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RESEARCH ARTICLE

# Studies on Effect of Pruning and Nutrition on Yield and Quality of Fig (*Ficus carica* L.)

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## ABSTRACT

An experiment was conducted on "Studies on the effect of pruning and nutrition on growth, yield, and quality of fig (*Ficus carica* L.)" fig orchard located at the College of Agriculture, Badnapur, during the year 2021-2022. The field experiment was laid out in Factorial Randomized Block Design (FRBD) replicated thrice with twelve treatments, where factor 'A' is heading back of 30 cm central leader, heading back of 30 cm side branches and pruning with alternate limbs and control and factor 'B' is soil application of N: $P_2O_5$: $K_2O$ at different levels. The pruning was done in 11$^{th}$ October of 2021. Observations were made on physiological, flowering, and quality traits. The results of the investigation revealed that the morphological, physiological, and quality characters were significantly influenced by different pruning levels and fertilizer treatments. Among the different treatments, T6 (Heading back of 30cm side branches with soil application of N: $P_2O_5$: $K_2O$ @ 900: 250:275g/plant) influence the yield characters *viz.,* number of fruits per tree, number of spur or flowers per plant and, yield of fruit per tree, yield of fruit per hectare. The quality characters like total soluble solids, ascorbic acid content, reducing sugars, non-reducing sugars and weight of pulp were higher in T6 (Heading back of 30 cm side branches with Soil application of N: P205:K20 @ 900: 250: 275g/plant). In conclusion of this study, it was inferred that T6 (Heading back of 30cm side branches with Soil application of N: P205: K20 @ 900: 250:275g/plant).

**Keywords**: *Pruning, Nutrition, Fig, Yield, Quality*

## INTRODUCTION

Fig (*Ficus carica* L.) is an important fruit crop grown as subtropical crop, especially in arid and semiarid regions of the world. It is a member of the *Moreceae* family. It is indigenous to an area extending from Asiatic Turkey to North India, but natural seedlings grown in most Mediterranean countries. It is a native to Southern part of Arabian Peninsula, Italy, the Balkan Peninsula and Russia. It is an important fruit and is consumed fresh or in processed form, the dried form being the most popular. It can also be canned or used for candy or jam making (Rajshree, 2007). There are various fig products commonly processed throughout the world, the dominant among these products are fig jam, fig pickle, dried figs, canned figs, fig preserve etc. In India, its commercial production is limited to a few places near Pune and Aurangabad districts of Maharashtra, Bellary and Anantpur districts of Karnataka. Some of the cultivars grown in world are Black Ischia, Brown Turkey, Turkish White, Kabul, Marseilles and in India Poona fig, Daulatabad, Dinkar etc. varieties grown commercially. As far Maharashtra is concerned most



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of the area of the fig is under Daulatabad and Dinkar varieties. In the world, the area under fig cultivation is 4,15,780 hectares with production of 10,47,230 MT (Anonymous, 2015). Egypt is the leading fig producing country followed by Turkey, Algeria, Morocco and Iran. In India, fig cultivation is carried out in area of 5600 hectares with the production of 13802 thousand tonnes and with the productivity of 12.32 tonnes per hectare (2014). It is minor fruit crop in Northern India. On commercial scale it is cultivated in Pune district of Maharashtra state. Also the commercial farming of common (edible) fig is mostly confined to parts of Gujarat, Maharashtra, Uttar Pradesh, Tamil Nadu and Karnataka.

The main objective of pruning in figs is to induce the growth of flower-bearing wood and thereby improve the yield of fruits. In addition, pruning increases the fruit weight in early cultivars. Nevertheless, as the fruits are borne in the axils of current season's shoot maintaining adequate shoot vigour with sufficient number of leaves is also important to get good fruit yield in fig. Keeping these in view, a field experiment was carried out to find out the effect of different levels of pruning and fertilizer application on the yield and quality of fruit.

## MATERIALS AND METHOD

Location: The study was conducted at Research farm, College of Agriculture, Badnapur, Tal- Badnapur Dist- Jalna during the year 2021-22. The geographical coordinates of Badnapur are: Longitude - 75° 43' East, Latitude – 19° 52' North, Badnapur stands at 347 meters above sea level (MSL).

