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The Effect of phytohormones sprays to 40 days old cauliflowers plants on leaf number, recorded and total chlorophyll recorded

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Abstract

The response of various concentration 10, 25, 50, 100, 200, 400 and 800 of bio regulates as Cycocel, GA_3 and Ethepon on the effect of phytohormones sprays to 40-day old and number recorded and total chlorophyll record after three weeks. The studies was carried out at Hindu College P.G. College Moradabad, U.P. The photo Synthetic efficiency of upper and lower leavers recorded. It is family Cruciferae /Brassicaceae and in this plant a short erect stem is produced with an undeveloped influence. The whole inflorescence from a large head of abortive flowers on thick hypertrophied branched. Cultivated all over northern India. The condensed inflorescence is eaten as vegetable. Curds area not only used as a vegetable but also used in soups and pic less. Leaf stalks also as cooked as vegetable. A good number of broccolis are canned and stored in frozen condition leaves and stems a cauliflower, obtained as wastes are utilized as live stocks feed.

Keywords- Cauliflower, GA_3, Cycocel and Ethyele

Introduction

In this plant a short erect stream is produced with an undereveped inflorescence. The whole inflorescence forms a large head of abortive flowers on thick hypertrophised branches. Cultivated all over northern India. The condensed inflorescence is eaten as vegetable. Curds are not only used as a vegetable but also used in syrups and pickles. Leaf staks are also cooked as vegetable. A good number of broccolies are canned and stared in frozen condition. Leaves and stems of cauliflowers obtained as wastes are utilized as live stoked feeds.

Variety: (1) Pusa Deepali- Early season Asiatic variety suitable for sowing in hot season head ready in 100-120 days, plants medium tall with erect waxy medium short leaves; self-branching type over, cured medium size, compact and white.

Variety (2) Improved snow ball- Mid season variety crops in 90-95 days. Curd large size compact and white.

Variety: (3) Pusa Snowball- Late variety, produced medium sized solid curds of attractive show white colour. Suitable for cooler months.

Variety: (4) Pusa Snowball- About 10 days late in maturity than Pusa snowball. Leaves straight upright, inner leaves tight curd very compact of medium size with good stay in quality. Experimental site was selected at MIMT farm houses Delhi Road, Pakwara, Moradabad. The research field was situated in TMIMT research Centre and equipped with all accessories and equipment's for 'irrigation.

During recent years, the application of phytohormone increased tremendously for the betterment and improvement of agriculture and horticulture crops. Synthetic plant bioregulation's and manner of their application amy result in increased production in oil and other crops. When a plant suritches over the reproductive phase from vegetative phase vegetative phase there occur numerous complexities in physiological activities. In fact, these changes are governed by plant growth regulatory substance, the phytohormones include a large number of synesthetic and naturally produced

compounds, which bring about magnus vegetative and reproductive changes when applied at proper concentrations in an Appropriate manner at suitable stage of plant growth.

It has been confirmed by research that from the very beginary of life of a plant, there is a dominance of plant hormones/ regulator that governs all the vital activities inside the plant body at early stage till the death. Plant hormones have been defined, controlling growth and other physiological functions at a site remote from its place of production and active in minute amount. Synthetic plant regulators at proper concentration and manner of their application may result in increased production in vegetable and other crops. The problem relating to their proper concentration and their methods of use has therefore drawn attention of scientific workers both in India and abroad. Attempts are being made to fully explore the possibilities of their use for immediate and better production of economic values especially in the vegetables. The worker done on the effects of gibberellins, Cycocel and ethephone on germination, seedling emergence, vegetative growth flowering, yield component, oil content and quality cauliflower plants is reviewed below it has also been reported that gibberellins increase the growth of plant by increasing the number of cells and length (Arney and Mancinelli, 1966).

Cauliflower is a member of the cruciferous vegetable family. It looks like a white version of broccoli, which is also a cruciferous vegetable. Like broccoli cauliflower has tightly bunched heads called florets, which are connected by a thick core, often with a few light leaves surrounding it. Each of these varieties may have slightly different nutrition benefited. No matter the colour the taste is the same. Mild, slightly sweet and a little nutty. Cauliflower can be substituted for other food such a rice or potatoes or stand on its own.

