DISSERTATION-I REPORT

(HRT- 596)

EFFECT OF DIFFERENT PLANT GROWTH REGULATORS ON GROWTH , YIELD AND QUALITY OF CUCUMBER

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CERTIFICATE

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Introduction

Cucumber (*Cucumis sativus* L.) is a widely cultivated plant belonging to the family Cucurbitaceae. It is an annual, dioecious creeping vine that grows up trellises or other supports, wrapping around them with thin, spiral tendrils. The plant has large leaves that form a canopy over the fruit. The fruit of the cucumber is roughly cylindrical, elongated with tapered ends.

Cucumber is used as salad, pickle and also as cooked vegetable because of its low calorie content. Tender leaves are also used as vegetables. Fruits help in the cure of constipation, jaundice and indigestion. Seeds have a number of ayurvedic uses. The fruits and seeds possess cooling properties, hence used as astringent and antipyretic.

Cucumber has originated from India, but is now grown in most continents. Many different varieties are traded on the global market. Cucumbers popularly known in India as 'khira' and gherkins are extensively grown in tropics, subtropics and milder temperate zones of India. It is grown in hills and plains of India. It is being grown in the country for almost 4000 years. The fruits are highly nutritive and have very high water content and very low calories. The fruit is used as a vegetable or salad. It is rich in minerals, thiamine, niacin and vitamin C. (0.38 g, 0.3 mg, 0.2 mg and 78 mg, respectively per 100 g of edible fruit). Fruits consist about 80 percent of edible portion which contains 95% water, 0.7% protein, 0.1% fat, 3.4% carbohydrates, 0.4% fiber and 0.4% ash (Aykroyd, 1963).

The cucumber is grown successfully on many kinds of soils, from sandy to heavy clays. Where early crop is desired, a sandy or sandy loam soil should be preferred. Loam, silt loam or clay loam is preferred where heavy yields are main consideration. It grows better in soil having pH 5.5-6.7. The soil should be well- drained.

Cucumber is grown mainly for its fruits both in India and abroad. Worldwide, cucumbers are extensively grown for fresh market and China leads in production followed by India. In India, It is cultivated extensively in the states of Madhya Pradesh, Tamil Nadu, Uttar Pradesh, Andra Pradesh, Kerala and Maharashtra. In India it occupies an area of 41 million ha with the production of 641 MT & its productivity 15.63 t/ha (Handbook of Horticulture Statistics 2014).

It is grown throughout the year in Southern states of India. While in plains of Northern India, it is grown generally during summer and rainy seasons and least grown in late kharif. Production of cucumber in India is mainly restricted to its open field condition. Nevertheless, biotic and abiotic stresses are the main factors responsible for low yield and

poor quality under open field condition. Particularly, rainy season crop is always affected by pests and diseases, resulting into low productivity and poor quality of fruits.

Problem background

- Length of vines are lesser.
- Produce female flower less than yield will be decrease.
- Use less amount of insecticide
- Red pumpkin beetle is major insect of cucurbitaceous crop which show highly infestation in cucumber crop.
- Mostly farmers use chemical fertilizer that degradation of the soil and reduce the quality of the fruit.

Role in Plant growth regulators

Auxins: Apical dominance, root induction, control fruits drops, regulation of flowering, parthenocarpy, phototropism, geotropism, herbicides.

Gibberellin: Stimulate cell division and elongation; stimulate germination of seeds Stimulates bolting/flowering in response to long days, prevention of genetic dwarfism.

Maleic hydrazide: use on vegetative growth, sex expression, fruit setting, and fruit yield of cucumber.

Objective

1. Effect of Plant Growth Regulators on the growth parameter of cucumber.

2. Effect of Plant Growth Regulators on the yield attributes of the cucumbers.

3. Effect of Plant Growth Regulators on the quality of cucumber.

Review of literature

The total dry weight (vine + leaf + fruit) was recorded at 40, 55 and 70 DAS. Leaf area per plant was worked out by leaf disc method (Vivekanandan *et al.*, 1972) on dry weight basis and expressed in cm2 per plant.

