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Research Article

EFFECT OF PHYTOREGULATORS ON FRUIT SETTING AND YIELD OF MUSKMELON (*Cucumis melo L.)* HYBRID-TRISHA UNDER POLY HOUSE CONDITION

Verma Annu*, Dohare Seema, Singh J. and Panigrahi H. K.

Indira Gandhi Krishi Vishwavidyalaya, Krishak Nagar, Raipur, Chhattisgarh 492012, India
*Corresponding Author: Email-annu.verma74@rediffmail.com

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Abstract- A field experiment was conducted during *kharif* season 2016-17 at Research Farm of Centre of Excellence on Protected cultivation and Precision Farming, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) to study the effect of phyto-regulator (CPPU) on fruit setting, yield and quality of muskmelon (*Cucumis melo L.)* hybrid- Trisha under poly house condition. The experiment was laid out in factorial randomized block design with three replications having eight different treatment combinations, T2: Pollination+ 10 ppm CPPU, T3: Pollination+ 20 ppm CPPU, T4: Pollination+ 30 ppm CPPU, T5: Pollination+ 40 ppm CPPU, T6: Unpollinated+ 10 ppm CPPU, T7: Unpollinated+ 20 ppm CPPU, T8: Unpollinated+ 30 ppm CPPU and T9: Unpollinated+ 40 ppm CPPU with one control, T1 (hand pollination with water spray) along with B.A. (Benzyl adenine) @ 100 ppm in all the treatments except control. Under treatment combinations T_5 (pollination + 40 ppm CPPU), recorded maximum fruit set (97.95%). Results showed that the production and number of fruits obtained with CPPU treatments were similar to what is obtained by using hand pollination. A positive relation was also observed between production and CPPU concentration. Significant differences were also observed among the treatment with respect to quality of the fruit.

Keywords- CPPU, Muskmelon Fruit, Quality, Fruit setting.

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Introduction

Muskmelon commonly known as *Kharbooja* is one of the most important dessert cucurbits of India. It is major crop of riverbed, covering 80% area of total muskmelon cultivation. Muskmelon is annual with climbing, creeping, or trailing vines. Vines are monoecious or andro-monoecious. The fruit contains 0.3 mg protein and 26 mg vitamin C in 100 g edible portion, and seeds contain edible oil. China is the largest producer growing over 55% of all Cantaloupes. The total area and production of muskmelon in India in year 2014-15 was 39.0 (000 ha) and 825.0 (000 tonnes) respectively (Anon, 2015). In Chhattisgarh, muskmelon is being grown on about 1.48 (000 hectares) with an annual production of 11.84 (000 tonnes) [1]. Muskmelon may be grown in open as well as in protected condition. But its cultivation under field condition is not very profitable because of unfavorable weather condition. But Pollination is the main problem in the production of muskmelon in plastic houses due to the limited activity of bees (*Apis mellifera*) when climatic conditions are unfavorable. Under unfavorable climatic conditions, muskmelon fruit set is a serious problem, which is not completely solved by using artificial pollination or increasing the number of beehives. Plant bioregulators are an alternative to natural pollination in numerous crops. Various research papers have shown that the application of plant growth regulators such as auxins, gibberellins, and cytokinins can improve fruit set and development: 1-(2-chloro-4-pyridyl)-3-phenylurea (CPPU) and gibberellic acid (GA3) in grape [2]. Cytokinin are thought to play important roles in fruit development, especially cell division. Keeping these points in view, an experiment was conducted to investigate the effect of different concentrations of CPPU on fruit setting, yield and quality parameters.

Materials and Methods

The study was conducted during *kharif* season 2016-17 at Research Farm of Centre of Excellence on Protected cultivation and Precision Farming under poly house, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). The soil of experimental field was sandy loam. The experiment was laid out in factorial randomized block design with three replications having eight different treatment combinations, T2: Pollination+ 10 ppm CPPU, T3: Pollination+ 20 ppm CPPU, T4: Pollination+ 30 ppm CPPU, T5: Pollination+ 40 ppm CPPU, T6: Unpollinated+ 10 ppm CPPU, T7: Unpollinated+ 20 ppm CPPU, T8: Unpollinated+ 30 ppm CPPU and T9: Unpollinated+ 40 ppm CPPU with one control, T1 (hand pollination with water spray). The experimental material was muskmelon variety Trisha. Muskmelon seeds were planted in portrays in cocopeat. Seedlings were transplanted in the experimental field at the spacing of 150×50×50 cm (paired row). Fertilizers were applied through fertigation by drip irrigation. The solutions of different treatments were applied with a hand sprayer to the ovaries of opened flower at anthesis. Standard cultural practices were followed during the entire crop period for all the treatments. The data were recorded on fruit set (%), days to 50% fruit setting, fruit weight (Kg), fruit diameter (cm), no. of fruits per plant, days of first, second and third fruit picking and total fruit yield (t/ha).

