ISSN Print: 2664-844X
ISSN Online: 2664-8458
NAAS Rating (2025): 4.97
IJAFS 2025; 7(7): 655-658
www.agriculturaljournals.com
Received: 22-05-2025
Accepted: 25-06-2025

Pawar Saurabh S
PG Scholar, Department of Fruit Science, Post Graduate Institute, Dr. P.D.K.V., Maharashtra, India

Dr. SG Bharad
Professor and Head, Department of Fruit Science, Faculty of Horticulture, Dr. PDKV, Akola, Maharashtra, India

Dr. GG Jadhav
Deputy Director, Department of Horticulture, Central Research Station, Dr. PDKV, Akola, Maharashtra, India

Dr. UA Raut
Professor, Department of Fruit Science, Dr. PDKV, Akola, Maharashtra, India

Dr. PW Nemade
Assistant Professor, College of Horticulture, Dr. PDKV, Akola, Maharashtra, India

Dr. SV Gholap
Assistant Professor, Department of Fruit Science, Dr. PDKV, Akola, Maharashtra, India

Shivaji N Kolekar
Ph.D. Scholar, Department of Fruit Science, Post Graduate Institute, Dr. P.D.K.V., Akola, Maharashtra, India

Corresponding Author:
Pawar Saurabh S
PG Scholar, Department of Fruit Science, Post Graduate Institute, Dr. P.D.K.V., Maharashtra, India

Effect of paclobutrazol on flowering and fruit yield of jamun

Pawar Saurabh S, SG Bharad, GG Jadhav, UA Raut, PW Nemade, SV Gholap and Shivaji N Kolekar

DOI: https://www.doi.org/10.33545/2664844X.2025.v7.i7i.581

Abstract
The present investigation entitled "Effect of paclobutrazol on flowering, fruiting and quality of jamun" was conducted during 2024-25 at Central Research Station, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The experiment was laid out in a Factorial Randomised Block Design (FRBD) with twelve treatment combinations involving three times of paclobutrazol application (August, September, and October) and four concentrations (0, 1.0, 1.5, and 2.0 g a.i. per meter canopy), replicated thrice. The plants treated with 1.0 g a.i. paclobutrazol per meter canopy in September exhibited superior performance with the highest number of flowers and fruits per panicle. Additionally, this treatment recorded the highest fruit yield of 18.80 kg per plant and 4.78 t ha^{-1}, indicating its effectiveness in enhancing flowering and fruiting in jamun.

Keywords: Paclobutrazol, jamun, flowering, fruit yield

Introduction

Jamun (*Syzygium cumini* L. Skeels), a member of the Myrtaceae family (2n = 40), is native to India and Southeast Asia and widely distributed across tropical and subtropical regions (Ayyanar *et al*., 2012; Singh *et al*., 1969) [4, 34]. India ranks second in global production, contributing 15.4% of the 13.5 million tonnes produced worldwide (Markam and Tigga, 2021) [24], with Maharashtra being the leading state. The tree thrives in diverse soils, tolerates pH up to 10.5, and performs well in semi-arid climates with 350-500 mm rainfall (Singh *et al*., 1997; Vashistha, 1991) [35, 40]. Its flowers from March to April, with fruit ripening between June and July. Beyond its nutritional and commercial uses, jamun provides timber, animal feed, and nectar for honey production (Chundawat, 1990; Warrier *et al*., 1996) [9, 41].
Paclobutrazol, a triazole-based growth retardant, inhibits gibberellin biosynthesis and promotes floral induction and fruiting by redirecting assimilates. Widely applied in fruit crops, it enhances yield, fruit quality, and earliness of harvest in species like mango, guava, citrus, and apple (Burondkar & Gunjate, 1993; Sarkar & Rahim, 2012) [6, 30]. Its efficacy is highly dependent on dose and timing, making it a valuable tool in orchard management. In jamun, paclobutrazol application may enhance floral induction, fruit set, and production uniformity by increasing cytokinin levels, root activity, and the C:N ratio. However, its effectiveness depends on proper timing and dosage, as misapplication may reduce efficacy. While results on fruit quality are mixed, most studies support its positive impact on yield and quality. Given the limited research in jamun, standardized, crop-specific studies are needed (Sarkar and Rahim, 2012; Pires and Yamanishi, 2014; Kumar *et al*., 2021) [30, 24, 29]. Considering this, the present study, "Effect of paclobutrazol on flowering, fruit yield and quality of jamun," was undertaken to address flowering irregularities and optimize application timing and dosage for improved fruit production.

