Biological Forum – An International Journal **16(12): 18-23(2024)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Effect of Date of Sowing and Plant Growth Regulators in Snap Melon [*Cucumis melo* L. var. momordica (Roxb.)]

Sunil Kumar Gola[1], Sanjay Kumar[1], Naveen Kumar[2], Uday Singh[1*] and Sunil Kumar[1]
[1]Department of Vegetable Science, CCS haryana Agricultural University, Hisar (Haryana), India.
[2]Maharana Pratap Horticultural University, Karnal (Haryana), India.

(Corresponding author: Uday Singh[*])
(Received: 28 August 2024; Revised: 29 September 2024; Accepted: 30 October 2024; Published: 14 December 2024)
(Published by Research Trend)

ABSTRACT: The experiment entitled "Effect of date of sowing and plant growth regulators in Snap melon [*Cucumis melo* L. var. momordica (Roxb.)]" was conducted at Research Farm, Department of Vegetable Science, CCS Haryana Agricultural University Hisar, during 2022-23 and 2023-24 with four different dates of sowing: D1(15th May), D2 (30th May), D3 (15thJune) and D4 (30th June) and seven concentrations of plant growth regulators *viz.,* (Ethrel @50ppm, Ethrel @75 ppm, Ethrel @100ppm, Cycocel @ 50 ppm, Cycocel @ 100 ppm, Cycocel @200 ppm) with control (water spray) were laid out in split plot design with three replications. According to pooled mean results maximum field emergence, was recorded on 15th May date of sowing in application of treatment Ethrel @100 ppm. The maximum number of primary branches, number of secondary branches and minimum inter-nodal length were recorded when crop sown on 30th June with application of treatment Ethrel @100ppm and minimum number of primary branches, number of secondary branches and maximum inter-nodal length was observed when sown on 15th May in control.

Keywords: Plant growth regulators, Ethrel, CCC, germination, branches.

INTRODUCTION

Snap melon [*Cucumis melo* L. var. *momordica* (Roxb.)] belonging to family Cucurbitaceae having chromosome number 2n=2x= 24 is native to India and commonly known as 'phoot' which means to split as the fruit tends to split either from the middle or longitudinally. It is also called as phootkakari Dhillon *et al.* (2007). Snap melons can be consumed in raw and cooked forms, and used in various ways. Ripe fruit can be used to make desserts because of its sweet flavour. Snap melon is a warm season crop and majorly grown in tropical and subtropical regions. The optimum temperature for seed germination is 18-25°C. While for plant growth is 22°C and it can vary from 15-32°C. Climatic factors will play an important role in sex expression. Crop is grown on wide range of soil but it grows best in sandy loam or loam soils rich in organic matter. The optimum pH for plant growth is 6.5-7.5. In India, it is widely cultivated in states of Gujarat, Rajasthan, Haryana, Punjab, West Bengal, Uttar Pradesh and few areas of North Eastern states Hazara *et al*. (2011).

Plant growth regulators play a vital role in various physiological and biochemical processes in plants and is well known to have an effect on producing of early flowers, ratio of male: female flower, fruit setting, yield and weight of fruits. Initiation of flower bud, development of flowers and fruits are controlled by physiological process. In many agricultural plants, these processes can often be used to alter by proper application of the plant growth substances. Exogenous application of growth regulators has shifted the sex expression by increasing the production of female flower and suppressing that of male flower in cucurbits (Farhana, 2015).

Ethrel slow down the cell division and cell elongation in meristematic tissue of shoot and regulated the plant height without change in the morphology and physiology of the plant (Hill *et al*., 2010). Ethrel increases female flowering and ultimately increases the number of fruits per vine of cucurbits which ultimately increases the average yield of the entire cultivated field (Patel *et al*., 2017). Ethrel is used for more number of female flowers due to its property of better development of gynoecium, fruit ripening, stress induction and lateral cell expansion. Ethrel has been most effective including early flowering and increases femaleness at lower concentration (Farhana, 2015).

