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**Original Research Article**

# Studies on Different Levels of Fertigation on Yield and Economics of Pomegranate (*Punica granatum* L.) cv. Super Bhagwa

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**A B S T R A C T**

The field study was conducted on a well-established pomegranate orchard of four years age, spaced at 2.5 x 3 $m^2$ at post- Gangapur, Taluka and District- Latur during 2016-2017, to study the different levels of fertigation on yield and economics of pomegranate (*Punica granatum* L.) cv. Super Bhagwa. The experiment was laid out in a Randomized Block Design with 06 treatments *viz.*, $T_1$ (Surface irrigation + R.D.F.-control), $T_2$ (Drip irrigation + R.D.F.), $T_3$ (50% R.D.F. through fertigation), $T_4$ (75% R.D.F. through fertigation), $T_5$ (100% R.D.F. through fertigation) and $T_6$ (125% R.D.F. through fertigation) with four replications. The experiment framed was concentrated to find out optimum dose of liquid fertilizers through fertigation as well as to study the effect of different levels of fertigation for getting high yield and economics of pomegranate fruits. The investigation indicated 75 % recommended dose of fertilizers through fertigation ($T_4$) resulted, the maximum number of fruits $tree^{-1}$ (70.83), fruit yield $tree^{-1}$ (18.32 kg), marketable yield $tree^{-1}$ (16.10 kg) and average yield $hectare^{-1}$ (214.61 q), gross monetary returns (643830.00 Rs. $ha^{-1}$), net monetary returns (439057.00 Rs. $ha^{-1}$) and Benefit: Cost ratio (3.14) as compared to other treatments. Therefore, ($T_4$) 75 % recommended dose of fertilizers through fertigation can be recommended for getting higher yield and economics for four to five years old pomegranate cv. Super Bhagwa.

**Keywords**

Fertigation, Yield, Economics, 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.* Pomegranate is commercially grown for its delicious, refreshing with sweet- acidic taste. The 'Anardana' is also prepared from pomegranate (Singh and Singh, 2004). 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. It is self-pollinated as well as cross-pollinated by insects. Cross pollination increases the fruit set (Kumari *et al*., 2012). 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).

Pomegranate is native of Iran and is extensively cultivated in Mediterranean countries like Spain, Morocco, Egypt,

Afghanistan and Baluchistan. It is also grown to some extent in Burma, China, Japan, USA (California) and India. 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).

The juice of wild pomegranate contains citric acid and sodium citrate for pharmaceutical purposes (Shastri and Pawar 2014). Recently, it has been reported that extract of fruits has anti-cancer properties (Sudhakar *et al*., 2015). 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 production of yield and economics of pomegranate.

## Materials and Methods

A field trial 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 $m^2$ spacing were used for the experiment.

The experiment was laid out in a Randomized Block Design with 6 treatments *viz*., $T_1$ (Surface irrigation + R.D.F.-control), $T_2$ (Drip irrigation + R.D.F.), $T_3$ (50% R.D.F. through fertigation), $T_4$ (75% R.D.F. through fertigation), $T_5$ (100% R.D.F. through fertigation) and $T_6$ (125% R.D.F. through fertigation) with four replications.

The fertilizers for the treatment $T_1$ and $T_2$ were applied by ring and dibbling method, respectively. Fertilizers for treatment $T_3$ to $T_6$ were applied through drip irrigation system (fertigation). The statistical analysis of the data in respect of yield and economics was done according to the standard procedure given by Panse and Sukhatme (1984).

## Results and Discussions

### Effect of fertigation on yield of pomegranate

It is revealed from the data (Table 1 and Figure 1), the yield of pomegranate was significantly influence by different levels of fertigation. The maximum number of fruits $tree^{-1}$ (70.83), fruit yield $tree^{-1}$ (18.32 kg), marketable yield $tree^{-1}$ (16.10 kg) and average yield $hectare^{-1}$ (214.61 q) were noted under the treatment $T_4$ (75 per cent RDF through fertigation) as compared to other treatments. This might be due to the effect of direct application of fertilizers at the correct time through the irrigation system to the region where most of the feeder root develop, results in an increased yield. Drip irrigation always maintains the soil moisture and the water available to the plant continuously; it helped to improve fruit yield. These findings are in accordance with the results obtained by Singh *et al.* (2006) in pomegranate, Kumar *et al.* (2012) in banana and Nath *et al.* (2016) in coconut.

