The Pharma Innovation Journal 2023; 12(12): 1857-1860

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(12): 1857-1860

www.thepharmajournal.com
Received: 05-09-2023
Accepted: 19-11-2023

Kshetrimayum Sonalini Devi
M.Sc. Students, Department of Horticulture, College of Agriculture, Latur, Maharashtra, India

Dr. VN Shinde
Assistant Professor, Department of Horticulture, College of Agriculture, Latur, Maharashtra, India

Dr. VS Jagtap
Associate Professor, Department of Horticulture, College of Agriculture, Latur, Maharashtra, India

Sristi G
M.Sc. Students, Department of Horticulture, College of Agriculture, Latur, Maharashtra, India

Mohit Pal
M.Sc. Students, Department of Fruit Science, College of Horticulture and Forestry, Acharya Narendra Dev University of Agriculture and Technology Kumarganj, Ayodhya, Uttar Pradesh, India

Corresponding Author:
Kshetrimayum Sonalini Devi
M.Sc. Students, Department of Horticulture, College of Agriculture, Latur, Maharashtra, India

Studies on management of vegetative flush for uniform flowering in mango (*Mangifera indica* L.) cv. Kesar

Kshetrimayum Sonalini Devi, Dr. VN Shinde, Dr. VS Jagtap, Sristi G and Mohit Pal

Abstract
The present investigation was conducted on well-established mango orchard of Department of Horticulture, College of Agriculture, Latur, VNMKV, Parbhani to study the management of vegetative flush to improve flowering, fruit set and yield in mango during 2022-23. The experiment was carried out on Factorial Randomized Block Design with two factors i.e. length of axillary bud for pruning (L_1: 2.5 cm axillary bud, L_2: 5.0 cm axillary bud, L_3: 7.5 cm axillary bud) and spraying of chemicals (C_1: 2% KNO_3, C_2: 0.5% Thiourea, C_3: 0.2% KH_2PO_4 and C_4: 3% Calcium nitrate) with three replications. The results revealed that, flowering parameters, fruit parameters and yield parameters were significantly maximum in treatment with 2.5 cm of axillary bud pruning (L_1) and spraying of 2% KNO_3 (C_1). However, volume (213.25 ml) and weight of fruits (218.25 g) were recorded highest in spraying of 0.2% KH_2PO_4 (C_3). Fruit set percentage at harvest stage was found to be maximum in treatment with 2% KNO_3 (0.23%). Interaction effect of pruning and chemicals was found to be significant on days of panicle emergence and number of fruits at mature stage. Therefore, treatment with 2.5 cm of axillary bud pruning with spraying of 2% KNO_3 was found to be beneficial for improving flowering, fruit set and yield in mango.

Keywords: Mango, pruning, KNO_3, flowering, fruit set, yield

1. Introduction
Mango (*Mangifera indica* L.), which belongs to the family Anacardiaceae, is one of the important major fruits of India. It is one of the most delicious and nutritious fruit in the world. It is a cross-pollinated amphidiploid crop with chromosome number 2n=40. Mango is one of the most significant and widely grown fruits in the tropical and warmer sub-tropical regions of the world. It is called "the King of Fruits" due to its wide adaptability, delicious taste, excellent flavour, attractive appearance and richness in phytochemicals and nutrients (Purseglove, 1972) [13]. Biennial bearing or irregular cropping is a major problem in commercial mango cultivation. The nature of flower production in mango is highly important and complex, as it is related to the method of managing the balance between vegetative and reproductive development, as well as the climatic conditions, which play an important role in growth and flowering. Flowering in mango trees is especially challenging for physiologists, breeders and growers (Rani, 2018) [15]. Many investigations have been conducted to combat the biennial bearing tendency in mango. Pruning and use of chemicals can be followed for this purpose. However, the effects of pruning and chemicals differ according to the variety, location, chemical dose and time of application (Srihari and Rao, 1996) [19]. Foliar spraying with a 2% KNO_3 solution was very effective for inducing mango trees to bloom (Mass, 1989) [8]. It also can speed up the flowering and fruiting period of mango (Nagao and Nishina, 1993) [10]. Phosphorous is a fundamental nutrient element for flowering (Marschner, 2002) [7], stimulating floral initiation and increasing the number of perfect flowers (Oosthuyse, 1996) [11]. Keeping the above view in mind, present investigation was performed to study the management of vegetative flush to improve flowering, fruit set and yield in mango cv. Kesar.

