

Standardization of water requirement and fertigation schedules of Kinnow under micro-irrigation system in arid ecosystems

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In hot arid ecosystem, water and fertilizer use efficiency in fruit crops is very low and productivity also remains low which can be easily enhanced by adopting water and nutrient application through drip fertigation. Kinnow is very important of irrigated arid region. The present study was undertaken to evaluate the performance of different micro-irrigation systems alongwith fertilizer application.

Keywords: Kinnow, micro-irrigation, fertigation, water requirement

Material and methods

Experiment was conducted on Kinnow crop with four irrigation systems i.e. drip, micro sprinkler, bubbler and open channel system with three irrigation levels i.e. replenishment of soil moisture by 100, 75 and 50 per cent and four fertigation schedules i.e. 125, 100, 75 and 50 per cent of recommended dose of N, P and K in sandy soils. The fertilizer dose was applied in 16 splits and given in each week. The crop growth, leaf nutrient status, soil moisture content, fruit development, yield and quality parameters were measured.

Results and discussion

Maximum plant height 3.10 m was recorded in I_3L_1 treatment which was statistically at par with I_1L_1 followed in I_1L_2 and minimum plant height (2.70 m) in I_4L_1 treatment. Canopy volume was maximum (76.50 m³) in I_1L_1 and was lowest was measured in I_4L_1 (33.00 m³). Drip irrigation at 0.75 CPE level and micro-sprinkler at 1.00 CPE level are giving maximum plant height and canopy volume. Maximum N content (2.32 %) was estimated in I_1L_1 treatment and it was statistically at par with I_1L_2 and I_3L_2 treatments. Maximum fruit yield (122 q ha⁻¹) was in I_2L_1 and which was statistically at par with I_1L_1 and I_3L_2 (117 q ha⁻¹). Shirsath et al. (2002) and Patel et al. (2002) reported the increase in fruit yield under drip over conventional irrigation in guava and ber fruit crops. Maximum water use efficiency (2.85q/ha-cm) was recorded in I_2L_2 . Sivanappan (2000) observed the similar results in different fruit crops.

Table 1 Response of micro irrigation systems vis a vis conventional method in terms of water and fertilizer economy in kinnow

System	Irrigation level	yield (q ha ⁻¹)	Water applied (cm)	Saving (%)	WUE (q/ha-cm)
Micro sprinkler					
1.00 CPE	I_1L_1	117.00	52.00	-	2.18
0.75 CPE	I_1L_2	82.00	39.00	25	2.05
0.50 CPE	I_1L_3	55.00	26.00	50	1.73
Drip					
1.00 CPE	I_2L_1	122.00	52.00	-	2.18
0.75 CPE	I_2L_2	117.00	39.00	25	2.85
0.50 CPE	I_2L_3	58.00	26.00	50	2.12
Pipe					
1.00 CPE	I_3L_1	66.00	52.00	-	1.15
0.75 CPE	I_3L_2	58.00	39.00	25	1.43
0.50 CPE	I_3L_3	42.00	26.00	50	1.53
Open channel	I_4L_1	43.00	52.00	-	0.77
CD (5%)		6.650	-	-	

The data in table 2 revealed that the increase in yield with excess nitrogen application (125% RDN) under drip and micro sprinkler was non-significant. The lowering the nitrogen dose by 25 per cent than recommended dose also did not significantly reduced the fruit yield while at 50 per cent recommended dose of N reduced the fruit yield significantly under drip irrigation system. Thus application of 75 per cent of recommended dose of N through drip in kinnow fruit crop gave the optimum higher yield with better fertilizer use efficiency.

Table 2 Effect of fertigation on the fruit yield and fertilizer use efficiency in kinnow

Treatment	Particulars of treatment	N, P & K (kg/ha)	Yield (q ha ⁻¹)	N FUE (Kg ⁻¹ ha-kg ⁻¹)
T ₁	125 % of recommended N,P & K (micro sprinkler)	950, 625 & 325	118.00	11.92
T ₂	100 % of recommended N,P & K	750, 500 & 250	107.00	12.60
T ₃	75% of recommended N,P & K	560, 375 & 190	102.00	15.20
T ₄	50% of recommended N,P & K	375, 250 & 125	78.00	14.50
T ₅	125 % of recommended N,P & K (Drip)	950, 625 & 325	115.00	12.20
T ₆	100 % of recommended N,P & K	750, 500 & 250	112.00	15.85
T ₇	75% of recommended N,P & K	560, 375 & 190	110.00	14.90
T ₈	50% of recommended N,P & K	375, 250 & 125	75.00	13.33
T ₉	100% of recommended N,P & K (Open Channel)	750, 500 & 250	62.00	7.62
	CD (5%)	-	15.52	2.52

Conclusion

Data presented above revealed that the water applied through drip irrigation system at 75 % replenishment of crop evapotranspiration at alternate day and application of 100 % recommended dose of N, P and K on weekly basis through drip fertigation gave the better crop growth, highest fruit yield, better fruit quality parameter of kinnow grown in hot arid conditions of *thar* desert of western Rajasthan in India.

References

- Shirsath HK, TA More, AR Karale, BV Garad, Gohil SN (2002) Studies on drip fertigation on yield, quality and economics in Lucknow-49 guava. In: Nat. Sem. On sustainable management of water resources for enhanced agricultural production. BSKVV, Dapoli, October 26-28, 2002, p67.
- Patel JC, BK Tejnani, RS Patel, Raman RS (2002) Response of Tobacco to drip fertigation with and without mulch. In: Nat. Sem. On sustainable management of water resources for enhanced agricultural production. BSKVV, Dapoli, October 26-28, 2002 p98.
- Sivanappan RK (2000) Status and Perspective of micro-irrigation research in India. In: Progress in micro-irrigation research and development in India. WTCER, Bhubaneswar, pp. 17-29.