Cauliflower Nutrition Facts

A serving equals 1 cap or about 100 grams (3.5 oun cy of chopped cauliflower one serving of raw cauliflower has .25 calories, 0.25 gram of fat 5 grams of carbohydrates, 2 grams a dietary fiber 2 gram of sugar, 2 grams of protein, 30 milligrams of sodium. As for vitamins and nutrient, one serving of cauliflower has 57% of the daily value of Vitamin 14%, Dv of vit. k, 2% Dv of calcium of Iran. 7% Dv of potassium, 4% Dv of magnesium, 15% Dv of folate, 12% Dv of Vit, B_6, 14 Dv of Vit. B_6, B_5, I Dv of Chaline.

Materials and Methods

The present investigations were carried out to explore the effects of three growth regulations viz. Cycocel ethephon and GA_3 on germination vegetable growth, photosynthesis, flowering no. of seeds weight of seed, total seed yield of cauliflowers.

This variety was selected because it is recently introduced and also because it is suitable for growing throughout the year. It matures in 90-150 days in kharif. Keeping in view the effect of phytohormones on growth development.

Selection of Plant Material

The details of the materials used and experimental procedure and techniques followed for the various experimental during the course of this investigation are describe below.

1. Seeds of Pusa Deepali-
2. Seeds of Snow Snowball-
3. Improved Japanes-
4. Seeds snow ball-

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

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

Obtained from crop research central, G.B. Pant University and Technology Pantnagar. Diathane-N-45 and sandivit were also obtained from crop research center Pantnagar. It has been found to antagonize GA_3 action in several plant system (Scott and Leopold, 1967: Lieberman, 1979).

Apparatus

1. All glassware used was either of coming India Ltd. Or Pyrez U.S.A.
2. Vacuum Pump (Metrex India)
3. Spekal (Carl Zelis Jena-DDR)
4. Luxmeter (Research- Luxomet-300, Atlantes, India)
5. Blender (Metrex Slender)
6. Measuring slender

7. Air Hand Sprayer.

Field Culture

For exposure to estimate photosyn (19.20x12.75m) was selects. A normal dose of N.P.K. was applied to the soul. About 100 seeds were sown by keeping normal distance recommended for crops. After 10 days seedling was thin to twenty. Vijay and Vandana (2007) Studies the effect of growth retardants on glandulous.

Preparation of Hormones solutions

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

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

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

Foliar Spray of Hormones

1. 40 days after seedling emergences
2. 55 days after seedling emergences. (Bud initiation Stage)
3. 70 days after seedling emergences (Flowering stage)

Treatments	Control Concentration ppm)
GA_3	10, 25, 50, 100, 200, 400, and 800 ppm
Cycocel	10, 25, 50, 100, 200, 400 and 800 (ppm)
Ethephon	10, 25, 50, 100, 200, 400 and 800 (ppm)

Thirty plants were sprayed for each concentration.

In a field trail, Lovett and Orchan (1977) found that application of chlormequal at 10^{th} leaf stage increased that dry weight of mature at mature heads seed yield were 2.43t/ha chlormequat and 2.29t/ ha in untreated controls (6.1% increase over control). Bhat et.al., (2006) the effect of growth regulators and nutrients on fruit cracking and fruit quality in lemon. Literature on the effects of phytohormones and regulator various aspects of growth has been reviewed by Thiamnn (1972). The effects of phytohormones and growth regulator on agriculturally useful crops, particularly with reference to their agricultural and economic uses, have been given by Wittwer (1971). Seed treatment methods also affect germination (Akinala et. Al., 2000).

Chemical analysis

Chemical analysis was conducted in the plant physiology lab of Botany Department Hindu College, Moradabad and College of Basic science, G.B. Pantnagar University Pantnagar (U.A.).

Quantitative determination of Chlorophyll constant

Chlorophyll a, Chlorophyll b, and total chlorophyll content of leaves were determined Spectro photometrically, acc to the method of Arnon's (1949) after the pigments were extracted in 80% acetone in a semi dark room. Weighed leaf disc. (0.01 gm fresh material) from each treatment were extracted in 1 liter of 80% acetone and volume is to be multiplied by 0.1 extract was filtered (with suction) through Whatman No. 1 filter paper. The residue was extracted repeatedly in small amounts of 80 percent and filtered till visibly colorless and the final volume of the extract was adjusted. The absorbance of pigment extract was read at 645, 652 and 663 against 80% acetone as blank. The concentration of chlorophylls was calculated with the help of Arnon's (1949) equation as given below.