Cycocel (CCC) is a plant growth regulator which is anti-gibberelic in nature. It inhibits cell elongation, resulting in thicker stalks, which are more sturdier and is also having the effects like enhancement in numbers of female flowers per vine, low male: female ratio in the cucurbitaceous plants, lesser vine length and also reduces the days to first female flowering which is an essential attribute to high yield and earliness.

MATERIALS AND METHODS

A. Site description

The experiment was carried out at the Research Farm of the Department of Vegetable Science, CCS Haryana Agricultural University, Hisar, Haryana during during 2022-23 and 2023-24 with four different dates of sowing D1(15th May), D2 (30th May), D3 (15th June) and D4 (30th June) and seven concentrations of plant growth regulators (Ethrel @50ppm, Ethrel @75 ppm, Ethrel @100ppm, Cycocel @ 50 ppm, Cycocel @ 100 ppm, Cycocel @200 ppm) with control (water spray). The soil of the experimental field was non-saline, sandy loam in texture, medium in organic carbon, low in available nitrogen, high in available phosphorus and rich in available potassium..The experiment was conducted in Split Plot Design (SPD) having 28 treatments.

The seeds of snap melon was done on four different dates as per the treatment details mentioned in the treatments. Two to three seeds were sown per hill about 3 to 4 cm depth at spacing 2.0 × 0.5 m. When the seedlings attained 10-15 cm height or two to three leaves stage and hard enough then one healthy seedling was selected to remain in each pit and others were thinned out.

Growth attributes *viz.*, to measure field emergence percentage (%) were recorded from date of sowing to date of germination for five plants in each treatment. No. of primary branches were counted which were emerged from main vine, five randomly plants selected from each plot and results were average, no. of secondary branches emerged from primary branches were counted from randomly selected five plants from each plot and averaged, Internodal length was counted with the help of simple hand scale, after 60 days of sowing internodal length between 10th to 15th nodes were calculated and averaged of 5 nodes from randomly five selected plants from each plot.

B. Treatments details:

Treatment A	Dates of sowing (4)
D1	15 May
D2	30 May
D3	15 June
D4	30 June
Treatment B	**Plant growth regulator**
P0	Control (water spray)
P1	Ethrel @ 50 ppm
P2	Ethrel @ 75 ppm
P3	Ethrel @ 100 ppm
P4	Cycocel @ 50 ppm
P5	Cycocel @ 100 ppm
P6	Cycocel @ 200 ppm

C. Measurements

Germination percentage was recorded from date of sowing to date of germination for five plants in each treatment. The number of seeds germinated and seedlings established in each plot was recorded for survival percentage of plant at 30 days after sowing at 30 days after sowing. The branches were counted for number of primary branches which were emerged from main vine, five randomly plants selected from each plot and results were average. The branches emerged from primary branches were counted for number of secondary branches from randomly selected five plants from each plot and averaged.

D. Statistical Analysis

The experiment was laid out in split plot design (SPD) and incompletely randomized design (CRD) for field and laboratory parameters, respectively. The data obtained from experiment conducted in RBD and CRD were analyzed as per standard method suggested by Panse and Sukhatme (1985). The data observed for the various characters during the study were statistically analyzed following the technique of analysis of variance (ANOVA). The significance of difference between mean of two treatments were judge with the critical difference(CD)worked out using following formula:

$$CD = \frac{2 \times \text{Mean square error}}{n} \times 't'$$

Where, CD = Critical difference

n = Number of replications of the factor for which C.D. is to be calculated.

t = The value from fisher table for error degree of freedom at 5 per cent level of significance.

RESULTS AND DISCUSSION

A. Field emergence percentage (%)

The data pertaining to the effect of different sowing dates and plant growth regulators (PGRs) on the field emergence percentage (%) of snap melon for both year and pooled mean (2022-23 and 2023-24) is presented in Table 1. Among various dates of sowing, the highest field emergence percentage (93.5%, 90.2% and 91.9%) was recorded on when sowing was done on 15thMay Which, was statistically at par with 30thMay date of sowing (91.9%, 88.5% and 90.2%) during 2022-23, 2023-24 and pooled data, respectively. While, the minimum field emergence percentage (83.4%, 81.8% and 82.6%) was observed on 30thJune sowing date during 2022-23, 2023-24 and pooled data, respectively. This might be due to availability of the suitable micro-climate due to presence of optimal air temperature, relative humidity and light intensity during sowing date (*i.e.,* 15th May) and thereafter during germination or emergence and all growth stages which promoted better seed emergence.

