

Effect of Phytohormones on the Morphological Parameters on 40, 55 and 70 Days in Sunflower (*Helianthus Annuus L*)

ADESH KUMAR AND V. K. BHATNAGAR

Dept. of Botany, Hindu (P.G.) College, Moradabad

Abstract

The experiment on the effect of GA₃, Cycocel and Ethepon on vegetable growth (Plant height, leaf number, stem diameter) on cultivar G.H.S. 323 on different days. Leaf number and plant height was increased consistently only by GA₃ application at all the growth stages. The effect of other hormones on leaf number and plant height varied with concentration and age of the plants. The plant growth regulators (P.G.R.) are an organic compounds that modify plant physiological process. Phytohormones applied to the field crops promote, stimulated plant growth improve flowering and protects plants against unfavourable year weather conditions.

Keyword – GA₃, Cycocel, Ethepon, Sunflower plants

Introduction

Sunflower is an important source of oil and proteins necessary of development of healthy humans. By producing sunflower seeds, the main gains a possibility to use oil and proteins in different forms. The content of the observe parameters varies and depends on numerous factors. The sunflower seed, yield and good quality, edible oil which possesses pleasant flavor, high keeping quality and can be used like any other oil of the sunflower oil has a fatty acid composition of palmitic acid 5.7 to 7.6 percent olic acid 27.9 to 7.6 percent and lenolic acid 51.6 to 59.6 percent. Del planque (2000 ab) reported that traditional sunflower oil in the major polyunsaturated oil content in linoleic acid which is being used for many years in human nutrition to replace saturated fat. GA₃ (200 ppm) in created the germination percentage and seedling height in sunflower C_v 323. Adesh Kumar et al., (2010). The wide adaptability, greater yield potential, short duration, photo insensitivity and high oil content (35-45%) are some of the asset of this crop. Although work on agronomy breeding and disease resistance of sunflower has progressed significantly very little physiological work has been under taken on this potentially important crop. Cycocel application affects the height of the plant, number and colour of leaves, number and sizes of flower and fruits set Down and Cottey (1960).

During recent years, the application of Phytohormones has increased tremendously for the

betterment and improvement of Agriculture and horticulture crops. Synthetic plant bio regulates at proper concentrations and manner of their application may result in increased production in oil crops and other crops. The phytohormones include a large number of synthetic and naturally produced compounds which bring about magnus vegetative and reproductive changes when applied at proper concentration and in an appropriate manner at suitable stage at plant growth. Cycocel has been reported to alter the chemical composition of fruits Bhatnagar and Bisar (1978).

Discover of phytohormones has opened new vistas up on the horizon of crop production. They have provided man with a powerful means of stimulating the growth and development of the plant. It is the plant growth and development of the plants. It is the plant growth regulatant their so called magic substance, without a practical of magic that make plant growth ton mammoth size. GA₃ application increased the height of plant and no. of leaves in *Spinacia Oleraceae* Gonzaliz et al., (1983). It has been confirmed by researches that from the very beginning of life of a plant, there is a dominance of plant hormones/regulators that governs all the vital activities inside the plant body at early stage till the death. Zack and Loy (1984) reported that GA₃ significantly enhanced thypocoty elogalion in *Catrullus lanatus*.

Materials and Methods

The present investigations were carried out to

explore the effects of three growth regulators viz. Cycocel, Ethephon and GA₃ at different concentration (10, 25, 50, 100, 200, 400, 800) on plant height, leaf number, stem diameter (cm) at 40, 55, 70 days. The variety 'NSFH 45' (Swathi) was selected as experimental plant material in the present investigation. This variety was selected because it is recently introduced and also because it is suitable for growing throughout the year. It matures in 90-95 days in Kharif, in 120-125 days in Rabi and in 90-140 days when sown in spring. The middle of January to the end of February the optimum time in any time of year. Keeping in view the effect of phytohormones on growth development and oil content, side by side demand of supply of sunflower oil, the present investigation will be taken the role of growth regulators on *Helianthus annuus* L.

Seed GHS – 323: Seed elliptical with a broad base and narrowed at the tip, seed coloured and seed surface, smooth, elevated on both surface Karnel, soft, yellowish white in colour, testa flexible, softer.

Source of chemical

All chemical employed in this investigation were of analytical grade supplied by BDH (India) unless specified otherwise.

Dehydrated absolute ethyl alcohol was supplied by Bengal chemical company India. Etheral was supplied by Duchem, U.S.A., Gibberellic acid supplied by CDH (Central Drug House P. Ltd., Post Box No. 7138, New Delhi – 110002.)