### Effect of fertigation on economics of pomegranate

It is revealed from the data (Table 2 and Figure 2), the lowest cost of cultivation (149405.85 Rs. $ha^{-1}$) was recorded in treatment $T_2$ (Drip irrigation + RDF). While, the highest cost of cultivation (278803.22 Rs. $ha^{-1}$) was recorded in the treatment $T_6$ (125 per cent RDF through fertigation). The lowest cost of cultivation in treatment $T_2$ (Drip irrigation + RDF) could be due to as there no expenditure towards the cost of drip maintenance, labour charges and water insoluble fertilizers. However, the highest cost in treatment $T_6$ (125 per cent RDF through fertigation) could be attributed due to high cost of water soluble fertilizers.

The maximum gross monetary returns (643830.00 Rs. $ha^{-1}$) and net monetary returns (439057.00 Rs. $ha^{-1}$) were obtained in the treatment $T_4$ (75 per cent RDF through fertigation). While, the minimum gross monetary returns (269520.00 Rs. $ha^{-1}$) and net monetary returns (115114.15 Rs. $ha^{-1}$) in control $T_1$ (Surface irrigation + RDF). This could be attributed to production of highest yield of fruits with the application of optimum levels of fertigation.

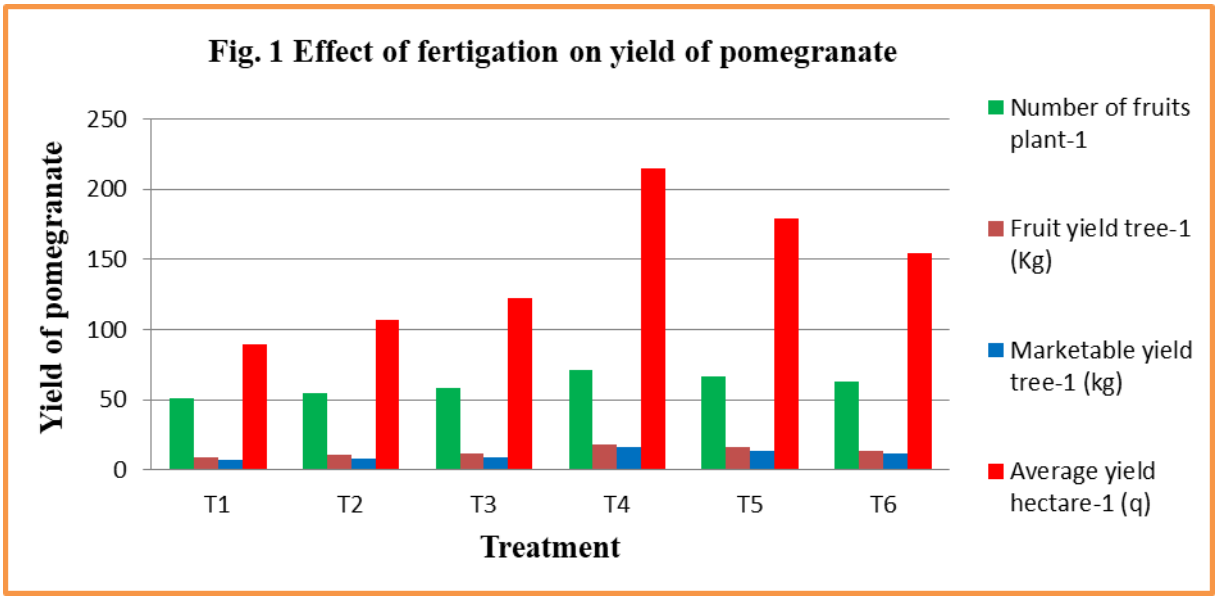
As regards to the Benefit: Cost ratio, the highest Benefit: Cost ratio (3.14) was obtained in treatment $T_4$ (75 per cent RDF through fertigation). Whereas, the lowest Benefit: Cost ratio (1.66) was obtained in treatment $T_6$ (125 per cent RDF through fertigation). The variation in Benefit: Cost ratios due to different levels of fertigation in pomegranate were also reported by Singh *et al.* (2006) in pomegranate and Nath *et al.* (2016) in coconut.

