

Research
Paper

Effect of drip irrigation levels on onion seed production

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ABSTRACT

An experiment was carried out during the *Rabi* seasons of 2007-08, 2008-09 and 2009-10 to study the effect of drip irrigation treatments on seed production of onion (*Allium cepa* L.) at Vegetable Research Station, Junagadh Agricultural University, Junagadh. The treatments comprised of total thirteen treatments of drip irrigation including surface irrigation. The drip irrigation was applied on four different periods of schedules (daily, three days once, seven day once and ten days once) on the basis of three pan evaporation levels (75, 100 and 125 % of pan evaporation). Results revealed that significantly the highest seed yield of 6.52, 6.19, 5.93 and 6.21 q ha⁻¹ were recorded with the drip irrigation schedule at daily on the basis of 75 per cent pan evaporation during 2007-08, 2008-09, 2009-10 and in pooled, respectively. However, pooled result showed that there was no significant difference between drip irrigation schedule at 75 per cent pan evaporation on daily and 100 per cent pan evaporation application on daily. The maximum net returns of 128795 Rs. ha⁻¹ was recorded by the treatment of drip irrigation scheduling at daily on basis of 75 per cent pan evaporation level, while the highest benefit cost ratio of 1: 3.78 was recorded by the surface irrigation.

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KEY WORDS : Onion crop, Drip irrigation schedules, Pan evaporation levels, Seed yield, Economics

Onion (*Allium cepa* L.) is an allogamous vegetable crop of global importance. It is popularly used both in immature and mature bulb stage as a vegetable and a spice. Onion is a biennial crop for the purpose of seed production. In one season, bulbs are produced from seed and in the second season bulbs are replanted to produce seed. Onion seeds are poor in keeping quality and lose viability within a year (Shukla *et al.*, 2008). Therefore, it is essential to produce fresh seed for bulb production every year. The national onion bulb productivity is only 10.6 tones ha⁻¹ which is lower than the world productivity (17.46 tones ha⁻¹) (Tomar *et al.*, 2005). The low productivity is attributed to limited availability of quality seed of high yielding varieties and hybrids and lack of optimum production technologies. This can be possible by adopting different improved production technologies including drip irrigation method. Among these, drip irrigation method play an important role in increasing seed production per unit area. Judicious use of water under drip irrigation regimes would substantially increase the seed yield. The information of the drip irrigation levels for onion seed production is meagre for Saurashtra region of Gujarat. Hence, the present experiment was carried out.

RESEARCH PROCEDURE

A field experiment was conducted during the *Rabi* seasons of the year 2007-08, 2008-09 and 2009-10 at Vegetable Research Station, Junagadh Agricultural University, Junagadh. The soil of the experiment site was medium black in texture, low in available nitrogen, high in available phosphorus and medium in available potash with pH of 8.20. The treatments comprised of total thirteen treatments of drip irrigation including surface irrigation were tested in Randomized Block Design with three replications. The drip irrigation was applied at four different schedules (daily, 3 days once, 7 days once and 10 days once) on the basis of pan evaporation (PE) of three levels of percentages (75, 100 and 125 % of PE). The bulbs were planted at 30 cm (within row) x 45 cm (between two row) x 135 cm (lateral) spacing in raised bed paired row planting system. The inline drip (4 LPH at 50 cm) was placed at 1.35m spacing in raised bed paired. The bulbs were planted on November 22, 2007, October 10, 2008 and October 12, 2009 during the respective experimental year. The common full dose of phosphorus, potash and half dose of nitrogen was applied as basal dose, while remaining half dose of nitrogen was applied as

Table 1: Effect of drip irrigation application on seed yield and economics of onion

Treatments	Seed yield (q ha ⁻¹)				Net returns (Rs. ha ⁻¹)	Net benefit cost ratio
	2007-08	2008-09	2009-10	Pooled		
T ₁ -Drip irrigation at75% PE-daily	6.52	6.19	5.93	6.21	128795	2.24
T ₂ - Drip irrigation at75%PE-3days once	5.04	4.22	3.95	4.40	74474	1.30
T ₃ - Drip irrigation at75%PE-7days once	3.37	3.19	3.33	3.29	41078	0.71
T ₄ - Drip irrigation at75%PE-10 days once	3.26	3.07	2.90	3.09	35090	0.61
T ₅ - Drip irrigation at100% PE-daily	6.19	5.78	5.49	5.82	114688	1.91
T ₆ - Drip irrigation at100 %PE-3days once	5.48	4.07	4.07	4.55	76417	1.27
T ₇ - Drip irrigation at100%PE-7days once	3.33	3.22	3.52	3.37	40987	0.68
T ₈ - Drip irrigation at100%PE-10days once	3.04	3.11	3.03	3.05	31603	0.52
T ₉ -Drip irrigation at125% PE-daily	6.00	5.56	5.00	5.52	103176	1.65
T ₁₀ - Drip irrigation at125%PE-3days once	5.93	4.82	5.37	5.38	98856	1.58
T ₁₁ - Drip irrigation at125%PE-7days once	3.43	3.15	3.15	3.25	34905	0.56
T ₁₂ - Drip irrigation at125%PE-10days once	3.21	3.00	2.96	3.05	29103	0.47
T ₁₃ - Surface irrigation at 50 mm cumulative pan evaporation(CPE)	5.53	4.67	4.51	4.90	116327	3.78
C.D.(P =0.05)	0.68	1.41	1.17	0.63	---	---
C.V. %	8.65	20.09	16.95	15.55	---	---

top dressing at 30 days after planting in each experimental year. The sources of nitrogen, phosphorus and potash were urea, diammonium phosphate and murate of potash, respectively. All the cultural operations were followed to raise a good crop of onion cv. PILIPATTI. The data were recorded for seed yield on net plot basis and then converted on hectare basis and subjected to statistical analysis.

RESEARCH ANALYSIS AND REASONING

The results indicated that various treatments of drip irrigation application produced significant effect on seed yield during all the experimental years of 2007-08, 2008-09, 2009-10 and in pooled (Table 1). The highest seed yield of 6.52, 6.19, and 5.93 q ha⁻¹ was secured by the drip irrigation application scheduling at daily on the basis of 75 per cent pan evaporation during the year 2007-08, 2008-09 and 2009-10, respectively. The pooled results also revealed that significantly the highest seed yield of 6.21 q ha⁻¹ was obtained by the drip irrigation application scheduling at daily on the basis of 75 per cent pan evaporation level which produced 5.82 q ha⁻¹ seed yield. It might be due to daily availability of 25 per cent less quantity of water on the basis of pan evaporation at right time and place resulting in better translocation of nutrients under optimum moisture condition of the soil and ultimately increased the seed yield. Tomar *et al.* (2005) reported that seed yield of onion was the highest by drip irrigation method as compared to surface irrigation. The similar findings were also obtained by Singh *et al.* (2002) and Gethe *et al.* (2006).

Economics:

With regards to economics, the maximum net returns of 128795 Rs. ha⁻¹ was recorded by the drip irrigation application scheduling at daily on the basis of 75 per cent pan evaporation level, while the highest benefit cost ratio of 1: 3.78 was recorded by the surface irrigation.

It can be concluded that drip irrigation application scheduling at daily on the basis of 75 per cent pan evaporation level was found the best economical treatment for securing the maximum seed yield of onion during *Rabi* season under Saurashtra region of Gujarat.

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