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EFFECT OF CYCOCEL ON GROWTH, YIELD AND QUALITY OF TOMATO (*Lycopersicon esculentum* MILL.)

Jitendra Kumar, Madan Lal[1] and Krishan Pal

Department of Horticulture, University Teaching Departments, Chaudhary Charan Singh University Campus, Meerut-250 005 Uttar Pradesh, India.

[1]Department of Horticulture, Allahabad Agricultural Institute, Allahabad–211 007, U.P., India.

E.mail.- dhaka1968@gmail.com

ABSTRACT: The yield of any crop is influenced by a number of factors. Therefore, an investigation was carried out to determine the effect of different rates of Cycocel on growth, yield and quality of tomato. The findings carried out on tomato, revealed that the application of cycocel at 300 ppm brought about the best results. Cycocel as retardant (CCC) exhibited the capacity for profuse branching, higher leaf count, higher flower cluster and better yield per plant as compared to control.

Keywords : *Tomato, cycocel, growth parameter, yield, quality.*

Tomato belonging to the family Solanaceae is one of the most popular vegetable of the world. But the production and productivity of this crop in India is for below as compared to the global scenario. The quantity being produced is insufficient to feed our burgeoning population. So, it is clear that our tomato production must increased greatly.

Discovery of the chemicals which retard plant growth without such side effects dates back to 1949. Among the new group of quaternary ammonium compounds, the most active compound is (2-chloroethyl trimethyl-ammonium chloride), an analog of choline, in that the hypodryxyl group in choline was replaced by a chlorine substituent. It is named as chlorocholine chloride which was abbreviated as CCC and commercially known as cycocel. This was proved to be most effective chemical as it retarded growth of a larger number of species than any other compound. Many scientists have been trying to control the stem elongation of vegetable plants by the application of growth retarding chemicals, which retard stem elongation and thereby increases green colour of leaves and indirectly affect the flowering and fruiting. Hence, the present experiment was conducted to elucidate the information on the effect of cycocel on growth, yield and quality of tomato cv. Angurlata.

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MATERIALS AND METHODS

The present investigation was conducted at Research Farm, Department of Horticulture, Allahabad Agricultural Institute Allahabad during winter season. The experiment was laid out in randomized block design with 5 treatments, replicated 4 times. Treatments were cycocel 0 ppm or control, 500ppm, 1000ppm, 2000ppm, and 3000ppm spray. The gross plot size for each treatment was 3.5×1.5m. Tomato plants were planted at a spacing of 60cm×45cm. All the treatments were given in the form of foliar spray at 23 days after transplanting. The plants were sprayed by hand sprayer. The data on the growth parameters were recorded from a sample of three plants taken randomly at different intervals (30 and 50 DAT). Yield and quality aspects were recorded at harvest only and analyzed statistically.

RESULTS AND DISCUSSION

All the concentrations sprayed after twenty three days of transplanting suppressed the growth significantly at thirty and fifty days. The lowest height was recorded at the highest concentration (3000ppm) of cycocel followed by other concentrations i.e. 2000 ppm, 1000 ppm, 500 ppm, respectively. The spread per plant was recorded at two successive stages of growth and the degree of differences caused by different concentrations of CCC was recorded statistically, there was no

Table 1: Effect of different treatments of cycocel on growth parameters of tomato.

S. No.	Treatments	Plant height (cm)		Plant spread (cm)		No. of branches/plant		No. of leaves/plant	
		30 DAT	50 DAT	30 DAT	50 DAT	30 DAT	50 DAT	30 DAT	50 DAT
1.	T_1 (500 ppm cycocel)	31.50	40.74	23.50	38.38	13.50	12.13	29.05	40.30
2.	T_2 (1000 ppm cycocel)	30.54	45.39	24.83	39.24	11.50	14.24	29.85	47.10
3.	T_3 (2000 ppm cycocel)	26.69	41.81	25.25	39.99	13.50	14.75	29.89	47.89
4.	T_4 (3000 ppm cycocel)	27.67	37.97	25.17	40.62	13.67	15.88	30.25	48.25
5.	T_0 (Control No cycocel)	33.95	42.95	21.83	37.02	13.00	14.75	24.45	44.45
	C.D. (P = 0.05)	3.12	4.12	NS	NS	NS	NS	NS	NS

DAT : Days after treatment; NS : Non significant

Table 2 : Effect of different treatments of cycocel on flowering and yield of tomato.

