

EFFECT OF DIFFERENT PRUNING INTENSITIES AND TIME ON QUALITY AND YIELD OF NAGPUR MANDARIN

Y. V. Kherde¹, V. U. Raut², R. R. Todkar³ and Hiteshwari A. Katankar⁴

ABSTRACT

The experiment entitled “Effect of different pruning intensities and time on quality and yield of Nagpur mandarin” was conducted at Centre of Excellence for Citrus, College of Agriculture, Nagpur during the academic year 2022-23. The experiment was laid out in Factorial Randomized Block Design. Three pruning intensities were tested viz., 30 cm from top, 60 cm from top and 90 cm from top with three dates viz., 20th May, 30th May and 10th June. There was an unpruned plant as a control with overall 10 treatment combinations with three replications. The data in respect of quality parameters of Nagpur mandarin i.e. fruit weight (g), fruit length (cm), fruit diameter (cm), juice per cent were recorded maximum with the treatment pruning at 60 cm from top on 30th May and minimum was recorded in unpruned plant. Chemical parameters i.e. total soluble solids (°B), ascorbic acid (mg 100 ml⁻¹) was recorded maximum under the treatment pruning at 60 cm from top on 30th May. Titratable acidity (%) recorded maximum in unpruned plant. The data in respect of the yield parameters of Nagpur mandarin as influenced by pruning intensity and time such as number fruits plant⁻¹, yield of Nagpur mandarin was recorded maximum under the same treatment i.e. pruning at 60 cm from top on 30th May and Minimum was recorded in unpruned plant. Therefore, from the results obtained, it can be inferred that pruning at 60 cm from top on 30th May was superior for induction of mrigbahar in Nagpur mandarin.

(Key words: Nagpur mandarin, pruning, Citrus, FRBD)

INTRODUCTION

Mandarin orange is most common among citrus fruits grown in India. Mandarins are called easy peelers. It is highly polyembryonic species of Chinese origin, having medium sized upright tree, leaves lanceolate in shape with narrowly winged petiole. Fruits of mandarin are delicious, medium sized, globose, sweet taste, segments easily separable, core open at maturity, loose skinned and can be peeled easily. Mandarin remains the most consumed and demanded citrus species due to several advantages such as smaller fruit, thinner skins, easy peeling and export possibilities. Nevertheless, there is still a great deal of work in citrus breeders to further enhance the quality of mandarin fruits and to offer customers new, tasty, healthy and easy to eat seedless fruits. Nagpur mandarin commonly referred as Nagpuri Santra is reported to be finest mandarin variety of India. It occupies first position among the citrus varieties grown in India with respect to area and production. It is considered as one of the most important cultivated varieties among loose skinned oranges and is being commercially grown in and around the adjoining Vidarbha region of Maharashtra.

Pruning in mandarin has not been considered as a regular practice so far but the recent studies has shown

that, pruning in citrus is as important as deciduous fruit in order to obtain higher yield and good quality fruit as well as to get healthy bud wood with maximum number of buds with higher success. Accelerated growth of shoots is generally obtained after pruning and depending upon the growth condition, equilibrium between shoots and roots can be reached. For this purpose, pruning is the best option for desirable outcomes as well as management of plant canopy. It was observed that, citrus tree, which were begun to decline in vigor, yield and size of fruit, need pruning to help restore their condition. Pruning has been practiced for ages in controlling tree size because it has much less stimulating effect on shoot growth. The pruning is done to restrict excessive vegetative growth and to maintain a balance between leaf/fruit ratio, fruit size, fruit colour and other quality attributes. Pruning by removing the vigorous growing shoots increase the light intensity in cropping zone.

MATERIALS AND METHODS

The experiment entitled “Effect of different pruning intensities and time on quality and yield of Nagpur mandarin” was conducted at Centre of Excellence for Citrus, College of Agriculture, Nagpur during the academic year 2022-23. The experiment was carried out in standing orchard of mandarin selecting 12 years old trees during the year

1,3& 4. P.G. Students, Horticulture section, College of Agriculture, Nagpur

2. Professor and Head, Horticulture section, College of Agriculture, Nagpur

2022-23 at the research field at Centre of Excellence for Citrus, Bharatnagar, Nagpur. The treatment factor A consist of three intensities i.e. pruning at 30 cm from top, pruning at 60 cm from top, pruning at 90 cm from top towards ground level and factor B consist of time 20th of May, 30th of May and 10th of June. So, there were 10 number of treatment combinations. 60 trees were selected for observation. The observations were recorded at harvest. Physical quality parameters like fruit weight (g), fruit length (cm), fruit diameter (cm), juice percentage and chemical quality parameters like total soluble solids (^oB), ascorbic acid (mg 100 ml⁻¹) and titratable acidity (%) were recorded. In respect of yield parameters *viz.*, number of fruits and yield t ha⁻¹ were also recorded.