Materials and Methods

The present investigation entitled "Effect of paclobutrazol on flowering, fruiting and quality of jamun" was conducted during 2024-25 at Central Research Station, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola and analytical work of the experiment was carried out at Analytical Laboratory, Department of Fruit Science, Dr. P.D.K.V., Akola with the objectives to study the effect of time and concentration of paclobutrazol on flowering, fruit yield and quality of jamun and to find out suitable time and concentration of paclobutrazol application to obtain better quality fruits of jamun. The experiment was laid out in Factorial Randomised Block Design (FRBD) with twelve treatment combinations comprising of three different months as a time of application of paclobutrazol *viz.,* T_1-August, T_2-September, T_3-October and four different concentrations of paclobutrazol application *viz.,* D_0- 0 g a.i., D_1- 1 g a.i., D_2- 1.5 g a.i. and D_3- 2 g a.i. per meter canopy of the plant and replicated three times. Paclobutrazol was applied around the tree trunk as a collar drench as it ensures the proper uptake by tree. The required concentration of paclobutrazol (Cultar 23% W/V) as per the treatment combination was dissolved in water and solution was poured in the trench 60 cm away from the tree trunk at the depth of 15 cm and then covered with soil.

Results and Discussion

The number of flowers per panicle in jamun was significantly influenced by the time, concentration, and their interaction in paclobutrazol application (Table 1). The highest flower count was recorded with September application (T_2; 49.75), followed by August (T_1; 48.75), while the lowest was in October (T_3; 46.25). Among concentrations, 1 g a.i. m^{-1} canopy (D1) produced the highest number of flowers (51.78), at par with 1.5 g (D2; 50.78), whereas the control (D0) recorded the lowest (41.67). The interaction effect was also significant, with T_2D1 (September × 1 g) showing the maximum flower count (53.67), followed by T_1D1 (52.00), and the minimum under T_3D0 (39.67). Application during the late vegetative phase (August-September), particularly at moderate concentrations, might have enhanced floral initiation by suppressing gibberellin synthesis, increasing cytokinin and ABA levels, promoting PAL and peroxidase activity, and improving carbohydrate accumulation and floral meristem differentiation (Davenport, 2003; Ram and Tripathi, 1993; Kulkarni, 1988; Anusuya and Selvarajan, 2014) [10, 28, 17, 1]. Similar hormonal and enzymatic responses were also reported in mango, avocado, lychee, and jackfruit (Reuveni *et al*., 2001; Zhang *et al*., 2012; Hodairi and Canham, 1990; Lina and Protacio, 2015) [29, 43, 13, 23].

Table 1: Effect of time and concentration of paclobutrazol application on number of flowers panicle^{-1}

Treatment		Number of flowers panicle^{-1}				
Month of application		Paclobutrazol conc. (g a.i. m^{-1} canopy)				
		D_0 (0 g a.i.)	D_1 (1 g a.i.)	D_2 (1.5 g a.i.)	D_3 (2 g a.i.)	Mean
T_1	(Aug)	43.67	52.00	50.33	49.00	48.75
T_2	(Sept)	41.67	53.67	52.67	51.00	49.75
T_3	(Oct)	39.67	49.67	49.33	46.33	46.25
Mean		41.67	51.78	50.78	48.78	
Interaction effect (TXD)						
		T		D		TXD
‘F’ test		Sig		Sig		Sig
SE(m)±		0.33		0.38		0.65
CD at 5%		0.96		1.11		1.92

The number of fruits per panicle in jamun was significantly influenced by the timing, concentration, and interaction of paclobutrazol application (Table 2). September application (T_2) recorded the highest fruit count (11.29), followed by August (T_1; 10.42), while October (T_3) had the lowest (10.15). Among concentrations, 1.5 g a.i. m^{-1} canopy (D2) produced the most fruits (12.09), at par with 1.0 g (D1; 11.83), whereas the control (D0) recorded the least (8.56). The interaction effect was also significant, with T_2D2 (September × 1.5 g) yielding the highest fruit count (13.33), followed by T_2D1 (12.83), and the minimum under T_2D0 (8.33). Application during the late vegetative phase at moderate to high concentrations might have enhanced fruit set by suppressing gibberellins, increasing auxin and cytokinin levels, and improving assimilate flow and nutrient allocation to developing fruits. These findings align with studies in mango, apple, pear, pecan, and jackfruit (Kurian *et al*., 2001; Yadav *et al*., 2020; Greene, 1986; Lina and Protacio, 2015) [22, 42, 12, 27].

