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# Effect of irrigation and fertigation scheduling on growth, flowering, yield and economics of guava cv. Lalit under ultra high density planting system

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## ABSTRACT

**A study was conducted to find out the effect of irrigation and fertigation scheduling on growth, flowering, yield and cost economics of guava cv. Lalit elanted under ultra high density planting system. The experiment consisted of 15 treatments combination comprising three different levels of irrigation [50 % ($I_1$), 75% ($I_2$) and 100% ($I_3$) irrigation of pan evaporation] and five level of fertigation [20% ($F_1$), 40% ($F_2$), 60% ($F_3$), 80% ($F_4$) and 100% ($F_5$) or recommended of NPK. Among the different treatment combination, highest shoot gain after pruning (39.90 cm), plant spread N-S (1.72 m), increase in girth of primary branch (0.315 cm) and canopy volume (1.265 $m^3$) were recorded under $I_3F_5$ treatment combination. Whereas, highest flowers shoot$^{-1}$ (47.60), fruit weight (96.91 g), pulp weight (70.84 g), pulp: seed ratio (14.96), number of fruits plant$^{-1}$ (77.70) and yield (6.75 kg plant$^{-1}$ & 33.75 t ha$^{-1}$) were recorded in $I_2F_4$ treatment combination. However, treatment combinations $I_2F_4$ and $I_2F_3$ were found statistically at par with each other in respect of fruit weight, number of fruit plant$^{-1}$ and yield with each other in all the above parameters. Treatment combination $I_2F_3$ gave the maximum net return (Rs. 2,79,081) per ha under ultra high density planting.**

**Key words:** Guava, drip irrigation, fertigation scheduling, evapotranspiration, ultra high density planting system.

## INTRODUCTION

Guava (*Psidium guajava* L.) is one of the important fruit of the tropic and sub-tropic parts of the world due to its hardy nature and prolific bearing even in marginal land. Guava is considered as an apple of the tropics, because of its richness in vitamins especially vitamin C and minerals like Ca, P and Fe. It is mainly used as a table fruit but because of high pectin content, it has a very good potentiality of processing also and used for preparation of jam, jelly, nectar and other processed products. Due to high yield per unit area, ultra high density planting system of guava is gaining popularity among small as well as large farmers of southern Rajasthan. Among different cultivars of guava, farmers of the region prefer Lalit cultivar for ultra high density planting because it performs better though, fertigation is being followed in southern Rajasthan but the schedules are arbitrary due to lack of availability of scientifically worked out fertigation schedules.

Water is a scarce commodity, and it is important that 50 per cent of our arable land could be brought under irrigation. Thus, increasing demand for highly efficient irrigation system calls for the use of drip irrigation, which has also been found suitable under adverse climate, soil and irrigation water conditions. The drip-irrigation have ability to apply small but frequent irrigation, which has been found superior over flood method in terms of water saving, yield, quality and water use efficiency (Thakur *et al.*, 14). Soil is considered as a reservoir for water under basin irrigation and the objective of irrigation is mainly to replenish the soil water, whereas under drip irrigation it is possible to apply small quantity of water based on evapotranspiration of the plant (Stegman, 13). Irrigation is often significantly exceeds the crop requirement, because the evapotranspiration accounts for nearly 30-50 per cent of applied water. Therefore, it is essential that plant should be irrigated on the basis of evapotranspiration.

Mineral nutrition is one of the most important inputs for increasing productivity and quality of fruits and accounts for nearly 30 per cent of the cost of cultivation. The limited root zone and the reduced amount of mineralization in the restricted wetted zone are the main reasons for the reduced nutrient availability to the plant with conventional method of fertilizer application under drip irrigation (Megen, 4). With drip irrigation both water and fertilizer can be applied more precisely in controlled quantity and at appropriate time directly to the root zone as per the crop need at different growth stage. Fertigation through drip can save fertilizers (25-40%), labour (50-60%) and water (50-60%), and increased yield (12-76%), water use efficiency (70-95%) and fertilizer use efficiency (Marwaha, 3; Thakur *et al.*, 14). Therefore,

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the present study was undertaken to find out the efficient irrigation and fertigation schedule for guava under ultra high density planting system in southern Rajasthan.

