



Effect of drip fertigation on growth and yield of onion

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ABSTRACT

Investigations were carried out in onion at the Department of Vegetable Crops, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore during 2007-2008 on fertigation in onion. The varieties used for experiment were Agri Found Dark Red (big onion) and COOn5 (aggregatum onion). The experiments were laid out in a RBD with four treatments in five replications. The performance of drip fertigation at 75%, 100% and 125% was compared with the soil application of recommended dose of fertilizer. The results indicated that in big onion var. Agri Found Dark Red, the fertigation with 75 per cent recommended dose of fertilizers (i.e., 75: 112.5: 56.25 kg of NPK ha⁻¹) registered higher bulb yield (10.30 and 12.70 t ha⁻¹). In small onion var. COOn5, the fertigation with 75 per cent recommended dose of fertilizers (i.e., 45: 45: 22.5 kg of NPK ha⁻¹) registered higher bulb yield (8.34 and 11.05 t ha⁻¹) compared to soil application of fertilizer. The nutrient uptake pattern also increased with application of 75 per cent recommended dose of fertilizer as fertigation. Based on the economic analysis, application of 75 per cent RDF a straight fertilizers viz., Urea, SSP and SOP through fertigation recorded the highest benefit cost ratio than the other treatments and it was adjudged to be the best nutrient management practice for both the onion varieties.

Keywords: Fertigation, onion, yield, quality.

INTRODUCTION

Onion (*Allium cepa* L.) is an important commercial vegetable. The total area under onion in Tamil Nadu is 27,200 hectares with a production of 2,77,110 tonnes. The crop comes well under sandy loam soil conditions. Limited availability of irrigation water and fertilizers and improper methods of application of fertilizers at critical phases of plant growth are some of the major factors affecting onion productivity. The fertilizer application not only increases the yield but also improves the quality. Drip fertigation remarkably increases the efficiency of the applied fertilizers thus economising the quantity of fertilizers and water, and cost of labour and energy resulting in reduced cost of cultivation.

MATERIALS AND METHODS

The two experiments for big onion var. Agri Found Dark Red and aggregatum onion var. COOn5 was laid out separately in a Randomized Block Design with four treatments replicated five times. The crop was raised under drip fertigation in raised bed, adopting a spacing of 20×15 cm. The recommended dose of fertilizer was 100:150:75 kg of NPK/ha for big onion and 60:60:30 kg of NPK/ha for aggregatum onion. The straight fertilizers

were used viz., urea, single super phosphate and sulphate of potash for fertigation considering higher cost of water soluble fertilisers. The field lay out and randomization of treatments to the plots was carried out as per standard procedures followed.

Treatment details

T₁ – Fertigation with 125% recommended dose of fertilisers

T₂ - Fertigation with 100% recommended dose of fertilisers

T₃ – Fertigation with 75% recommended dose of fertilisers

T₄ - Recommended dose of fertilisers through soil application

Observations on yield parameters like yield of bulbs per plot and per hectare and quality parameters like TSS, pyruvic acid, ascorbic acid, protein and total sugar content were recorded.

RESULTS AND DISCUSSION

All the growth attributes ie., plant height, number of leaves/plant and root length of onion was significantly influenced by fertilizer levels. The plant height was recorded at 30, 60 DAT and at harvest. During the earlier crop growth period (30 DAT) and at harvest the differences in plant height among fertilizer levels were very narrow and found to be non significant. Application of 75 percent RDF recorded the highest plant height, number of leaves/plant

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and root length followed by 100 percent and 125 percent RDF. The lowest value was observed with soil application of RDF in both the varieties (Tables 1 and 2).

Shashank Singh *et al.* (1994) stated that the increase in plant height and number of leaves might be due to the fact that nitrogen with synthesized carbohydrates was metabolized into aminoacids and proteins, which allowed the plants to grow faster. Application of 75 and 100 percent RDF produced longer roots than other levels. Onions have a shallow, sparsely branched root system with most roots in the top 30 cm of soil. Rooting density decreases with soil depth. The sparse, shallow rooting of onions is an important consideration for efficient management of mobile nutrients such as nitrate-nitrogen (NO₃- N) (Patel and Rajput, 2002).

