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AR Jadhav

Department of Horticulture,
College of Agriculture, Latur,
Vasantrao Naik Marathwada
Krishi Vidyapeeth, Parbhani,
Maharashtra, India

RM Dheware

Department of Horticulture,
College of Agriculture, Latur,
Vasantrao Naik Marathwada
Krishi Vidyapeeth, Parbhani,
Maharashtra, India

PS Urade

Department of Horticulture,
College of Agriculture, Latur,
Vasantrao Naik Marathwada
Krishi Vidyapeeth, Parbhani,
Maharashtra, India

Studies on different levels of fertigation on growth and leaf nutrient status of pomegranate (*Punica granatum* L.) cv. Super Bhagwa

AR Jadhav, RM Dheware and PS Urade

Abstract

The field trial was conducted on a well-established pomegranate orchard of four years age, spaced at 2.5 x 3 m² at post- Gangapur, Taluka and District- Latur during 2016-2017, to study the different levels of fertigation on growth and leaf nutrient status of pomegranate (*Punica granatum* L.) cv. Super Bhagwa. The experiment was laid out in a Randomized Block Design with six treatments viz., T₁ (Surface irrigation + R.D.F.-control), T₂ (Drip irrigation + R.D.F.), T₃ (50% R.D.F. through fertigation), T₄ (75% R.D.F. through fertigation), T₅ (100% R.D.F. through fertigation) and T₆ (125% R.D.F. through fertigation) with four replications. The investigation indicated 100 % recommended dose of fertilizers through fertigation (T₅) resulted, the highest net increasing plant height (0.28 m), plant spread (0.30 m), leaf nitrogen concentration at 55 days after bahar treatment (2.02 %) and final harvest (1.73 %) as compared to other treatments. Therefore, 100 % recommended dose of fertilizers through fertigation can be recommended for improve growth and leaf nutrient status of pomegranate cv. Super Bhagwa for four years old tree.

Keywords: fertigation on growth, leaf nutrient, pomegranate

Introduction

Pomegranate (*Punica granatum* L.) is an important fruit crop of the Tropical and Subtropical regions belonging to the family Punicaceae and genus *Punica*. The 'Anardana' is prepared from pomegranate (Singh and Singh, 2004) [8]. The pomegranate is a neat rounded shrub or small tree that can grow to 20 or 30 feet but more typically to 12 to 16 feet in height. It is usually deciduous, but in certain areas the leaves will persist on the tree. The trunk is covered by a red-brown bark which later becomes gray. The branches are stiff, angular and often spiny. There is a strong tendency to suckers from the base. Pomegranates are also long lived. The vigour of a pomegranate declines after about 15 years. Leaves are glossy, narrow and lance-shaped. The pomegranate is self-pollinated as well as cross-pollinated by insects. Crosspollination increases the fruit set (Kumari *et al.*, 2012) [3]. The total area under cultivation of pomegranate in India is 192 thousand ha and production is around 2263 thousand MT according to NHB (Anonymous, 2017) [1]. The juice of wild pomegranate contains citric acid and sodium citrate for pharmaceutical purposes (Shastri and Pawar 2014) [7]. Recently, it has been reported that extract of fruits has anti-cancer properties (Sudhakar *et al.*, 2015) [10]. In India mainly cultivated varieties like Ganesh, Mridula, Bhagwa, Dholka, Joyti, Muscat, Jodhpur Red, Ruby Red, etc. grown in different agro-climatic conditions (Venkatesha and Yogish, 2016) [13]. In Marathwada region, there is very scarcity rainfall and the water resources are limited, so that the application of drip irrigation system and fertilizers play important role in improves of growth and leaf nutrient status of pomegranate.