Among the different plant growth regulators, the foliar application of treatment P3 (Ethrel @100 ppm) at two and four true leaves stages recorded the maximum field emergence (92.8%, 90.0% and 91.4%), which was statistically at par with the treatment Ethrel @75 ppm (P2- 88.82, 86.89 and 87.86)and with application of Cycocel @200 ppm (P6- 91.0%, 88.0% and 89.5%) during 2022-23, 2023-24 and pooled data, respectively. However, the minimum control treatment P0 (water spray) resulted in the lowest emergence with a pooled mean of 84.2%, which was significantly lower than all PGR-treated plants. The interaction between sowing dates and plant growth regulators was found to be non-significant.

Table 1: Effect of date of sowing and plant growth regulators on field emergence percentage (%).

Treatments	Field emergence %		Pooled Mean
	2022-23	2023-24	
Date of sowing			
15-May	93.5	90.2	91.9
30-May	91.9	88.5	90.2
15-June	89.1	86.1	87.6
30-June	83.4	81.8	82.6
CD at 5%	3.8	4.0	4.2
Plant growth regulators			
P0:Control (water spray)	84.9	83.5	84.2
P1:Ethrel @ 50 ppm	88.7	85.1	86.9
P2:Ethrel @ 75 ppm	91.6	88.8	90.2
P3:Ethrel @ 100 ppm	92.8	90.0	91.4
P4:Cycocel @ 50 ppm	87.6	84.5	86.0
P5:Cycocel @ 100 ppm	89.6	86.6	88.1
P6:Cycocel @ 200 ppm	91.0	88.0	89.5
CD at 5%	4.3	4.9	4.5
Interaction (Sowing dates × PGR)	NS		

B. No. of primary branches

Data presented in Table 2 indicated that dates of sowing and plant growth regulators (PGRs) influenced the number of primary branches per plant in snap melon significantly. However, the interactions between sowing dates and plant growth regulators were found to be non-significant. Among the sowing dates, the maximum number of primary branches (6.12, 5.95 and 6.04) was recorded on 30th June. This was followed by 15th June (5.70, 5.65, and 5.67). Whereas, the minimum number of primary branches was observed when sown on 15th May (4.47, 4.15, and 4.31) across the respective years and pooled data.

Data further revealed that the highest number of primary branches (6.25, 5.93, and 6.09) was recorded with the application of treatment P3 (Ethrel @100 ppm) at 2 and 4 true leaves, which was statistically at par with P2 (Ethrel @75 ppm), which recorded values (5.93, 5.71, and 5.82) and P6 (5.70, 5.53, and 5.61). However, minimum number of primary branches (4.73, 4.58 and 4.66) was observed in control treatment, P0 (water spray) in the corresponding years and pooled data.

Table 2: Effect of date of sowing and plant growth regulators on no. of primary branches in snap melon.

Treatments	No. of primary branches		Pooled Mean
	2022-23	2023-24	
Date of sowing			
15-May	4.47	4.15	4.31
30-May	5.33	5.29	5.31
15-June	5.70	5.65	5.67
30-June	6.12	5.95	6.04
CD at 5%	0.61	0.51	0.55
Plant growth regulators			
P0:Control (water spray)	4.73	4.58	4.66
P1:Ethrel @ 50 ppm	5.03	5.02	5.03
P2:Ethrel @ 75 ppm	5.93	5.71	5.82
P3:Ethrel @ 100 ppm	6.25	5.93	6.09
P4:Cycocel @ 50 ppm	4.90	4.79	4.85
P5:Cycocel @ 100 ppm	5.30	5.26	5.28
P6:Cycocel @ 200 ppm	5.70	5.53	5.61
CD at 5%	0.57	0.46	0.51
Interaction (Sowing dates × PGR)	NS		

C. No. of secondary branches

The data related to effect of different sowing dates and plant growth regulators (PGRs) on number of secondary branches are depicted in Table 3 which clearly revealed that different sowing dates and plant growth regulators significantly influenced the number of branches per plant. Among the sowing dates, the maximum number of secondary branches (12.3) was observed on 30th June sowing dates during first year and it was recorded significantly at par with the 15th June sowing date (12.1) while, minimum number of secondary branches (10.6) was recorded on 15th May date of sowing. During second year of experimentation, the treatment almost followed the same order and were in line with the findings of first year.

