



Evaluation of Potato Varieties under Rainfed Conditions in West Kameng District of Arunachal Pradesh

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ABSTRACT

A field experiment was conducted during spring season at farmers' field to study the suitability of five different potato varieties viz., Kufri Jyoti, Kufri Kanchan, Kufri Giriraj, Kufri Girdhari and Kufri Pukhraj. The experiment was laid out in randomized block design with three replications. The experimental site is located at 1500 m above mean sea level at approximately 27°35'84" latitude and 92°24'09" longitude, and falls under temperate sub-alpine to sub tropical climate with minimum temperature and maximum temperature ranged from 7.72°C to 18.82°C and 22.28°C to 27.88°C respectively, with annual mean rainfall of 1578 mm during the investigation period. The soil of the experimental site was red sandy hilly soil with 217.5, 365.7 and 134.4 kg NPK per hectare, respectively. No significant effects were observed in germination percentage and plant height at 60 d after planting among the varieties. However, significant variations were observed in plant height at 30 d after planting, number of stems and leaves per plant, number and total yield of tubers among the different varieties.

Key Words: Conditions, Evaluation, Potato, Rainfed, Variety.

INTRODUCTION

The potato is the world's fourth most important food crop after maize, wheat and rice. It is a good source of dietary fibre, minerals and vitamin particularly ascorbic acid (Camire *et al*, 2009). Besides being nutritionally superior and highly productive than most food crops, it has a relatively short duration and therefore amenable for inclusion in intensive cropping system. Due to its exceptionally high productivity coupled with high food value, potato demands greater attention to accomplish both food and nutritional security Wahengbam and Singh (2013).

Potato yield in all North East states except Tripura (18.5t/ha) has been low (4-8t/ha) as compared to national average of 18.2 t/ha (Dubey *et al*, 2010). A number of factors have been identified that contribute to the poor productivity in the region.

Major factors among them are rain fed conditions, heavy incidence of pest like white grub, rodents, potato tuber moth and diseases like late blight and brown rot, inadequate availability of inputs like fertilizer, plant protection chemicals, quality seed of high yielding varieties and continuation of traditional practices of potato cultivation. Therefore, a study on evaluation of potato varieties under rainfed conditions in West Kameng district of Arunachal Pradesh was conducted.

MATERIALS AND METHODS

The field experiment was conducted during spring seasons of 2013-14 and 2014-15 at farmer's field of Dirang area under West Kameng district of Arunachal Pradesh to study the suitability of different potato varieties in the selected area. The experimental site is located at 1500 m above mean

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sea level at approximately 27035'84" latitude and 92024'09" longitude, and falls under temperate sub-alpine to sub tropical climate with minimum temperature and maximum temperature ranged from 7.72°C to 18.82°C and 22.28°C to 27.88°C respectively, with annual mean rainfall of 1578 mm during the investigation period. The whole experiment was carried out under rainfed condition.

Five potato varieties *viz.*, Kufri Jyoti, Kufri Kanchan, Kufri Giriraj, Kufri Girdhari and Kufri Pukhraj were selected for evaluation and the experiment was laid out in randomized block design with three replications. Seed tubers were planted in ridge and furrow method with spacing of 50 cm row to row X 20 cm plant to plant. Planting was done in the last week of February and harvested at individual maturity stages of the varieties. No inorganic nutrients were applied but well decomposed farm yard manure@30t/ha was incorporated into the soil. Seed tubers were inoculated with *Azotobacter* and *Phosphobacteria* spp, for which a jaggery solution was prepared by dissolving 100 g of jaggery in a litre of water. To this, 250 g each of the bio-fertilizers was added to form slurry. The slurry was then spread on the seed tubers and was mixed thoroughly so that uniform and even spread of bio-fertilizers over the tubers was achieved. The tubers were then allowed to dry in shade. This treatment was done just prior to planting. Salient features of the potato varieties selected for evaluation (Gupta *et al*, 2009 and Kumar *et al* 2014).

Kufri Jyoti

This variety is medium to early maturing, tall, erect, compact and vigorous with few but thick stems. Flowers are white; tubers are medium to large in size, oval in shape with white skin and fleet eyes. Sprouts are blue-purple. The yield potential is 20-30 t/ha and is moderately resistant to late and early blight, easy to cook, waxy texture, mild flavor and suitable for processing.

Kufri Kanchan

This variety is semi-compact, stem red-purple with green pigment which are highly scattered

throughout, flowers are blue-violet. Tubers are pink, ovoid with medium-deep eyes and cream flesh. Sprouts are pink. Medium maturing cultivar takes 110-135 d during summer and 90-100 d during winter with average yield potential of 25-30t/ha. Resistant to wart disease and late blight and easy to cook, texture waxy, flavour mild, free from after-cooking discoloration. Its special character is slow rate of degeneration.