The significant increase in TDM due to growth regulator application indicated the role of growth regulators in translocation of photoassimilates from leaves and vines to developing fruits and thereby enhancing the fruit yield in cucumber. A similar increase in dry weight in cucumber due to GA3 application was also observed by Vadigeri *et al.* (2001).

The number of fruits per plant was significantly higher with the foliar application of GA3 @50 ppm followed by CCC @ 500 ppm. The fruit yield was also significantly higher with the foliar application of GA3 @ 50 ppm followed by CCC @ 500 ppm and the lowest fruit yield was recorded in control. Similar results were also reported by Dostogir *et al.*, (2006) in bittergourd.

The experiment conducted by Krishnamoorthy and Sandooja (1981) revealed that the application of GA3 increased the stem growth and the effect was more at higher concentrations. According to Mangal *et al*. (1981), the application of CCC at 250 ppm showed significant increase in plant height compared CCC at 500 ppm in bittergourd. Application of CCC at 100 ppm and ethrel (250 ppm) spray proved equally effective in the elongation of main axis in musk melon (Sidhu *et al.,* (1982).

The application of GA3 at 25 ppm and NAA at (50 ppm) stimulated the elongation of main vine length in summer squash. Similarly, the application of GA3 (25 ppm) at 2-4 true leaf stage resulted in the more vine length as compared to control in bittergourd (Arora *et al*. 1982 and 1985). It was noticed that the application of NAA at 2 and 4 true leaf stages increased the main vine length of the vine in watermelon CV, Sugar Baby (Shinde *et al,*. 1994).

Arun *et al.* (1982) reported that the application of GA3 @ 200 ppm resulted in maximum plant height followed by seed soaking with GA3 @15 ppm in brinjal CV Pusa Purple Long. According to Ram Asrey *et al.* (2001), the application of GA3 at 500 ppm increased the length the vine in muskmelon.

Das and Swain (1977) reported that nitrogen and growth regulators increased leaf numbers as well as leaf area in pumpkin when the crop was sprayed with planofix (100 ppm), ethrel (200 ppm) and alar (200 ppm) at 10 and 20 days after planting. Whereas, Singh *et al*. (1991) reported that the foliar application of mixtalol (30 ml/10 l) increased the number of leaves per plant significantly in bottlegourd. Seed soaking with 550 ppm GA3 for 12 hrs increased the number of leaves per plant in muskmelon (Ram Asrey *et al.* 2001).

El- Kholy and Hafez (1982) in their experiment with snake cucumber obtained more number of male flowers by the application of gibberellic acid at 100 mg/l. Significantly increased number of male flowers and reduced number of female flowers was recorded by Patil *et al.,* (1984) with the application of gibberellic acid at 225 ppm in cucumber.

According to Mangal *et al.,* (1981), higher concentration of cycocel (250-500 ppm) resulted in early female flower appearance when growth regulators were applied at fourth true leaf stage in bittergourd cv. KH-8.

Wittwer and Buckovac (1965) reported that the application of GA3 succeeded in promoting fruit set without pollination in watermelon. According to Gopalkrishnan and Choudhary (1978), foliar application of GA3 at 25 and 50 ppm increased percent fruit set.

Rajpal Singh *et al.* (2001) also reported that the foliar application of NAA at 10 and 20 ppm in ber cv. Umran significantly increased fruit set over control. The highest percent (84.51) fruit set per plant was obtained when GA3 was applied at 70 ppm. The lowest (63.41) was obtained with GA3 (20 ppm) in bittergourd (Dostogir *et al.*, 2006)

Choudhury and Singh (1970) reported that NAA 100 ppm, IAA 100 and 200 ppm, Maleic Hydrazide (MH) 50 and 200 ppm were equally effective in suppressing the male flowers and increasing the number of female flowers in cucumber. The effects subsequently increased the percentage of fruit set and ultimately the yield.

