Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.2922

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **5 (3):** 499-504 (2017)

Research Article

International Journal of Pure & Applied Bioscience

OPEN ACCESS

Effect of Foliar Application of GA_3 and Homa Ash on Vegetative Growth and Yield of Cape Gooseberry (*Physalis peruviana* L.) Grown under Subtropical Conditions

Akshay Kumar Gocher[1], Deepa H. Dwivedi[2] and R. K. Bairwa[3*]

[1&2]Department of Applied Plant Science (Horticulture) Babasaheb Bhimrao Ambedkar University

[3]Department of Horticulture, Swami Keshwanand Rajasthan Agriculture University, Bikaner- 334006, Rajasthan

*Corresponding Author E-mail: ramkishan00029@gmail.com

Received: 27.04.2017 | Revised: 8.05.2017 | Accepted: 10.05.2017

ABSTRACT

The experiment was conducted at the Horticulture Research Farm-I of the Department of Applied Plant Science (Horticulture) at Baba Saheb Bhimrao Ambedker University (A Central University), Vidya Vihar Rae Bareli Road, Lucknow. The present experiment foliar application of GA_3 and Homa ash on growth and yield of Cape gooseberry were studied. The maximum plant height (64.75cm), number of branches (12.25) and internodal distance (7.75) are observed in treatment T_4 (400 ppm gibberellic acid) followed by treatment T_3 (300 ppm gibberellic acid) increased significantly compared to the control. It was observed that the maximum yield of fresh fruits (387.12 g) was recorded in treatment T_4 400 ppm GA_3 followed by $T_3$400 ppm(356.32g), Whereas minimum (161.60g) yield was recorded in treatment T_0 (Control).

Key words: *GA_3, Homa, Cape gooseberry (Physalis peruviana L.), Growth, Yield.*

INTRODUCTION

Cape gooseberry (*Physalis peruviana* L.) a diploid species with 2n=48[14] belongs to family Solanaceae and is a potential underutilized fruit crop which is grown in tropical (as perennial) and subtropical (as annual) regions of the world[5]. Fruits are eaten as fresh fruit and due to its good natural flavour can be used in the fruit processing industry to make syrup, sauce, pies, puddings, chutneys, ice-cream and fruit salads[6,7].From the nutritional point of view , its importance is not less than any other major fruit crop, as the edible portion of berry contains 11.5 % carbohydrates, 1.8 % protein, 0.2 % fat, 3.2 %, fibre, 0.6 % mineral matter and 49 mg ascorbic acid per 100 gm edible portion of fruit[10]. Fruit also contain calcium 8.0mg, phosphorus 55.3mg, iron 1.2mg carotene 1.6mg, thiamine 0.1mg and 1.70mg niacin[19] and high level of vitamin A, B, C[20]. Growth and yield of plants grown under such condition could be enhanced by the application of some promoting substances[22].

Cite this article: Gocher, A.K., Dwivedi, D.H. and Bairwa, R.K., Effect of Foliar Application of GA_3 and Homa Ash on Vegetative Growth and Yield of Cape Gooseberry (*Physalis peruviana* L.) Grown under Subtropical Conditions, *Int. J. Pure App. Biosci.* **5(3):** 499-504 (2017). doi: http://dx.doi.org/10.18782/2320-7051.2922

Plant growth regulators (PGR) are extensively used in horticultural crops to enhance plant growth and improve yield by increasing fruit number, fruit set and size. Plant growth regulators like promoters, inhibitors or retardants play a key role in controlling internal mechanisms of plant growth by interacting with key metabolic processes such as nucleic acid metabolism and protein synthesis. Use of plant growth regulators (PGR) might be a useful alternative to increase crop production. Recently, there has been global realization of the important role of PGR's in increasing crop yield[4]. It was reported that GA_3 application resulted in an increase in plant height number of leaves and fresh and dry weight of plants such as spinach plants[1]. GA_3 increased plant height and improved quality of spinach plants[21].

Agnihotra therapy is being popularized by Sri Vasant P.Paranjpe and others internationally and is used to improve environment and crop production with minimum expenditure. Homa farming is a totally revealed science. Agnihotra was regularly performed to purify the atmosphere since ancient time. It is basic of Homa a yagna is the technical term describing the process of purification of the house and atmosphere through fire, which is tuned to rhythm of nature, radiation effects of astrological combinations and "Mantras" leads to better capture of the planet in natural harmony benefiting all concerns. The act of singing special vibrations where Agnihotra ash copper pyramid fire burns a resonance effect is created which invigorates the cells of plants, and human beings leading to better reproductive cycles. That Agnihotra ash could produce disinfectant, anticoagulant and tissue contracting effects on living matter has been now well established[17].

Since Cape gooseberry is a potential crop for its medicinal and nutraceatical value and there is increasing demand for organic products hence the present investigation was designed to improve plant growth and fruit yield.