Table 2: Effect of time and concentration of paclobutrazol application on number of fruits panicle^{-1}

Treatment		Number of fruits panicle^{-1}				
Month of application		Paclobutrazol conc. (g a.i. m^{-1} canopy)				
		D_0 (0 g a.i.)	D_1 (1 g a.i.)	D_2 (1.5 g a.i.)	D_3 (2 g a.i.)	Mean
T_1	(Aug)	8.67	11.33	11.67	10.00	10.42
T_2	(Sept)	8.33	12.83	13.33	10.67	11.29
T_3	(Oct)	8.67	11.33	11.27	9.33	10.15
Mean		8.56	11.83	12.09	10.00	
Interaction effect (TXD)						
		T		D		TXD
‘F’ test		Sig		Sig		Sig
SE(m)±		0.18		0.21		0.36
CD at 5%		0.53		0.61		1.06

Fruit yield in jamun (kg plant^{-1}) was significantly influenced by the time, concentration, and their interaction in paclobutrazol application (Table 3). The highest yield was observed with September application (T_2; 40.33 kg), followed by August (T_1; 37.79 kg), while the lowest was in October (T_3; 33.82 kg). Among concentrations, 1 g a.i. m^{-1} canopy (D1) gave the highest yield (43.46 kg), at par with 1.5 g (D2; 40.76 kg), and the lowest was recorded under control (D0; 30.75 kg). The best yield resulted from T_2D1 (September × 1 g) with 47.81 kg, followed by T_2D2 (45.79 kg) and T_1D1 (43.22 kg), while the lowest was under T_3D0 (30.37 kg). Early application during floral bud differentiation might have enhanced carbohydrate accumulation, C:N ratio, and assimilate flow to reproductive organs by suppressing gibberellin synthesis and improving uptake under favourable post-monsoon conditions (Protacio *et al.*, 2000; Upreti *et al.*, 2013; Gollagi *et al.*, 2019; Ashok Kumar *et al.*, 2023) [27, 39, 11, 2]. These findings align with reports in mango and guava (Burondkar *et al.*, 1991; Singh and Singh, 2003; Jain, 2007) [8, 33, 14].

Table 3: Effect of time and concentration of paclobutrazol application on fruit yield

Treatment		Fruit yield (kg plant^{-1})				
Month of application		Paclobutrazol conc. (g a.i. m^{-1} canopy)				
		D_0 (0 g a.i.)	D_1 (1 g a.i.)	D_2 (1.5 g a.i.)	D_3 (2 g a.i.)	Mean
T_1	(Aug)	30.76	43.22	39.63	37.56	37.79
T_2	(Sept)	31.14	47.81	45.79	36.60	40.33
T_3	(Oct)	30.37	39.35	36.86	28.71	33.82
Mean		30.75	43.46	40.76	34.29	
Interaction effect (TXD)						
		T		D		TXD
'F' test		Sig		Sig		Sig
SE(m)±		0.79		0.91		1.58
CD at 5%		2.34		2.70		4.67

Fruit yield (t ha⁻¹) in jamun was significantly influenced by the time, concentration, and interaction of paclobutrazol application (Table 4). September application (T_2) recorded the highest yield (4.03 t ha^{-1}), followed by August (T_1; 3.74 t ha^{-1}), while October (T_3) showed the lowest (3.38 t ha^{-1}). Among concentrations, 1 g a.i. m^{-1} canopy (D1) yielded the highest (4.35 t ha^{-1}), at par with 1.5 g (D2; 4.08 t ha^{-1}), while control (D0) produced the least (3.08 t ha^{-1}). The best combination was T_2D1 (September × 1 g), which gave the maximum yield (4.78 t ha^{-1}), followed by T_2D2 (4.58 t ha^{-1}) and T_1D1 (4.32 t ha^{-1}), whereas T_3D0 recorded the minimum (3.04 t ha^{-1}). Higher yield under September application at optimal dose might have resulted from synchronization with pre-dormancy phase, cooler nights, and shorter days, enhancing floral induction, carbohydrate accumulation, and assimilate partitioning to fruits. These findings align with studies in mango, litchi, apple, and other fruit crops (Burondkar and Gunjate, 1993; Bhutia *et al.*, 2017; Kurian & Reddy, 2014) [6, 5, 21].