(1) Chlorophyll a (mg/g,$^{-1}$ fresh wt.)

$$= 12.7\,(A\ 663) - 2.69\,(A\ 645) \times \frac{V}{1000 \times W}$$

(2) Chlorophyll b (mg/gm^{-1} fresh wt)

$$= 22.9\,(A\ 645) - 4.68\,(A652) \times \frac{V}{1000 \times W}$$

(3) Total Chlorophyll (mg gm^{-1} fresh weight)

$$= 20.2\,(A645) + 8.02\,(A663) \times \frac{V}{1000 \times W}$$

$$(4)\ \text{Chlorophyll a/b} = \frac{\text{Mg Chlophyll a/gm tissue}}{\text{Mg Chlophyll b/gm tissue}}$$

'A' = absorbance of chlorophylls

'V' = Final volume of solution

W gms = tissue extracted.

Result and Discussion

At 40 days Data recorded after 3- weeks of spray on chlorophyll content of upper (8^{th} from

top) and lower (14th from top leaves of plants) are presented in table 1. Non-significant changes in chlorophyll content of lower and upper leaves of plants treated with different hormones was observed. However, a significant increase in chlorophyll a/b ratio of bottom leaf with different treatments was found. The maximum increase in a/b ratio was seen in leaf of plants sprayed with 50 ppm ethephon (48.8% increase) and minimum increase was 26.8% with GA_3 100 ppm followed by 400 ppm (18.0%).

Photosynthetic efficiency

Data recorded after 3 weeks of spray on photosynthesis efficiency of lower (14th from top) upper (8th from top) leaves of different treatments are presented in table.

Photosynthetic efficiency (expressed as cpm/gm, dry wt) was found to be higher in lower leaf and that of upper leaf in all the items except ethephon 500 ppm were the effect was just the reverse.

Photosynthetic efficiency of lower and upper leaves of plants given different treatments was not found to be significantly changed in most cases. However photosynthetic efficiency of lower leaf of plants sprayed with 400 ppm ethephon decreased to about 42.11% of that of control. On the other hand photosynthetic of upper leaf of plants sprayed with 50 ppm GA_3 increased by about 43.6% in comparison to that of control.

Photosynthetic efficiency (expressed as cpm/cm^2 leaf area) was found to be higher in lower leaf than that of upper leaf in all the treatments and ethrel 400 ppm in which no difference in photosynthetic of two leaves was found. It was noted that the photosynthetic efficiency of lower leaf in plant sprayed with ethral (400 ppm) decreased by about 35.16% of that of control while that of upper leaf of plants sprayed with GA_3 in (50 ppm) increased by about 61%.

Table 1: Effect of Phytohormone sprays to 40 days old Cauliflowers on photosynthetic efficiency of upper and lower leaves, recorded after three weeks of sprays