Results and Discussion

Fruit set (%): Maximum fruit set (%) was observed under the treatment T5 (pollination + 40 ppm CPPU), which was found statistically at par with T3, T4 and T2 having average number of fruit set 99.72%, 99.03 %, and 96.97 % respectively. The possible reason for increase in fruit setting % might be due to synthetic cytokinin as synthetic Cytokinins have a significant role in increasing

fruit set which was probably due to the ability of cytokinins to mobilize assimilate to the area of application and responsible for increase fruit set and final fruit retention. Similar results were also found by Banyal *et al* (2013) in apple, El-Sabagh (2002) on apple trees and Hayata *et al* (2000) in muskmelon [3-5].

Days to 50% fruit setting: The minimum days taken to 50% fruit setting (54.93 days) was noted under the treatment T5 (Pollination+ 40 ppm CPPU), which was found statistically at par with the treatments T3 (Pollination+ 20 ppm CPPU), T4 (Pollination+ 30 ppm CPPU), T9 (Unpollinated+ 40 ppm CPPU) and T2 (Pollination+ 10 ppm CPPU) havingdays taken to 50% fruit setting 56.27, 58.23, 58.27 and 58.40 days respectively. However, maximum days taken to 50% fruit setting (73.37 days) was observed under the treatment T6 (Unpollinated + 10 ppm CPPU).

Fruit diameter (cm): The data revealed that maximum diameter of fruit (16.00 cm) was recorded under the treatment T5 (Pollination + 40 ppm CPPU) which showed significant differences with all the other treatments. These results collaborates with the findings of Hou *et al* (2011) in muskmelon and Fathi *et al* (2011) [6,7].

Fruit weight (kg): Spray of 40 ppm concentration of CPPU applied in hand pollinated condition (T5) showed highest weight of fruit (2.01 kg), which was found significant differences among all other treatments. Similar results were also found by Hifny *et al* (2017) in washington navel orange, Fathi *et al* (2011) in "Costata" persimmon, Hou *et al* (2011) in muskmelon, which are in close agreement with the present findings [8].

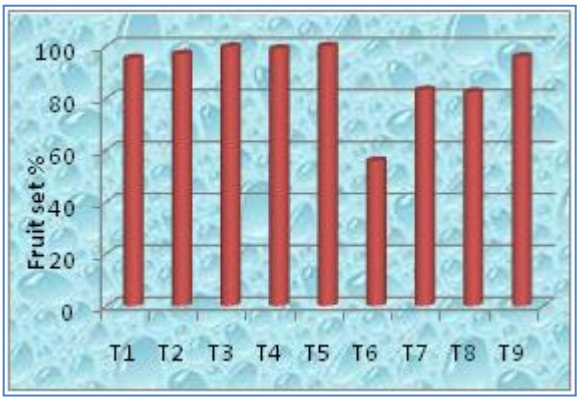

Fig-1 Response of phytoregulators on fruit set

No. of fruits per plant: The maximum no. of fruits per plant (11.23) was recorded under the treatment T5 (Pollination+ 40 ppm CPPU), followed by treatment T3 (Pollination+ 20 ppm CPPU) having average no. of fruits per plant 9.42. These findings are in agreement with the findings of Huitron *et al* (2007) in watermelon, Abd El Raheem *et al* (2013) in navel orange and Fathi *et al* (2011) in "Costata" persimmon. They also obtained higher no. of fruits per plant with the application of phytoregulator [9-11].