RESULTS AND DISCUSSION

Effect of different pruning intensity and time on quality parameters and yield of Nagpur mandarin

The data with respect to the effect of pruning intensity on fruit weight (g), fruit length (cm), fruit diameter (cm), juice percentage, total soluble solids (^oB), ascorbic acid (mg 100 ml⁻¹), and titratable acidity (%), number of fruits plant⁻¹ and yield t ha⁻¹ are presented in Table 1. Pruning at 60 cm from top which was followed by Pruning at 30 cm from top and pruning at 90 cm from top significantly enhanced all above parameters studied when compared with unpruned plants.

The data with respect to the effect of pruning time on fruit weight (g), fruit length (cm), fruit diameter (cm), juice percentage, total soluble solids (^oB), ascorbic acid (mg 100 ml⁻¹), and titratable acidity (%), number of fruits plant⁻¹ and yield t ha⁻¹ are presented in Table 1. These all parameters were found significantly maximum on 30th may pruning which was followed by 10th June and 20th may when compared with unpruned plants.

The data presented in Table 1 revealed that, interaction effects due to different pruning intensity and time were found significant. From the data it indicates that, fruit weight (g), fruit length (cm), fruit diameter (cm), juice percentage, total soluble solids (^oB), ascorbic acid (mg 100 ml⁻¹) and titratable acidity (%), number of fruits plant⁻¹ and yield t ha⁻¹ were significantly maximum in treatment pruning at 60 cm from top on 30th of May (P₂D₂) when compared with rest of the treatments and control i.e. unpruned plant. Next to this, pruning at 60 cm on 10th June (P₂D₃), pruning at 30 cm on 30th may (P₁D₂), pruning at 30 cm on 10th June (P₁D₃), pruning at 30 cm on 20th may (P₁D₁), pruning at 60 cm on 20th may (P₂D₁), pruning at 90 cm on 30th may (P₃D₂), pruning at 90 cm on 10th June (P₃D₃), pruning at 90 cm on 20th may (P₃D₁)

were also found significantly superior in a descending manner when compared with unpruned plants (control).

Pruning might increase absorption of water, mobilization of minerals in pruned area. Thus, the fruits produced by medium pruning had higher average weight, length and diameter in relation to fruits produced by unpruned plants. Ahmad *et al.* (2006) in kinnow and Shree *et al.* (2022) and Kadam *et al.* (2018) also reported similar findings, where medium pruning treatments in respect of quality parameters like average fruit weight, diameter, length and juice percentage excelled among all treatments. Highest total soluble solids, ascorbic acid found in juice of fruit which is pruned at medium intensity, since the quality fruit juice depend on the sink-source relationship, this might be due to pruning improved physiology of leaves, thereby causing better translocation of vital components in fruit and assimilation of photosynthesis by developing fruit. Similarly, it may increase activity of enzymes such as amylase which hydrolyze complex polysaccharides into simple sugars which accelerates the translocation of metabolites towards developing fruits. This might also be due to favourable climatic condition for better growth and development of fruits. Ghosh and Bera (2014) conducted an experiment on sweet orange. They reported that, maximum vitamin C content, highest total soluble solids and highest juice content in medium pruned trees. Verma *et al.* (2023) in phalsa found that pruning at 40 cm from ground level (medium pruning) significantly increased juice per cent, total soluble solids, titratable acidity and ascorbic acid content. Kumar *et al.* (2017) noted that, the maximum number of fruits and highest fruit yield with better quality fruits in terms of TSS, ascorbic acid content was found with 40 % pruning intensity. The maximum number of fruits branch⁻¹ was recorded under medium pruning which was followed by severe and light pruning treatments. While, the minimum fruits branch⁻¹ and tree⁻¹ was recorded under unpruned trees. The trees subjected to heavy pruning recorded low yield as compared to medium pruned trees. This might be due to the reduced shoot area in severely pruned trees and the interval between the periods of pruning and fruiting was short enough to enable the remaining shoots to improve their vigour and fruiting ability. It might also be due to fact that, the moderate pruning intensity improved the efficiency of metabolic processes and ultimately gave higher yields. Ingle *et al.* (2005) conducted an experiment on acid lime tree. They stated that, tree pruned at medium intensity gave maximum fruit yield (29.35 kg). They also reported that, total mean number of fruits (902) was also highest in medium pruning. These findings are similar to those of Prakash *et al.* (2012), who recorded maximum yield in medium pruning treatments.