Treatments		Cpm gm^{-1} dry wt.		Cpm Cm^2 leaf area	
Phytohormones	Conc. (ppm)	Lower leaf*	Upper Leaf*	Lower Leaf	Upper Leaf*
Water (Control)		17100±92.4	12501±79.0	91.2±7.5	77.0±7.1
Cycocel	10	11799±77.0	11990±75.0	67.0±6.7	54.0±6.2
	25	13500±78.0	12230±80.0	78.5±6.2	65.2±7.0
	50	15330±80.0	12944±81.2	85.5±6.6	70.0±7.2
	100	16199±95.5	13099±81.0	90.0±7.5	73.0±6.9
	200	17220±93.5	14000±80.7	92.5±7.5	74.2±6.8
	400	18150±95.3	14570±81.6	91.2±7.2	75.4± 6.7
	800	18770±95.4	14880±83.2	90.6±6.6	76.6±6.8
GA_3	10	14649±85.7	11890±77.1	87.0±7.4	69.0±6.8
	25	14530±86.6	11212±76.2	87.5±7.2	67.2±6.7
	50	14210±87.2	11050±75.2	88.0±7.3	64.3±6.5
	100	14149±84.0	10350±72.0	89.0±7.4	69.0±6.8
	200	14100±84.2	10212±70.0	89.5±8.0	58.6±6.2
	400	14010±83.7	10010±73.0	90.2±7.9	57.5±6.3
	800	14000±86.2	10000±71.0	92.6±7.8	56.2±6.2
Ethephon	10	18249±95.5	12224±78.3	85.0±7.2	69.0±6.7
	25	13012±96.4	12220±76.4	74.0±7.3	65.2±5.6
	50	12272±98.2	12210±77.2	70.0±7.2	63.4±6.2
	100	11077±97.2	12205±78.8	65.4±7.6	60.5±6.7
	200	1000±96.5	12750±76.3	60.6±6.2	55.6±7.2
	400	9899±70.5	12149±78.0	59.0±6.3	58.0±6.3
	800	9500±73.6	12120±77.7	58.6±6.2	58.2±6.1

*Fourteen leafs from top * Eighth leaf from top

At 55 days Chlorophyll Content

Data recorded after 3 week of spray on chlorophyll control lower (14th from top) and upper (8th from top) leaves of plants are present in table 2. Data for chlorophyll of different treatments were not significantly different however for upper leaf of different treatments significant differences in chlorophyll content were recorded chlorophyll a content of upper leaves from plants sprayed with 50 and 500 ppm ethephon increased by 4.84 and 18.84% chlorophyll b content increased by 18.75 and 24.68% and total chlorophyll content increased by 19.5 and 31.0% respectively. One the other hand chlorophyll a content of plant sprayed with 10 and 100 ppm GA_3 decreased by 31.17% with both the concentrations. Chlorophyll b content decreased by 28.12 and 34.88% and total chlorophyll content decreased by 24.0 and 26.0% respectively. Chlorophyll a/b rations of lower and upper leaves of plants given. Hormonal sprays were not significantly changed by hormonal sprays.

Photosynthetic efficiency

Data recorded after 3 weeks of spray on photosynthetic efficiency of lower (14th from top) and upper (8th from top) lower of plants given different treatments are presented in Table 3. Data for photosynthetic efficiency (expressed as cpm gm^{-1} dry wt) of upper and lower leaves of plants receiving various treatments show that lower concentration of cycocel and receiving various treatments show that lower concentration of cycocel and ethephon (10 and 50 ppm) increased photosynthetic efficiency of lower leaf by 55.4 and 52.3% respectively. Higher concentration by GA_3

Table 2: Effect of Phytohormones sprays to 40 days old plants, on chlorophyll a, chlorophyll b, total chlorophyll and chlorophyll a/b ratio, in lower & upper leaves, recorded after three weeks of spray

Statements		Chlorophyll a		Chlorophyll b		Total Chlorophyll		Chlorophyll a/b	
	Conc. (ppm)	Lower leaf	Upper leaf	Lower leaf	Upper leaf	Lower leaf	Upper leaf	Lower leaf	Upper leaf
					Mg/gm fresh weight				
	D.W.	0.674	0.754	0.398	0.360	1.074	1.11	1.699	2.164
GA_3	10	1.065	0.885	0.470	0.470	1.535	1.360	2.245	1.905
	25	1.140	0.895	0.500	0.400	1.600	1.300	2.242	2.220
	50	1.225	0.920	0.545	0.350	1.770	1.270	2.240	2.315
	100	1.240	0.930	0.560	0.330	1.780	1.250	2.235	2.400
	200	1.255	0.945	0.580	0.320	1.790	1.230	2.230	2.440
	400	1.266	0.950	0.585	0.315	1.800	1.215	2.228	2.465
	800	1.280	0.966	0.590	0.305	1.805	1.200	2.225	2.490
Cycocel	10	0.822	0.599	0.340	0.260	1.170	0.860	2.380	2.342
	25	0.800	0.585	0.338	0.210	1.160	0.750	2.300	2.450
	50	0.770	0.560	0.337	0.200	1.155	0.700	2.220	2.550
	100	0.745	0.455	0.335	0.170	1.150	0.626	2.155	2.644
	200	0.730	0.450	0.330	0.150	1.140	0.600	2.140	2.690
	400	0.710	0.430	0.320	0.130	1.130	0.550	2.130	2.710
	800	0.700	0.420	0.310	0.120	1.120	0.510	2.110	2.730
Ethephone	10	0.840	0.885	0.336	0.330	1.155	1.220	2.570	2.880
	25	0.870	0.880	0.395	0.325	1.160	1.210	2.560	2.850
	50	0.880	0.878	0.400	0.320	1.175	1.205	2.525	2.800
	100	0.895	0.875	0.420	0.318	1.200	1.190	2.400	2.790
	200	0.900	0.870	0.430	0.315	1.250	1.180	2.200	2.765
	400	0.910	0.868	0.450	0.313	1.365	1.185	2.115	2.755
	800	0.915	0.865	0.455	0.310	1.385	1.170	2.105	2.740
	-	0.123	0.108	0.053	0.051	0.178	0.166	0.123	0.192
		0.425	0.365	0.103	0.124	0.570	0.534	0.407	0.612