## MATERIALS AND METHODS

The field experiment was conducted during 2010-11 and 2011-12 on uniform four-year-old plants of guava cv. Lalit planted at the spacing of 2.0 x 1.0 m at Horticulture Farm of the Rajasthan College of Agriculture, MPUAT, Udaipur. There were three levels of irrigation, [50 % ($I_1$), 75% ($I_2$) and 100% ($I_3$) irrigation of pan evaporation] and five levels of fertigation [20% ($F_1$), 40% ($F_2$), 60% ($F_3$), 80% ($F_4$) and 100% ($F_5$) or recommended of NPK (225, 75, 150 g NPK plant$^{-1}$ year$^{-1}$ was applied alone and in combination (Shukla *et al.*, 12). The experiment was laid out in factorial randomized block design with four replications. The treatment of different irrigation levels were given from June to March at one day interval. The daily USDA class A open pan evaporation readings were obtained from meteorological observatory, Agronomy Farm of RCA, Udaipur (Fig. 1 & 2). As per the treatments, water soluble fertilizer grade (NPK-19:19:19) was applied in 5 splits from fruit set to maturity stage and remaining nitrogen and potassium dose was supplemented through urea and MOP, respectively. The drip irrigation system was set up with main (75 mm) and sub-mains (50 mm) made up of high density polyethylene and laterals (12 mm) made up to low density polyethylene. The spacing between two adjacent laterals was 1.0 m. Two microtube type (1.2 mm) emitters were used on each plant for application. Water soluble fertilizers were injected in drip system through venturi. The data on gain of shoot after pruning (cm), tree height (m), plant spread from