MATERIALS AND METHODS

The experiment was conducted at the Horticulture Research Farm-I of the Department of Applied Plant Science (Horticulture) at Baba Saheb Bhimrao Ambedker University (A Central University), Vidya Vihar Rae Bareli Road, Lucknow. The experiment was undertaken in order to find out the effect of Gibbrellic acid and Homa ash on performance of Cape gooseberry plant. The doses of GA_3 which are given to all treatments separately are as following treatment details.

T_0– Control, T_1- 1oo ppm GA3, T_2 – 200 ppm GA3, T_3 – 300 ppm GA3, T_4 – 400 ppm GA3, T_5 –50 mg Homa Ash, T_6 – 100 mg Homa Ash, T_7 – 150 mg Homa Ash, T_8 –200 mg Homa Ash. The experiment was laid out in Randomized Block Design (RBD). Nine treatments were replicated three times. At the time of land preparation, the recommended dose of FYM @ 20t/ha was applied in the soil. Fertilizers viz. nitrogen, phosphorus and potash were applied in the recommended dose of 100: 50: 50 kg/ha respectively. The half dose of nitrogen and full amount of phosphorus and potash were applied as basal dose at the time of transplanting. The remaining half dose of nitrogen was top dressed in two equal split doses at 35 days and 55 days after planting. Observations recorded on Vegetative growth parameters to determine for plant height, number of branches per plant, stem diameter, intermodal distance on vegetative growth of Cape gooseberry. The data on plant height were recorded with the help of meter scale in four tagged plant in each treatment and average weight was expressed in cm. Number of branches produced in four tagged plant in each treatment was counted manually during the crop period and average number of branches per plant were calculated. The internode between the fifth and six nodes of each tagged plant was measured in length with the help of meter scale during crop period to find out the average internodal distance and also the total yield of crop is recorded.

RESULT AND DISCUSSION

During the experimental work the observation are recorded and are presented in tabulated form in different tables. According to the table 1, 2 and 3 the maximum plant height (64.75cm), number of branches (12.25) and internodal distance (7.75) are observed in treatment T_4 (400 ppm gibberellic acid) followed by treatment T_3 (300 ppm gibberellic acid) increased significantly compared to the control. It was observed that different concentrations of gibberellic acid had positive effect on plant growth through the effect on cell division and elongation and increased cell enlargement by enhanced auxin destruction or by stimulating auxin biosynthesis, hence increasing the endogenous auxin level of the plants thus resulting into increased cell division. Results also have clearly shown that number of branches increased considerably by different concentrations of gibberellic acid. Similarly, different concentrations of homa ash have also shown an increase the biomass of plants[17]. These results are reported by Batlang *et al*[2]., in brinjal, Khan *et al*[11]., in tomato, Uddain *et al*[23]., in tomato, Choudhary *et al*[3]., in chilli, and Wanyama *et al*[25]., in cape gooseberry all reporting a similar increase in plant height, number of branches due to application of different concentrations of gibberellic acid. This was further reported by Tohamy *et al*[22]., in Cape gooseberry and Choudhary *et al*[3]., in tomato.

The yield of fresh fruits was measured four sampled plants per plot wise in all the three replications. Data Regarding that Yield of fresh fruit was measured after harvesting and the average value of Yield has been presented in Table 4 clearly indicate that yield of fruit per plant was significantly increased by application of different concentrations of gibberellic acid and homa ash. It was observed that the maximum yield of fresh fruits (387.12 g) was recorded in treatment T_4 400 ppm GA_3 followed by $T_3$400 ppm(356.32g), Whereas minimum (161.60g) yield was recorded in treatment T_0 (Control). All the treatments of gibbrellic acid and homa ash were found to be significantly superior to control. Data also indicated that the higher concentration of gibberellic acid gave better results upto 400 ppm. Similarly, different concentrations of homa ash have also shown an increase the fruit yield per plant. Different concentration of homa ash solution used for treatment presented in Table 4. The maximum fruit yield per plant (227.29g) was recorded in 200 mg Homa ash concentration. The result was reported by Nunez-Elisea and Davenport[16], in mango, Naeem *et al*[15]., Van Rensburg *et al*[24]., in orange, Kaur *et al*[8]. This was further reported by Prasad *et al*[18]., Kazemi *et al*[9]., in tomato Lal *et al*[12]., in guava, Mehraj *et al*[13]., in cherry tomato.