Table-1 *Effect of phytoregulator on fruit setting and yield attributing characters of muskmelon.*

Treatments	Fruit set (%)	Days to 50% fruit setting	Fruit diameter (cm)	Fruit weight (kg)	No. of fruits per plant	Days of fruit picking			Total fruit yield (t/ha)
						First	Second	Third	
T_1: Control (Hand pollinated)	95.33	59.50	12.68	1.04	7.06	94.91	107.78	112.38	14.20
T_2: Pollination+ 10 ppm CPPU	96.97	58.40	13.85	1.36	7.64	91.12	106.77	111.17	14.50
T_3: Pollination+ 20 ppm CPPU	99.72	56.27	15.68	1.92	9.42	84.09	105.82	110.62	18.55
T_4: Pollination+ 30 ppm CPPU	99.03	58.23	14.47	1.48	8.63	92.20	106.20	110.93	15.38
T_5: Pollination+ 40 ppm CPPU	100.00	54.93	16.00	2.01	11.23	80.73	105.18	109.94	19.82
T_6: Unpollinated+ 10ppm CPPU	55.80	73.37	12.25	0.85	3.86	96.11	108.91	116.67	11.90
T_7:Unpollinated+ 20 ppm CPPU	83.10	67.68	12.87	1.03	6.81	95.43	107.40	113.25	14.33
T_8: Unpollinated+ 30 ppm CPPU	82.37	70.33	12.51	0.94	5.47	95.17	108.57	114.83	13.10
T_9: Unpollinated+ 40 ppm CPPU	95.90	58.27	13.26	1.19	7.26	94.62	107.17	111.70	14.43
SEm±	1.30	1.42	0.10	0.03	0.21	0.98	0.12	0.19	0.49
CD	3.88	4.26	0.29	0.08	0.64	2.94	0.35	0.57	1.48

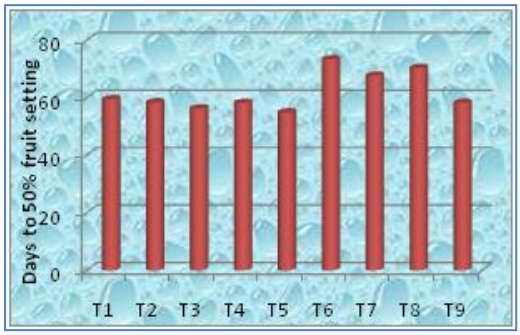

Fig-2 Response of phytoregulators on days to 50% (%) fruit setting

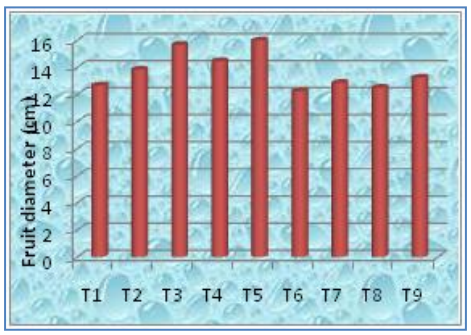

Fig-3 Response of phytoregulators on fruit

Days of first, second and third fruit picking: At days to first, second and third fruit picking minimum days was registered under the treatment T5 (Pollination+ 40 ppm CPPU) having days of fruit picking 80.73, 105.18 and 109.84 days respectively which showed non-significant differences with rest of the treatments under the present investigation. However, the maximum days to first, second and third fruit picking was recorded under the treatment T6 (Unpollinated+ 10 ppm CPPU) having days of fruit picking 96.11, 108.91 and 116.67 days respectively.

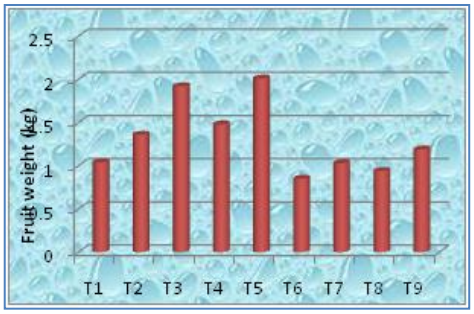

Fig-4 Response of phytoregulators on fruit weight diameter (cm) (kg)

Total fruit yield (t/ha): Yield (t/ha) was ranged from 23.84 to 41.00 t/ha under the different treatments. The highest yield (41.00 t/ha) was recorded under the treatment T5 (Pollination+ 40 ppm CPPU), showed significant differences among

all other treatments. The significant increase in total fruit yield is a cumulative effect of CPPU as CPPU increased the fruit set percent, fruit weight, dimensions and ultimately crop yield by affected cell elongation. The similar results were observed by Fathi *et al* (2011) in "Costata" persimmon, Abd El Raheem *et al* (2013) in navel orange, Hou *et al* (2011) in muskmelon and Huitron *et al* (2007) in watermelon.

