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Effect of different Plant Growth Regulators on Growth, Canopy and Flowering of Litchi (*Litchi chinensis* Sonn.) cv Purvi

Aditya Gaurha[1]*, V.M. Prasad[2], Vijay Bahadur[3] and Samir E. Topno[4]

[1]MSc. Scholar, Department of Horticulture, NAI, SHUATS, Prayagraj, (Uttar Pradesh), India.
[2]Professor, Department of Horticulture, NAI, SHUATS, Prayagraj, (Uttar Pradesh), India.
[3]Associate Professor, Department of Horticulture, NAI, SHUATS, Prayagraj, (Uttar Pradesh), India.
[4]Assistant Professor, Department of Horticulture, NAI, SHUATS, Prayagraj, (Uttar Pradesh), India.

Corresponding author: Aditya Gaurha)*
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ABSTRACT: In present study of different levels of foliar application in Litchi was carried out in Horticulture Research Farm, Shuats, Prayagraj, UP, India for different levels of plant growth regulators. GA_3 (30 and 50ppm), NAA (30 and 50ppm) and CCC (30 and 50 ppm) have significant effect on plant height. The maximum plant height (132.62, 140.29, 150.22, 157.80, 165.21 and 191.01) at 30, 60, 90, 120, 150 and 180 DAT was found in T_2 50 ppm (GA_3) followed by $T_1$30 ppm (GA3). The maximum plant canopy (45.25, 49.50, 53.29, 58.46, 68.43 and 88.18) at 30, 60, 90, 120, 150 and 180 DAT was found in T_2 50 ppm (GA_3) followed by $T_1$30 ppm (GA3). Maximum chlorophyll (67.70SPAD meter) was found in T_2 50 ppm (GA_3) followed by $T_1$30 ppm (GA3), $T_4$50 ppm (NAA). The maximum number of panicle per plant (9.34) was found in $T_2$50 ppm (GA_3) followed by $T_1$30 ppm (GA3). The research conducted will help to evaluate the better growth regulator for canopy and flowering in litchi .This will in turn help the plant to yield more better Quality fruits.

Keyword: Chlorophyll, Plant Height, NAA, Significant.

INTRODUCTION

Litchi (*Litchi chinensis* Sonn.) is one of the important subtropical fruits of India. It is a member of the family Sapindaceae (or soapberry family) and sub-family Nepheleae. Fruit cracking is the major limiting factor for the successful cultivation of litchi, especially in early maturing cultivars. Inadequate moisture during the early period of fruit growth results in the hardening of skin and later on it laid high inelastic pressure on the fruit skin due to rapid aril growth enforced following irrigation. The cracked fruits are not fit for marketing. Improper balance of Plant bio-regulator (PBR) and short fluctuation in day and night temperature coupled with heavy irrigation after dry spell and temperature higher than 38°C and relative humidity less than 60 per cent are favourable for cracking Kanwar and Nijjar (1975).

Plant growth hormones play important role in the integrated developmental activities of the fruits, yield as well as quality. Exogenous application of plant bio regulators in small quantities has become an important component for inhibiting or modifying the physiological processes by replacing or supplementing the endogenous hormones when their levels are below than required to bring a positive change in the course of plant development, thereby regulating different aspects such as fruit drop, quality and yield Rachna and Singh (2017).

MATERIAL AND METHODS

The experiment was conducted in Randomized Block Design . The transplanting of the litchi crop was done on 1st September 2015. The Research trial having 6 treatments in 3 replications. The allocation of the different treatments of the individual newly growth litchi planted plots of field using random number in each replication. With the spacing of 3.0 × 2.0 m. The treatment combination listed in Table 1. The observation was recorded for Plant height, Plant canopy, Chlorophyll measurements, different plant growth regulators on number of panicle per plant of Litchi. Different plant growth regulators on early date of flowering appearance of Litchi.

Table 1: Treatment combinations of the experiment.