Materials and methods

An experiment on pomegranate cv. Super Bhagwa was conducted at post- Gangapur, Taluka and District- Latur during the *Ambia bahar*, 2016-2017. The 4 years old plants grown at 2.5 x 3 m² spacing were used for the experiment. The experiment was laid out in a Randomized Block Design with six treatments viz., T₁ (Surface irrigation + R.D.F.-control), T₂ (Drip irrigation + R.D.F.), T₃ (50% R.D.F. through fertigation), T₄ (75% R.D.F. through fertigation), T₅ (100% R.D.F. through fertigation) and T₆ (125% R.D.F. through fertigation) with four replications.

Correspondence

AR Jadhav

Department of Horticulture,
College of Agriculture, Latur,
Vasantrao Naik Marathwada
Krishi Vidyapeeth, Parbhani,
Maharashtra, India

The fertilizers for the treatment T₁ and T₂ were applied by ring and dibbling method, respectively. Fertilizers for treatment T₃ to T₆ were applied through drip irrigation system (fertigation). The statistical analysis of the data in respect of growth and leaf nutrient status was done according to the standard procedure given by Panse and Sukhatme (1984)^[5].

Result and discussion

Effect of fertigation on growth of pomegranate: It is revealed from the data (Table 1 and Figure 1), the highest initial plant height (1.67 m) and initial plant spread (1.81 m) at beginning of bahar treatment was observed in treatment T₆ (125 per cent RDF through fertigation) and final harvest

stage, the highest final plant height (1.94 m) and final plant spread (2.08 m) was observed in treatment T₅ (100 per cent RDF through fertigation). The highest net increasing plant height (0.28 m) and plant spread (0.30 m) observed in treatment T₅ (100 per cent RDF through fertigation). The difference was observed among all the treatments due to the different levels of fertilizers but 100 per cent water soluble fertilizers increased the plant height and plant spread of pomegranate as compared to normal fertilizers. The similar results at final harvest stage had been reported by Singh *et al.* (2006)^[9] in pomegranate, Tank *et al.* (2011)^[12] in papaya and Ramniwas *et al.* (2012)^[6] in guava.

Table 1: Effect of fertigation on growth of pomegranate

Treatments	Height of the plant (m)			Spread of the plant (m)		
	Initial plant height	Final plant height	Net increasing plant height	Initial plant spread	Final plant spread	Net increasing plant spread
T ₁	1.65	1.82	0.17	1.77	1.97	0.20
T ₂	1.64	1.91	0.27	1.77	2.06	0.29
T ₃	1.64	1.80	0.16	1.77	1.96	0.19
T ₄	1.63	1.88	0.25	1.76	2.04	0.28
T ₅	1.66	1.94	0.28	1.78	2.08	0.30
T ₆	1.67	1.90	0.23	1.81	2.05	0.24
S.E.±	0.01	0.05	--	0.01	0.03	--
C.D at 5%	NS	NS	--	NS	NS	--