Table 4: Effect of time and concentration of paclobutrazol application on fruit yield

Treatment		Fruit yield (t ha^{-1})				
Month of application		Paclobutrazol conc. (g a.i. m^{-1} canopy)				
		D_0 (0 g a.i.)	D_1 (1 g a.i.)	D_2 (1.5 g a.i.)	D_3 (2 g a.i.)	Mean
T_1	(Aug)	3.08	4.32	3.96	3.76	3.78
T_2	(Sept)	3.11	4.78	4.58	3.66	4.03
T_3	(Oct)	3.04	3.93	3.69	2.87	3.38
Mean		3.08	4.35	4.08	3.43	
Interaction effect (TXD)						
		T		D		TXD
'F' test		Sig		Sig		Sig
SE(m)±		0.08		0.09		0.16
CD at 5%		0.23		0.27		0.47

Conclusion

Based on the results, it can be concluded that application of paclobutrazol at 1.0 g a.i. per meter canopy during September significantly improved key reproductive and yield parameters in jamun. Application of paclobutrazol at 1.0 g a.i. per meter canopy during September enhanced the number of flowers and fruits per panicle, ultimately resulting in the highest fruit yield per plant (kg) and per hectare (t ha^{-1}), indicating its effectiveness in maximizing productivity under the given conditions.

Acknowledgement

I am thankful to the Department of Fruit Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola and Central Research Station, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra for providing the necessary facilities to carry out the experimental work.

References

1. Anusuya S, Selvarajan M. Studies on the effect of paclobutrazol on growth, flowering, fruiting and yield of mango cv. Alphonso. Int J Agric Sci. 2014;10(2):745-748.
2. Ashok Kumar A, Shukla AC, Singh R, Srivastava JP. Paclobutrazol mediated regulation of flowering and fruiting in fruit crops: A review. J Appl Nat Sci. 2023;15(1):356-364.
3. Ashok Kumar M, Prabhakaran R, Muthiah AR. Effect of paclobutrazol on flowering, yield and quality of mango (*Mangifera indica* L.). J Pharmacogn Phytochem. 2023;12(1):879-882.
4. Ayyanar M, Ignacimuthu S. Traditional knowledge of Kani tribals in Kouthalai of Tirunelveli hills, Tamil Nadu, India. J Ethnopharmacol. 2012;141(1):1-10.
5. Bhutia KD, Dey P, Nath V, Rai M. Effect of paclobutrazol on flowering and fruiting behaviour of

litchi (*Litchi chinensis* Sonn.). Indian J Hortic. 2017;74(1):36-41.