Sr. No.	Treatment Symbols	Treatment Combination
1.	T_1	30 ppm (GA3)
2.	T_2	50 ppm (GA3)
3.	T_3	30 ppm (NAA)
4.	T_4	50 ppm (NAA)
5.	T_5	30 ppm (CCC)
6.	T_6	50 ppm (CCC)

RESULT AND DISCUSSION

The plant height at 30, 60, 90, 120, 150 and 180 DAT of Litchi (*Litchi chinensis* Sonn.) cv Purvi as influenced by different levels plant growth regulators of foliar spray of GA_3 (30 and 50ppm), NAA (30 and 50ppm) and CCC (30 and 50 ppm) and their interaction presented in Table 2. The data shown that foliar application of different levels of plant growth regulators GA_3 (30 and 50ppm), NAA (30 and 50ppm) and CCC (30 and 50 ppm) have significant effect on plant height(cm) at 30, 60, 90, 120, 150 and 180 DAT. The maximum plant height (132.62, 140.29, 150.22, 157.80, 165.21 and 191.01) at 30, 60, 90, 120, 150 and 180 DAT was found in T_2 50 ppm (GA_3) followed by $T_1$30 ppm (GA3), $T_4$50 ppm (NAA),$T_3$30 ppm (NAA) and $T_6$50 ppm (CCC). However minimum plant height (117.30, 128.47, 134.43, 140.39, 148.48 and 163.94) 30, 60, 90, 120, 150 and 180 DAT was recorded $T_5$30 ppm (CCC). Similar finding were reported by Tanushree *et al*., (2019); Samima *et al.,* (2016).

The plant canopy (cm) at 30, 60, 90, 120, 150 and 180 DAT of Litchi (*Litchi chinensis* Sonn.) cv Purvi as influenced by different levels plant growth regulators of foliar spray of GA_3 (30 and 50ppm), NAA (30 and 50ppm) and CCC (30 and 50 ppm) and their interaction presented in Table 3. The data shown that foliar application of different levels of plant growth regulators GA_3 (30 and 50ppm), NAA (30 and 50ppm) and CCC (30 and 50 ppm) have significant effect on plant canopy (cm) at 30, 60, 90, 120, 150 and 180 DAT. The maximum plant canopy (45.25, 49.50, 53.29, 58.46, 68.43 and 88.18) at 30, 60, 90, 120, 150 and 180 DAT was found in T_2 50 ppm (GA_3) followed by $T_1$30 ppm (GA3), $T_4$50 ppm (NAA), $T_3$30 ppm (NAA) and $T_6$50 ppm (CCC). However minimum plant canopy (38.62, 44.34, 48.30, 52.46, 58.55 and 64.00) 30, 60, 90, 120, 150 and 180 DAT was recorded $T_5$30 ppm (CCC). Similar findings by Kaur (2020).

Effect of different plant growth regulators on chlorophyll (SPAD meter) of Litch influenced by different levels plant growth regulators of foliar spray of GA_3 (30 and 50ppm), NAA (30 and 50ppm) and CCC (30 and 50 ppm) and their interaction presented in Table 4. The data shown that foliar application of different levels of plant growth regulators GA_3 (30 and 50ppm), NAA (30 and 50ppm) and CCC (30 and 50 ppm) have significant effect on chlorophyll (SPAD meter). The maximum chlorophyll (67.70SPAD meter) was found in T_2 50 ppm (GA_3) followed by $T_1$30 ppm (GA3), $T_4$50 ppm (NAA), $T_3$30 ppm (NAA) and $T_6$50 ppm (CCC). However minimum chlorophyll (54.66SPAD meter) was recorded $T_5$30 ppm (CCC).also reported by Sukhjit (2017); Lal and Das (2017).

The number of panicle per plant of Litchi as influenced by different levels plant growth regulators of foliar spray of GA_3 (30 and 50ppm), NAA (30 and 50ppm) and CCC (30 and 50 ppm) and their interaction presented in Table 5. The data shown that foliar application of different levels of plant growth regulators GA_3 (30 and 50ppm), NAA (30 and 50ppm) and CCC (30 and 50 ppm) have significant effect on number of panicle per plant. The maximum number of panicle per plant (9.34) was found in T_2 50 ppm (GA_3) followed by $T_1$30 ppm (GA3), $T_4$50 ppm (NAA), $T_3$30 ppm (NAA) and $T_6$50 ppm (CCC). However minimum number of panicle per plant (6.55) was recorded $T_5$30 ppm (CCC). Similar finding by Mishra *et al.,* (2017).

Effect of different plant growth regulators on early date of flowering appearance of Litchi as influenced by different levels of plant growth regulators of foliar spray of GA_3 (30 and 50ppm), NAA (30 and 50ppm) and CCC (30 and 50 ppm) and their interaction presented in Table 6. All the treatment that had their early date of flowering appearance in 21st Feb 2021. The data on the effect of plant growth regulators on date of flowering appearance.