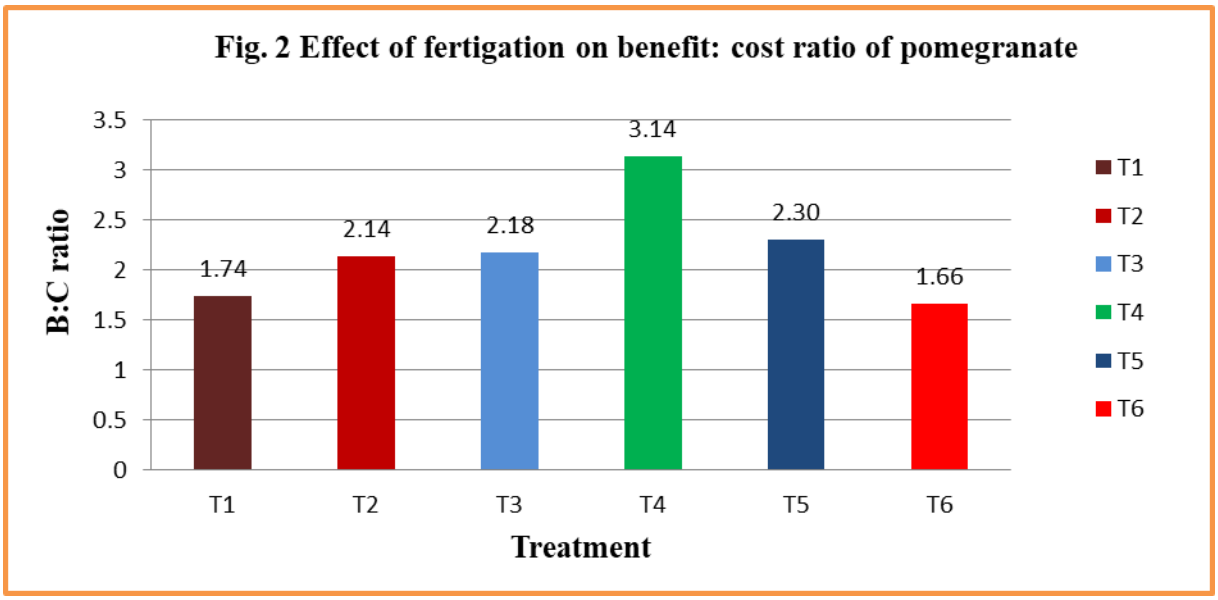
**Table.1** Effect of fertigation on yield of pomegranate

| Treatments | Number of fruits $tree^{-1}$ | Fruit yield $tree^{-1}$ (kg) | Marketable yield $tree^{-1}$ (kg) | Average yield $hectare^{-1}$ (q) |
|---|---|---|---|---|
| $T_1$ | 50.74 | 8.89 | 6.74 | 89.84 |
| $T_2$ | 54.71 | 10.33 | 8.03 | 107.03 |
| $T_3$ | 58.55 | 11.35 | 9.16 | 122.10 |
| $T_4$ | 70.83 | 18.32 | 16.10 | 214.61 |
| $T_5$ | 66.36 | 15.76 | 13.47 | 179.55 |
| $T_6$ | 63.18 | 13.63 | 11.60 | 154.62 |
| **S.E.±** | **2.47** | **0.57** | **0.44** | **5.89** |
| **C.D at 5%** | **7.61** | **1.77** | **1.36** | **18.13** |

**Table.2** Effect of fertigation on economics of pomegranate

| Treatments | Cost of cultivation (Rs. $ha^{-1}$) | Gross moneroty returns $ha^{-1}$ | Net moneroty returns $ha^{-1}$ | B:C ratio |
|---|---|---|---|---|
| $T_1$ | 154405.85 | 269520.00 | 115114.15 | 1.74 |
| $T_2$ | 149405.85 | 321090.00 | 171684.15 | 2.14 |
| $T_3$ | 167756.90 | 366300.00 | 198543.10 | 2.18 |
| $T_4$ | 204773.00 | 643830.00 | 439057.00 | 3.14 |
| $T_5$ | 233565.42 | 538650.00 | 305084.58 | 2.30 |
| $T_6$ | 278803.22 | 463860.00 | 185056.78 | 1.66 |




In conclusion, the 75 per cent fertigation RDF can reduces the cost of application and labour chargers, prevent soil erosion and improve soil health, minimize the losses of fertilizers through runoff and leaching. The yield parameters and economics of fertigation were positively influenced by application of 75 per cent RDF through fertigation. In a light, the 75 per cent RDF through fertigation was observed most economical and effective for getting higher yield and returns as the highest net profit ha$^{-1}$ with highest benefit cost ratio. Fertigation and drip irrigation can save fertilizers up to 25 %; it helps to improve yield and economic benefits of pomegranate crop.

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