Table 1. Effect of different pruning intensity and time on fruit weight, fruit length, fruit diameter, fruit diameter, juice per cent, total soluble solids, titrable acidity, ascorbic acid, number of fruits and yield of Nagpur mandarin

Treatments	Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	Juice per cent	Total soluble solids (°B)	Titrable acidity (%)	Ascorbic acid (mg 100 ml ⁻¹)	Number of fruits plant ⁻¹	Yield t ha ⁻¹
Factor A (pruning intensity)									
P ₁ -pruning at 30 cm from top	142.87	5.71	6.90	48.74	10.45	0.84	37.92	386.44	30.68
P ₂ -pruning at 60 cm from top	148.47	5.87	7.09	50.12	10.68	0.79	37.98	390.44	32.27
P ₃ -pruning at 90 cm from top	124.23	5.52	6.72	46.72	8.89	0.90	33.75	363.67	25.11
Unpruned	115.60	5.20	6.60	44.51	8.53	0.95	31.62	347.00	22.28
SE m (±)	0.15	0.03	0.016	0.004	0.09	0.005	0.17	1.15	0.03
CD (0.05%)	0.45	0.09	0.048	0.012	0.27	0.015	0.51	3.44	0.09
Factor B (Pruning date)									
D ₁ - 20 th May	129.87	5.58	6.78	47.32	9.58	0.88	35.36	371.67	26.86
D ₂ -30 th May	145.77	5.81	7.00	49.61	10.28	0.82	37.54	387.67	31.47
D ₃ - 10 th June	139.93	5.72	6.94	48.64	10.14	0.84	36.74	381.22	29.73
Unpruned	115.60	5.20	6.60	44.51	8.53	0.95	31.62	347.00	22.28
SE m (±)	0.15	0.03	0.016	0.004	0.09	0.005	0.17	1.15	0.03
CD (0.05%)	0.45	0.09	0.048	0.012	0.27	0.015	0.51	3.44	0.09
Pruning intensity x Pruning date									
P ₁ D ₁	137.90	5.65	6.85	48.20	10.16	0.85	37.66	381.33	29.21
P ₂ D ₁	132.30	5.60	6.80	47.85	9.89	0.84	36.71	375.67	27.61
P ₃ D ₁	119.40	5.48	6.68	45.91	8.70	0.93	31.72	358.00	23.74
P ₁ D ₂	149.50	5.77	6.95	49.53	10.70	0.82	38.20	390.67	32.44
P ₂ D ₂	158.02	6.09	7.27	51.77	11.10	0.75	38.71	400.33	35.14
P ₃ D ₂	129.80	5.57	6.77	47.53	9.05	0.88	35.72	372.00	26.82
P ₁ D ₃	141.20	5.72	6.91	48.50	10.48	0.85	37.89	387.33	30.38
P ₂ D ₃	155.10	5.93	7.20	50.72	11.04	0.79	38.53	395.33	34.06
P ₃ D ₃	123.50	5.52	6.72	46.70	8.90	0.90	33.81	361.00	24.76
Unpruned (control)	115.60	5.20	6.60	44.51	8.53	0.95	31.62	347.00	22.28
SE m (±)	0.02	0.06	0.03	0.01	0.16	0.02	0.30	2.1	0.06
CD (0.05%)	0.06	0.18	0.09	0.03	0.48	0.06	0.90	6.0	0.18

REFERENCES

- Ahmad, S., Z. A. Chatha, M. A. Nasir, Aziz, A .B.D.U.L., N.A. Virk and A.R. Khan, 2006. Effect of pruning on the yield and quality of Kinnow fruit. *J. Agric. Soc. Sci.* **2**(1) :51-53.
- Ghosh, S. N. and B. Bera, 2014. Effect of pruning on productivity of sweet orange. *J. Hortic. Sci.* **9** (2): 206-208.
- Ingle, H. V., S. G. Zambre and B. B. Shinde, 2005. Effect of severity of pruning on growth, yield and quality of old acid lime tree. *Agric. Sci. Dig.* **25** (2):127-129.
- Kadam, S., R. M. Dheware and P. S. Urade, 2018. Effect of Different Levels of Pruning on Quality of Custard Apple (*Annona squamosa* L.). *Int. J. Bio-resour. Stress Manage.* **9** (5) : 573-575.
- Kumar, P., K. Karuna, A. Mankar, D. Tiwari and R. R. Singh, 2017. Influence of pruning severity on plant canopy architecture for yield and quality attributing traits of guava (*Psidium guajava* L.) cv. Pant Prabhat. *Res. Environ. Life Sci.* **10** (6): 560-564.
- Prakash, S., V. Kumar, P. L. Saroj and S. C. Sirohi, 2012. Response of yield and quality of winter guava to severity of summer pruning. *Indian J. Hort.* **69** (2): 173-176.
- Shree, S., N. Chauhan and P. Thakur, 2022. Pruning effects on growth, yield and fruit quality of apple (*Malus × domestica* Borkh.) cv. Gale Gala. *Ann. Phytomed.* **11** (2) : 597-601.
- Verma R., A. K. Dwivedi, V. K. Tripathi, and M. Awasthi, 2023. Effect of Different Levels of Pruning Intensity and Foliar Feeding of NAA on Growth, Yield and Quality Attributes of Phalsa (*Grewia asiatica* L.) cv. Sharbati. *Curr. J. Appl. Sci. Technol.* **42**(10):15-21.

Rec. on 10.03.2024 & Acc. on 09.04.2024