2. Materials and Methods
The present investigation was carried out at mango orchard at Department of Horticulture, College of Agriculture, Latur, VNMKV, Parbhani during the year 2022-23. About ten years old, uniform size mango trees planting at the spacing of 10 m × 10 m were selected for the experiment. The experiment was laid out in Factorial Randomized Block Design with two factors i.e. length of axillary bud for pruning (L_1: 2.5 cm axillary bud, L_2: 5.0 cm axillary bud,

L_3: 7.5 cm axillary bud) and spraying of chemicals (C_1: 2% KNO_3, C_2: 0.5% Thiourea, C_3: 0.2% KH_2PO_4 and C_4: 3% Calcium nitrate) with three replications. Different lengths of selected axillary bud were pruned in the third week of August and chemicals were sprayed twice in the month of October and November.

Observations were recorded on flowering, fruit, yield and quality parameters. The data was statistically analysed Factorial Randomized Block Design (FRBD) for analysis of variance and their means were presented.

3. Results and Discussion

3.1 Flowering parameters

From data presented in Table 1, minimum days of panicle emergence (22.16), maximum number of panicles per tree (559.00) and maximum length of the panicles (37.98 cm) were recorded in L_1. This might be due to the immediate loss of apical dominance after pruning and as a result of early shoot production, which allowed the shoots to mature earlier than expected and gave rise to earlier panicle emergence. Similar results were reported by Dhapute *et al.* (2018) [4] in custard apple, Adhikari and Kandle (2015) [1] in guava, Solanki *et al.* (2016) [18], Singh *et al.* (2010) [17] in mango, etc. Among chemical treatments, minimum days of panicle emergence (13.97), maximum number of panicles per tree (466.25) and maximum length of the panicles (30.13 cm) were recorded in C_1 treatment. Interaction effect of pruning and chemicals has significant on days of panicle emergence. Minimum days of emergence (17.37) was recorded in 2.5 cm of axillary bud pruning with spraying of 2% KNO_3. This might be due to the redistribution of endogenous hormonal substances to favour flowering as a result of pruning as well as active compounds of potassium nitrate. The above results are in agreement with the findings reported by Mitali *et al.* (2019) [9] in Litchi, Ramirez *et al.* (2010) [14] in mango, etc.

3.2 Fruit parameters

Data presented in Table 1 revealed that the maximum number of fruits at pea stage (7866.50, 6158.50), number of fruits marble stage (892.00, 717.75), number of fruits mature stage (255.50, 206.50), length of fruits (9.78 cm, 7.69 cm) and diameter of fruits (7.43 cm, 5.98 cm) were recorded in L_1 and C_1 respectively. The fruit set percentage at harvest stage (0.23%) was significantly highest in the treatment with 2% KNO_3 spray. Interaction effect of pruning and chemicals has significant on number of fruits at mature stage. Maximum number of fruits (292.00) was recorded in 2.5 cm of axillary bud pruning with spraying of 2% KNO_3. This might be due to more number of panicles emergence, adequate availability of photosynthates to the developing fruits, more fruit set percentage and fruit retention percentage. Similar results are in agreement with findings reported by Kumar and Reddy (2008) [5] in mango cv. Baneshan.

3.3 Yield and quality parameters

Data presented in Table 2 indicated that, among different length of pruning, significantly maximum weight of fruits (279.75 g), yield per tree (72.04 kg) and yield per hectare (7.2 t/ha) were recorded in L_1. This might be due to removal of less vegetative branches, early vegetative shoot emergence and longer days to maturity in low intensity pruning, which leads to increase photosynthesis and utilization of solar light, resulting in higher results. Similar results were also reported by Ali *et al.* (2014) [2] in guava, Solanki *et al.* (2016) [18], Pratap *et al.* (2003) [12] in mango, etc. Regarding chemical treatments, maximum yield per tree (58.58 kg) and yield per hectare (5.86 t/ha) were recorded in spraying of 2% KNO_3 (C_1) while weight (218.25 g) and volume of fruits (213.25 ml) were maximum with the spraying of 0.2% KH_2PO_4 (C_3). This might due to phosphorous playing an important role in energy storage and transfer in crop plants which is supported to increase fruit weight. Similar results were found by Amarcholi *et al.* (2018) [3] in mango, Kumar *et al.* (2017) [6] in Litchi, etc.

The maximum TSS (14.74%) was recorded in C_1 treatment which might be because of the tissues with high K level neutralise organic acids, which also causes the acidity to decrease. These findings were closely related with that of Sharma *et al.* (1990) [16] in mango. However, interaction effect of pruning and spraying of chemicals were found to be a non-significant on yield and quality parameters.