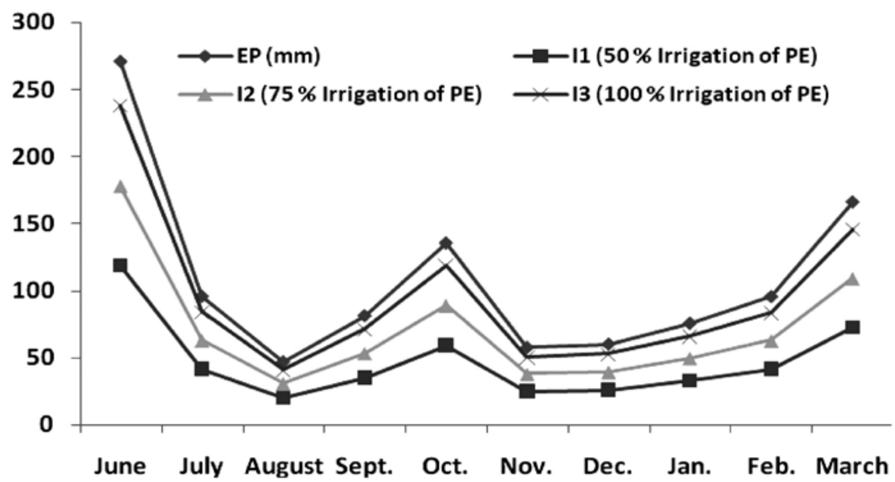


**Fig. 1.** Monthly crop water applied (L) and EP (mm) during 2010-11.

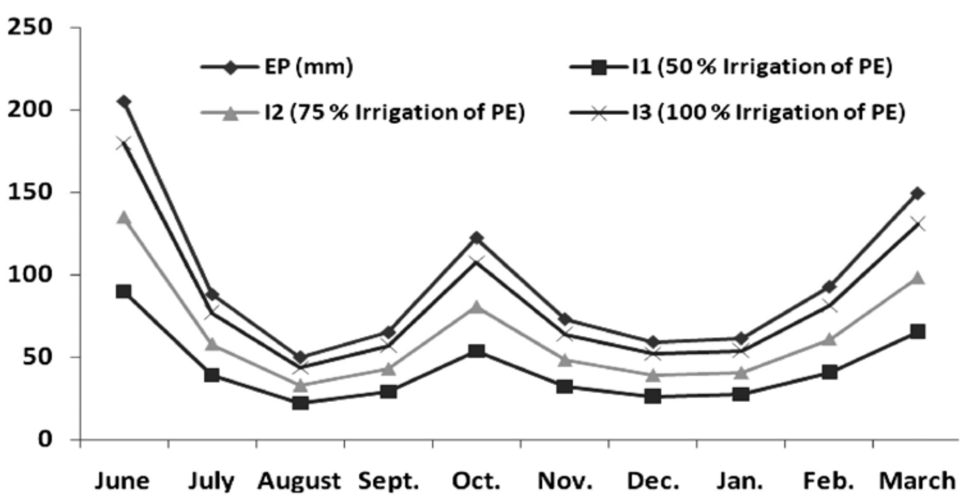


**Fig. 2.** Monthly crop water applied (L) and EP (mm) during 2011-12.

North-South and East-West (m) were recorded using metre scale, while girth of primary branches (cm) was recorded with Vernier calipers. Average increase in the girth of shoot was calculated by subtracting end value to initial value. Leaf area ($cm^2$) was measured with the help of leaf area meter (Systronics). Canopy volume was calculated as the method described by the Samaddar and Charkarbarti (8) and expressed in $m^3$. Fruit diameter, polar and equatorial was taken with the help of Vernier calipers. Mature fruits were harvested periodically in each treatment separately and the weight was recorded with the help of electronic balance and then the yield per plant was calculated. Estimated yield per hectare was calculated by multiplying the yield plant$^{-1}$ with number of plants per ha$^{-1}$. Total working cost (establishment cost/ annum, seasonal cost of drip system, cost of cultivation and cost of treatment along with interest and rental value) converted into per plant as well as per hectare. The net income was obtained by subtracting the total working cost from gross income.

## RESULTS AND DISCUSSION

Varying quantities of water applied *via* drip irrigation 50, 75 and 100 per cent irrigation of PE level had a positive effect on different vegetative parameters. The stimulation on such growth characters were attributed to increasing quantities of water and maximum gain of shoot after pruning (33.13 cm), plant spread (1.81 m E-W & 1.55 m N-S), increase in girth of primary branches (0.233 cm), leaf area (67.60 $cm^2$) and canopy volume (0.93 $m^3$) were under $I_3$ (100% irrigation of PE level). However, $I_3$ and $I_2$ (75% irrigation of PE level) treatments did not differ significantly among themselves with respect of plant spread, increase in girth of primary branches and leaf area (Table 1). Judicious application of water directly to the root zone could improve plant growth and development. The favourable influence of $I_3$ on vegetative parameters may be due to excess moisture compared to $I_2$ and $I_1$ in the soil through drip irrigation treatment. This maintained the soil moisture at optimum level eliminating water stress to the plant resulting in greater vigour. The results are in accordance with the findings of Kachwaya *et al*. (2) on strawberry and Sarolia *et al*. (9) on guava.

Results in Table 1 indicated that growth parameters of guava trees were gradually stimulated with increasing levels of fertigation from $F_1$ to $F_5$. Fertigation level $F_5$ (100% RDF) showed higher shoot length gain (37.38 cm), plant spread (1.90 m E-W & 1.66 m N-S), increase in girth of primary branches (0.30 cm), leaf area (73.03 $cm^2$) and canopy volume (1.16 $m^3$). Increase in the vegetative growth with increasing fertigation levels might possibly be attributed to better supplementation and utilization of nutrients and moisture particularly in the plants with highest dose of NPK, when applied through fertigation. Which in turn enhanced cell division and formation of more tissues resulting in more vegetative growth leading to higher annual extension and plant spread. A direct relationship between nitrogen application and vegetative growth is a well established fact (Ramniwas *et al*., 7) in guava.

Among the different treatment combinations, $I_3F_5$ (100% irrigation of PE level + 100% RDF) resulted in maximum shoot gain (39.90 cm), plant spread N-S (1.72 m) and canopy volume (1.265 $m^3$) might be due to over all improvement in growth parameters with 100 per cent irrigation of PE level and application of 100 per cent RDF through fertigation (Table 1). The findings of present study are in accordance with Sharma *et al*. (11) and Varu *et al*. (15) on guava.

