Journal of Tropical Agriculture 31 (1993) : 239 - 242

EFFECT OF POTASSIUM AND IRRIGATION ON YIELD AND WATER USE EFFICIENCY IN ASHGOURD

Potassium improves water relation of plants and maintains yield under water stress. Application of K during drought periods helps to maintain or increase leaf area and hence to increase yield (Sinha and Nair, 1971). Lahiri and Kackar (1987) stressed on the need of adequate K fertilization under both favourable and water stress conditions. Their studies revealed that reduced nutrient availability was the principal cause of growth reduction under water stress. Hence it is felt that studies with graded level of potassium will be of some use for successful crop management practices under prolonged water stress conditions.

A field experiment was conducted to assess the efficiency of potassium and irrigation on yield and water use efficiency in ashgourd at Vellanikkara. The experiment consisted of twelve treatments with all possible combinations of four levels of potassium viz., K_0, K_1, K_2 and K_3 representing 0, 75, 150 and 225 per cent of KAU package of practices recommendation (25 kg K_2O/ha) and three irrigation levels viz., I_1, I_2 and I_3 representing IW/CPE ratios 0.75, 0.50 and 0.25. Yield characters were recorded.

Data on the yield and yield attributes are presented in Table 1. Mean effects of potassium and irrigation did not exert any significant influence on per cent driage during stage 1. Plant part showed no significant response to irrigation levels. But among potassium main effects, maximum driage was shown by K_0 (29.17) which was on par with K_3 (27.08). In fruit, no treatment was found to be significantly different.

In the case of dry matter production, at stage 2, only the interaction effects were found to be significant. The availability of K is checked and it occurs so under moisture stress (Mengal and Kirkby, 1980). Lack of significant response by K application during I_2 and I_3 levels may be explained by this.

Fruit length was significantly influenced by K application. K_3 recorded the maximum length of 23.83 cm and was significantly superior to other treatments. Application of potassium resulted in a gradual increase of fruit girth, the differences being not statistically significant. Higher fruit length by K application may be attributed to the role of K in cell expansion and cell division. Fruit length recorded at K_3 was 11.2 per cent higher than the value. Such a role of K in providing the necessary pressure for cell division was reported by Hsiao (1973).

Even though the K levels showed a marginal increase in yield, they were not statistically significant. However, the data reveal a numerical increase of 52.5 per cent in yield with K application of 20 kg/ha over control. A positive role of K in influencing the yield parameters has been reported by Ramanathan (1985).

The data on water use efficiency are presented in Table 2. The main effect of irrigation alone showed significant influence on field water use efficiency. I_3

Table 1. Effect of potassium and irrigation on yield attributes

Treatment	Per cent driage				Dry matter (g/pit)			No. of fruits per pit	Length of fruit cm	Girth of fruit cm	Yield t/ha
	35 DAP	50 DAP	Harvest		35 DAP	50 DAP	Harvest				
			Plant	Fruit							
Levels of potassium											
K_0	18.32	18.02	29.17	3.55	144.42	259.63	1459.99	1.81	21.43	45.89	9.43
K_1	19.03	16.70	23.00	3.75	153.86	271.51	1360.85	2.61	22.23	45.99	14.38
K_2	18.04	18.21	22.18	4.15	165.92	306.26	1176.61	2.45	21.91	46.25	13.90
K_3	18.75	18.02	27.08	3.68	240.82	261.77	1208.06	2.19	23.83	47.14	13.04
Levels of irrigation											
I_1	18.01	17.61	24.97	3.93	181.95	292.29	1303.57	2.59	22.17	46.44	14.07
I_2	18.33	18.42	25.59	3.73	210.33	283.16	1404.09	2.46	21.93	46.01	13.51
I_3	19.26	17.19	25.52	3.69	136.49	248.93	1196.48	1.75	23.01	46.51	10.48
$SEm\pm$	0.82	1.45	1.98	0.34	45.74	32.83	182.35	0.50	0.77	1.62	2.50
CD (0.05) K	NS	NS	3.35	NS	NS	NS	NS	NS	1.30	NS	NS
CD (0.05) I	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
CD (0.05) K x I	2.39	NS	NS	NS	NS	96.31	NS	NS	NS	4.72	NS

NS = Not significant DAP = Days after planting

Table 2. Effect of potassium and irrigation on field water use efficiency (kg/ha mm)

Treatment	Levels of potassium				Mean	Total water applied ha mm
	K_0	K_1	K_2	K_3		
Levels of irrigation						
I_1	43.81	50.19	53.50	58.52	51.50	273.15
I_2	39.51	94.21	61.24	62.00	64.24	210.27
I_3	59.66	71.63	105.84	75.20	78.08	134.26
Mean	47.66	72.01	73.53	65.24		
SEm ±		14.10				
CD (0.05) K		NS				
CD (0.05) I		20.69				
CD (0.05) KxI		NS				

NS = Not significant

showed the maximum efficiency and was on par with I_2. Results were such as to conclude that field water use efficiency (FWUE) increased with decrease in IW/CPE ratio chosen. An increase of 51.61 per cent in FWUE could be observed when irrigation level shifted from I_1 to I_3. The amount of water used at I_3 is about one half that used at I_1. This may be the reason for significant increase in FWUE at I_3. It was also clear that application of K brings about significant increase in FWUE with K_2 showing 77.4 per cent increase over control at I_3 level. But the highest yield was recorded at K_1 which was on par with K_2. Potassium level of 20 kg/ha can be the best dose when the irrigation is scheduled with IW/CPE ratio as 0.25.

This paper forms a part of M.Sc.(Ag) thesis of the senior author submitted to the Kerala Agricultural University, 1990. The authors are grateful to Dr.C.C.Abraham, Associate Dean and Dr. A.I.Jose, Professor & Head, Department of Soil Science and Agricultural Chemistry, College of Horticulture, Vellanikkara, for providing all the facilities for this work. The senior author gratefully acknowledges the Indian Council of Agricultural Research for awarding the Junior Research Fellowship.

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