Indian J. Hort. 66(3), September 2009: 390-392

Short communication

Response of fertigation and plastic mulch on growth characteristics of young 'Dashehari' mango

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Micro-irrigation provides a good tool for horticulturist to regulate plant growth and development in a manner to augment yield with quality fruits (Glenn, 1). Fertigation is the most effective and convenient means of maintaining optimum fertility level in the soil and water supply according to the specific requirement of the plants (Shirgure *et al.,* 2).Thus, fertilizer application in combination with drip irrigation with plastic mulch keeps moisture optimal in growing zone, regulates soil temperature, improves soil fertility besides controlling soil erosion and weed population. Therefore, the present investigation was carried out to study the effect of fertigation and black plastic mulch on growth characteristics of young (6-year-old) 'Dashehari' mango during 2003-04.

The experiment was conducted on 6- year- old trees of mango cv. Dashehari planted at 10 m distance in square system of planting. The experiment was laid out in two factors Randomized block design. The treatments were replicated thrice and three trees served as a unit of treatment in each replication. The two factors of treatments were, firstly different irrigation level and mulch [I_1: Irrigation at 'V' level (Estimated volume of water applied to the plants in litres/day/plant) through drip+ plastic mulch; I_2: Irrigation at 0.8'V' level through drip + plastic mulch; I_3: Irrigation at 0.6'V' level through drip + plastic mulch I_4: Irrigation at 0.6'V' level through drip; I5: Irrigation at 'V' level through surface (control)]. Secondly, level of fertilizer applied with irrigation [i.e. F_1:100% of normal dose (NPK @:380 g : 380 g : 380 g); (F_2:75% of normal dose (NPK @:285 g : 285 g : 285 g); (F_3:50% of normal dose (NPK @:190 g : 190 g : 190 g), Control: 500g: 175g: 375g)]. Above doses of fertilizers were combined with different levels of irrigation with mulch, andapplied (*viz*. water soluble NPK) in February, March and April (I, II, III and IV week of each month) @ 10.125 kg NPK per dose. The observations were recorded on increase of scion height, scion girth, rootstock girth, canopy spread (N-S and E-W direction), canopy volume, shoots length and leaf area during June and December. Data were statistically analyzed for analysis of variance using two factor RBD (Snedecor and Cochran, 7). Considerable incremental influences on various growth characteristics of Dashehari mango were observed. Significant increment were observed due to drip irrigation over conventional method of irrigation in the growth characters, *viz*. average scion height, scion girth, canopy diameter, canopy volume, shoot length and leaf area. However, there was no significant effect on increment on average rootstock girth.

However, most of the growth characters were significantly influenced only due to different level of drip irrigation irrespective of doses of fertilizer used through drip. Average leaf area increased significantly due to dose of fertilizer and interaction with level of irrigation. The maximum scion height was recorded in I_2F_1 (drip irrigation at 0.8 'V' level with mulch + 100% dose of fertilizers through fertigation), while average leaf area was maximum with the same treatment but less than (75%) recommended dose of fertilizers. This increment might be due to increased availability of soil moisture, nutrients and less weed growth due to drip irrigation with mulch, as also reported by Shirgure *et al.* (3). The maximum scion girth was recorded in treatment I_3F_3 (drip irrigation at 0.6 'V' level with mulch + 50% dose of fertilizers through fertigation) but same treatment (I_3F_3) with full recommended dose of fertilizers recorded maximum shoot length. Above observation might be due to better fertilizer use efficiency (FUE) through drip irrigation and mulch which is similar to the finding of Shirgure *et al.* (4) who reported that rootstock girth increased due to fertigation over conventional method of irrigation. As far as average canopy diameter and volume are concerned, these were maximum in the treatment I_1F_1 (drip irrigation at 'V' level with mulch + full recommended dose of fertilizers through fertigation), which might be due to sufficient moisture availability in root zone with better nutrients (and moderate

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evaporation from soil surface) (Singh *et al*., 6) which were translocated from root to leaves for photosynthesis and ultimate increment in spread of the tree. These results are similar to the finding of Shukla *et al.* (5) in *aonla*, as after daily drip irrigation; canopy spread was highest over conventional method of irrigation.