Among different levels of irrigation, maximum polar fruit diameter (5.34 cm), fruit weight (89.06 g), pulp weight (64.88 g), pulp: seed ratio (14.39), number of fruits plant$^{-1}$ (71.75) and yield (5.82 kg plant$^{-1}$ & 29.11 t ha$^{-1}$) were observed in treatment $I_2$ (75% irrigation of PE level) and minimum in $I_1$ level (50% irrigation of PE level) (Tables 2 & 3). The possible explanation for increase in fruit diameter and fruit weight by $I_2$ treatments might be due to increase in balanced vegetative growth with maximum harvest of solar light. The pulp weight is directly correlated to fruit size and weight therefore, the increase in size and weight of fruit due to this treatment is possible reason for increase in pulp weight. Further, per cent fruit set and retention were recorded maximum in $I_2$ level therefore number of fruits plant$^{-1}$ ultimately increased in this treatment. Bigger size fruits, higher fruit weight and maximum number of fruits plant$^{-1}$ were observed in $I_2$ level, which was, one of the reasons for achieving higher yield of guava under $I_2$ irrigation level. The outcomes of present study are also in line of Sarolia *et al*. (9) and Varu *et al*. (15) on guava.

Among different fertigation levels, $F_4$ (80% RDF) registered maximum fruit set (59.96%), fruit retention (62.33%), equatorial fruit diameter (5.65 cm), fruit weight (89.86 g), pulp weight (66.95 g), number of fruits plant$^{-1}$ (73.90) and yield (6.22 kg plant$^{-1}$ & 31.10 t ha$^{-1}$). However, treatment $F_4$ and $F_3$ (60% RDF) did not differ statistically concerning their influence on fruit set, fruit retention, equatorial diameter of fruit, fruit weight, pulp weight, seed weight and number of fruits plant$^{-1}$ (Tables 2 & 3). Prolonged availability of nutrients during the growth, flowering and fruiting period from fertigation might have improved the fruit set and retention. Nitrogen application might increase the supply of auxins to the fruits, which reduce abscission therefore increased fruit retention.

**Table 1.** Effect of irrigation and fertigation levels and their interaction on growth parameters in guava.

| Treatment | Gain of shoot after pruning (cm) | Plant spread E-W (m) | Plant spread N-S (m) | Increase in girth of primary branches (cm) | Leaf area ($cm^2$) | Canopy volume ($m^3$) |
|---|---|---|---|---|---|---|
| $I_1$ | 28.20 | 1.70 | 1.45 | 0.186 | 61.98 | 0.72 |
| $I_2$ | 31.98 | 1.76 | 1.53 | 0.225 | 66.89 | 0.86 |
| $I_3$ | 33.13 | 1.81 | 1.55 | 0.233 | 67.60 | 0.93 |
| CD at 5% | 0.81 | 0.05 | 0.05 | 0.01 | 1.98 | 0.02 |
| $F_1$ | 23.68 | 1.64 | 1.37 | 0.145 | 57.57 | 0.55 |
| $F_2$ | 27.75 | 1.67 | 1.47 | 0.170 | 62.68 | 0.67 |
| $F_3$ | 31.42 | 1.76 | 1.45 | 0.212 | 65.18 | 0.77 |
| $F_4$ | 35.28 | 1.82 | 1.61 | 0.252 | 68.98 | 1.03 |
| $F_5$ | 37.38 | 1.90 | 1.66 | 0.295 | 73.03 | 1.16 |
| CD at 5% | 1.04 | 0.06 | 0.060 | 0.007 | 2.56 | 0.03 |
| $I_1F_1$ | 21.75 | 1.64 | 1.29 | 0.145 | 55.15 | 0.480 |
| $I_1F_2$ | 26.10 | 1.63 | 1.44 | 0.160 | 59.70 | 0.580 |
| $I_1F_3$ | 27.45 | 1.64 | 1.52 | 0.160 | 62.55 | 0.710 |
| $I_1F_4$ | 31.65 | 1.73 | 1.45 | 0.215 | 65.00 | 0.805 |
| $I_1F_5$ | 34.05 | 1.87 | 1.57 | 0.250 | 67.50 | 1.015 |
| $I_2F_1$ | 23.90 | 1.60 | 1.43 | 0.140 | 57.95 | 0.555 |
| $I_2F_2$ | 28.05 | 1.65 | 1.48 | 0.175 | 64.00 | 0.655 |
| $I_2F_3$ | 33.20 | 1.79 | 1.36 | 0.225 | 66.75 | 0.730 |
| $I_2F_4$ | 36.55 | 1.86 | 1.70 | 0.265 | 70.50 | 1.175 |
| $I_2F_5$ | 38.20 | 1.91 | 1.71 | 0.320 | 75.25 | 1.190 |
| $I_3F_1$ | 25.40 | 1.67 | 1.39 | 0.150 | 59.60 | 0.600 |
| $I_3F_2$ | 29.10 | 1.75 | 1.49 | 0.175 | 64.35 | 0.780 |
| $I_3F_3$ | 33.60 | 1.86 | 1.46 | 0.250 | 66.25 | 0.865 |
| $I_3F_4$ | 37.65 | 1.88 | 1.69 | 0.275 | 71.45 | 1.115 |
| $I_3F_5$ | 39.90 | 1.92 | 1.72 | 0.315 | 76.35 | 1.265 |
| CD at 5% | 1.80 | NS | 0.10 | 0.01 | NS | 0.05 |

