The Pharma Innovation Journal 2022; 11(1): 291-293

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(1): 291-293

www.thepharmajournal.com
Received: 12-10-2021
Accepted: 23-11-2021

Lalit Kumar
Department of Horticulture, Babasaheb Bhimrao Ambedkar University, Vidya-Vihar, Rae Bareli Road, Lucknow, Uttar Pradesh, India

Sanjay Kumar
Department of Horticulture, Babasaheb Bhimrao Ambedkar University, Vidya-Vihar, Rae Bareli Road, Lucknow, Uttar Pradesh, India

RS Verma
Department of Horticulture, Babasaheb Bhimrao Ambedkar University, Vidya-Vihar, Rae Bareli Road, Lucknow, Uttar Pradesh, India

Shatrunjay Yadav
Department of Horticulture, Babasaheb Bhimrao Ambedkar University, Vidya-Vihar, Rae Bareli Road, Lucknow, Uttar Pradesh, India

Corresponding Author:
Lalit Kumar
Department of Horticulture, Babasaheb Bhimrao Ambedkar University, Vidya-Vihar, Rae Bareli Road, Lucknow, Uttar Pradesh, India

Effect of plant growth regulators and mulches on yield and quality of strawberry (*Fragaria x ananassa* Duch.) cv. Chandler

Lalit Kumar, Sanjay Kumar, RS Verma and Shatrunjay Yadav

Abstract
The experiment was carried out at the Horticulture Research Farm of the Department of Horticulture, Babasaheb Bhimrao Ambedkar University, and Lucknow (U.P.) during the year of 2018-19 & 2019-20. To study Effect of plant growth regulators and mulches on quality of strawberry (*Fragaria x ananassa* Duch.) cv. Chandler. The results of the investigation, regarding the influence of different plant growth regulators and mulches *viz*., T_1;Control, T_2;(GA_3 50ppm + Black polythene), T_3;(GA_3 75ppm + Black polythene), T_4;(GA_3 50ppm + Transparent polythene), T_5;(GA_3 75ppm + Transparent polythene), T_6;(GA_3 50ppm + Paddy straw), T_7; (GA_3 75ppm + Paddy straw), T_8;(GA_3 50ppm + Rice husk), T_9;(GA_3 75ppm + Rice husk), T_{10};(NAA 20ppm +Black polythene), T_{11};(NAA 40ppm +Black polythene), T_{12};(NAA 20ppm + Transparent polythene), T_{13}; (NAA 40ppm + Transparent polythene), T_{14};(NAA 20ppm + Paddy straw), T_{15};(NAA 40ppm + Paddy straw), T_{16};(NAA 20ppm + Rice husk), T_{17};(NAA 40ppm + Rice husk) were evaluated in simple randomized block design with three replication. The result revealed showed The minimum days taken for initial of fruit set (4.18days), minimum days taken to 50% fruit (51.14days), maximum weight of fruit per plant (310.75g) and the maximum TSS (12.24ºBrix) were found in the berries produced from the plants treated with (GA_3 75ppm + Black polythene). The maximum specific gravity (1.035) and minimum acidity were noticed with (GA3 75ppm + Black polythene) in strawberry.