Table 1: Effect of pruning and spraying of chemicals on flowering and fruit parameters in Kesar mango

Treatments Length of axillary bud for pruning (L)	Days of panicle emergence	No. of panicles per tree	Length of the panicles (cm)	No. of fruits at			Length of fruits (cm)	Diameter of fruits (cm)	Fruit set percentage at harvest stage (%)
				Pea stage	Marble stage	Mature stage			
L_1	22.16	559.00	37.98	7866.50	892.00	255.50	9.78	7.43	0.27
L_2	23.58	539.25	36.49	7083.50	804.25	224.50	9.45	7.20	0.27
L_3	25.61	500.00	34.04	6678.75	756.75	205.75	8.75	6.58	0.26
S.E ±	0.77	19.37	1.19	341.08	38.54	3.95	0.33	0.27	0.01
C.D. at 5%	2.31	58.07	3.57	1022.44	115.52	11.83	0.99	0.82	NS
Spraying of chemicals (C)									
C_1	13.97	466.25	30.13	6158.50	717.75	206.50	7.69	5.98	0.23
C_2	17.98	372.00	25.86	4899.50	551.25	155.25	6.59	4.89	0.19
C_3	17.39	400.50	27.17	6116.50	709.00	197.50	7.40	5.69	0.21
C_4	22.02	359.50	25.35	4454.25	475.00	126.50	6.30	4.64	0.16
S.E ±	0.77	19.37	1.19	341.08	38.54	3.95	0.33	0.27	0.01
C.D. at 5%	2.31	58.07	3.57	1022.44	115.52	11.83	0.99	0.82	0.03
Interaction (L×C)									
L_1C_1	17.37	653.00	41.00	8906.00	1038.00	292.00	10.27	8.17	0.30
L_1C_2	23.80	522.00	36.67	7405.00	833.00	252.00	9.50	7.00	0.27
L_1C_3	21.20	561.00	37.83	8752.00	1014.00	285.00	10.30	7.97	0.29
L_1C_4	26.27	500.00	36.40	6403.00	683.00	193.00	9.07	6.57	0.23
L_2C_1	18.17	641.00	40.80	8117.00	946.00	279.00	10.40	8.20	0.32

L_2C_2	24.10	496.00	35.77	7063.00	795.00	216.00	8.77	6.63	0.25
L_2C_3	24.77	536.00	34.40	7865.00	912.00	253.00	10.00	7.77	0.28
L_2C_4	27.30	484.00	35.00	5289.00	564.00	150.00	8.63	6.20	0.21
L_3C_1	20.33	571.00	38.73	7611.00	887.00	255.00	10.10	7.57	0.31
L_3C_2	24.00	470.00	31.00	5130.00	577.00	153.00	8.10	5.93	0.24
L_3C_3	23.60	505.00	36.43	7849.00	910.00	252.00	9.28	7.03	0.28
L_3C_4	34.50	454.00	30.00	6125.00	653.00	163.00	7.50	5.80	0.20
S.E ±	1.34	33.55	2.06	590.76	66.75	6.84	0.57	0.47	0.02
C.D. at 5%	4.00	NS	NS	NS	NS	20.50	NS	NS	NS

Table 2: Effect of pruning and spraying of chemicals on yield and quality parameters in Kesar mango

Treatments Length of axillary bud for pruning (L)	Volume of fruits (ml)	Weight of fruits (g)	Yield per tree (kg)	Yield per hectare (t/ha)	TSS (%)
L_1	273.00	279.75	72.04	7.20	18.73
L_2	266.25	274.00	62.33	6.23	18.57
L_3	249.75	257.00	53.82	5.38	18.29
S.E ±	7.22	7.16	2.11	0.21	0.48
C.D. at 5%	21.64	21.46	6.32	0.63	NS
Spraying of chemicals (C)					
C_1	207.50	212.75	58.58	5.86	14.74
C_2	188.50	193.75	40.61	4.06	13.23
C_3	213.25	218.25	57.53	5.75	14.47
C_4	179.75	186.00	31.46	3.15	13.14
S.E ±	7.22	7.16	2.11	0.21	0.48
C.D. at 5%	21.64	21.46	6.32	0.63	1.44
Interaction (L×C)					
L_1C_1	286.00	293.00	85.46	8.55	19.50
L_1C_2	263.00	270.00	67.96	6.80	17.90
L_1C_3	292.00	298.00	84.90	8.49	19.43
L_1C_4	251.00	258.00	49.82	4.98	18.10
L_2C_1	277.00	284.00	79.06	7.91	20.30
L_2C_2	257.00	264.00	57.59	5.76	17.40
L_2C_3	288.00	295.00	74.71	7.47	19.30
L_2C_4	243.00	253.00	37.97	3.80	17.27
L_3C_1	267.00	274.00	69.81	6.98	19.17
L_3C_2	234.00	241.00	36.90	3.69	17.63
L_3C_3	273.00	280.00	70.52	7.05	19.15
L_3C_4	225.00	233.00	38.07	3.81	17.20
S.E ±	12.51	12.40	3.65	0.37	0.83
C.D. at 5%	NS	NS	NS	NS	NS