$I_1$ (50%) $I_2$ (75%) $I_3$ (100%) irrigation of PE; $F_1$ (20%), $F_2$ (40%), $F_3$ (60%), $F_4$ (80%) and $F_5$ (100%) recommended dose of NPK.

The promotive effect of N and K in rapid production of leaves with better photosynthetic activity resulting in higher C: N ratio for flowering and better fruit set (Turner and Barkus, 20). Similar, results have also been reported by Shankar *et al*. (10) on guava.

Nitrogen is an essential constituent of chlorophyll the increase in chlorophyll would result in additional food manufacture, which would further result in to increased length, width and weight of fruits in treatments $F_3$ and $F_4$ as compared to $F_1$ and $F_2$. Furthermore, healthy and optimum vegetative growth with the application of treatment $F_4$ might have augmented photosynthesis, respiration and synthesis of more carbohydrate required for fruit growth, increase in vegetative growth resulted in production of more food material, which in turn may have been utilized for better development of fruits. Vegetative growth is directly correlated with physical attributes of fruit. However, maximum vegetative growth was attributed from $F_5$, but, under ultra high density planting there is no significance of more vegetative growth only optimum foliage is required with higher light interception for photosynthesis to produce maximum yield and good quality fruits. Per cent fruit set, per cent fruit retention, number of fruits plant$^{-1}$, fruit size and fruit weight were obtained highest from fertigation levels $F_4$ and $F_3$ during both the year of experiment which was responsible for higher yield. Results are in accordance with the findings of Patel *et al*. (5), Dantas *et al*. (1) and Pramanik and Patra (6) in guava.

**Table 2.** Effect of irrigation and fertigation levels and their interaction on flowers per shoot, fruit set, fruit retention, fruit diameter and weight of guava.