Bisaria (1974) found that foliar spray of NAA at 100 ppm increased the number of female flower per plant and the sex ratio was reduced in cucurbits.

Islam (1995) stated that application of GA3 was effective in improving the yield components of bitter gourd when applied at low concentration of 10 ppm. The inhibitory effect of GA3 applied at the rate of 100 ppm was observed on production of fruits with lesser number of filled seeds, dry matter of seeds, weight of 100 seeds, seed yield and percent seed vigor index.

Wang and Zeng (1996) reported that gibberellic acid at 25 to 100 ppm increased the number of female flowers up to 80 days.

Plant growth regulator affects the physiology of plant growth and influence the natural rhythm of a plant. (IAA) and (GA) can manipulate a variety of growth and developmental phenomena in various crops. IAA has been found to increase the plant height; number of leaves per plant, GA stimulated stem elongation increase dry matter accumulation (Hore *et al.*, 1988).

Southern California growers raise artichokes from seed as annuals for a winter harvest to take advantage of the favourable winter market prices, result have revealed that multiple applications of GA3 produce an earlier and more uniform first harvest in annual artichokes (Wayne *et al.*, 1994).

GA3 increased shoot extension, leaf area, number of leaves, stolen and tubers but decreased dry matter of stem, leaf and tuber, IAA (Kumar *et al.*, 1981).

Materials and methods:

Experimental Site: Lovely Professional University Farm.

Treatment Details:

Fourteen different treatments combination of plant growth regulators (NAA,GA3,CCC) along with control were impose in cucumber variety in Randomized Block Design with three replications.

A. Layout of the Experiment:

Variety	:
Design	: RBD (Randomized Block Design)
Treatments	: 11
Number of Replication	: 3
Plot size	: 2 m x 1m
Total number of plots	: 33
Total Area	: 180 m^2
Spacing	: 1.5 - 3 m x 60 - 90 cm
Seed rate	: 2.5-4 kg/ha
Sowing time	: February to march

B. Observations to be recorded:

Based on growth parameter:

1. Number of leaves per plant
2. Number of branches per plant
3. Length of vines per plant
4. Leaf area
5. Inter nodal length
6. Days taken to first flowering
7. Days taken to 50% flowering
8. Days to Fruit maturity
9. Male and female flower

Based on yield parameter:

1. Number of fruits per plant
2. Fruit length of plant
3. Diameter of fruit
4. Fruit diameter of plant

Based on quality parameter:

1. Total soluble solid (TSS %)
2. Physiological loss in weight (PLW %)
3. Texture of fruit

C. **Treatment Details:**

T1 – Foliar spray 50ppm NAA
T2 - 100ppm NAA
T3 - 150ppm NAA
T4 - 200ppm MH
T5 - 250ppm MH
T6 - 300ppm MH
T7 - 50ppm GA3
T8 - 100ppm GA3
T9 - 150ppm GA3
T10 - 100ppm NAA + 250ppm MH + 100ppm GA3
T11 – control

R1	R2	R3
T1	T6	T11
T2	T5	T10
T3	T4	T9
T4	T3	T8
T5	T2	T7
T6	T1	T6
T7	T11	T5
T8	T10	T4
T9	T8	T3
T10	T9	T2
T11	T7	T1

D. Materials required:

1. FYM = 15 to 20 t/ha (400 kg FYM / 180 m^2)
2. NPK = 100:50:50 kg/ha (4kg Urea: 6 kg SSP: 2 kg MOP for 156 m^2)
3. Vermicompost = 2 t/ha (40 kg/ 180 m^2)

EXPECTED RESEARCH OUTCOME

The research outcome will be to know the association of different plant growth regulators on fruit yield of cucumber and their direct or indirect effect on the yield of cucumber. Various characters are responsible for yield of cucumber like plant height, no. of branches, no. of fruits per plant, fruit length, inter nodal length, length of vine etc.

On the basis of plant growth regulator to increase the growth and quality of cucumber. Also increase the productivity of cucumber.

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