Fertilizer and other chemicals

Urea, Single super phosphate and muriate of potash (Gujarat fertilizer) were obtained from crop research centre, G.B. Pant University of Agriculture and Technology, Pantnagar. Diathane N-45 and Sandovit were also obtained from crop research centre, Pantnagar.

Apparatus

1. All glassware used was either of coming India Ltd. or Pyrez, U.S.A.
2. Vacuum Pump (Matrex India)
3. Spekhal (Carl Zeiss Jena-DDR)
4. Luxmeter (Research –Luxomet-300)
5. Blender (Matrex, India)
6. Measuring Slender
7. Air Hand Sprayer

Field culture

For exposure to estimate photosynthesis efficiency of individual leaves, a plot (19.20 x 12.75 m) was selected. A Normal dose of keeping, Normal

distance recommended for sunflower. After 10 days seedling were thin to twenty.

Preparation of hormones solution

To prepare stock solution of different hormones, the following additions were made per litre. Deionized water was used for solution preparations.

Hormones	Amount added/ litre (mgs)	Concentration (ppm)
Gibberellic Acid	100	100
Cycocel	50	50
Ethephon (1ml=400 mg)	1.25 ml	500

Gibberellic acid and Ethephon were directly dissolved in water. Cycocel was first dissolved in a few drops of absolute ethyl alcohol and then required volume was made by deionized water 0.22 ml of Sandevit per litre of hormone solution was added as a Surfactant.

Spraying stages

1. 40 days after seedling emergence.
2. 55 days after seedling emergence. (Bud initiation stage)
3. 70 days after seedling emergence (flowering state)

Methods and Materials

Experimental site was selected at TMIMT farm house, Delhi Road, Pakwara, Moradabad. The research field was situated in TMIMT Research centre and equipped with all accessories and equipment's for irrigation. After harvesting the previous crop through ploughing was given and left as such as for a couple of days. This was followed again by ploughing, planking and finally leveling. Farmyard manure was applied in good amount at the time of land preparation with the help of measuring tape flags and ropes the required area 19.20 meter x 12.75 meter was measured and divided into 66 sub-plots in three block or replication as per plan of layout.

Completely randomized design none used for statistical analysis of experiments. The chemical treatments, being the major importance were kept in the sub plot. The experiment was conducted with 21 treatments and one control. All the treatments were replicated three times. Thus, there were 66 sub plots in all.

1. Total number of treatment - 22
2. Number of replicates - 03
3. Row to row distance - 60 cm
4. Plant to plant distance - 30 cm
5. Sowing distance - 60 x 30 cm
6. No. of plant/treatments - 30
7. No. of rows/treatments - 03

8. Total number of sub-plat	- 21 x 3=66
9. Total number of plant	- 1980
10. Plot size	- 792 m
11. Total experimental area	- 760.32

Results and Discussion

Data obtained for leaf no, plant height, stem diameter (cm) of plants given different treatments were statistically significant (Table 1, 2 and 3). Plant height are increasing in Cycocel and Gibberellic acid but decrease in Ethephon compared to control (water) in 40, 55, 70 days. Leaf number is increasing (25.28) in GA₃ in different concentration but Cycocel & Ethephon, leaf number decrease compare to control (water) in 40, 55, 70 days. Bottom, middle, top (stem diameter) increase in ethephon, cycocel but decrease in GA₃ comparing to control (water) in 40 days. 55 and 70 days Botton, middle, top (stem diameter) increase in Cycocel, GA₃, Ethephon comparing to control stem diameter at the bottom, middle and top

positions are affected by different treatments were found significant.

Data on plant height as affected by various phytohormones spray reveals that GA₃ in only hormones which consistently increased the plant height when applied at any of the three growth states (40, 55 and 70 days). Leaf number was increased consistently only by GA₃ application at all the growth stages. The effect of other hormones on leaf number varied with concentration and age of plant. Travis (1973) also observed that the increase in plant height by GA₃ application was more pronounced in the dwarf sunflower cultivar than in the tall cultivars. GA₃ (10 ppm, 25 ppm, 100 ppm, 200 ppm and 400 ppm) give best result (plant height, leaf number, stem diameter) comprise of Cycocel & Ethephon (different concentration) in sunflower crop at 40, 55, 70 days.