| Treatment | Flowers $shoot^{-1}$ | Fruit set (%) | Fruit retention (%) | Fruit dia. (polar) (cm) | Fruit dia. (equatorial) (cm) | Fruit wt. (g) |
|---|---|---|---|---|---|---|
| $I_1$ | 42.88 | 53.44 | 59.20 | 5.22 | 5.45 | 81.05 |
| $I_2$ | 44.35 | 54.43 | 59.89 | 5.34 | 5.56 | 89.06 |
| $I_3$ | 43.37 | 53.58 | 59.99 | 5.26 | 5.48 | 84.36 |
| CD at 5% | NS | NS | NS | 0.09 | NS | 0.94 |
| $F_1$ | 41.53 | 49.41 | 56.08 | 5.17 | 5.25 | 77.23 |
| $F_2$ | 43.15 | 52.21 | 57.21 | 5.25 | 5.50 | 82.48 |
| $F_3$ | 45.13 | 56.53 | 62.08 | 5.34 | 5.64 | 89.84 |
| $F_4$ | 44.50 | 56.96 | 62.33 | 5.33 | 5.65 | 89.86 |
| $F_5$ | 43.37 | 53.98 | 60.76 | 5.27 | 5.46 | 84.68 |
| CD at 5% | 2.46 | 1.81 | 1.906 | 0.11 | 0.14 | 1.212 |
| $I_1F_1$ | 43.43 | 49.26 | 57.84 | 5.05 | 5.10 | 73.80 |
| $I_1F_2$ | 40.00 | 51.95 | 55.56 | 5.13 | 5.10 | 78.36 |
| $I_1F_3$ | 44.98 | 55.80 | 60.92 | 5.31 | 5.33 | 86.11 |
| $I_1F_4$ | 43.00 | 56.41 | 61.31 | 5.33 | 5.33 | 84.73 |
| $I_1F_5$ | 43.00 | 53.79 | 60.35 | 5.28 | 5.26 | 82.22 |
| $I_2F_1$ | 40.14 | 50.07 | 55.07 | 5.23 | 5.20 | 80.36 |
| $I_2F_2$ | 45.91 | 52.10 | 58.08 | 5.31 | 5.30 | 85.88 |
| $I_2F_3$ | 47.60 | 57.45 | 62.75 | 5.47 | 5.50 | 95.15 |
| $I_2F_4$ | 45.00 | 58.29 | 62.64 | 5.44 | 5.21 | 96.91 |
| $I_2F_5$ | 43.10 | 54.26 | 60.93 | 5.25 | 5.21 | 87.00 |
| $I_3F_1$ | 41.00 | 48.92 | 55.33 | 5.24 | 5.23 | 77.54 |
| $I_3F_2$ | 43.54 | 52.59 | 58.00 | 5.30 | 5.26 | 83.20 |
| $I_3F_3$ | 42.81 | 56.35 | 62.58 | 5.24 | 5.20 | 88.27 |
| $I_3F_4$ | 45.50 | 56.18 | 63.04 | 5.21 | 5.17 | 87.95 |
| $I_3F_5$ | 44.00 | 53.90 | 60.99 | 5.29 | 5.33 | 84.82 |
| CD at 5% | 4.27 | NS | NS | 0.19 | NS | 2.09 |

$I_1$ (50%), $I_2$ (75%), $I_3$ (100%) irrigation of PE; $F_1$ (20%), $F_2$ (40%), $F_3$ (60%), $F_4$ (80%) and $F_5$ (100%) recommended dose of NPK.

Among different combination of irrigation and fertigation maximum average fruit weight (96.91 g), average pulp weight (70.84 g), pulp: seed ratio (14.96), fruits $plant^{-1}$ (77.70) and yield (6.75 kg $plant^{-1}$ and 33.75 t $ha^{-1}$) were obtained under $I_2F_4$ level, which remained at par with $I_2F_3$ (Tables 2 & 3). However, treatment combination $I_2F_3$ registered maximum number of flowers $shoot^{-1}$ (47.60) might be due to ensure constant supply of water and balance nutrition to plant, favours better growth, development and dry matter accumulation. The reason of higher fruit diameter, fruit weight, pulp weight and seed weight under $I_2F_4$ and $I_2F_3$ treatment combinations may be due to availability of more constant soil moisture thereby their more translocation from root to leaves and other part of plant. The interaction level, $I_2F_4$ and $I_2F_3$ recorded significantly higher yield attributing characters might be due to their individual effect. The increase in number of flowers $shoot^{-1}$, fruit set, fruit retention, fruit size and fruit weight with the application of treatment combinations $I_2F_4$ and $I_2F_3$ is possible reason to increase in number of fruits $plant^{-1}$ and yield. The results are in the confirmation with those of Varu *et al*. (21) in guava. The highest net return (Rs. 2,79,081.08) was obtained from $I_2F_3$ which was at par with $I_2F_4$. When the benefit: cost ratio was taken into consideration, it was highest (2.64) in $I_1F_1$ and $I_2F_1$. However, there is no significance differences were noted between treatment combinations $I_1F_1$, $I_2F_1$ and $I_3F_1$ in respect of B:C ratio. It is because of low