Table 1: Effect of Gibbrellic acid and Homa ash on plant height (cm) in Cape gooseberry (*Physalis peruviana* L.) at different days after transplanting (DAT)

Treatments	Plant height (cm)				
	50 DAT	65DAT	80 DAT	95 DAT	110 DAT
T_0 –Control	20.26	24.82	30.57	40.53	48.42
T_1-100 ppm GA3	24.59	29.28	38.63	48.66	60.59
T_2-200 ppm GA3	24.38	29.97	38.91	50.14	60.93
T_3-300 ppm GA3	28.82	32.54	39.39	51.87	62.20
T_4-400 ppm GA3	28.84	32.73	41.21	52.48	64.75
T_5-50 Mg Homa ash	23.24	26.69	34.75	48.68	55.88
T_6- 100 Mg Homa ash	23.79	27.53	37.16	50.96	57.52
T_7- 150 Mg Homa ash	24.44	29.10	38.80	51.20	59.02
T_8-200 Mg Homa ash	28.16	30.10	39.70	51.68	59.03
SE(m)	0.806	0.885	1.169	1.738	2.123
CD at 5%	2.417	2.653	3.504	5.211	6.365

Table 2: Effect of Gibbrellic acid Homa ash on number of branches per plant in Cape gooseberry (*Physalis peruviana* L.) at different days after transplanting (DAT)

Treatments	Number of branches				
	50 DAT	65DAT	80 DAT	95 DAT	110 DAT
T_0 –Control	1.92	3.50	4.83	5.58	6.25
T_1-100 ppm GA3	2.17	5.17	7.03	9.58	10.33
T_2-200 ppm GA3	2.42	5.50	7.58	10.58	11.58
T_3-300 ppm GA3	2.50	5.58	7.67	10.67	11.67
T_4-400 ppm GA3	2.92	6.17	8.75	11.67	12.25
T_5-50 Mg Homa ash	2.17	5.33	6.58	8.00	8.58
T_6- 100 Mg Homa ash	2.15	4.92	5.83	7.67	8.67
T_7- 150 Mg Homa ash	2.33	5.08	5.67	7.97	8.58
T_8-200 Mg Homa ash	2.42	5.42	6.67	8.17	9.00
SE(m)	0.151	0.208	0.285	0.402	0.47
CD at 5%	0.452	0.625	0.853	1.207	1.43

Table 3: Effect of Gibbrellic acid Homa ash on internodal distance per plant in Cape gooseberry (*Physalis peruviana* L.) at different days after transplanting (DAT)

Treatments	Internodal distance (cm)		
	95 DAT	110 DAT	125 DAT
T_0 –Control	4.25	5.77	5.85
T_1-100 ppm GA3	5.79	6.42	6.78
T_2-200 ppm GA3	5.92	7.02	7.60
T_3-300 ppm GA3	5.97	7.03	7.62
T_4-400 ppm GA3	6.15	7.45	7.75
T_5-50 Mg Homa ash	5.06	5.92	6.33
T_6- 100 Mg Homa ash	5.02	6.10	6.18
T_7- 150 Mg Homa ash	5.08	6.25	6.20
T_8-200 Mg Homa ash	5.37	6.12	6.57
SE(m)	0.211	0.247	0.302
CD at 5%	0.631	0.739	0.904

Table 4. Effect of different concentrations of gibberellic acid and homa ash on fruit Yield in Cape gooseberry (*Physalis peruviana* L.)

Treatments	Fruit yield (g/plant)			
	R1	R2	R3	AVERAGE
T_0 –Control	162.43	164.51	157.85	161.60
T_1-100 ppm GA3	290.16	288.4	295.0	291.19
T_2-200 ppm GA3	355.6	348.39	350.55	351.51
T_3-300 ppm GA3	366.54	342.09	360.32	356.32
T_4-400 ppm GA3	387.00	390.87	383.5	387.12
T_5-50 Mg Homa ash	199.5	233.26	243.59	225.45
T_6- 100 Mg Homa ash	267.05	210.66	182.6	220.10
T_7- 150 Mg Homa ash	227.04	208.38	223.1	219.51
T_8-200 Mg Homa ash	220	202.5	261.29	227.93
SE(m)				11.850
CD at 5%				35.532