S. No.	Treatments	No. of flower clusters/plant		No. of flowers/cluster		No. of fruits/plant		Total yield of fruits (q/ha)
		30 DAT	50 DAT	30 DAT	50 DAT	30 DAT	50 DAT	
1.	T_1 (500 ppm cycocel)	2.16	11.23	8.99	15.29	9.94	12.98	125.58
2.	T_2 (1000 ppm cycocel)	2.30	11.63	10.50	14.50	10.00	13.00	126.58
3.	T_3 (2000 ppm cycocel)	2.41	12.08	9.42	15.17	10.11	13.13	127.17
4.	T_4 (3000 ppm cycocel)	2.52	12.79	13.83	17.98	10.30	13.50	128.42
5.	T_0 (Control No cycocel)	1.41	10.60	7.33	11.38	9.75	12.83	116.25
	C.D. (P = 0.05)	0.17	4.12	NS	NS	NS	0.056	0.018

DAT : Days after treatment; NS : Non significant

significant differences among the spread of plants of various treatments at various stages of growth. The spread in the control was lowest as compared to all the CCC treated plants (Table 1).

Among the different cycocel treatments, the number of branches and number of leaves per plant were recorded at two successive stages of growth (30 DAT and 50 DAT). There was no significant differences among the treatments at various stages. However, it is evident from the Table 1 that maximum number of branches as well as leaves/plant were recorded on plants which were treated with 3000ppm cycocel. The other treatments also gave more number of branches than control. Thus, it seems that the reduction in terminal growth of the plant paved way to a better lateral growth. These observations are in agreement with the findings of Ali and Siddique (2) and Das and Prusty (4).

The differences in the flower clusters per plant was significant at 30 DAT and 50 DAT. All the treatments of CCC increased the number of flower clusters/plant at different stages (Table 2). Untreated plants produced minimum number of flower clusters/plant. These findings are similar with the report of Weichold (6). Among the number of flowers per cluster, a non-significant difference was noted at 30 and 50 days after treatment. However, 3000 ppm CCC spray produced maximum number of flowers/cluster. Significant differences was found among the treatments as for number of fruits per plant was concerned at 50 DAT only. It is evident from the Table 2 that cycocel 3000ppm gave maximum number of fruits

Table 3 : Effect of different treatment of cycocel on quality of fruits of tomato.

S.No.	Treatments	Volume of fruit (cm^3)	Vitamin C (mg/100g)	TSS (%)	Total titratable acidity (%)
1.	T_1 (500 ppm cycocel)	23.50	29.32	5.00	0.44
2.	T_2 (1000 ppm cycocel)	26.25	28.80	5.25	0.54
3.	T_3 (2000 ppm cycocel)	27.00	27.00	5.48	0.63
4.	T_4 (3000 ppm cycocel)	28.50	25.60	6.00	0.45
5.	T_0 (Control No cycocel)	23.00	31.04	4.50	0.34
	C.D. (P = 0.05)	2.51	NS	NS	NS

DAT : Days after treatment; NS : Non significant

followed by 2000ppm, 1000ppm and 500ppm. Untreated plants gave the minimum number of fruits. Thus, it is apparent that the retardation in the vegetative phase resulted in to increased reproductive phase. These findings are in confirmity with the finding of Abdalls *et al.* (1) and Bhujbal and Patil (3).

The total yield per hectare with treated plots was found to be more than a control plot (Table 2). Cycocel 3000ppm gave maximum fruit yield followed by 2000ppm, 1000ppm and 500ppm. Untreated plants produced minimum yield as compared to treated ones.

Among the different cycocel treatments. (Table 3), the volume of fruit was significantly increased with the increase in the concentration of growth retardant sprayed. Cycocel @ 300ppm gave maximum volume followed by 2000ppm, 1000ppm and 500ppm. Untreated plants produced fruits with lowest volume. Cycocel treatments reduced the vit 'C' content in the fruits at all levels (Table 3). Maximum vit 'C' content was found with the control. However, it was statistically non significant with all the concentration of cycocel sprayed. Total soluble solids (TSS) as well as total tritratable acidity could not be affected significantly with cycocel treatment. However, it was noted that acidity of fruit was increased linearly with every increase in cycocel concentration acidity. Thus, it is clear from the Table 3 that CCC 2000 ppm is optimum level of cycocel as far as total acidity of the fruit is concerned. These findings are in close conformity with the findings of Pandita *et al.* (5).

From the present study application of cycocel recommended as a more effective growth retardant. In this study carried out on Angurlata it was found that the application of cycocel at Cycocel as a growth retardant exhibited the capacity for propuse branching, higher leaf count, higher flower cluster and better yield per plot as compared to control. Thus, it may be concluded that better results can be obtained by the application of 3000 ppm CCC on Angurlata variety of tomato.

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