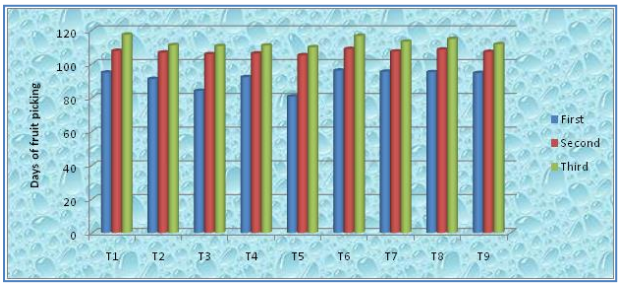

Fig-5 Response of phytoregulators on days of fruit picking

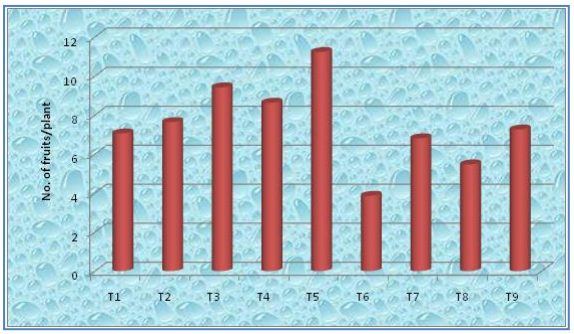

Fig-6 Response of phytoregulators on no. of fruits per plant

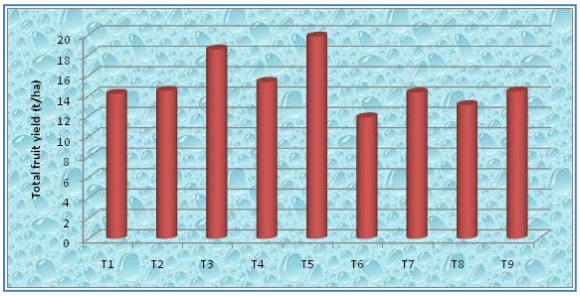

Fig-7 Response of phytoregulators on total fruit yield (t/ha)

Conclusions

The results presented herein allow the affirmation that in the place where these experiments were conducted the production obtained with CPPU is similar to that obtained by using pollinator insects. The maximum fruit set percent (95.33%) as well as highest yield of muskmelon (41.00 t/ha) was recorded under the treatment T5 (Pollination+ 40 ppm CPPU). Thus, the yield was increased in pollinated condition which was higher than control. Application of suitable concentration of CPPU along with pollination is proved to be best for increasing fruit retention, and yield of muskmelon. Pollination requirement of the crop can easily be fulfilled during round the year.

Application of research:

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Author Contributions: All author equally contributed

Abbreviations:

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

Conflict of Interest: None declared

References

[1] Anonymous (2014-2015) Horticuluture Statistics Division, FAC &FW.
[2] Retamales J., Bangerth F., Cooper T. and Callejas R. (1995) *Acta Horticulturae,* 394, 81-83.
[3] Banyal A. K., Raina R. and Kaler R. K. (2013) *J Krishi Vigyan,* 2(1), 30-32.
[4] Hayata Y., Niimi Y., Inoue K. and Kondo S. (2000) *Hort. Science,* 35(5), 868–870.
[5] Fathi M. A., Azza I. Mohamed and Abd El-Bary A. (2011) *Nature and Science,* 2011, 9(8).
[6] Hou L., Hao H., and Yu X. (2011) Application of CPPU on muskmelon alters fruit size and quality. Global science books.
[7] Huitro´n M.V., Diaz M., Diaznez F., and Camacho F. (2007) *Hort. Science,* 42(3), 559–564.
[8] Needed Huitron M.V., Diaz M., Dianez F., Camacho F. (2007) *J Food Agric Environ* 5:344-348.
[9] Abd El Raheem M.E., Abd El- Rahman G.F., Hoda M. Mohamed and Elharony S.B. (2013) *Nature and Science*, 11(6), 13-21.
[10] Abd El-Rahman G.F., Hoda M. Mohamed and Ensherah A.H.Tayh (2012) *Nature and Science*, 10(1), 148-157.
[11] El- Sabagh A.S. (2002) *Alex. J. Agric. Res.,* 47(3), 85-92.