REFERENCES

1. Abou-sedra, F.A., Effect of Nitrogen Fertilizer and Gibbrelic acid (GA_3) on yield and quality of spinach. MSc. Thesis Univ. Zagzig(BanhaBronnh), Fac. Agr. Sci. Moshotohor. (1981).
2. Batlang, V., Emonger, V.E. and Pule-Meulenburg, F., Effect of benzyladenine and gibberellic acid on yield and yield components of cucumber (Cucumissativus L. cv.tempo). *J. Agron.*, **5(3):** 418-423 (2006).
3. Choudhury, S., Islam, N., Sarkar, M.D. and Ali, M.A., Growth and Yield of Summer Tomato as Influenced by Plant Growth Regulators, *International Journal of Sustainable Agriculture*, **5(1):** 25-28 (2013).
4. Davies, P.J., Plant Hormones, Physiology, Biochemistry and Molecular Biology. Kluwer AcademiPublishers,Dordrecht (1995).
5. Dwivedi, D.H., Yadava, A.K. and Kumar, P., Integrated Nutrient Management in Cape gooseberry (Physalis peruviana L.) for Peri Urban Horticulture. *Indian Journal of Applied Research*, **4(12):** 274-275 (2014).
6. Facciola, S., Cornucopia A source book of Edible Plants. Kampong Publication pp. 207 (1990).
7. Huxley, A., The New RHS Dictionary of Gardening. MacMillian Press, New York, pp. 15 (1992).
8. Kaur, G., Kaur, A., Singh, B. and Singh, S., Effect of plant growth regulators on fruit quality of Cape gooseberry (*Physalis peruviana* L.) cv. Aligarh. *International Journal of Agricultural Sciences*, **9(2):** 633-635 (2013).
9. Kazemi, M., Effect of Gibberellic Acid and Potassium Nitrate Spray on Vegetative Growth and Reproductive Characteristics of Tomato. *J. Biol. Environ. Sci.*, **8(22):** 1-9 (2014).
10. Khan, K.F. and Growder, R.B., The Cape gooseberry a remunerative intercrop for orchards in Nilgiris. *South Indian Hort.*, **3(4):** 104-107 (1955).
11. Khan, M.A., Gautam, C., Mohammad, F., Siddiqui, M.H., Naeem, M., and Khan, M.N., Effect of Gibberellic Acid Spray on Performance of Tomato Plant. *Turk J. Biol*., **30:** 11-16 (2006).
12. Lal, N., Das, R.P. and Verma, L.R., Effect of Plant Growth Regulators on Flowering and Fruit Growth of Guava (*Psidium Guajava* L.) Cv. Allahabad Safeda. *The Asian Journal of Horticulture*, **8(1):** 54-56 (2013).
13. Mehraj, H., Sadia, A.A., Taufique, T., Rashid, M. and Uddin, A.F., Influence of Foliar Application of Gibberellic Acid on Cherry Tomato. (*Lycopersicon esculentum* Mill. var. Cerasiforme, *J. Expt. Biosci.*, **5(2):** 27- 30 (2014).
14. Menzel, M.Y., Thecytotaxonomy and genetics of Physalis. *Proc. Am. Philosophical Soc*., **95**: 132-183 (1951).
15. Naeem, N., Ishtiaq, M., Khan, P., Mohammad, N., Khan, J. and Jamiher, B., Effect of Gibberellic Acid on Growth and Yield of Tomato Cv. Roma, *J. of Biological Sciences*, **1(6):** 448-450 (2001).
16. Nunez-Elisea, R. and Davenport, T.L., Flowering of "Keitt" mango in response to deblossoming and gibberellic acid. *Proc. Fla. State Hort. Soc.*, **104:** 41-43 (1991).
17. Pathak, R.K. and Ram, R.A., Manual on Vedic Krishi, **1:** 31 (2004).
18. Prasad, R.N., Singh, S.K., Yadava, R.B. and Chaurasia, S.N., Effect of GA_3 and NAA on growth and yield of tomato. *Vegetable Science*, **40(2):** 195-197 (2013).
19. Ramadan, M.F. and Morsel, J.T., Golden berry: A novel fruit source of fat soluble bioactive. INFORM, **15:** 130-131 (2007).
20. Sarkar, T.K. and Chattopadhyay, T.K., Correlation studies on Cape gooseberry (*Physalis peruviana* L.) *Ann. Agric. Res.*, **14:** 211-214 (1993).
21. Shehata, S.M., Tohamy, W.A. and Shehata, M.A., An attempt to reduce nitrate hazard in spinach plant by using foliar application treatments under two sources of nitrogen fertilization. *Egypt. J. Hort*., **28(4):** 447-462 (2001).

22. Tohamy, W.A., El-Abagy, H.M., Badr, M.A., Ghoname, A.A. and Abou-Hussein, S.D., Improvement of productivity and quality of capegooseberry by foliar application of some chemical substances (2012).
23. Uddain, J., Hossain, K.M.A., Mostafa, M.G. and Rahman, M.J., Effect of Different Plant Growth Regulators on Growth and Yield of *Tomato International Journal of Sustainable Agriculture*, **1(3):** 58-63 (2009).
24. Van Rensburg, P., Shung-Shi, P., Garcia-Luis, F.A. and Guardiola, J.L., Improving crop value in Fino Clementine mandarin with plant growth regulators. *Proc. Int. Soc.* Citricult, **2:** 970-974 (1996).
25. Wanyama, D.O., Wamocha, L.S., Ngamau,K. and Ssonkko, R.N., Effect of Gibberrellic acid on Growth and Fruit Yield of Greenhouse Grown Cape Gooseberry. *African Crop Sci. J.*, **14 (4):** 319-323 (2006).