Among different plant growth regulators, the treatment P3 (Ethrel @100 ppm) exhibited the highest number of secondary branches, (12.2, 11.8 and 12.0) and it was statistically at par with treatment P2 (Ethrel @75 ppm), which recorded (12.0, 11.6 and 11.8), and P6 (Cycocel @200 ppm), which showed values of (11.8, 11.5 and 11.6) during both season and pooled data, respectively. Whereas, the lowest number of secondary branches (10.5, 9.6 and 10.0) was observed in the control treatment, P0 (water spray), significantly lower than all PGR-treated plants. The interaction effect between sowing dates and plant growth regulators was found to be non-significant.

Table 3: Effect of date of sowing and plant growth regulators on no. of secondary branches in snap melon.

Treatments	No. of secondary branches		Pooled Mean
	2022-23	2023-24	
Date of sowing			
15-May	10.6	9.7	10.1
30-May	11.2	10.8	11.0
15-June	12.1	11.7	11.9
30-June	12.3	11.9	12.1
CD at 5%	0.9	1.0	0.9
Plant growth regulators			
P0:Control (water spray)	10.5	9.6	10.0
P1:Ethrel @ 50 ppm	11.4	11.1	11.2
P2:Ethrel @ 75 ppm	12.0	11.6	11.8
P3:Ethrel @ 100 ppm	12.2	11.8	12.0
P4:Cycocel @ 50 ppm	11.3	10.5	10.9
P5:Cycocel @ 100 ppm	11.5	11.2	11.4
P6:Cycocel @ 200 ppm	11.8	11.5	11.6
CD at 5%	0.7	0.6	0.7
Interaction (Sowing dates × PGR)	NS		

D. Internodal length (cm)

The interaction of date of sowing and plant growth regulators was found non-significant. Data regarding internodal length of snap melon as affected by dates of sowing and plant growth regulators have been presented in Table 4. It is clear from the table that internodal length decreased as the planting delayed. Internodal length was found significantly different from each other in respect of different sowing dates and plant growth regulators application. Among sowing dates minimum internodal length (5.33, 5.45 and 5.39 cm) was observed on 30th June date of sowing which was at par with 15th June (5.41, 5.59 and 5.50 cm) and 30th May (5.44, 5.63 and 5.54 cm) date of sowing during 2022-23, 2023-24, and pooled data, respectively.

Among plant growth regulators, the application of treatment at 2 and 4 true leaves stages, P3 (Ethrel @100 ppm) was recorded minimum internodal length (5.19, 5.37 and 5.28 cm) which was statistically at par with treatment, P2 (Ethrel @75 ppm), P5 (Cycocel @ 100 ppm) and P6 (Cycocel @200 ppm). However, the highest internodal length (5.66, 5.98 and 5.82 cm) was observed in the control treatment, P0 (water spray) in 2022-23, 2023-24, and pooled data, respectively.

Table 4: Effect of date of sowing and plant growth regulators on internodal length (cm)in snap melon.

Treatments	Internodal length		Pooled Mean
	2022-23	2023-24	
Date of sowing			
15-May	5.50	5.69	5.60
30-May	5.44	5.63	5.54
15-June	5.41	5.59	5.50
30-June	5.33	5.45	5.39
CD at 5%	0.15	0.19	0.16
Plant growth regulators			
P0:Control (water spray)	5.66	5.98	5.82
P1:Ethrel @ 50 ppm	5.49	5.62	5.56
P2:Ethrel @ 75 ppm	5.28	5.43	5.36
P3:Ethrel @ 100 ppm	5.19	5.37	5.28
P4:Cycocel @ 50 ppm	5.57	5.68	5.63
P5:Cycocel @ 100 ppm	5.42	5.55	5.46
P6:Cycocel @ 200 ppm	5.35	5.49	5.45
CD at 5%	0.23	0.21	0.18
Interaction (Sowing dates × PGR)	NS		

