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Influences of Varying Seed and Intra-Row Spacings on Yield and Certain Yield Attributes of Kufri Chandramukhi Potato

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Studies were carried out to assess the influence of three seed sizes with five intra-row spacings on the growth and yield of potato during *rabi* of 1977-78 and 1978-79 as well as *kharif* of 1978 in red sandy loam soil of Bangalore. Higher yields were recorded from *kharif* crop. The maximum yield (335.2 q/ha) was obtained with large sized seed tubers spaced at 25 cm between tubers, while the lowest yield (241.7 q/ha) was recorded with small sized seed tubers spaced at 25 cm between tubers. The large and medium sized seed tubers produced higher yields of large and medium sized tubers as well as higher number of tubers and shoots per hill as compared to small sized seed tubers. The results indicated that when the inter-row spacing was 60 cm, the intra-row spacing could be quite narrow (15-20 cm) for small sized seed tubers and slightly wider spacing (20-25 cm) for large and medium sized seed tubers to obtain higher yields under Bangalor conditions.

Proper size of seed tubers and optimum spacings are important factors contributing to higher yields in potato since the seed and sowing cost constitute 67 to 68 per cent of cost of cultivation (Om Prakash and Singh, 1976). Earlier investigations have revealed that size of tubers and spacings influenced yield of potato (Singh and Wakankar, 1943; Kapoor, 1950a; Sandhu, 1969; Krishnappa and Gowda, 1979). This study was carried out with a view to determine the yield and growth responses of Kufri Chandramukhi potato to varying seed sizes tubers and intra-row spacings are discussed.

MATERIAL AND METHODS

Experiments were laid out during three seasons *rabi*, 1977-78 and 1978-79 as well as *kharif*, 1978 at the Horticultural Research Station, University of Agricultural Sciences, Bangalore in a sandy loam soil under irrigation in randomised block design with four replications. Three seed sizes with five intra-row spacings were tested. The treatments constituted nine selected combinations based on the results of previous trails carried out elsewhere in India (Anon., 1974).

In all the seasons disease free seed tubers of cv. Kufri Chandramukhi were procured and sorted out into three grades with diameter ranges of 25 - 35 mm (small), 36 - 45 mm (medium) and 46-55 mm (large) by passing the tubers through riddles. The gross plot sizes were 4·8 × 2·1 m². Following were the treatment combinations. Seed tubers were weighed and planted at a common inter-row spacing of 60 cm in all the seasons. The *rabi* crop was

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planted during the second week of December, 1977 and during the third week of December, 1978, while in the *kharif* season the crop was planted dur-during the third week of June, 1978. Cultural and plant protection practices were adopted uniformly as recommended. Crop was harvested at full maturity.

Plant population/ha (thousand)	Intra-row spacing (cm)	Seed size range (mm)
111 (P_1)	15	25-35 (W_1)
83 (P_2)	20	36-45 (W_2)
67 (P_3)	25	46-55 (W_3)
56 (P_4)	30	
48 (P_5)	35	

Number of shoots and tubers hill were recorded from ten random hills and averaged per hill. Gradewise tuber yield was recorded based on distinctive grades of tubers *viz.*, with diameters below 25 mm (Small), 26 - 50 mm (Medium) and 51-75 mm (Large).

RESULTS AND DISCUSSION

Total yield : Significant differences were observed between small sized seed tubers and the medium or large sized seed tubers but the difference between the latter two were not significant (Table I). The results were in agreement with those of the earlier workers (Singh and Wakankar, 1943; Singh *et al.*, 1961 ; Sandhu, 1969; Krishnappa and Gowda, 1979). The data indicated that intra-row spacing of 20 to 25 cm was optimum with a population range of 67,000 to 83,000 plants/ha to obtain higher yields. Earlier workers have reported similar results (Singh and Wakankar 1943; Singh *et al.* 1961; Singh and Arora 1976).