Keywords: Strawberry, PGRs, mulching, yield and quality characters

Introduction
Strawberry (*Fragaria* x *ananassa* Duch.) is an important herbaceous perennial fruit crop belonging to family rosaceae. It is a small fruit of great nutritional and medicinal value. Some commercial varieties of strawberry (*Fragarria* x *ananassa* Duch.) are everywhere in the world. Strawberry is one of the most important temperate berry fruit which can also be cultivated in sub-tropical region. It can be grown up to 3000 meters, above mean sea level in humid and dry regions. Strawberry can be grown in different type soil ranging from heavy clay to gravel types, but it prefers light porous soil that are rich in humus. Planting can be done at any time between July to April either on furrows or on raised beds in a particular system of planting. Mostly sub surface irrigation is applied by drip and sprinkler system depending on localities. Adequate amount of manures and fertilizers is required for proper nourishment of the soil as well as to obtain uniformly high yield and quality fruits. Owing the medicinal properties (anti-carcinogenic, anti-diabetic and antioxidant), strawberry is gaining popularity among all age group consumers. Strawberries are good source of natural antioxidant including carotenoids, vitamins, phenols, flavonoids, dietary glutathione and metabolite and exhibit a high level of anti-oxidant capacity against various group of free radicals such as superoxide, hydrogen peroxide, hydrogen radicals and singlet oxygen (Wang and Jiao, 2000). Strawberry's antioxidant activity levels are affected not only by the genotype butalso by both growing temperature (Wang and Zheng, 2001) and cultural practices (Wang *et al*., 2002). Gibberellic acid promotes cell elongation, cell division, counteracting the phenomenon of apical dominance. It initiates growth of lateral buds and promotes the growth of the leaves. GA_3 induces flowering in long day plants and in plants requiring inductive cold period. It also promotes formation of male flower by playing important role in the development of androecium. GA_3 affects positively to fruit setting, increase the fruit size, total yield and quality.

Naphthalene acetic acid (NAA) is one of the vital member of auxins. Application of a-naphthalene acetamide in early stage induce cell division in cambium cells, and leads to xylem

tissue formation in lower internodes which gives mechanical support to plants, there by prevention of lodging. It is beneficial for enhancing fruit set and prevention of per harvest dropping of fruits. NAA induce profuse and early flowering and is also effective in controlling plant height and branching at low concentration. It also prevent the fruit shed.

Materials and Methods

The experiment was carried out at the Horticulture Research Farm of the Department of Horticulture, Babasaheb Bhimrao Ambedkar University, Vidya-Vihar, Rae Bareli Road, Lucknow (U.P.) during the year of 2018-19 & 2019-20. The experimental field situated at 26.50° N latitude, 82.52°' E longitude and altitude of 111 meter above mean sea level (MSL). The area receives average rainfall between 800 to 1000 mm with temperature ranging from 15 to 30°C.Transplanting of runners was done in the month of October during 2018-19 & 2019-20 respectively. The strawberry cv. Chandler was planted at the spacing 30 x 30 cm with the various type of treatments combination i.e. T_1;Control, T_2;(GA_3 50ppm + Black polythene), T_3;(GA_3 75ppm + Black polythene), T_4;(GA_3 50ppm + Transparent polythene), T_5;(GA_3 75ppm + Transparent polythene), T_6;(GA_3 50ppm + Paddy straw), T_7;(GA_3 75ppm + Paddy straw), T_8;(GA_3 50ppm + Rice husk), T_9;(GA_3 75ppm + Rice husk), T_{10};(NAA 20ppm +Black polythene), T_{11};(NAA 40ppm +Black polythene), T_{12};(NAA 20ppm + Transparent polythene), T_{13}; (NAA 40ppm + Transparent polythene), T_{14};(NAA 20ppm + Paddy straw), T_{15};(NAA 40ppm + Paddy straw), T_{16};(NAA 20ppm + Rice husk), T_{17};(NAA 40ppm + Rice husk) were evaluated in simple randomized block design with three replication. The soil of the experimental field was sandy loam in the texture having pH of 7.9. Recommended dose of (N.75 Kg.), (P_2O_5 80 Kg.) and (K_2O 50 Kg.) was supplied through urea, single super phosphate and muriate of potash respectively. FYM 20 tone applied at the time of field preparation. The crop was grown with standard cultural practices and plant protection measures were adopted as per schedule. The observations were recorded on quality characters *viz*-total sugar, reducing sugar, non-reducing sugar, total soluble solids, specific gravity and acidity was measured as per protocol of A.O.A.C. (2000) [1]. Data recorded from the study were analysed as per procedure by Gomez *et al*. (1984) and tabulation.