### *Treatment details*

The experiment was laid out in a Factorial Randomized Design with 12 treatments and 3 replications. The levels of bunch trimming were P1- heading back of 30 cm central leader, P2- heading back of 30 cm side branches, P3- Pruning with alternate limbs and P0- control (no pruning) and fertilizer combination of F1: 80 % RDF through chemical + 20 % through FYM, F2:60%RDF through chemical+20% through FYM+20% Neem cake, F0:100% RDF through chemical. The basins were prepared by digging the soil around tree trunk. The plants of experimental orchards were pruned from15 September to 15 October. The manures and fertilizers applied immediately after the pruning.

## RESULT AND DISCUSSION

### *A) Yield parameters*

*Number of fruits per plant:* In the case of pruning, the significant maximum number of fruits per plant (204.05) was recorded in treatment P2, and the minimum number of fruits per plant (177.99) was noticed in treatment P0. In the case of fertilizer, the significant maximum number of fruits per plant (213.12) was recorded in treatment F0, while the minimum number of fruits per plant (175.08) was noticed in treatment F2.The interaction effect of pruning and fertilizer was found to be significant. The maximum number of fruits per plant (259.16) in treatment P2F0, while the minimum number of fruits (151) was found in treatment P3F1.

*Weight of fruits per plant:* In the case of pruning, the significant maximum weight of fruit per plant (87.44) was recorded in treatment P1, while the minimum weight of fruit (81.05) was noticed in treatment P2. The effect of fertilizer on weight of fruit per plant was significantly maximum(84.70) was recorded in treatment F0 while the minimum number of flowers (83.03) was observed in treatment F2.The interaction effect of pruning and fertilizer on the weight of fruit per plant was found to be significantly maximum (89.33) in treatment P2F0, and the minimum weight of fruit(75) was observed in treatment P2F1.An appraisal of data showed that T2 was superior in respect of average fruit weight(89.33 g). Pruning increases the ability to take water, carbon dioxide, and sunlight to make carbohydrates or sugars that ultimately encourage trees to produce higher yields. Similarly, pruning increases photosynthetic activity and fruit set by reducing fruit drop, and thereby higher number of fruits and ultimately, higher fruit yield. These findings are in accordance with the results obtained by, Ghum (2011) in custard apple, Prakash *et al.* (2012) and Adhikari and Kandel (2015) in guava.

*Yield per tree (kg)* **:** In case of pruning, the significantly maximum yield per tree (16.79) was noticed in treatment P1 and minimum yield (14.82) was recorded in treatment P0.In case of effect of fertilizer, the significantly maximum yield (18.09) was noticed in F0 while the minimum yield (14.72) was found in treatment F1.The interaction effect of pruning and fertilizer was found to significant. The maximum yield per tree (22.80) was recorded in treatment P2F0 while

the minimum yield(13.28) was noticed in treatment P3F1.

*Yield per hectare (qt/ha):* In the case of pruning, the significant maximum yield per hectare (77) was noticed in treatment P1, and the minimum yield (74) was recorded in treatment P0.In the case of the effect of fertilizer, the significant maximum yield per hectare (78.05) was noticed in F0, while the minimum yield (72.25) was found in treatment F1.The interaction effect of pruning and fertilizer was found to be significant. The maximum yield per hectare (88) was recorded in treatment P2F0 while the minimum yield(67) was noticed in treatment P2F1.Among the various treatments, 30 cm pruning had increased fruit yield. It might be because the plants prepare food during the rainy season, which was diverted for the development of more fruits during the winter season. Dhaliwal and Singh (2004), Ingle *et al*. (2005) and Bikashdas *et al.* (2007) had also reported similar findings in guava.

Table 1 Effect of different levels of pruning and fertilizers on number of fruits per plant, weight of fruit, yield per tree, yield per hectare and Circumference of fruit (cm).