**Table 3.** Effect of irrigation and fertigation levels and their interaction on pulp weight, seed weight, pulp: seed ratio and yield of guava.

| Treatment | Pulp weight (g) | Pulp: seed ratio | Fruits plant$^{-1}$ | Yield tree$^{-1}$ (kg) | Estimated yield ha$^{-1}$ (tonnes) | Net return (Rs.) | B: C ratio |
|---|---|---|---|---|---|---|---|
| $I_1$ | 60.99 | 13.80 | 68.55 | 5.30 | 26.49 | 202679.25 | 1.87 |
| $I_2$ | 64.88 | 14.39 | 71.75 | 5.82 | 29.11 | 233787.14 | 2.12 |
| $I_3$ | 62.68 | 13.91 | 70.00 | 5.56 | 27.79 | 217558.63 | 1.98 |
| CD at 5% | 0.79 | 0.30 | 1.76 | 0.15 | 0.74 | – | – |
| $F_1$ | 57.42 | 14.09 | 67.15 | 4.88 | 24.39 | 212176.02 | 2.63 |
| $F_2$ | 61.13 | 13.78 | 67.82 | 5.24 | 26.19 | 216268.96 | 2.21 |
| $F_3$ | 66.12 | 14.14 | 72.65 | 5.99 | 29.96 | 243967.61 | 2.11 |
| $F_4$ | 66.95 | 14.25 | 73.90 | 6.22 | 31.10 | 240147.17 | 1.80 |
| $F_5$ | 62.62 | 13.91 | 68.98 | 5.47 | 27.34 | 177481.94 | 1.18 |
| CD at 5% | 1.02 | NS | 2.28 | 0.19 | 0.95 | – | – |
| $I_1F_1$ | 56.16 | 14.06 | 68.00 | 4.87 | 24.33 | 211711.92 | 2.64 |
| $I_1F_2$ | 59.17 | 14.07 | 66.75 | 5.03 | 25.17 | 204351.05 | 2.09 |
| $I_1F_3$ | 63.60 | 13.67 | 70.00 | 5.55 | 27.75 | 217811.37 | 1.89 |
| $I_1F_4$ | 64.10 | 13.77 | 71.00 | 5.80 | 29.00 | 215311.09 | 1.62 |
| $I_1F_5$ | 61.90 | 13.43 | 67.00 | 5.24 | 26.20 | 164210.82 | 1.09 |
| $I_2F_1$ | 58.56 | 14.25 | 66.45 | 4.89 | 24.43 | 212547.42 | 2.64 |
| $I_2F_2$ | 62.28 | 13.70 | 68.45 | 5.32 | 26.62 | 221440.58 | 2.26 |
| $I_2F_3$ | 69.36 | 14.85 | 75.95 | 6.58 | 32.89 | 279081.08 | 2.42 |
| $I_2F_4$ | 70.84 | 14.96 | 77.70 | 6.75 | 33.75 | 271913.82 | 2.04 |
| $I_2F_5$ | 63.36 | 14.19 | 70.20 | 5.58 | 27.88 | 183952.80 | 1.22 |
| $I_3F_1$ | 57.54 | 13.97 | 67.00 | 4.89 | 24.43 | 212268.72 | 2.62 |
| $I_3F_2$ | 61.94 | 13.58 | 68.25 | 5.36 | 26.79 | 223015.25 | 2.27 |
| $I_3F_3$ | 65.40 | 13.89 | 72.00 | 5.85 | 29.24 | 235010.37 | 2.03 |
| $I_3F_4$ | 65.90 | 14.02 | 73.00 | 6.11 | 30.55 | 233216.59 | 1.75 |
| $I_3F_5$ | 62.60 | 14.11 | 69.75 | 5.59 | 27.93 | 184282.20 | 1.22 |
| CD at 5% | 1.77 | 0.67 | 3.95 | 0.33 | 1.65 | – | – |

$I_1$ (50%), $I_2$ (75%), $I_3$ (100%) irrigation of PE; $F_1$ (20%), $F_2$ (40%), $F_3$ (60%), $F_4$ (80%) and $F_5$ (100%) recommended dose of NPK

treatment cost. However, on the basis of net return (Rs. 2,79,081.08) and B:C ratio (2.42) we recommend $I_2F_3$ treatment combination (Table 3).