Result and Discussion

During present investigation it is observed that days taken initial of fruit set, days taken 50% fruit set and Fruit weight per plant (Table 1) and Total soluble solids (TSS**),** specific gravity and acidity (Table 2) were increased by NAA and GA_3 with decrease titrable acidity. The minimum days taken for initial of fruit set (4.18days), minimum days taken to 50% fruit (51.14days) obtained from T_{10}(NAA 20ppm +Black polythene). The results are congruent with Diwivedi *et al*. 2002 [2]. The plants produced maximum weight of fruit per plant (310.75g) T3 treated with (GA_3 75ppm + Black polythene). Gibberellic acid plays a regulatory role in the mobilization of metabolites from source foliage to sink (developing fruits) Iqbal *et al.*, 2011 [4]. The maximum total sugar (9.51%), reducing sugar (5.11%), non-reducing sugar (4.63%) and TSS (12.24°Brix) were found in the berries produced from the plants treated with (GA_3 75ppm + Black polythene). This increase in total sugar, reducing sugar, non-reducing sugar and TSS may be attributed due to the quick metabolic Trans formation of starch and pectin in to soluble compounds and rapid translocation of sugars from leaves to developing fruits Brahamchari and Rani. (2001). The maximum specific gravity (1.035) and minimum acidity were noticed with (GA3 75ppm + Black polythene. These results are in close agreement with Turmis and Kaka (1997).

Table 1: Effect of plant growth regulators and mulches on days taken initial of fruit set, days taken 50% fruit set and fruit weight per plant of strawberry cv. Chandler.

Treatments Combinations	Days taken initial of fruit set			Days taken 50% fruit set			Fruit weight per plant		
	2018-19	2019-20	Pooled	2018-19	2019-20	Pooled	2018-19	2019-20	Pooled
T_1 Control	6.30	6.23	6.26	57.14	58.20	57.67	93.55	106.29	99.92
T_2(GA_3 50ppm + Black polythene)	4.76	4.90	4.83	54.15	55.50	54.82	302.43	308.20	305.31
T_3(GA_3 75ppm + Black polythene)	5.13	5.20	5.16	54.73	55.75	55.24	306.20	315.30	310.75
T_4(GA_3 50ppm + Transparent polythene)	5.16	5.23	5.19	54.81	55.75	55.28	286.26	305.30	295.78
T_5(GA_3 75ppm + Transparent polythene)	5.36	5.50	5.43	55.22	55.99	55.60	296.86	306.93	301.89
T_6(GA_3 50ppm + Paddy straw)	5.40	5.53	5.46	55.88	56.21	56.04	283.33	287.43	285.38
T_7(GA_3 75ppm + Paddy straw)	5.46	5.56	5.51	56.03	56.43	56.23	284.43	302.46	293.44
T_8(GA_3 50ppm + Rice husk)	5.60	5.66	5.63	56.72	56.86	56.79	245.73	260.26	252.99
T_9(GA_3 75ppm + Rice husk)	5.63	5.76	5.69	56.80	57.45	57.12	259.06	276.96	268.01
T_{10}(NAA 20ppm +Black polythene)	4.16	4.20	4.18	50.75	51.53	51.14	240.40	256.40	248.40
T_{11}(NAA 40ppm +Black polythene)	4.23	4.36	4.29	51.69	52.68	52.18	237.13	248.03	242.58
T_{12}(NAA 20ppm + Transparent polythene)	4.33	4.40	4.36	51.84	52.76	52.30	235.40	238.66	237.03
T_{13}(NAA 40ppm + Transparent polythene)	4.36	4.43	4.39	52.29	52.82	52.55	209.50	217.83	213.66
T_{14}(NAA 20ppm + Paddy straw)	4.40	4.56	4.48	52.65	53.74	53.19	181.86	204.03	192.94
T_{15}(NAA 40ppm + Paddy straw)	4.46	4.63	4.54	52.76	53.86	53.31	169.06	183.90	176.48
T_{16}(NAA 20ppm + Rice husk)	4.53	4.70	4.61	53.46	54.61	54.03	157.20	174.73	165.96
T_{17}(NAA 40ppm + Rice husk)	4.73	4.76	4.74	53.91	55.25	53.08	154.93	171.36	163.14
CD at (P=0.05)	0.864	0.797	0.830	1.520	1.349	1.434	32.301	28.362	30.331
SE(m)±	0.298	0.275	0.286	0.525	0.466	0.485	11.162	9.801	10.481

Table 2: Effect of plant growth regulators and mulches on total soluble solids (TSS), specific gravity and acidity of strawberry cv. Chandler.