Table 1: Effect of Photohormones Sprays to 40 Days Old Sunflower Plants on Plant Height, Leaf Number and Stem Diameter Recorded after Three Weeks of Spray

Treatments		Plant height (m)	Leaf Number	Stem diameter (cm)			
Phytohormones	Conc. (ppm)			Bottom	Middle	Top	
Water	Cycocel	-	96.00	21.95	3.45	2.44	1.93
		10	108.0	20.92	3.56	2.54	2.52
		25	102.84	20.22	3.82	2.80	2.30
		50	100.26	19.62	3.95	2.93	2.42
		100	98.43	19.78	4.12	3.10	2.60
		200	96.23	18.82	4.38	3.36	2.86
		400	94.65	18.72	4.56	3.54	3.04
		800	84.50	17.90	4.88	3.85	3.34
GA ₃		10	119.12	25.28	3.26	2.18	1.70
		25	122.46	25.33	3.10	2.08	1.60
		50	123.32	26.52	3.00	2.00	1.52
		100	125.45	27.46	2.78	1.76	1.36
		200	126.82	29.57	2.52	1.58	1.22
		400	126.30	30.62	2.32	1.30	1.15
		800	128.40	30.85	2.18	1.26	1.02
	Ethephon		10	82.84	17.50	4.27	3.25
		25	81.77	17.27	4.38	3.36	2.85
		50	80.52	16.50	4.55	3.52	3.02
		100	78.58	16.30	4.70	3.68	3.18
		200	76.16	15.42	4.94	3.90	3.40
		400	75.07	15.32	5.20	4.18	3.72
		800	74.84	14.56	5.64	4.62	4.12
SEm±		-	3.84	1.71	1.20	1.27	1.87
CD	-	12.33	5.48	1.62	1.36	1.80	

Table 2: Effect of Phytohormones Sprays to 55 Days old sunflower plants on Plant Height, Leaf Number & Stem Diameter Recorded

Treatments Phytohormones	Conc. (ppm)	Plant height (m)	Leaf Number	Stem diameter (cm)		
				Bottom	Middle	Top
Water Cycocel	-	110.5	20.0	2.75	2.46	1.91
	10	118.5	21.0	3.92	2.60	2.10
	25	120.2	22.2	4.00	2.65	2.20
	50	125.3	22.6	4.20	2.70	2.30
	100	128.0	23.0	4.45	2.75	2.50
	200	129.2	23.2	4.60	2.80	2.65
	400	130.6	23.5	4.65	2.85	2.70
	800	132.4	24.0	4.90	2.90	2.75
GA ₃	10	113.0	21.0	4.20	2.70	2.13
	25	117.0	22.2	4.15	2.65	2.20
	50	120.4	23.2	4.12	2.60	2.30
	100	125.3	24.4	4.10	2.55	2.45
	200	128.0	25.5	4.05	2.50	2.50
	400	130.2	26.0	4.03	2.50	2.55
	800	132.4	27.0	4.00	2.45	2.60
	Ethephon	10	106.0	16.0	3.80	2.80
25		105.2	17.8	3.90	2.70	2.05
50		104.2	18.4	3.95	2.65	2.10
100		103.6	19.3	4.00	2.60	2.12
200		103.2	20.6	4.02	2.50	2.15
400		102.0	21.0	4.06	2.43	2.20
800		101.0	21.4	4.08	2.40	2.25
SEm±			3.70	1.58	-	-
CD		11.80	5.06	-	-	-

Table 3: Effect of Photohormones Sprays to 70 Days old sunflower plants on Plant Height, Leaf Number and stem diameter recorded after three Weeks of Spray

Treatments Phytohormones	Conc. (ppm)	Plant height (m)	Leaf Number	Stem diameter (cm)		
				Bottom	Middle	Top
Water Cycocel	-	121.0	17.5	4.00	2.50	1.75
	10	128.0	21.5	4.23	2.85	2.33
	25	126.0	20.0	4.20	2.95	2.30
	50	125.0	19.5	4.10	3.00	2.15
	100	124.0	19.0	4.03	3.03	2.03
	200	123.0	19.0	4.00	3.15	2.00
	400	123.0	18.5	3.90	3.20	2.00
	800	122.0	18.0	3.80	3.30	2.00
GA ₃	10	138.0	23.0	4.06	2.83	1.93
	25	140.2	23.0	4.00	2.80	1.90
	50	143.3	23.2	3.98	2.75	1.85
	100	148.4	23.5	3.90	2.70	1.83
	200	150.2	23.8	3.80	2.65	1.80
	400	151.6	23.9	3.10	2.60	1.78
	800	152.2	24.9	3.65	2.55	1.70
	Ethephon	10	120.9	20.5	4.43	2.83
25		120.8	18.0	4.40	2.85	2.10
50		117.5	17.4	4.20	2.87	2.00
100		115.7	16.3	3.85	2.88	1.97
200		110.5	16.0	3.63	2.90	1.93
400		108.6	15.4	3.50	2.95	1.90
800		107.0	15.0	3.45	2.95	1.85
SEm±			3.70	1.58	-	-
CD		11.80	5.06	-	-	-

* Significant at 5% probability level

Statistically not analysed

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