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Effect of Application of Potassium and Magnesium on the Yield of Different Grades of Potatoes

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Potassium application at a higher dose of 100 kgK_2O/ha significantly decreased the seed tuber and increased the ware tuders. Magnesium application increased the ware tubers and the increase in seed size was limited upto 50kg Mg/ha level. Ware/seed ratio was increased by K fertilizations significantly.

Production of potatoes for table and for seed purposes needs different managerial techniques of which application of different doses of chemical fertilizers is very important. It has been reported by several workers that potassium alone or in combination with magnesium influenced the different grades of potato tubers (Sharma *et al.*, 1976; Simpson *et al.*, 1973) With this in view the present investigation was undertaken.

MATERIAL AND METHODS

Two crops of potatoes were raised with different combinations of potassium, magnesium and lime (Table 1) and the treatments were replicated six times. A basal dose of Nitrogen (60kg N/ha) and phosphorus (240kg P_2O_5/ha) at the rates recommened for potato crops of the region (Nilgiris district) were applied to all the plots. Magnesium and potassium were applied to plots as magesium sulphate and muriate of potash.

Well sprouted seed potatoes of uniform size (45-55 mm diameter) were placed in the furrows opened 45 cm apart adopting a spacing of 25 cm between tubers. The normal intercultural, weeding and plant protection measures were taken up during the crop growth period. The crop was harvested at maturity. The tubers were graded into ware potatoes (More than 55 mm diameter) and seed potatoes (45-55 mm diameter). Since the chats size (less than 45 mm diameter) potato tubers were very negligible, they were added to the seeds. The yields were recorded separately. The data were subjected to statistical analysis sanedecor and Cochran, 1967).

RESULTS AND DISCUSSION

Ware tuber yield: The ware tuber yield ranged from 19. 4 to 43.0 q/ha with a mean of 28.1 q/ha in the first crop. In the second crop, the mean ware tuber was 45.6 q/ha, the values ranging from 25.7 to 69.9 q/ha (Table-1) Ware potato yield increased by an average of 3.6 and 4.6 q/ha in the first and the second crops respectively, by K fertilization. The increase was

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caused, at least in part, by damage to stolens at tuber initiation, resulting in a decrease in the number tubers per plant. The reduced number of tubers grew to a larger size. (Simpson *et al.*, 1973)

Increasing Mg rate from 0 to 150 kg/ha gave an increase in yield of the ware tubers from 23.9 to 32.7 q/ha in the first crop and from 39.3 to 53.3 q/ha in the second crop. Upto the first three levels of magnesium application ware tuber yield was increased by an average of 11.8 q/ha by increasing the amount of applied potassium to 100 kg/ha (Table 3). At the higher dose of Mg applications tried (150 kg Mg/ha) the trend was just reversed and a marked decrease of 16.3 q/ha of ware tuber was registered. The same trend was confirmed in the second crop of potato also though the response was more.

Seed tuber yield

The average decrease in yield of seed size tubers brought about by K fertilization was 10.0 q/ha in the first crop and 11.5 q/ha in the second crop, the values being higher at lower levels of magnesium application. On an average Mg fertilization at Mg_1 level increased the seed size tubers by 8.1 and 18.8 q/ha in first and second crops respectively. Beyond this level, seed size tubers decreased with further application of magnesium. At K_0 level, the quantity of seed size tubers, expressed as percentage of the total were progressively decreased by Mg application were as at K_1 level it decreased, progressively upto Mg_1 level beyond which it increasad.

ware/seed ratio

Ware/seed ratio varied from 0.078 to 0.280 in the first crop and from 0.087 to 0.273 in the second crop. Higher ratio were induced by K fertilization. The ratio was increased from a mean value of 0.159 at K_0 level to 0.182 at K_1 level in the first crop. In the second crop the increase in ratio due to K fertilization was from 0.161 at K_0 level to 0.180 at K_1 level. The differences in ware/seed ratio due to potash fertilizarion were observed to be statistically significant. Sharma *et al.* (1976) stated that applied K increased yields of large sized tubers but no effect on yield of medium and small tubers. Liming also increased the ware seed ratio from 0.169 to 0.172 but not significantly.