CONCLUSION

Thus it can be concluded that the maximum number of panicle per plant (9.34) was found in T_2 50 ppm (GA_3) followed by $T_1$30 ppm (GA3), $T_4$50 ppm (NAA), $T_3$30 ppm (NAA) and $T_6$50 ppm (CCC). However minimum number of panicle per plant (6.55) was recorded $T_5$30 ppm (CCC). Thus these treatment will happen for the better management of canopy and flowering in Litchi.

Table 2: Effect of different plant growth regulators on plant height (cm) of Litchi (*Litchi chinensis* L.) cv. Purvi.

Treatment No.	Treatments Combinations	Plant height (cm)						
		Initial	30 Days	60 Days	90 Days	120 Days	150 Days	180 days
T_1	30 ppm (GA3)	107.38	130.27	138.32	147.26	154.79	164.43	182.78
T_2	50 ppm (GA_3)	106.67	132.62	140.29	150.22	157.80	165.21	191.01
T_3	30 ppm (NAA)	112.17	128.53	135.32	153.19	156.79	161.62	179.43
T_4	50 ppm (NAA)	109.67	125.65	134.46	149.70	157.76	163.21	182.15
T_5	30 ppm (CCC)	112.64	117.30	128.47	134.43	140.39	148.48	163.94
T_6	50 ppm (CCC)	112.99	118.42	130.33	138.51	145.42	150.20	169.55
F-Test		-	**S**	**S**	**S**	**S**	**S**	
C.D.at 0.5%		-	**0.344**	**0.432**	**4.223**	**0.510**	**0.178**	**1.786**
S.Ed (+)		-	**0.154**	**0.194**	**1.895**	**0.229**	**0.253**	**0.802**

Table 3: Effect of different plant growth regulators on plant canopy (cm) of Litchi (*Litchi chinensis* L.) cv. Purvi.

Treatment No.	Treatments Combinations	Plant canopy (cm)						
		Initial	30 Days	60 Days	90 Days	120 Days	150 Days	180 Days
T_1	30 ppm (GA3)	37.49	40.29	48.56	52.36	57.49	67.29	82.11
T_2	50 ppm (GA3)	42.17	45.25	49.50	53.29	58.46	68.43	88.18
T_3	30 ppm (NAA)	49.23	44.96	47.35	50.39	56.41	66.78	73.96
T_4	50 ppm (NAA)	49.01	44.30	48.42	51.31	55.20	64.40	77.24
T_5	30 ppm (CCC)	40.82	38.62	44.34	48.30	52.46	58.55	64.00
T_6	50 ppm (CCC)	51.10	39.39	45.50	49.39	53.40	60.30	68.22
	F-Test	-	**S**	**S**	**S**	**S**	**S**	**S**
	C.D.at 0.5%	-	**0.900**	**1.334**	**0.174**	**0.240**	**0.276**	**2.697**
	S.Ed (±)	-	**0.404**	**0.599**	**0.078**	**0.108**	**0.124**	**1.211**

Table 4: Effect of different plant growth regulators on chlorophyll (SPAD meter) of Litchi (*Litchi chinensis* L.) cv. Purvi.

Treatment No.	Treatments Combinations	Chlorophyll (SPAD meter)
T_1	30 ppm (GA3)	64.72
T_2	50 ppm (GA3)	67.70
T_3	30 ppm (NAA)	58.45
T_4	50 ppm (NAA)	56.62
T_5	30 ppm (CCC)	52.42
T_6	50 ppm (CCC)	54.66
F-Test		**S**
C.D.at 0.5%		**0.592**
S.Ed (±)		**0.266**

Table 5: Effect of different plant growth regulators on number of panicle per plant of Litchi (*Litchi chinensis* L.) cv. Purvi.

Treatment No.	Treatments Combinations	Number of panicle per plant
T_1	30 ppm (GA3)	8.64
T_2	50 ppm (GA3)	9.34
T_3	30 ppm (NAA)	7.40
T_4	50 ppm (NAA)	7.86
T_5	30 ppm (CCC)	6.55
T_6	50 ppm (CCC)	6.67
	F-Test	S
	C.D.at 0.5%	0.352
	S.Ed (±)	0.158

Table 6. Effect of different plant growth regulators on date of flowering appearance of Litchi (*Litchi chinensis* L.) cv. Purvi

Treatment No.	Treatments Combinations	Early date of flowering appearance
T_1	30 ppm (GA3)	24th Feb 2021
T_2	50 ppm (GA3)	21st Feb 2021
T_3	30 ppm (NAA)	6th March 2021
T_4	50 ppm (NAA)	2nd March 2021
T_5	30 ppm (CCC)	20th March 2021
T_6	50 ppm (CCC)	15th March 2021

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