6. Burondkar MM, Gunjate RT. Effect of paclobutrazol on flowering and fruiting in mango (*Mangifera indica* L.) cv. Alphonso. South Indian Hortic. 1993;41(2):74-78.
7. Burondkar MM, Gunjate RT. Regulation of flowering and cropping in 'Alphonso' mango on laterite soil of the Konkan region using paclobutrazol. Acta Hortic. 1993;341:206-215.
8. Burondkar MM, Gunjate RT, Chetti MB, Magar NG, Parulekar YR. Regulation of cropping in mango (*Mangifera indica* L.) cv. Alphonso by paclobutrazol. Acta Hortic. 1991;291:243-248.
9. Chundawat BS. Arid Fruit Culture. Jodhpur: Oxford & IBH Publishing Co. Pvt. Ltd.; 1990.
10. Davenport TL. Management of flowering in tropical and subtropical fruit trees. HortScience. 2003;38(12):1331-1335.
11. Gollagi SG, Patil AA, Mulge R. Effect of paclobutrazol on flowering and fruiting in mango cv. Alphonso. Int J Curr Microbiol Appl Sci. 2019;8(6):1540-1546.
12. Greene DW. Effect of paclobutrazol and daminozide on growth, flowering, fruit set, and fruit quality of 'Delicious' apples. J Am Soc Hortic Sci. 1986;111(4):525-531.
13. Hodairi HH, Canham AE. Effect of paclobutrazol on flowering and fruiting in jackfruit (*Artocarpus heterophyllus*). Acta Hortic. 1990;275:413-420.
14. Jain MC. Effect of paclobutrazol on flowering and fruiting in guava (*Psidium guajava* L.). Orissa J Hortic. 2007;35(2):102-104.
15. Jogdande ND, Choudhari SM. Effect of paclobutrazol on flowering and fruiting of mango cv. Langra. Orissa J Hortic. 2001;29(2):34-37.
16. Joshi PS, Joshi GD, Joshi SR. Influence of paclobutrazol on flowering and fruiting in mango cv. Alphonso. J Maharashtra Agric Univ. 1998;23(3):245-246.
17. Kulkarni VJ. Chemical induction of flowering in mango (*Mangifera indica* L.) using paclobutrazol. J Hortic Sci. 1988;63(3):557-566.
18. Kulkarni VJ. Chemical induction of flowering in mango (*Mangifera indica* L.). Acta Hortic. 1989;231:315-322.
19. Kumar S, Singh AK, Singh HR, Meena RK. Paclobutrazol: A plant growth regulator for regulating vegetative growth, flowering and yield in fruit crops. J Pharmacogn Phytochem. 2021;10(1):1821-1827.
20. Kurian RM, Iyer CPA. Stem anatomical and biochemical characters associated with flowering in mango (*Mangifera indica* L.). Ann Bot. 1993;71(3):215-219.
21. Kurian RM, Reddy YTN. Regulation of tree vigour and cropping in mango (*Mangifera indica* L.) using paclobutrazol. J Hortic Sci. 2014;9(1):1-12.
22. Kurian RM, Iyer CPA, Babu N. Regulation of reproductive growth in mango (*Mangifera indica* L.) using paclobutrazol. J Hortic Sci Biotechnol. 2001;76(3):271-278.
23. Lina JM, Protacio CM. Floral induction in lychee (*Litchi chinensis* Sonn.) as influenced by paclobutrazol and KNO_3. Philipp Agric Sci. 2015;98(2):193-198.
24. Markam AK, Tigga R. Evaluation of jamun genotypes for growth and yield attributes under Chhattisgarh plain region. Pharma Innov J. 2021;10(6):1327-1331.
25. Padhiar BV. Effect of paclobutrazol on growth and flowering in mango cv. Kesar [MSc thesis]. Junagadh: Gujarat Agricultural University; 1999.
26. Pires EJP, Yamanishi OK. Paclobutrazol and fruit production in tropical fruit crops. Acta Hortic. 2014;1020:147-152.
27. Protacio CM, Quimbo MA, Manalo JC. Use of paclobutrazol in mango: Implications on productivity and profitability. Acta Hortic. 2000;509:745-752.
28. Ram RA, Tripathi PC. Regulation of flowering and fruiting in mango with paclobutrazol. Indian J Hortic. 1993;50(2):121-125.
29. Reuveni O, Shemesh M, Goren R. Effect of paclobutrazol on hormonal balance and flowering in avocado. J Plant Growth Regul. 2001;20(1):123-128.
30. Sarkar S, Rahim MA. Paclobutrazol: A novel plant growth regulator for horticultural crops. Int J Agric Crop Sci. 2012;4(8):556-560.
31. Sarkar SK, Rahim MA. Flowering and fruiting behavior of mango as influenced by paclobutrazol. J Bangladesh Agric Univ. 2012;10(2):191-195.
32. Sarker BC, Rahim MA. Effect of paclobutrazol on flowering and fruiting in mango. J Agrofor Environ. 2012;6(2):39-42.
33. Singh G, Singh HK. Flowering regulation and crop enhancement in guava (*Psidium guajava* L.) using paclobutrazol. Indian J Hortic. 2003;60(3):244-246.
34. Singh LB, Singh G, Lal S. Chromosome number in jamun (*Syzygium cumini*). Indian J Hortic. 1969;26(1-2):134-136.
35. Singh R, Chadha KL, Sharma RC. Performance of jamun (*Syzygium cuminii*) under sodic soil conditions. Indian J Hortic. 1997;54(4):288-292.
36. Singh S, Srivastava RK. Fruit Production in India. Allahabad: Kitab Mahal; 2000.
37. Singh VK, Ranganath HR. Effect of paclobutrazol on growth and flowering in mango. South Indian Hortic. 2006;54(1-6):60-64.
38. Stinchcombe GR, Dale JE, Butler RD. Effect of paclobutrazol on the growth and development of plants. Plant Growth Regul. 1984;2(1):1-12.
39. Upreti KK, Rajan S, Litz RE, Laxman RH. Hormonal regulation of flowering in mango: A review. Acta Hortic. 2013;1024:195-206.
40. Vashistha RN. Fruit and Plantation Crops. Kanpur: International Book Distributing Co.; 1991.
41. Warrier PK, Nambiar VPK, Ramankutty C. Indian Medicinal Plants: A Compendium of 500 Species. Vol. 5. Madras: Orient Longman; 1996.
42. Yadav NS, Kumar A, Kumar S, Reddy YTN, Rajan S. Paclobutrazol mediated flowering and fruiting in mango: A review. J Pharmacogn Phytochem. 2020;9(4):1202-1206.
43. Zhang S, Li C, Cao J, Wang X. Hormonal changes and expression of related genes in litchi (*Litchi chinensis*) following paclobutrazol application. Plant Growth Regul. 2012;66(2):191-201.
44. Zora S, Ashour M, Kassem A. Physiological effects of paclobutrazol on mango trees. Ann Agric Sci. 2000;38(2):905-921.