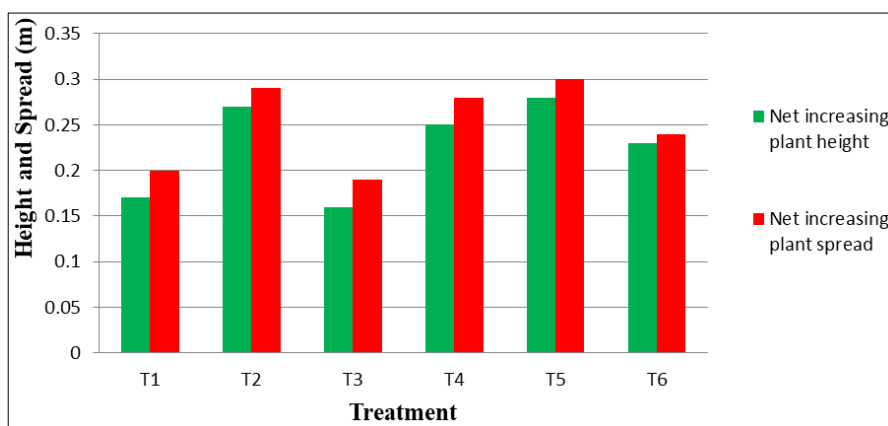


Fig 1: Effect of fertigation on growth of pomegranate

Effect of fertigation on leaf nutrient status of pomegranate: It is revealed from the data (Table 2 and Figure 2), the leaf nitrogen concentration was significantly maximum at 55 days after bahar treatment (2.02 %) and final harvest (1.73 %) under treatment T₅ (100 per cent RDF through fertigation). This might be due to application of higher doses of nitrogen had resulted in more availability of nitrogen in the leaves, which has increased the nitrogen uptake. This indicated that the 100 per cent of RDF was sufficient for optimum concentration of nitrogen in leaves. These findings are in accordance with the results obtained by

Singh *et al.* (2006)^[9] in pomegranate, Tank and Patel (2013)^[11] in papaya and Basavaraju *et al.* (2014)^[2] in coconut. The leaf phosphors and potassium percentage at 55 days after bahar treatment and final harvest were not influenced by the different treatments. The remarkable difference was not observed among all the treatments included under this investigation for this attribute. Hence, the treatments were statistically non-significant at this stage. These findings are in accordance with the results obtained by Kumar *et al.* (2012)^[4] in banana.

Table 2: Effect of fertigation on leaf nutrient status of pomegranate

Treatments	Nitrogen (%)		Phosphors (%)		Potassium (%)	
	55 days after bahar treatment	Final harvest stage	55 days after bahar treatment	Final harvest stage	55 days after bahar treatment	Final harvest stage
T ₁	1.84	1.48	0.17	0.15	1.07	0.93
T ₂	1.88	1.65	0.19	0.17	1.02	0.94
T ₃	1.64	1.38	0.18	0.16	1.09	0.85
T ₄	1.91	1.57	0.20	0.19	1.10	0.86
T ₅	2.02	1.73	0.20	0.18	1.15	0.92
T ₆	2.01	1.72	0.21	0.18	1.17	0.97
S.E.±	0.07	0.08	0.06	0.07	0.04	0.03
C.D at 5%	0.24	0.24	NS	NS	NS	NS

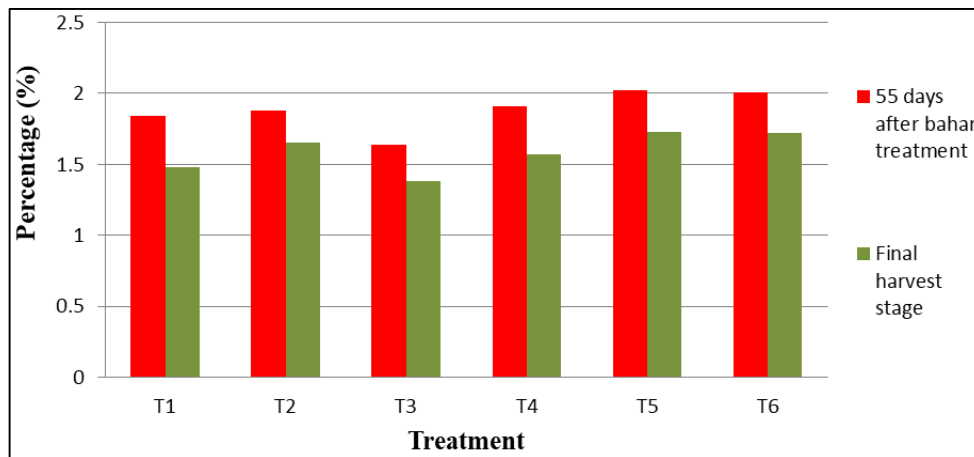


Fig 2: Effect of fertilization on leaf nitrogen of pomegranate

Conclusion

the highest net increasing plant height, plant spread and leaf nitrogen concentration at 55 days after bahar treatment and final harvest stage were positively influenced by application of treatment 100 per cent RDF through fertilization. In a light, the 100 per cent RDF through fertilization was observed most effective for increasing plant height and spread with highest leaf nitrogen concentration.

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