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Table 1 Effect of treatments on Total Tuber Yield and on different grades of potato Tubers (Mean of six replications)

Treatments	Mean Ware potatoes		Mean Seed potates		Seed as petcentage of total yield		Ware/Seed ratio	
	I Grop	II Crop	I Crop	II Crop	I Crop	II Crop	I Crop	II Crop
$L_0 K_0 Mg_0$	14.4	25.7	184.2	295.7	92.8	92.0	0.078	0.087
$L_0 K_0 Mg_1$	19.0	33.2	187.3	292.3	90.8	89.8	0.101	0.114
$L_0 K_0 Mg_2$	25.5	43.7	178.0	255.5	87.5	85.4	0.143	0.171
$L_0 K_0 Mg_3$	37.8	63.7	169.5	233.1	81.8	78.5	0.232	0.273
$L_0 K_1 Mg_0$	27.2	53.8	164.1	257.2	85.8	82.7	0.166	0.209
$L_0 K_1 Mg_1$	26.9	54.2	156.0	285.3	85.3	84.0	0.172	0.190
$L_0 K_1 Mg_2$	27.2	47.3	187.7	276.2	87.3	85.4	0 145	0.171
$L_0 K_1 Mg_3$	21.8	40.4	172.8	281.7	88.8	87.5	0.126	0.143
$L_1 K_0 Mg_0$	21.1	25.8	164.3	294.3	88.6	92.0	0.128	0.088
$L_1 K_0 Mg_1$	24.9	27.1	172 5	314.9	84.4	89.5	0.144	0.118
$L_1 K_0 Mg_2$	29.0	47.3	166.8	276.9	85.2	85.4	0.174	0.171
$L_1 K_0 Mg_3$	43.8	69.9	156.3	262.6	78.1	79.0	0.280	0.266
$L_1 K_1 Mg_0$	32.5	51.6	146.0	243.4	81.8	82.5	0.223	0.212
$L_1 K_1 Mg_1$	38.3	51.7	176.0	272.5	82.1	84.0	0.218	0.190
$L_1 K_1 Mg_2$	32.4	45.0	159.3	257.7	83.1	85.1	0.203	0.175
$L_1 K_1 Mg_3$	27.4	39.1	137.9	258.0	83.4	86.8	0.199	0.152
Mean	28.1	45.6	167.5	272.5	85.6	85.6	0.170	0.171

L_0 : No Lime
L_1 : Lime at 16.8 t/ha
K_0 : No Potassium
K_1 : Potassium at 100 Kg K_2O/ha
Mg_0 : No Magnesium
Mg_1 : 50 Kg Mg/ha
Mg_2 : 100 Kg Mg/ha
Mg_3 : 150 Kg Mg/ha

Table 2 Effect of application of potassium and Magnesium on yield of different grades of potatoes Q/ha.

Grade	K Levels	Mg_0	Mg_1	Mg_2	Mg_3	Mean
			I CROP			
Ware	K_0	17.8	21.8	27.3	40.8	26.0
	K_1	29 9	32.6	29.8	24.5	29.2
	Mean	23.9	27.2	28.6	32.7	28.1
Seed	K_0	174.8	179.9	172.4	162 9	172 5
	K_1	155.0	166.0	173.5	155.4	162.5
	Mean	164.9	173.0	173.0	159.2	167.5
Total	K_0	192.6	201.7	199.7	203.7	199.4
	K_1	184.9	198.6	203.3	179.9	191.7
	Mean	188.8	200.2	201.5	181.8	195.6
			II CROP			
Ware	K_0	25.8	35.2	45.5	66.8	43 3
	K_1	52.7	53.0	46.2	39.8	47.9
	Mean	39.3	44.1	45.9	53.3	45.6
Seed	K_0	295.0	303.6	266.2	247.8	278.2
	K_1	250.3	279.4	267.0	269.9	266.7
	Mean	272.7	291.5	266.6	258.9	272.5
Total	K_0	320.8	338.8	311 7	314 6	321.5
	K_1	303.0	332.4	313.2	309.2	314.6
	Mean	311.9	335.6	312.5	312.2	318.1