



RESPONSE OF DIFFERENT MULCHES AND IRRIGATION LEVELS ON GROWTH AND YIELD OF WATERMELON (*CITRULLUS LANATUS* THUMB)

R. R. Hasure, R. M. Gethe, B. R. Najan, J. D. Jadhav and L. N. Tagad

Interfaculty Department of Irrigation Water Management,
Mahatma Phule Krishi Vidyapeeth, Rahuri

Received: 18/08/2017

Edited: 23/08/2017

Accepted: 28/08/2017

Abstract: The length of watermelon fruit (29.94 cm), girth of fruit (50.26 cm) and weight of fruit (2.35 kg) was maximum in sugarcane trash mulch treatment with drip irrigation at 100% ETC which was at par with black polythene strip (BSP) and significantly superior over non mulch (NM). The yield of watermelon was maximum (505.55 qha⁻¹) in sugarcane trash mulch and superior over other mulches. Significantly higher yield of watermelon (513.92 qha⁻¹) was recorded with irrigation at 100% ETC level which was at par with irrigation at 60% ETC level (512.22 qha⁻¹). The lowest fruit length (cm), fruit girth (cm), fruit weight (kg) & total yield qha⁻¹ was recorded in no mulch (NM) treatment irrigated at 80% ETC with drip and surface irrigation. The drip irrigation showed 70.32 per cent water saving over control. Thus sugarcane trash mulch coupled with irrigation at 100% ETC showed best performance in terms of growth and yield of summer water melon in sandy clay loam soils at Rahuri.

Key Words: Water melon, Mulches, Irrigation, WUE, Yield.

Introduction

Drip irrigation has proved its superiority due to direct application of water and fertilizer into the vicinity of root zone with more than 90 per cent irrigation efficiency. The information available on scheduling of irrigation water to watermelon with mulch under summer condition is limited. During summer, evapo-transpiration is high, and hence timely application of irrigation is important, besides fertilizers. Present study was, therefore, undertaken to determine water requirement, and water use efficiency of watermelon through drip irrigation method associated with mulching.

Material and Methods

A field experiment was conducted at demonstration cum research farm of Inter Faculty Department of Irrigation Water Management, Post Graduate Institute, M.P.K.V., Rahuri during February to May, 2010, in factorial randomized block design (FRBD), involving ten treatments with three replications. The treatments were combinations of three mulches *viz.*: black polythene strip (BPS), sugarcane trash mulch (STM) and no mulch (NM), and three irrigation levels *viz.*, 60 80 and 100 %

ETC. Additional, treatment of surface irrigation without mulch was included as control. The size of each plot was 4.00 m × 3.60 m with 1m area left in between two plots in order to avoid lateral movement of water. The total water applied through surface irrigation (5 cm depth at 50mm CPE) was 697.80 mm and that under drip irrigation was 167.25, 207.08 and 246.90 mm in irrigation levels of 60, 80, and 100% ETC respectively. Recommended cultural were followed. Farmyard manure (FYM) @ 5 tha⁻¹ was applied equally to all plots 10 days before sowing. The recommended dose of 100:50:50 kg N, P₂O₅, K₂O ha⁻¹ was applied uniformly through fertilizer. Sowing was done with variety Madhubala-80 on 28th February, 2010 with seed rate 2.5 kg ha⁻¹. The seeds were dibbled at 50 cm spacing in 60 - 120 - 60cm pair rows. The black polythene and sugarcane trash mulches were applied. The 25 μ gauge polythene strip of 1.25 × 4 m size was employed for mulching with holes on it for dibbling of watermelon seeds at 0.60 × 0.50 m spacing. The sugarcane trash mulch was used at rate of 5000 kg ha⁻¹ after complete germination of experimental crop. The observation on various growth and yield attributes were recorded

at harvest. Amounts of reducing sugars, non reducing sugars, total sugars, red flesh and total soluble solids in the fruits were determined following Ali and Gaur (2007).