The yield components also responded well to fertigation with 75 percent RDF, followed by 100 percent RDF. The Bulb diameter and bulb shape index were higher in fertigation with 75 percent RDF, followed by 100 percent RDF when compared to soil application of recommended dose of fertilizer in both big onion and aggregatum onion varieties. However, fertigation with 100 percent RDF was found to be on par with fertigation with 75 percent RDF (Fig. 1).

The increased yield might be the result of all the growth and yield attributing characters due to better availability of plant nutrients and irrigation water throughout the crop growth period under drip fertigation system. This is in accordance with the findings of Gural *et al.* (1989). But when the level of nutrients was

Table 1. Observation on growth character in big onion var. Agri Found Dark Red.

S. No.	Treatment details	Plant height at 30 DAT (cm)	Plant height at 60 DAT (cm)	No. of leaves	Root length (cm)	Bulb polar diameter (cm)	Bulb equatorial diameter (cm)	Bulb shape index	Bulb fresh wt. (g plant ⁻¹)
1.	T ₁ -Fertigation with 125% RDF	31.16	51.83	7.85	5.34	6.42	7.67	0.760	44.75
2.	T ₂ - Fertigation with 100% RDF	30.35	53.50	8.54	5.61	6.85	9.12	0.793	47.68
3.	T ₃ - Fertigation with 75% RDF	33.64	55.43	8.76	5.97	7.00	9.36	0.812	52.13
4.	T ₄ -Soil application of fertilizer with recommended dose	34.49	49.98	7.32	4.95	6.15	7.42	0.752	42.31
	CD (0.05%)	NS	2.564	0.394	0.265	0.224	0.291	0.037	2.274

Table 2. Observation on growth character in aggregatum onion var. COOn5.

S. No.	Treatment details	Plant height at 30 DAT (cm)	Plant height at 60 DAT (cm)	No. of leaves	Root length (cm)	Bulb polar diameter (cm)	Bulb equatorial diameter (cm)	Bulb shape index	Bulb fresh wt. (g plant ⁻¹)
1	T ₁ -Fertigation with 125% RDF	34.58	47.16	6.50	4.81	4.01	2.31	1.473	50.68
2	T ₂ - Fertigation with 100% RDF	31.01	50.16	6.80	4.90	4.31	2.56	1.548	54.32
3	T ₃ - Fertigation with 75% RDF	33.08	52.62	7.10	5.40	4.51	2.97	1.681	57.43
4	T ₄ -Soil application of fertilizer with recommended dose	26.62	48.96	6.00	4.98	3.56	2.10	1.442	48.65
	CD (0.05%)	NS	1.693	0.223	0.170	0.142	0.085	0.052	2.568

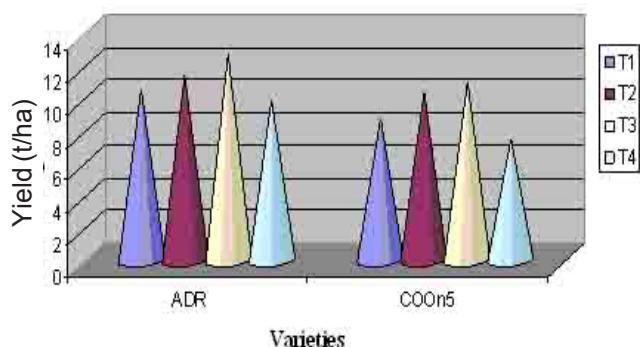


Fig. 1. Effect of fertigation on bulb yield (t/ha) in big onion var. AgriFood Dark Red and aggregation onion var. COOn5

increased to the dose of T_1 (125 percent RDF) there was decrease in bulb yield. This might be due to the fact that with increased nutrients to certain level, there was a better uptake and utilization as indicated by Jerald and Rickels (1972). Nitrogen is an important constituent of protein and promotes cell division (Shanthi and Balakrishnan 1989). At the level of 75 percent RDF itself there would have been better protein synthesis from the photoassimilates.

The maximum productivity of onion was noticed in application of 75 percent RDF (i.e., 75:112.5:56.25 kg NPK ha^{-1} in big onion and 45:45:22.5 kg NPK ha^{-1} in small onion) as fertigation proved its superiority over other treatments in respect of growth and yield traits, followed by 100 percent RDF. This indicated that loss of nutrients is less when N and K were applied through the drip fertigation system. Fertigation not only saves time and cost

when adopted over larger area but also increases the productivity level too.

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