The results associated with the growth attributes that is field emergence percentage (%), number of primary branches, number of secondary branches and inter-nodal length indicated that the growth attributing characters differed significantly with different sowing dates during both the years of study 2022-23, 2023-24, and pooled data, respectively. According to pooled analysis the field emergence percentage (91.9 %), was maximum on 15thMay date of sowing. This might be due to the availability of favourable environmental conditions to the crop, and minimum (82.6 %) was recorded on 30th June it might be due to variation in temperature which affected the germination percentage. The findings also correlate the results of Khan *et al.* (2001) who observed maximum germination of (99.25 %) in Tinda gourd when planted on 20th March as compared to other sowing times. Similar results were also reported by Pandit *et al.* (2011); Burki (1996); Thompson and Kelly (1982).

According to pooled analysis the maximum number of primary branches (6.04), number of secondary branches (12.1) and minimum inter-nodal length (5.39 cm) was recorded when crop sown on 30thJune and minimum number of primary branches (4.31), number of secondary branches (10.1) and maximum inter-nodal length (5.60 cm) was observed when sown on 15th May. This might be due to availability of the suitable micro-climate due to presence of optimal air temperature, relative humidity and light intensity during sowing date of 15th June and 30th June of snap melon plants. Similar conclusions were reported by Bellad and Hiremath (2018) in watermelon, Kamali *et al.* (2016) in bitter gourd, and Kumar *et al*. (2015) in bottle gourd.

Among plant growth regulators (PGRs) influenced the field emergence (%), number of primary branches per plant, number of secondary branches and inter-nodal length in snap melon significantly. According to pooled mean analysis the maximum field emergence percentage (91.4 %), number of primary branches (6.09), number of secondary branches (12.0) and minimum inter-nodal length (5.28 cm) was with the application of treatment P3 (Ethrel @100 ppm) at 2 and 4 true leaves stages which was at par with treatment P2 (Ethrel @75 ppm) and the lowest field emergence percentage (84.2 %), number of primary branches (4.66), number of secondary branches (10.0) and maximum inter-nodal length (5.82 cm) was observed in the control treatment, P0 (water spray). This might be due to the ability of ethrel to retard stem elongation, promote lateral branching and manipulate flowering date. Since, ethylene acts as antigibberellins (Hayashi et al., 2001). These findings are in close accordance with the results of Chaurasiya *et al.* (2016) in muskmelon. This result can be attributed to the reason that application of ethrel inhibits both the cell division and cell elongation in the meristematic shoots resulting in production of shorter shoots, as reported by Thappa *et al.* (2011). The results of the present study are in conformity with the reports of Arora *et al.* (1994). They stated that the ethephon at 250 mg per liter resulted in the shortest inter-nodal length in long melon crop.

CONCLUSION

On the basis of present study it may be concluded that maximum number of branches and minimum intermodal length of snap melon was recorded when crop sown on 30th June with the application of plant growth regulators Ethrel @100 ppm at 2 and 4 true leaves stages which was statistically at par with 15th June date of sowing under Haryana conditions.

REFERENCES

Arora, S. K., Pandita, M. L., Pandita, P. S. and Batra, B. R. (1994). Response of long melon (*Cucumis melo* var. *utilissimus*) to foliar application of plant-growth substances. *Indian Journal of Agricultural Sciences*, *64*(2), 841–844.

Bellad, S. B., and Umesh, H. (2018). Effect of sowing date, spacing and fertilizer levels on crop growth and seed yield of hybrid watermelon. *Environment and Ecology*, *36*(2), 498-507.

Burki, A. Q. (1996). Effect of different sowing dates on the yield and quality of tinda gourd var. *fistulosus* under the agro-climatic conditions of deraismail khan. M.Sc. Thesis, Department of Horticulture, Faculty of Agriculture, Gomal University, DI Khan, Pakistan.