Treatments Combinations	Total Soluble Solids (ºBrix)			Specific gravity			Acidity %		
	2018-19	2019-20	Pooled	2018-19	2019-20	Pooled	2018-19	2019-20	Pooled
T_1 Control	7.86	7.88	7.87	1.015	1.017	1.016	0.84	0.87	0.85
T_2(GA_3 50ppm + Black polythene)	11.73	12.10	11.91	1.034	1.035	1.034	0.55	0.52	0.53
T_3(GA_3 75ppm + Black polythene)	12.33	12.16	12.24	1.036	1.035	1.035	0.53	0.51	0.52
T_4(GA_3 50ppm + Transparent polythene)	11.30	11.73	11.51	1.031	1.033	1.032	0.60	0.62	0.61
T_5(GA_3 75ppm + Transparent polythene)	11.60	11.76	11.68	1.033	1.034	1.033	0.58	0.56	0.57
T_6(GA_3 50ppm + Paddy straw)	10.30	11.30	10.80	1.029	1.031	1.030	0.64	0.67	0.65
T_7(GA_3 75ppm + Paddy straw)	10.93	11.56	11.24	1.030	1.032	1.031	0.63	0.64	0.63
T_8(GA_3 50ppm + Rice husk)	10.03	10.25	10.14	1.027	1.029	1.028	0.68	0.70	0.69
T_9(GA_3 75ppm + Rice husk)	10.13	10.93	10.53	1.028	1.030	1.029	0.66	0.69	0.67
T_{10}(NAA 20ppm +Black polythene)	9.63	9.62	9.63	1.026	1.028	1.027	0.69	0.71	0.70
T_{11}(NAA 40ppm +Black polythene)	9.53	9.60	9.56	1.025	1.027	1.026	0.70	0.72	0.71
T_{12}(NAA 20ppm + Transparent polythene)	9.43	9.30	9.36	1.024	1.026	1.025	0.71	0.73	0.72
T_{13}(NAA 40ppm + Transparent polythene)	9.06	9.26	9.16	1.022	1.023	1.022	0.73	0.74	0.73
T_{14}(NAA 20ppm + Paddy straw)	8.73	8.80	8.76	1.021	1.022	1.021	0.74	0.75	0.74
T_{15}(NAA 40ppm + Paddy straw)	8.30	8.56	8.43	1.019	1.020	1.019	0.77	0.80	0.78
T_{16}(NAA 20ppm + Rice husk)	8.13	8.23	8.18	1.017	10.18	1.017	0.79	0.82	0.80
T_{17}(NAA 40ppm + Rice husk)	7.96	7.93	7.94	1.016	1.017	1.016	0.81	0.84	0.82
CD at (P=0.05)	1.257	1.251	1.254	0.002	0.002	0.002	0.018	0.014	0.016
SE(m)±	0.434	0.432	0.433	0.001	0.001	0.001	0.005	0.004	0.004

Conclusion

On the basis of findings of present investigation, it can be concluded that among the different combinations of plant growth regulators and mulches, (GA3 75ppm + Black polythene) is the best for yield and quality for strawberry followed by (GA_3 50ppm + Black polythene). For overall effect of various combinations of plant growth regulators and mulches (GA3 75ppm + Black polythene) may be suggested.