| Treatment | No. of fruits per plant | Wt. of fruit (g) | Yield per tree (kg) | Yield per hectare (qt/ha) | Circumference of fruit (cm) | Weight of pulp (gm) | Weight of fruit rind (gm) |
|---|---|---|---|---|---|---|---|
| Pruning (P) | | | | | | | |
| P1 | 191.88 | 87.44 | 16.79 | 77.00 | 12.15 | 21.8 | 4.3 |
| P2 | 204.05 | 81.05 | 16.65 | 75.33 | 12.81 | 22.9 | 4.3 |
| P3 | 180.77 | 84.44 | 15.21 | 76.33 | 10.57 | 22.3 | 4.5 |
| P0 | 177.99 | 83.38 | 14.82 | 74.00 | 11.85 | 23.2 | 5.02 |
| S.Em± | 1.36 | 0.18 | 0.17 | 1.38 | 0.07 | 0.08 | 0.03 |
| CD at 5% | 4.01 | 0.53 | 0.56 | 3.09 | 0.20 | 0.26 | 0.08 |
| Fertilizers (F) | | | | | | | |
| F1 | 177.83 | 83.49 | 14.72 | 72.25 | 12.22 | 22.3 | 4.54 |
| F2 | 175.08 | 84.03 | 14.80 | 76.25 | 11.74 | 22.2 | 4.70 |
| F0 | 213.12 | 84.70 | 18.09 | 78.05 | 11.57 | 23.2 | 4.42 |
| S.Em± | 0.18 | 0.15 | 0.24 | 0.19 | 0.06 | 0.07 | 0.02 |
| CD at 5% | 3.47 | 0.46 | 0.49 | 3.55 | 0.18 | 0.22 | 0.07 |
| Interaction (PXF) | | | | | | | |
| P1F1 | 181 | 86.83 | 15.71 | 80 | 14.26 | 23.2 | 4.2 |
| P1F2 | 212 | 88.00 | 18.93 | 73 | 11.33 | 21.7 | 4.4 |
| P1F0 | 182.66 | 86.16 | 15.73 | 69 | 10.86 | 22.4 | 4.4 |
| P2F1 | 218.5 | 75.00 | 16.38 | 67 | 12.50 | 22.1 | 4.5 |
| P2F2 | 134.5 | 80.16 | 10.78 | 71 | 13.20 | 21.5 | 4.7 |
| P2F0 | 259.16 | 89.33 | 22.80 | 88 | 12.73 | 25.3 | 3.7 |
| P3F1 | 151 | 88.00 | 13.28 | 73 | 11.03 | 22.6 | 4.4 |
| P3F2 | 172 | 82.00 | 14.10 | 82 | 10.23 | 22.6 | 4.8 |
| P3F0 | 219.33 | 83.33 | 18.27 | 74 | 10.46 | 21.9 | 4.5 |
| P0F1 | 160.83 | 84.16 | 13.53 | 69 | 11.10 | 23.3 | 5.06 |
| P0F2 | 181.83 | 84.66 | 15.39 | 79 | 12.20 | 23.1 | 4.9 |
| P0F0 | 191.33 | 81.33 | 15.56 | 83 | 12.26 | 21.3 | 5.1 |
| S.Em± | 0.37 | 0.31 | 0.31 | 0.37 | 0.12 | 0.15 | 0.05 |
| CD at 5% | 6.95 | 0.93 | 0.97 | 4.01 | 0.36 | 0.45 | 0.15 |

*Circumference of fruit (cm):* In the case of pruning, the significant maximum circumference of fruit (12.81) was recorded in treatment P2, and the minimum circumference (10.57) was noticed in treatmentP3. In the case of the effect of fertilizer, the maximum circumference of fruit (12.22) was recorded in treatment F1, while the minimum (11.57) was noticed in treatment F0.The interaction effect of pruning and fertilizer was found significantly maximum circumference (14.26) in treatment P1F1 while the minimum (10.23) was observed in treatment P3F2.

*Weight of pulp:* In the case of pruning, the significant maximum weight of pulp (23.2) was noticed in treatment P0, while the minimum weight of pulp (21.8) was observed in treatment P1. In the case of the effect of fertilizer, the significant maximum weight of pulp (23.2) was noticed in treatment F0, while the minimum weight (22.2) was recorded in treatment F2. The interaction effect of pruning and fertilizer on the weight of pulp of fruit was found to be significantly maximum (25.3) in treatment P2F0 while the minimum weight of pulp (21.3) was noticed in treatment P0F2.

*Weight of fruit rind:* In the case of pruning, the significant maximum weight of the rind (5.02) was noticed in treatment P0, while the minimum weight of the rind (4.3) was observed in treatment P1. In the case of the effect of fertilizer, the significant maximum weight of rind (4.70) was noticed in treatment, while the minimum weight (4.42) was recorded in treatment F0. The interaction effect of pruning and fertilizer on the weight of the rind of the fruit was found significantly maximum (5.06) in treatment, P0F1while the minimum weight of the rind (3.7) was noticed in treatment P2F0.