4. Conclusion

Treatment with 2.5 cm of axillary bud pruning found better impact on flower parameters, fruit parameters as well as yield of mango. Spraying of chemicals i.e. 2% KNO_3 improved flower parameters, fruit parameters as well as yield of mango. While spraying of 0.2% KH_2PO_4 showed better performance in weight and volume of fruits. Interaction effect of pruning and chemicals showed significantly better results in days of panicle emergence and number of fruits at mature stage. Hence, it can be concluded that management of vegetative flush through 2.5 cm of axillary bud pruning with spraying of 2% KNO_3 was beneficial for improving flowering, fruit set and yield in mango. As the result of present investigation are based on one season data, further research is necessary to confirm these findings.

5. References

1. Adhikari S, Kandle TP. Effect of time and level of pruning on vegetative growth, flowering, yield and quality of guava (*Psidium guajava* L.). Int. J Fruit Sci. 2015;(15):290-301.
2. Ali F, Abdel-Hameed AA. Effect of pruning on yield and fruit quality of guava trees. J Agric. Vet Sci. 2014;7(12):41-44.
3. Amarcholi JJ, Singh V, Sharma KM. Impact of KNO3, cycocel, ethrel and KH2PO4 on quality attributes of 'Kesar' mango (*Mangifera indica* L.). J Sci Agric Eng. 2018;18(25):11-13.
4. Dahapute VM, Joshi PS, Tayade SA, Nagre PK. Effect of severity of pruning on growth, yield and quality of custard apple. Int. J Chem Stud. 2018;6(2):1606-1609.
5. Kumar MA, Reddy YN. Preliminary investigations on the effect of foliar spray of chemicals on flowering and fruiting characters of mango cv. Baneshan. Indian J Agric Res. 2008;42(3):164-170.
6. Kumar A, Singh SK, Pandey SD, Patel RK, Nath V. Effect of foliar spray of chemicals on flowering and fruiting in litchi. Int. J Curr Microbiol Appl. Sci. 2017;6(5):1337-1343.
7. Marschner H. Mineral Nutrition of Higher Plants. London: Academic Press; c2002. p. 889.
8. Mass EF. Potassium nitrate foliar spray induces bloom in mango orchards. Better Crops Int'l. 1989;5:4-5.
9. National Horticultural Board. Database of Horticultural Crops, 2009. New Delhi; c2009.
10. Mitali, Ratna Rai, Pant AK, Mishra DS, Dongariyal A, Panwar R. Effect of pruning and KNO3 sprays on flowering attributes of litchi (*Litchi chinensis* Sonn.) cv.

Rose Scented. Int. J Chem Stud. 2019;7(6):383-386.
11. Nagao MA, Nishina MS. Use of potassium nitrate on mango flowering. In: Proceedings: Conference on mango in Hawaii; c1993. p. 61.
12. Oosthuyse SA. Effect of KNO3 to flowering mango trees on fruit retention, fruit size, tree yield and fruit quality. Acta Hort. 1996;455:33–36.
13. Pratap B, Sharma HC, Goswami AM, Singh SK, Mishra LN. Effect of pruning on photosynthetic rate, canopy microclimate and yield in mango cv. Amrapali under high-density planting. Indian J Hort. 2003;60(4):339-342.
14. Purseglove JW. Mangoes west of India. Acta Hortic. 1972;24:107-174.
15. Ramirez F, Davenport TL, Fischer G, Augusto Pinzon JC. The stem age required for floral induction of synchronized mango trees in the tropics. Hort. Sci. 2010;45(10):1453-1458.
16. Rani KU. Advances in Crop Regulation in Mango (*Mangifera indica* L.). Int. J Curr Microbiol App Sci. 2019;8(1):1106-1117.
17. Sharma TR, Nair PK, Nema MK. Effect of foliar spray of urea, KNO3 and NAA on fruiting behaviour of mango cv. Langra. Orrisa. J Hort. 1990;18(1):42-47.
18. Singh SK, Singh SK, Sharma RR, Patel VB. Influence of pruning intensity on flowering, fruiting yields and floral malformation in three mango cultivars planted under high density. Indian J Hort. 2010;67:84-89.
19. Solanki PD, Shah NI, Prajapati D, Patel HR. Response of mango (*Mangifera indica* L.) to different pruning time and intensity for vegetative, flowering and fruiting parameters. The Bioscan. 2016;11(4):2317-2322.
20. Srihari D, Rao MM. Induction of flowering directly on de-blossomed shoots in the “off” phase of Alphonso mango trees. J Res ANGRAU. 1996;25:48-50.