References

1. AOAC. Association of official Agricultural chemistry. Methods of analysis (15thed). Washington, DC, USA, 2000.
2. Diwivedi MP, Negi KS, Jindal KK, Rana HS. Influence of photoperiod and bioregulators on vegetative growth of Strawberry. Adv. Hort & Forestry. 2002;7:29-3.
3. Dubey V, Meena ML, Tripathi VK. Effect of plant bio-regulators and micro-nutrient on vegetative growth, yield and quality of strawberry cv. Chandler. Progressive Research-An International Journal. 2017;12(3):330-332.
4. Iqbal N, Nazar R, Khan MIR, Masood A, Khan NA. Role of gibberellins in regulation of source-sink relation under optimal and limiting environmental conditions. *Current Science*. 2011;100(7):998-1007.
5. Kumar R, Tandon V, Mir MM. Impact of different mulching materials on growth, yield and quality of strawberry (*Fragaria* × *ananassa* Duch.). Prog. Hort. 2012;44(2):234-236.
6. Kumar R, Bakshi M, Singh BD. Influence of plant growth regulators on growth, yield and quality of strawberry (*Fragaria* × *ananassa* Duch.) Under U.P. Subtropics. Asian journal of Horticulture. 2012;7(2):434-436
7. Khokhar UU, Prashad J, Sharma MK. Influence of growth regulators on growth, yield and quality of strawberry cv. Chandler. Haryana Journal of Horticultural Sciences. 2004;33(3/4):186-187.
8. Khunte SD, Kumar A, Ansari N, Saravanan S. Influence of PGRs and poultry manure on physic-chemical parameters of strawberry (*Fragaria* × *ananassa* Duch.) cv. Chandler. *Int. J Curr. Microbiol. App. Sci*. 2019;8(12):108-117
9. Mastuane C, Oseni TO, Masarirambi MT. Effect of gibberellic acid (GA_3) on the growth, fruit yield and quality of strawberry (*Fragaria x ananassa* Duch.) in a subtropical environment Unisaw J Agric. 2016;19:44-60.
10. Paikra S, Kumar H, Panigrahi, Chandrakar S. Effect of NAA and GA3 spray on quality parameters of strawberry (*Fragaria x ananassa* Duch.) cv. Sabrina under net tunnel. J of Pharmacognosy and Phytochemistry. 2018;7(6):393-395.
11. Palei S, Das AK, Sahoo AK, Das DK, Swain S. Influence of plant growth regulators on strawberry (*Fragaria x ananassa* Duch.) cv. Chandler. Under Odisha condition. *International Journal of Recent Scientific Research*. 2016;7(4):9945-9948.
12. Sekhar RS, Mehta K, Kumari S, Kalsi K. Effect of growth regulators on growth and yield of strawberry (*Fragaria x ananassa* Duch.) cv. Chandler. *Environ. & Ecology*. 2016;34(3B):1247-1250.
13. Sharma RR, Singh R. Gibberellic acid influences the production of malformed and button berries and fruit yield and quality in strawberry (*Fragaria x ananassa* Duch.) *Scientia Horticulturae*. 2009;119:430-433.
14. Thakur S, Mehta K, Shekhar RS. Effect of GA_3 and plant growth promoting rhizobacteria on growth, yield and quality of strawberry (*Fragaria x ananassa* Duch.) cv. Chandler. *Int. J. Advanced Res*. 2015;3(11):312-317.
15. Tiwari AK, Saravanan S, Lall D. Influence of different plant growth regulators on vegetative growth and physic-chemical properties of strawberry (*Fragaria x ananassa* Duch.) cv. Chandler. *Plant Archive*. 2017;17(1):367-370.
16. Tirpathi VK, Shukla PK. Effect of plant bio-regulators on growth, yield and quality of strawberry cv. Chandler. *Journal of Asian Horticulture.* 2006;3(1):9-14.
17. Vishal VC, Thipensha D, Chetana K, Maheshgowada BM, Veeresha BG, Basavraj AK. Effect of various growth regulators on vegetative parameters of strawberry (*Fragaria x ananassa* Duch.). cv. Sujatha. *Res. J. Chem. Environ. Sci*. 2016;4(4):68-71.
18. Yadav I, Singh J, Meena B, Singh P, Meena S, Neware S, *et al*. The effect of foliar application of growth regulators and micro-nutrients on production of strawberry (*Fragaria x ananassa* Duch.). cv. Winter Down under open field condition. Chem. Sci. Rev. Lett. 2017;6(21):589-594.
19. Yadav A, Pratap B, Shivram Kumar A, Patro A. Assess the effect of micro-nutrients and plant growth regulators on quality parameters of strawberry cv. Chandler. *The Pharma Innovation J*. 2018;7(1):303-305.