Chaurasiya, J., Verma, R. B., Ahmad, M., Adarsh, A., Kumar, R. and Pratap, T. (2016). Influence of plant growth regulators on growth, sex expression, yield and quality of muskmelon (*Cucumis melo* L.). *Ecology, Environment and Conservation*, *22,* 39-43.

Dhillon, N.P.S., Ranjana, R., Singh, K., Eduardo, I., Monforte, A.J., Pitrat, M., Dhillon, N. K. and Singh, P. P. (2007). Diversity among landraces of Indian snap melon (*Cucumis melo* var. *momordica*). *Genetic Resource Crop Evolution*, *54*(6), 1267-1283.

Dufault, R. J., Korkmaz, A., Ward, B. K. and Hassel, R. (2006). Planting date and cultivar affect melon quality and productivity. *Horticulture Science*, *41*(7), 1559-1564

Farhana, U. (2015). Effect of plant growth regulators on flowering behaviour and yield of cucumber. M.Sc. (Agri. Botany), Thesis (Unpublished). Department of Agricultural Botany, Sher-e-Bangla Agricultural University, Dhaka.

Hayashi, T., Heins, R. D., Cameron, A. C. and Carlson, W. H. (2001). Ethephon influences flowering, height and branching of several herbaceous perennials. *Horticulture Science*, *91*, 305-324.

Hazara, P., Chattopadhyay, A., Karmakar, K. and Dutta, S. (2011). Modern technology in vegetable production. New India Publication Agency, New Delhi, pp. 413.

Hill, J. S., Vyakarnahal, B. S., Biradar, D. P. and Ravi H. (2010). Effect of growth regulators and stages of spray on growth, fruit set and seed yield of ridge gourd (*Luffa acutangula* C. Roxb). *Karnataka Journal of Agricultural Science*, *23*(2), 239-242.

Kamali, S., Moaveni, P., Valadabadi, S. A., and Mehraban, A. (2016). Effects of sowing date on the morphological traits and fruit yield of bitter ground. *Journal of Agricultural and Biolological Science*, *11*(12), 458-462.

Khan, A. Q., Iqbal, M., Jilani, M. S., Ghaffoor, A. and Waseem, K. (2001). Effect of different sowing dates on the yield of Tinda Gourd (*Citrullus vulgaris*) Var. *Fistulosus* under the Agro climatic conditions of D.I. Khan. *Online Journal of Biological Science*, *1*(4), 235-237.

Kumar, S. K., Batra, V. K., Partap, P. S., and Narender Kumar, N. K. (2015). Early season cultivation of

bottle gourd: effect of dates of sowing and growing conditions on different growth parameters, 1139-1143.
Pandit, M. K., Pal, P. K. and Das, B. K. (2010). Effect of date of sowing on flowering and incidence and damage of melon fruit fly in snap melon (*Cucumis melo* var. *momordica*) genotypes. *Journal of Plant Protection science, 2*(1), 86-91.
Panse, V. G. and Sukhatme, P. V. (1985). Statistical Methods for Agricultural Workers. Indian Council of Agricultural Research, New Delhi
Patel, A. N., Parmar, V. K., Nayak, S. R. and Patel, N. M. (2017). Influence of pinching and plant growth regulators on morphological and sex expression of bottle gourd (*Lagenaria siceraria* L.). *International Journal of Chemical Studies, 5*(4), 2035-2038.
Thappa, M., Kumar, S. and Rafiq, R. (2011). Influence of plant growth regulators on morphological, floral, and yield traits of cucumber (*Cucumis sativus* L.). *Kasetsart Journal (Naural Scence)*, *45,* 177-188
Thompson, H. C. and Kelly, C. W. (1982). Vegetables crops. 5th Edition. Reprint 1982 McGraw Hill. Publ. Company. pp. 611.

How to cite this article: Sunil Kumar Gola, Sanjay Kumar, Naveen Kumar, Uday Singh and Sunil Kumar (2024). Effect of Date of Sowing and Plant Growth Regulators in Snap Melon [*Cucumis melo* L. var. momordica (Roxb.)]. *Biological Forum – An International Journal, 16*(12): 18-23.