Results and Discussion

The vine length (196.54 cm), number of branches per vine (4.55), number of leaves per vine (73.42) and days to 50% flowering (39.48) were maximum under sugarcane trash mulch with irrigation level at 100 % Etc(Table-1). Similar results were reported by Maher (1991), Sawant (2005), Nijamudeen (2007) and Kanade (2007). The length of fruit (29.94 cm), girth of fruit (50.26 cm) and weight of fruit (2.35 kg) were maximum under sugarcane trash mulch with irrigation level at 100% ETC. The yield of watermelon (505.55 q ha⁻¹) was maximum under sugarcane trash mulch treatment over other mulches (Table 2). Similar results were

reported by Thimme Gowda (1990), Limbulkar (1995), Kirnak and Demitras (2006), Nijamudeen (2007), Sawant (2005) and Patel (2009). The drip irrigation saved 75.66, 69.98 and 64.30% irrigation water at 60, 80 and 100 % ETC, respectively (Table-3). The maximum field water use efficiency (FWUE) was observed in STM with 60% Etc (270.14 kg ha⁻¹mm⁻¹) which was more than that of control or surface irrigation (54.33 kg ha⁻¹mm⁻¹) and all other treatments. Similar results were reported by Kirnak and Demitras (2006) and Srinivas *et al.* (1988)

The amounts of reducing sugars, non reducing sugars, total sugars, red flesh and total soluble solids in the fruits under the influence of different mulches and irrigation levels were statistically non-significant. Similar results were reported by Ali and Gaur (2007).

References

- Ali, A. and Gaur, G.S. (2007). *The Asian J. of Hort.* 2(1): 149
- Botcher, H.L., Dreibrudt and E. Hohne. 1979. Effect of irrigation and manuring on crop, quality and storage of onion. *Gor. Tenbau, Marhn Luther, Hallewiltenburg, Germany* 24 (2):44-46.
- Kirnak, H. and Demitras, M.N. (2006). *J. of Plant Nutri.* 11(2) : 46
- Kanade, N.B. (2007). "Yield response of cucumber to different mulches and irrigation levels under drip irrigation". M.Sc. (Agri.) Thesis, Mahatma Phule Krishi Vidyapeeth, Rahuri (M.S.).
- Limbulkar, C.S. (1995). "Yield response of cucumber to micro irrigation". M.Tech. (Agril.Engg.) Thesis, Mahatma Phule Krishi Vidyapeeth, Rahuri(M.S.).
- Maher, D.P. (1991). "Studies of efficiency of liquid fertilizer through drip and surface irrigation for garlic". M.Sc. (Agri.) Thesis, Mahatma Phule Krishi Vidyapeeth, Rahuri (M.S.).
- Nijamudeen, M. S. (2007). "Effect of different mulches on consumptive use, yield, quality and economics of rabi onion". M.Sc. (Agri.) Thesis, Mahatma Phule Krishi Vidyapeeth, Rahuri (M.S.).
- Patel, M.V., Varma, L.R., Patel, M.C., Joshi, P.C. (2009). *Green Farming* 2(6):354
- Srinivas, K., Hedge, D.M. and Havanagi, G.V. (1988). *Irrig.Sci.* 10:293
- Sawant, B.M. (2005). "Response of cucumber to fertigation under drip irrigation systems". M.Sc. (Agri.) Thesis, Mahatma Phule Krishi Vidyapeeth, Rahuri (M.S.).
- Thimme Gowda, (1990). A brief review of drip irrigation in Karnataka. *Proc. 11th Int. Cong. on use of plastics in agriculture*, New Delhi, India. 26 Feb. and 2 March, 1990. pp 114 -120.

