SHORT COMMUNICATION

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Effect of drip irrigation and bioregulators on water use efficiency and fruit yield of Kachri (*Cucumis melo* var. *callosus*)

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Rajasthan, particularly western region comes under hyper arid zone with very scarce water resource. Thus, more crop per drop of water is main motto of any agricultural production system in these region of the state. Kachri is one of the major cucurbitaceous vegetable of the region is grown extensively. The crop is generally grown as rainfed kharif crop. Growing the the crop as irrigated summer crop can be highly profitable. Among the irrigation methods drip irrigation is proved superior as it maintains moisture content at near about field capacity in one hand and eliminates water losses on other hand. The superiority of drip irrigation has been a well established fact particularly in cucurbits (Devaranavadgi *et al*) (1). Sulphydryl (-SH-) compounds improve phloem translocation of photosynthate and crop productivity. Thus, they act as bioregulators and play an important role in improving water use efficiency through enhanced phloem translocation and yield formation in arid regions. Thiourea (500ppm) significantly increase yield and quality of tubers in potato (Mani *et al*) (2). Beside thiourea, effect of N-acytyl cysteine and thioglycolic acid (TGA) also influence the fruit yield and water use efficiency of kachri. The information on bioregulators, and drip irrigation on kachri growth and yield are meager. Hence, there is a felt need to generate precise information on irrigation requirement of kachri through drip and effect of bio-regulators on kachri.

A field experiment was conducted on kachri during summer season of 2011 and 2012 at Niche Area Excellence Farm, S K Rajasthan Agricultural University, Bikaner situated in western hyper arid zone of Rajasthan. The soil was sandy loam in nature, having field capacity 6.50%, PWP 1.8%, bulk density 1.52 g /cc, pH (1:2) 8.4, electrical conductivity (1:2) 0.2 dS/m. The soil is very low in organic matter (0.11%) and medium in available P (32.4 kg/ ha) and high in available K (336 kg/ ha). The experiment was laid out in randomized block design with three replications. The treatments consist of three irrigation levels (40%, 60% and 80% ETc) and four bio-regulators levels (conrol- water spray, thiourea 500ppm, N-acetyl cysteine @ 20 ppm and TGA @ 100ppm) foliar spray at vegetative and flowering stage. The total irrigation water provided were 202.76, 291.42 and 380.08 mm at 40%, 60% and 80% ETc, respectively including the rainfall of 26.2 mm (Table 1). Ground water was below 10 m throughout the growth period. Kachri variety AHK 200 was sown using seed rate of 3 kg/ha in 60 cm x 120 cm crop geometry and final harvesting was done on June 30 in both the years. In total 4 to 5 picking of fruits were done during crop growing period. All the cultural operations were carried out as per recommendations.

Irrigation levels

Increasing irrigation levels from 40% to 80% ETc under drip increased fruit yield (Table 2). The highest fruit yield was recorded 278.35 q/ha at 80% ETc against 249 and 274.7 q/ha with 40% and 60% ETc through drip irrigation respectively. However 60% and 80% ETc gave at par fruit yield. This findings are in collaboration with *Manjunatha and Manjunatha*. (3).

Drip irrigation levels from 40% to 80% ETc saved water by 423.44 to 246.12 mm over surface irrigation which used 626.2 mm water. Hence, increased yield coupled with less water use in drip irrigation recorded higher water use efficiency (WUE) 122.80, 94.26 and 73.23 kg/ ha-mm at 40%, 60% and 80% ETc, respectively (Table 2). Lower water use efficiency in surface irrigation (absolute control) may be due to loss of irrigation water from sandy loam soil through deep percolation resulted in higher water use but lowered grain yield. Drip irrigation system saved quite a large amount of water, which can be useful in horizontal expansion of crop area in winter season when mostly irrigated crops are raised in Rajasthan.

Bio-regulator

Foliar spray of N-acytyl cysteine (20 ppm) recorded higher fruit yield (272.16 q/ha) over thiourea spray (500 ppm) (268.36 q/ha), TGA (100ppm) (268.73 q/ha) and control (260.13 q/ha)). The fruit yield in control and thiourea, thiourea and N-acytyl cysteine and N-acytyl cysteine and TGA are find significantly at par (Table 2). The highest fruit weight of round gourd was also recorded with N-acytyl cysteine (20 ppm) spray (110.4 gm) as compared to control (105.5 gm), thiourea spray (500 ppm) (107.8 gm), TGA (100ppm) (108.0 gm).

Interaction effect

Drip irrigation level 80% ETc gave highest fruit yield with the bioregulator spray of N-acytyl cysteine (281.0 q/ha) which is significantly at par with 60% and 80% ETc drip

Table 1. Month-wise irrigation events and irrigation water applied(mean of two years)

Month	Irrigation events	Irrigation water applied in mm (Drip irrigation)		
		40% ETc	60% ETc	80% ETc
March (14 to 31)	9	5.57	8.36	11.15
April	15	51.93	77.91	103.89
May	15	77.49	116.24	154.99
June (1-21)	11	42.27	63.41	84.55
Total	50	177.26	265.92	354.58
Rainfal (mm)		25.5	25.5	25.5
Total		202.76	291.42	380.08

Table 2. Effect of irrigation and bioregulators on yield, yield attributes, water use and water use efficiency of kachri (pooled of two years)

Treatment	Fruit yield (q/ha)	No. of fruits/ plant	Fruit Weight (g)	Water use (mm)	WUE (kg/ha-mm)
Irrigation level (ETc)					
40%	249	12.5	101.5	202.76	122.80
60%	274	14.4	110.6	291.42	94.26
80%	278	14.7	111.7	380.08	73.23
Surface irrigation	225	12.4	101.1	626.2	35.93
CD at 5%	8	1.1	2.5	-	-
Bio-regulator spray					
Control	260	13.3	105.5	291.42	89.26
Thiourea (500 ppm)	268	13.9	107.8	291.42	92.08
N-acetyl cysteine (20 ppm)	272	14.3	110.4	291.42	93.39
TGA (100 ppm)	268	14.0	108.0	291.42	92.21
CD at 5%	9	NS	2.9	-	-

Table 3. Inter action effect of irrigation and bioregulator on fruit yield and water use efficiencyof Kachri

Treatment	Fruit yield (q/ha)			Water use efficiency (kg/ha-mm)		
	40% ETc	60% ETc	80% ETc	40% ETc	60% ETc	80% ETc
Control	235.4	270.4	274.6	116.09	92.78	72.24
Thiourea (500 ppm)	251.5	275.3	278.3	124.03	94.46	73.22
N-acetyl cysteine (20 ppm)	257	278.5	281.0	126.75	95.56	73.93
TGA (100 ppm)	252.1	274.6	279.5	124.33	94.22	73.53
CD at 5%	16.5			-		

irrigation and control of bioregulator (Table 3). The fruit yield in 80% ETc and thiourea spray (278.3 q/ha) was found significantly at par with 60% and 80% ETc drip irrigation and control of bioregulator. Drip irrigation level 40% ETc gave highest WUE with the bioregulator spray of N-acytyl cysteine (126.75 Kg/ha-mm) over 60% and 80% ETc drip irrigation and bioregulator spray of N-acetyl cysteine.

References

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