Hence, 75 per cent irrigation of pan evaporation replenishment level along with supplementation of 60 per cent recommended dose of fertilizer, efficiently utilized water through liquid fertilizer (19:19:19) supplemented with urea and MOP in form of yield in guava cv. Lalit under ultra high density planting system.

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## REFERENCES


1. Dantas. B.F., Pereira, M.S., Ribeiro, L.D., Maia, J.S.T., Silva, D.J., Duenhas, L.H., Lima, M.A.C. and Bassoi, L.H. 2007. Metabolic responses of guava trees irrigated with different N and K levels in São Francisco Valley. *Rev. Bras. Fruticul*. **29**: 323-28.

2. Kachwaya, D.S., Chandel, J.S., Ghumare, V.S. and Khachi, B. 2016. Effect of fertigation on growth, yield and fruit quality of strawberry (*Fragaria* × *ananassa* Duch.) cv. Chandler. *Book of Abstracts*, *7th Indian Horticulture Congress*, November 15-18th, 2016 held at New Delhi, pp. 300-01.

3. Marwaha, B.C. 2003. Scope and significance of fertigation in Indian agriculture, *Fertilizer News,* **48**: 97-101.

4. Megen, H. 1995. Fertigation- An overview of some practical aspects. *Fertilizer News*, **40**: 97-100.

5. Patel, N.M., Patel, D.K. and Verma, L.R. 2010. Nitrogen management in guava (*Psidium guajava* L.) cv. L-49 through fertigation under north Gujarat conditions. *Asian J. Hort.* **5**: 439-41.

6. Pramanik, S. and Patra, S.K. 2014. Influence of fertigation on fruit yield, water use and distribution efficiency and economics of guava (*Psidium guajava* L.). *J. Soil Water Conserv.* **13**: 164-69.

7. Ramniwas, Kaushik, R.A., Sarolia, D.K., Pareek, S. and Singh, V. 2012. Effect of irrigation and fertigation scheduling on growth and yield of guava (*Psidium guajava* L.) under meadow orcharding. *African J. Agric. Res.* **7**: 6350-56.

8. Samaddar, H.N. and Charkarbarti, U. 1988. Effect of different rootstocks on Himsagar and Langra mango. *Acta Hort.* **231**: 220-24.

9. Sarolia, D.K., Singh, V., Kaushik, R.A., Ameta, K.D. and Pareek, S. 2010. Effect of micro irrigation on growth, yield and quality of Sardar guava under semi arid conditions of Rajasthan. *Book of Abstracts, 4th Indian Horticulture Congress*, November 18-21, 2010 held at New Delhi, pp. 158-59.

10. Shankar, U., Pathak, R.A., Pathak, R.K. and Ojha, C.M. 2002. Effects of NPK on the yield and fruit quality of guava cv. Sardar. *Prog. Hort.* **34**: 49-55.

11. Sharma, S., Patra, S.K. and Ray, R. 2011. Effect of drip fertigation on growth and yield of guava cv. Khaja. *Env. Ecol.* **29**: 34-38.

12. Shukla, A.K., Kaushik, R.A., Devendra, P. and Sarolia, D.K. 2008. *Guava*, Technical Bulletin, Communication Centre, DEE, Udaipur, 17 p.

13. Stegman, E.C. 1983. On scheduling applied timing criteria. **In**: *Advances in Irrigation, Vol. 2*. D. Hillel (Ed.), Academic Press, New York, pp. 1-30.

14. Thakur, N., Sharma, Y. and Singh, S.K. 2012. Drip irrigation and fertigation in fruits crops. *Book of Abstracts, 5th Indian Horticulture Congress*, November 6-9, 2012 held at Ludhiana, pp. 218.

15. Varu, D.K., Chovatia, R.S. and Barad, A.V. 2013. Study of fertigation system and nitrogen fertilizer in guava cv. Bhavnagar Red. *Book of Abstracts, National Seminar on Tropical and Subtropical Fruits*, January 9-11, 2013 held at NAU, Navsari (Gujarat), pp. 68.

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