (329.28 kg) and total tuber yield of 16.46 t/ha was recorded by Kufri Jyoti-tubers (T₂) (Tables 2 and 3). This might be due to their inherent genetic makeup, response to environmental condition, adaptability to particular environment and promotion of growth of auxiliary buds into new shoots (Nikmatullah 2018).

Table 4. Cost of cultivation for potato (ARC and Tubers) production in Hassan district. ARC- apical rooted cuttings.

Sl. No.	Genotypes	Total cost of cultivation (Rs / ha)	Total yield (t/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B : C ratio
1	Kufri Jyoti - ARC	137500	17.45	436250.00	298750.00	3.1
2	Kufri Jyoti - tubers	147500	16.46	181060.00	33560.00	1.2
3	Kufri Himalini - ARC	137500	19.53	488250.00	350750.00	3.5
4	Kufri Himalini - tubers	147500	19.24	211640.00	64140.00	1.4

Economics

Among the genotypes, significantly higher net returns and B:C ratio was obtained from Kufri Himalini-ARC (T_3) (350750.00 and 3.5) respectively followed by Kufri Jyoti-ARC (T_1) (298750.00 and 3.1) and Kufri himalini-tubers (T_4) (64140.00 and 1.4) respectively whereas, lowest net returns and B:C ratio was recorded in the genotype Kufri Jyoti-tubers (T_2) (Rajput *et al.* 2003) (Table 4). This may be due to tubers produced from Kufri Himalini-ARC and Kufri Jyoti-ARC is used as seed material which fetches high cost.

CONCLUSION

In the present investigation it could be concluded that, among the different treatments, genotype Kufri Himalini-ARC, Kufri Jyoti-ARC and Kufri Himalini – tubers were found promising in terms of total

tuber yield, net returns and B:C ratio in the Hassan district during *rabi* season. Hence, apical stem cuttings are suitable for cultivation for seed production in Hassan district.

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