Significant at 5% probability level Fourteen leafs from top Eighth leaf from top

Table 3: Effect of Phytohormones sprays to 55 days Cauliflowers plants on photosynthetic efficiency of upper leaf and lower leaf recorded after third week of spray

Treatments		Cpm gm^{-1} dry wt.		Cpm Cm^2 leaf area	
Phytohormones	Conc.(ppm)	Lower leaf*	Upper Leaf*	Lower Leaf	Upper Leaf*
Water (Control)	-	17598±94.0	13999±83.8	92.0±7.6	73.0±6.9
Cycocel	10	12750±80.0	13999±80.7	66.4±6.7	83.0±7.3
	25	12860±80.2	13110±82.6	78.6±5.8	84.2±7.8
	50	15970±89.5	13299±81.6	80.5±7.3	78.0±7.1
	100	15999±88.2	13170±92.4	82.6±7.4	78.2±8.2
	200	16000±89.7	13050±90.6	86.4±7.6	79.4±8.3
	400	16080±90.2	12000±90.7	88.3±7.8	80.6±6.7
	800	17170±90.6	19700±97.2	90.7±6.2	82.4±7.4
GA_3	10	16349±90.5	12949±80.5	94.0±7.6	78.0±7.1
	25	15270±90.4	13100±82.3	76.2±7.6	70.2±6.8
	50	13227±87.4	13800±83.6	66.4±7.4	60.5±6.7
	100	10049±71.5	14449±85.1	51.0 ±6.1	54.5±6.2
	200	10000±72.5	14700±86.2	50.0±7.2	53.1±8.1
	400	9981±80.2	14925±87.1	46.2±6.4	52.2±8.1
	800	9900±86.7	15000±86.1	44.6±6.8	51.6±7.8
Ethephon	10	27349±117.0	27399±117.1	175.0±9.9	184.0±10.2
	25	25412±126.2	25412±126.2	140.0±8.9	170.2±10.3
	50	21360±127.0	20300±135.4	135.0±9.2	150.6±9.4
	100	20412±129.2	19721±130.6	130.0±8.8	120.4±9.4
	200	19623±110.4	16220±120.7	125.0±7.9	115.0±9.8
	400	18850±97.2	12599±79.5	123.0±8.5	98.0±7.8
	800	18860±98.1	12602±80.5	122.2±8.3	97.0±7.0

*Fourteen leafs from top * Eighth leaf from top

(100 ppm) decreased photosynthetic efficiency by 43.0. Photosynthetic efficiency of upper leaf also increased by 95% with ethrel 50 ppm treatments. Data obtained for photosynthetic efficiency (Expressed as cpm cm^{-2} leaf area) of lower of upper leaf also show that ethephon (5 and 50 ppm) increased the photosynthetic efficiency of lower leaf by 14.5 and 90% respectively but it was decreased by GA_3 (100 ppm) treatment to the extent of 44.5% photosynthetic efficiency of upper leaf increased by 152 and 34% with 50 and 500 ppm ethrel, while 10 ppm GA_3 decreased it by 26 and 25.3%

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