Minimum scion height, scion girth, rootstock girth, canopy diameter, canopy volume and leaf area under the treatment I_3F_2 (surface irrigation at 'V' level without mulch + 75% dose of fertilizer application, conventionally). The reason might be the evaporation of moisture on bare soil (Singh *et al*., 6) and least FUE (fertilizer use efficiency) due to surface application led to the inadequate supply of moisture, nutrients with profuse weed growth. There was least shoot length in the treatment I_4F_2 (drip irrigation at 0.6 'V' level without mulch + 75% dose of fertilizer through fertigation) due to the no mulch, vigorous weed growth was there which causes inadequate availability of nutrients (Tables 1 & 2).

From aforesaid study, it emerged that combination of fertilizers applied through fertigation + mulching for young 'Dashehari' mango resulted better tree growth which will give improved yield with quality fruits.

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Table 1. Effect of fertigation and plastic mulch on growth characteristics of young 'Dashehari' mango plants.

Treatment		Scion height		Scion girth		Rootstock girth	
		2003	2004	2003	2004	2003	2004
I_1	F_1	3.36	3.68	15.66	16.83	17.33	19.83
	F_2	3.30	3.60	13.66	15.83	16.66	19.00
	F_3	2.96	3.20	14.00	15.33	17.33	12.00
I_2	F_1	3.56	3.78	14.76	16.83	16.66	18.66
	F_2	3.05	3.28	12.66	15.16	15.00	16.83
	F_3	3.16	3.33	14.33	15.85	16.33	18.33
I_3	F_1	3.11	3.21	14.00	15.50	16.66	13.33
	F_2	3.20	3.43	14.66	16.00	16.16	18.00
	F_3	3.36	3.70	13.33	17.33	17.00	18.66
I_4	F_1	2.98	3.11	13.50	15.60	17.88	20.16
	F_2	2.91	3.20	12.83	15.33	15.66	17.30
	F_3	3.25	3.38	14.33	16.83	16.66	20.00
I_5	F_1	2.41	2.71	12.00	15.00	14.83	17.00
	F_2	2.51	2.65	11.00	12.50	13.33	15.50
	F_3	2.78	2.93	11.00	13.00	13.26	15.83
CD at 5%							
Irrigation and mulch (a)		0.33	0.35	1.72	1.68	NS	NS
Fertilizer dose (b)		NS	NS	NS	NS	NS	NS
a × b		NS	NS	NS	NS	NS	NS

Table 2. Effect of fertigation and plastic mulch on growth characteristics of young 'Dashehari' mango plants.

Treatment		Canopy diameter (m)		Canopy volume (m^3)		Shoot length (cm)		Leaf area (cm^2)	
		2003	2004	2003	2004	2003	2004	2003	2004
I_1	F_1	4.04	4.86	13.05	20.56	23.83	24.60	61.00	80.00
	F_2	3.58	4.27	9.69	15.18	23.36	24.36	52.20	68.80
	F_3	3.16	4.05	7.12	12.74	22.73	24.36	61.00	78.16
I_2	F_1	3.75	4.30	12.02	17.04	22.10	24.30	55.50	66.73
	F_2	3.84	4.05	10.57	12.91	27.23	27.96	60.60	81.66
	F_3	4.00	4.27	11.77	13.99	24.33	26.06	57.10	70.16
I_3	F_1	3.55	4.13	9.04	13.10	30.83	31.96	53.50	70.50
	F_2	3.95	4.26	11.91	15.30	22.70	28.33	79.10	81.16
	F_3	3.83	4.33	12.03	16.96	26.03	27.16	77.60	79.33
I_4	F_1	3.37	3.88	8.59	12.08	19.26	20.33	60.80	76.83
	F_2	3.33	3.70	7.64	9.45	15.50	16.03	59.50	62.00
	F_3	3.80	4.18	11.33	14.35	15.83	16.66	65.30	69.53
I_5	F_1	3.08	4.50	3.01	7.84	24.71	26.53	49.20	61.83
	F_2	3.06	3.16	6.31	2.81	26.93	28.96	58.20	56.16
	F_3	2.86	3.43	3.24	7.96	21.90	23.13	59.70	61.16
CD at 5 %									
Irrigation and mulch (a)		0.39	0.50	2.54	4.13	3.91	3.77	3.40	2.96
Fertilizer dose (b)		NS	NS	NS	NS	NS	NS	2.08	NS
a × b		NS	NS	NS	NS	NS	NS	5.89	5.13

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Received: February, 2006; Revised: December, 2008; Accepted : February, 2009