Kufri Giriraj

It is a medium maturing variety, plants are medium tall, semi-erect with medium thick stems that are coloured at the base. Flowers are light purple. Tubers are white with smooth skin, medium to large in size, oval in shape with white flesh and fleet eyes. Sprouts are light purple and yield potential is 25-30 t/ha, resistant to late blight, easy to cook, waxy texture, not suitable for processing.

Kufri Girdhari

It is a medium maturing variety producing medium tall, semi-erect, vigorous, semi-compact plants with white flowers. The tubers are medium, oval-oblong, white, smooth, shallow eyes with pale yellow flesh. Sprouts are purple in colour. Potential yield is 27-30t/ha, highly field resistant to late blight in foliage and tubers and easy to cook.

Kufri Pukhraj

The plants of this variety are medium compact, stem green with purple pigment randomly distributed, flower white, tuber white cream, ovoid with shallow eyes and yellow flesh, sprout purple. Yield potential of the variety is 35-40 t/ha, resistant to early blight and moderately resistant to late blight, easy to cook, waxy texture, mild flavor, free from after cooking discoloration.

RESULTS AND DISCUSSION

Growth attributes

Germination of potato was recorded at 30 days after planting (DAP) and found that the germination percentage was same among the various varieties. However, highest germination percentage of 99.7

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Table 1. Growth and yield parameters of different varieties of potato (Mean of 2 yr).

Variety	Germination % (30 DAP)	Plant height (cm.)		Number of stems/ plant (30 DAP)	Number of leaves/plant (60 DAP)	Number of tubers (thousand/ ha)	Yield of tubers (t/ha)
		30 DAP	60 DAP				
Kufri Jyoti	99.7	38.7	45.3	3.5	35.2	640.6	25.1
Kufri Giriraj	98.6	27.1	39.6	4.2	42.1	678.8	26.8
Kufri Girdhari	98.2	30.7	40.1	4.0	38.3	754.7	30.8
Kufri Pukhraj	99.5	35.5	42.6	3.2	37.4	730.4	31.1
K.Kanchan	99.0	29.0	40.4	3.0	30.4	637.5	22.5
SEm+ ₋	2.76	1.55	1.62	0.16	1.71	10.99	1.74
CD(0.05)	NS	5.07	NS	0.52	5.57	35.86	5.66

per cent was observed in variety Kufri Jyoti while lowest of 98.2 per cent in variety Kufri Girdhari. Indires *et al* (2003) opined that the combined inoculation of both *Azotobacter chroococcum* and *Pseudomonas striata* in potato cv. Kufri Jyoti showed significant effect on increasing percent emergence of tubers, total number of tubers, tuber weight per plant, total tuber yield and marketable tuber yield. Similar findings were reported by Singh (2002) and Kumar *et al* (2013). The pooled data indicate that significant variation was observed in plant height among the varieties at 30 DAP, and reached more or less maximum value at 60 DAP irrespective of the varieties but not significant. Kufri Jyoti attained the maximum height of 38.7cm and 45.3cm while Kufri Giriraj recorded minimum height of 27.1cm and 39.6 cm at 30 and 60 DAP, respectively.

There was significant difference in number of stems and number of leaves per plant among the varieties. Maximum number of stems (4.2) and leaves per plant (42.1) was observed in variety Kufri Giriraj while red skin local variety showed the minimum number of stems (3.0) and leaves per plant (30.4) per plant (Table 1).

Yield Attributes

From the pooled data (Table 1), it was evident that there was significant variation in number and total yield of tubers among the different varieties. Kufri Girdhari showed significantly maximum number of tubers (754.7 thousands/ha) and total

yield of tubers (30.8 t/ha) while minimum number of tubers (637.5 thousands/ha) and total yield of tubers (22.5 t/ha) was observed in Kufri Kanchan.

CONCLUSION

It may be concluded that Kufri Giridhari has the potential to perform favorably in the area, thereby increasing the production and productivity of the tuber crop. Also, to accomplish higher yield in potato, it is essential to supply higher rates of nutrients. These are supplied mainly by inorganic fertilizers and the continuous use of inorganic without organics cause a drop in pH over a period of time and thus reduce crop yields drastically and also damage the soil physical properties. Hence, it is necessary to establish alternative solution to reduce the application of inorganic without any reduction in productivity. Bio-fertilizers have the potential to boost crop production in a sustainable manner as well as maintain the soil health through biological nitrogen fixation, solubilization and mobilization of phosphate, production of growth promoting substances or decomposition of plant residues particularly for heavy feeder crop like potato.

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