Table 1: The growth parameters of watermelon as influenced by different treatments at harvest

Treatments	Length of vine(cm)	Number of branches per vine	No. of leaves per vine	Days to 50% flowering
A. Mulches				
M1 : BPS	191.42	4.22	72.75	39.43
M2 : STM	196.54	4.55	73.42	39.48
M3 : NM	189.83	4.06	69.84	37.75
'F' test	Sig.	Sig.	Sig.	Sig.
S.E.±	2.20	0.03	0.65	0.57
C.D.at 5%	6.60	0.11	1.96	1.72
B. Irrigation levels				
I1:60% ETc	187.65	3.80	71.46	37.02
I2:80% ETc	195.57	4.37	73.13	39.56
I3:100% ETc	196.57	4.66	73.64	40.08
'F' test	Sig.	Sig.	N.S.	Sig.
S.E.±	2.20	0.03	0.65	0.57
C.D.at 5%	6.60	0.11	N.S.	1.72
Interaction				
'F' test	N.S.	N.S.	N.S.	N.S.
S.E.±	4.09	0.06	1.13	0.99
C.D.at 5%	N.S.	N.S.	N.S.	N.S.
General Mean	192.60	4.28	72.00	38.89
Surface irrigation (Control)	185.56	4.13	68.04	37.23

Table 2: Yield attributing characters and total yield (q/ha) of watermelon as influenced by different treatments

Treatments	Fruit length (cm)	Fruit girth (cm)	Fruit weight (kg)	Total yield (q ha ⁻¹)
A. Mulches				
M1 : BPS	29.91	50.12	2.17	501.77
M2 : STM	29.94	50.26	2.35	505.55
M3 : NM	29.53	49.32	1.88	473.74
'F' test	N.S.	Sig.	Sig.	Sig.
S.E.±	0.15	0.25	0.03	0.31
C.D.at 5%	N.S.	0.75	0.09	0.95
B. Irrigation levels				
I1:60% ETc	28.47	49.01	1.72	454.92
I2:80% ETc	29.80	50.28	2.21	512.22
I3:100% ETc	30.11	50.42	2.46	513.92
'F' test	N.S.	Sig.	Sig.	Sig.
S.E.±	0.15	0.25	0.03	0.31
C.D.at 5%	N.S.	0.75	0.09	0.95
Interaction				
'F' test	N.S.	N.S.	Sig.	Sig.
S.E.±	1.05	0.43	0.05	0.55
C.D.at 5%	N.S.	N.S.	0.16	1.64
General Mean	29.79	49.90	2.13	493.68
Surface irrigation (Control)	28.65	47.85	1.68	380.98

Table 2 (a): Interaction effects between irrigations and different mulches on fruit weight (kg) of watermelon

Treatments	Irrigation levels			
	60% Etc	80% Etc	100% Etc	Mean
Mulches				
BPS	1.75	2.25	2.50	2.17
STM	1.80	2.55	2.70	2.35
NM	1.61	1.84	2.20	1.88
Mean	1.72	2.21	2.46	2.13
S.E. ±	0.05			
C.D. at 5%	0.16			

Table 2 (b): Interaction effects between irrigation regimes and different mulches on yield (q/ha) of watermelon

Treatments	Irrigation levels			
	60% Etc	80% Etc	100% Etc	Mean
Mulches				
BPS	457.50	522.56	525.27	501.77
STM	461.00	527.75	527.91	505.55
NM	446.27	486.20	488.75	473.74
Mean	454.92	512.22	513.92	493.68
S.E. ±	0.55			
C.D. at 5%	1.64			

Table 3: Water use of watermelon as influenced by different treatments

Treatments	Water applied (mm)	Effective rainfall (mm)	Seasonal water requirement (mm)	Water Saving over control (%)	Fruit yield (kg ha ⁻¹)	FWUE (kg ha ⁻¹ mm ⁻¹)
T₁	167.25	3.40	170.65	75.66	45750	268.09
T₂	207.08	3.40	210.48	69.98	52256	248.27
T₃	246.90	3.40	250.30	64.30	52527	209.85
T₄	167.25	3.40	170.65	75.66	46100	270.14
T₅	207.08	3.40	210.48	69.98	52775	250.73
T₆	246.90	3.40	250.30	64.30	52791	210.91
T₇	167.25	3.40	170.65	75.66	44627	261.51
T₈	207.08	3.40	210.48	69.98	48620	230.99
T₉	246.90	3.40	250.30	64.30	48875	195.26
T₁₀	697.80	3.40	701.20	--	38098	54.33