*Pulp: rind ratio:* The data recorded on the effect of pruning and fertilizer treatments on pulp and rind ratio in fig presented in Table 2, the significant maximum pulp: rind ratio (5.42) was recorded in treatment while minimum ratio (4.60) was noticed in treatment P0. The interaction effect of pruning and fertilizer on pulp: rind ratio was found to be significant. Maximum ratio (6.86) was recorded in treatment P2F0, while the minimum (4.56) was noticed in treatment P0F0.It may also act as a catalyst in the formation of more complex substances and in the acceleration of enzyme activity, which ultimately leads to an increase in the pulp:seed ratio of the fruits. Kundu *et al.* (2007), Dhomane *et al.* (2012) observed similar results in guava.

### *Chemical parameters*

*Ascorbic acid:* In the case of pruning, the significant maximum percent of ascorbic acid (30.90) was recorded in treatment P2, while the minimum percent (24.00) was noticed in treatmentP3. In case of fertilizer, the maximum ascorbic acid percent (27.70) was found in treatment F0 and the minimum percent (25.43) was observed in treatment F1.The interaction effect of pruning and fertilizer was found to be significantly maximum (34.33) in treatment P2F0, and the minimum percent of ascorbic acid (22.80) was noticed in treatment P3F1.

*Reducing sugar (%):* In the case of pruning, the maximum percent of reducing sugar (8.42) was recorded in treatment P2,while the minimum percent of reducing sugar (7.03) was observed in treatment P1. In case of effect of fertilizer, the maximum percent of reducing sugar (7.78) was recorded in treatment F0 while the minimum (7.09) was noticed in treatment F1. In the case of the effect of pruning and fertilizer, the significant maximum percent of reducing sugar (9.21) was recorded in treatment P2F0,while the minimum (6.90) was noticed in treatment P1F1.

*Non-reducing sugar (%): I*n the case of pruning, the maximum percent of non-reducing sugar (3.02) was recorded in treatment P2,while the minimum percent of non-reducing sugar (2.02) was observed in treatment P3.In the case of the effect of fertilizer, the maximum percent of non-reducing sugar (2.61) was recorded in treatment F0,while the minimum (2.38) was noticed in treatment F1.In case of effect of pruning and fertilizer, the significantly maximum percent of non-reducing sugar (3.13) was recorded in treatment P2F0 while the minimum (1.85) was noticed in treatment P3F0.

*Juice content (%):* Incaseofpruning,themaximumjuicepercent(77.03)wasrecordedintreatment P1while the minimum juice content (71.13) was noticed in treatment P0. In case of effect of fertilizer, the maximum percent of juice (77.15)was noticed in treatment F2. While the minimum percent of juice (68.73) was noticed in treatment F0. The interaction effect of pruningandfertilizer,themaximumpercentofjuicecontent(84.99)wasfoundintreatment P1F1. While the minimum (68.44) was noticed in treatment P3F0.

*TSS (%):* Results showed a significant maximum TSS (14.87) was recorded in treatment P2, while

the minimum TSS (13.76) was noticed in treatment P3.In the case of the effect of fertilizer, the significant maximum TSS percent (15.46) was noticed in treatment F2 and the minimum TSS (13.52) was found in treatment F1.The interaction effect of pruning and fertilizer on TSS present in fruit was found significantly maximum (18.07) in treatment P1F2 while the minimum TSS percent (12.90) was noticed in treatment P1F1. The increase in the TSS content because of pruning before the onset of rainy season also reported by Bajpai *et al*. (1973), Gopikrishna (1981), Sheik and Hulmani (1994), Basu et al. (2007), in guava.

*pH:* Results showed a significant maximum pH (4.93) was recorded in treatment P3 while the minimum pH (4.82) was noticed in treatment P1.In the case of the effect of fertilizer, the significant maximum pH (5.06) was noticed in treatment F2 and the minimum pH (4.78) was found in treatment F1.The interaction

**Table 2 Effect of different levels of pruning and fertilizers pulp: seed ratio, Titrable acidity, ascorbic acid, reducing sugar, non reducing sugar, juice content, total soluble solid, pH**