Higher yields were recorded from *kharif* crop compared to *rabi* crop irrespective of treatments. High yields in *kharif* might be due to favourable soil moisture condition combined with moderate temperature (Murthi *et al.*, 1976). Lower yields recorded during *rabi*, 1978-79 may be attributed to the incidence of bacterial wilt.

TABLE I Effects of varying seed sizes and intra-row spacings on potato yield (q/ha)

Treatments	rabi 1977-78	Kharif 1978	rabi 1978-79	Mean of 3 seasons
W_1P_1	295.3	377.7	103.9	259.0
W_1P_2	276.0	372.8	100.4	249.7
W_1P_3	270.3	354.9	100.0	241.7
W_2P_2	360.1	417.1	192.0	323.1
W_2P_3	349.7	409.7	170.6	310.0
W_2P_4	321.9	382.7	167.4	290.7
W_3P_3	366.4	433.6	205.7	335.2
W_3P_4	361.8	423.6	192.9	325.8
W_3P_5	346.4	379.4	166.1	287.3
C.D. at P =0.05	53.3	45.7	68.6	—
C.V. (%)	10.5	6.3	28.2	—

Gradewise yield : Yield data of tubers recorded in three grades, *viz.*, large (L), medium (M) and small (S) are presented in Table II. The responses to the seed sizes and intra-row spacings in respect of yields of large and medium tubers were significant, while the yield of small tubers was non-significant. It was evident that large and medium

TABLE II Effects of varying intra-row spacings and seed sizes on the gradewise yield of potato (q/ha)

Treatments	*rabi*, 1977-78			*Kharif*, 1978		*rabi*, 1978-79		
	L	M	S	L	M	L	M	S
W_1P_1	118 8	175.7	0.8	138.2	239.5	35.7	66.1	2.1
W_1P_2	138.4	136.7	0.9	129.8	243.0	28.3	70.0	2.1
W_1P_3	129.7	139.7	0.9	129.9	225.0	35.1	63.0	1.9
W_2P_2	152.9	205.6	1.6	192 8	224.3	83.7	107.0	1.3
W_2P_3	152.1	196.4	1.2	167.2	242.5	69.4	99.7	1.5
W_2P_4	154.3	166.3	1.3	137.8	244.9	48.9	117.1	1.4
W_3P_3	149 8	215.3	1.3	178.0	255.6	97.7	106 7	1.3
W_3P_4	161.1	199.6	1.1	156.6	266.0	95.8	96.1	1.0
W_3P_5	167.0	178.5	0.9	132.4	247.0	64.3	100.7	1.1
C. D. at P=0.05	32.3	29.4	N.S.	62.7	33.5	45.4	33.3	N.S.
C. V. (%)	17.7	11.2	33.4	16.9	15.2	29.3	25.1	41.5

N S.=Non-significant

sized seed tubers produced higher yields of large and medium sized tubers compared to small sized seed tubers. It indicated that the yields of large and medium tubers were influenced by seed sizes. This is in line with the observations of Kapoor (1950) who observed that when the seed size was improved the average size of tubers was also increased.

TABLE III Effect of varying seed sizes and intra-row spacings on the number of tubers/hill.

Treatments	*rabi* 1977-78	*kharif* 1978	*rabi* 1978-79	Mean of 3 seasons
W_1P_1	4.2	4.3	4.3	4.3
W_1P_2	4.6	4.5	4.4	4.5
W_1P_3	5.5	5.6	4.5	5.2
W_2P_2	6.2	6.3	5.7	6.1
W_2P_3	6.5	6.8	5.2	6.2
W_2P_4	6.3	6.4	5.9	6.2
W_3P_3	7.4	7.4	6.6	7.1
W_3P_4	7.8	8.5	7.1	7.8
W_3P_5	8.7	9.0	8.3	8.7
C. D. at P= 0.05	1.0	0.9	1.8	—
C. V. (%)	9.3	8.2	16.9	—

Number of tubers per hill: Sig-Significant differences were observed among the treatments in the production of number of tubets/hill in all the three trials (Table III). It was evident that the large sized seed tubers produced more number of tubers. Suri (1963) and Maity and Chatterjee (1977) observed similar results.

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