| Treatment | Pulp : Rind ratio | Titrable acidity (%) | Ascorbic acid (mg/100 g pulp) | Reducing sugar (%) | Non reducing sugar (%) | Juice content (%) | Total soluble solids (%) | pH |
|---|---|---|---|---|---|---|---|---|
| Pruning (P) | | | | | | | | |
| P1 | 4.99 | 0.081 | 25.18 | 7.03 | 2.45 | 77.03 | 14.74 | 4.82 |
| P2 | 5.42 | 0.083 | 30.90 | 8.42 | 3.02 | 74.18 | 14.87 | 4.86 |
| P3 | 4.85 | 0.084 | 24.00 | 7.84 | 2.02 | 72.05 | 13.73 | 4.93 |
| P0 | 4.60 | 0.083 | 26.86 | 8.01 | 2.44 | 71.13 | 14.69 | 4.90 |
| S.Em± | 0.033 | 0.006 | 0.29 | 0.011 | 0.09 | 0.15 | 0.006 | 0.021 |
| CD at 5% | 0.09 | 0.002 | 0.85 | 0.032 | 0.26 | 0.45 | 0.017 | 0.063 |
| Fertilizers (F) | | | | | | | | |
| F1 | 4.87 | 0.084 | 25.43 | 7.09 | 2.38 | 74.90 | 15.46 | 4.78 |
| F2 | 4.69 | 0.083 | 27.08 | 7.60 | 2.47 | 77.15 | 13.52 | 5.06 |
| F0 | 5.34 | 0.082 | 27.70 | 7.78 | 2.61 | 68.73 | 14.57 | 4.79 |
| S.Em± | 0.028 | 0.006 | 0.25 | 0.009 | 0.09 | 0.13 | 0.005 | 0.018 |
| CD at 5% | 0.08 | 0.001 | 0.73 | 0.028 | 0.27 | 0.39 | 0.015 | 0.055 |
| Interaction (PXF) | | | | | | | | |
| P1F1 | 5.003 | 0.080 | 23.33 | 6.90 | 3.03 | 84.99 | 12.90 | 4.93 |
| P1F2 | 4.9 | 0.082 | 31.66 | 6.95 | 2.33 | 78.87 | 14.24 | 4.82 |
| P1F0 | 5.09 | 0.083 | 26.73 | 7.25 | 2.92 | 67.25 | 13.27 | 4.71 |
| P2F1 | 4.84 | 0.087 | 27.26 | 8.18 | 2.57 | 72.64 | 14.12 | 4.47 |
| P2F2 | 4.58 | 0.081 | 24.96 | 7.87 | 2.46 | 79.49 | 12.94 | 5.26 |
| P2F0 | 6.86 | 0.082 | 34.33 | 9.21 | 3.13 | 70.42 | 18.07 | 4.87 |
| P3F1 | 5.06 | 0.083 | 22.80 | 9.17 | 2.20 | 73.56 | 13.76 | 5.24 |
| P3F2 | 4.64 | 0.089 | 24.00 | 7.31 | 2.04 | 77.72 | 16.49 | 4.88 |
| P3F0 | 4.85 | 0.082 | 25.20 | 7.05 | 1.85 | 64.88 | 14.37 | 4.68 |
| P0F1 | 4.60 | 0.087 | 26.43 | 6.92 | 2.64 | 68.44 | 13.31 | 4.51 |
| P0F2 | 4.65 | 0.082 | 27.70 | 9.02 | 2.27 | 72.55 | 14.35 | 5.28 |
| P0F0 | 4.56 | 0.081 | 26.46 | 7.92 | 2.43 | 74.40 | 16.43 | 4.93 |
| S.Em± | 0.05 | 0.001 | 0.50 | 0.019 | 0.017 | 0.26 | 0.010 | 0.037 |
| CD at 5% | 0.16 | 0.003 | 1.47 | 0.056 | 0.070 | 0.79 | 0.030 | 0.110 |

effect of pruning and fertilizer on pH present in fruit was found significantly maximum (5.28) in treatment P0F2 while the minimum pH present (4.47) was noticed in treatment P2F1.

## CONCLUSION:

The different level of pruning and fertilizers showed positive response on physical as well as chemical quality attributes of fig fruits. The maximum values of chemical quality parameter like ascorbic acid (34.33mg/100g), total soluble solids (18.07%), reducing sugar (9.21%) and non reducing sugar (3.13%) observed in treatment T6 (Heading back of 30cm side branches with soil application of N: P2O5: K2O @900: 250: 275g/plant).

The yield parameters were significantly influenced by the different levels of pruning and fertilizers as compared to control. The maximum number of fruits per plant (259.16), Fruit weight (89.33 g), yield per tree (22.80 kg), yield per hectare (88 qt/ha) was recorded in treatment T6 (Heading back of 30cm side branches with soil application of N: P2O5: K2O @900: 250: 275g/plant). In affirmation to results obtained in the present investigation, it is clear that, the overall performance of the treatment heading back of 30 cm side branches with 100% RDF through soil application of N: P2O5: K2O @ 900: 250: 275g/plant was significantly superior for most of the character studied.

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