TRIVENI HARSH NARENDRA

By

GUJ-CUCUMBER-1

AND YIELD OF CUCUMBER (Cucumis sativus L.).CV

GROWTH, FLOWERING, SEX EXPRESSION, QUALITY

EFFECT OF PLANT GROWTH REGULATORS ON
Dedicated to

my beloved parents

Harsh...
GUJ-CUCUMBER-1
AND YIELD OF CUCUMBER (Cucumis sativus L.) CV.
GROWTH, FLOWERING, SEX-EXPRESSION, QUALITY
EFFECT OF PLANT GROWTH REGULATORS ON

B. Sc. (Agri.)
TRIVEDI HARSH NARENDRA

BY

MASTERS OF HORTICULTURE
IN
HORTICULTURE
BY

PROFESSOR NARENDRA

II

UNIVERSITY OF JUNAGADH

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MAY - 2011
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JUNAGADH AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE
DEPARTMENT OF HORTICULTURE

GUJARAT HANSI NARENDRA

IN PARTIAL FULFILLMENT OF REQUIREMENTS
FOR THE DEGREE OF MASTERS OF HORTICULTURE

ABSTRACT

A
Registration No.: 4-00542-2009

May – 2011

JUNAGADH JUNAGADH AGRICULTURAL UNIVERSITY COLLEGE OF AGRICULTURE DEPARTMENT OF HORTICULTURE

B.Sc. (Agr.)

TRIVEDI HARSH NARENDRA

BY

HORTICULTURE

IN

(Agriculture)

MASTER OF SCIENCE

FOR THE DEGREE OF

IN PARTIAL FULFILLMENT OF REQUIREMENTS

JUNAGADH AGRICULTURAL UNIVERSITY

SUBMITTED TO THE

THESES

A

GUJ-CUCUMBER-1.

AND YIELD OF CUCUMBER (Cucumis sativus L.) CV. GROWTH, FLOWERING, SEX-EXPRESSION, QUALITY EFFECT OF PLANT GROWTH REGULATORS ON
Abstract
(25.00/vine) were highest with GA; 10 ppm. While minimum 22.00/vine respectively) and number of nodes per vine 22.00/vine, 14.00/vine, and 12.00/vine, respectively; number of branches per vine at 60, 90, and 120 DAS (1.2.10/vine, 1.4.00/vine, and 1.8.00 m and 3.50 m respectively), number of branches per m, 2.50 m and 3.50 m respectively), number of branches per m, such as length of main axis of vine at 60, 90, and 120 DAS (1.8.00 m and 3.50 m respectively).

The results of experiment revealed that growth characters and true leaf stages.

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The experimental design (RBD) with three replications. The experiment included sixteen treatments, namely five concentrations each of GA3 (5 ppm), NAA (50, 75, 100, 125, and 150 ppm) and control (water 10, 15, 20 and 25 ppm). Each (150, 200, 250, 300, and 350 ppm) had four replications. Two sprays of plant growth regulators were done at 2nd

The experiment was laid out in the field in a Randomized Block Design (RBD) with three replications. The experiment included sixteen treatments, namely five concentrations each of GA3 (5 ppm), NAA (50, 75, 100, 125, and 150 ppm) and control (water 10, 15, 20 and 25 ppm). Each (150, 200, 250, 300, and 350 ppm) had four replications. Two sprays of plant growth regulators were done at 2nd

ABSTRACT

JUNAGADH

JUNAGADH AGRICULTURAL UNIVERSITY

COLLEGE OF AGRICULTURE

DEPARTMENT OF HORTICULTURE

Dr. A. V. Barad

TIRTHA Hars N. D.

Mehta, Pratik

Name of Student

CV. Guj-Cucumber-1.

p-expression, quality and yield of cucumber (Cucumis sativus L.)

effect of plant growth regulators on growth, flowering, sex-

effect of plant growth regulators on growth, flowering, sex-

expression.
The yield characters such as fruit length (26.2 cm), fruit width (11.3 cm) and fruit weight (3040 g/fruit) were highest in GA3 (15 ppm) in case of number of fruits per vine and fruit yield.

The yield recorded in GA3 25 ppm (1:3:23) minimum node number to first female flowers appearance was maximum node number to first male flowers appearance in NAA 100 ppm (1:3:9 ppm (4.9) and first male flowers appearance in GA3 10 ppm. While, maximum node number to first female flowers appearance (6.83) (3:32) and node number to first male flowers appearance (1:2:44:1:1:86, and 1:1:31 respectively).

The maximum number of male flowers at 60, 90, and 120 DAS was highest in the treatment NAA 75 ppm recorded in NAA 75 ppm. Similarly, the female: male sex ratio at 11:00 ppm, 1:9:20/vine, and 2:7:10/vine respectively, were 60, 90, and 120 DAS was recorded in GA3 15 ppm recorded in NAA 75 ppm, whereas, the minimum number of female flowers at 60, 90, and 120 DAS was (4:20/vine, 1:0:30/vine, and 1:8:40/vine respectively) and maximum number of male flowers (2:6:00/vine, 3:5:00/vine, and 4:0:20/vine respectively), and maximum number of female flowers (5:3:93 days) were noted in GA3 15 ppm, whereas, female flowers appearance (4:9:10 days) was recorded in NAA 75 ppm, while, lowest days to first maximum days to first male flowers appearance (1:4:90/vine), and number of branches per vine (1:4:90/vine).

The highest 200 ppm gave highest length of main axis (2.55 m) per vine (1:6:33/vine) were noted in control, whereas at 120 DAS (8:00/vine and 1:1:00/vine) respectively and number of nodes minimum number of branches per vine at 60 and 90 DAS (0:90 m and 1:50 m).
CBR (1.7.25).

300 ppm also gave the highest net return (183770 Rs./ha) and highest fruit yield. Similarly, with economic point of view, ethanol recorded in treatment 300 ppm with economic point of view, ethanol recorded in treatment 300 ppm was noted in the treatment control and NAA 125 ppm was recorded in treatment ethanol 300 ppm, while the minimum tase, cumulative score of cucumber fruit (9.2, 9.17 and 9.15) was observed in treatment 300 ppm. Highest Ascorbic acid (11.20 mg/100g) was recorded in treatment 300 ppm. The Total Soluble Solid was recorded maximum (4.73) in cucumber (4.88%), was recorded in treatment ethanol 200 ppm. Non-Reducing Sugar of seeds per fruit of cucumber CBR 1.7.25. Highest number of seeds per fruit of cucumber 300 ppm resulted in the highest net return (183770 Rs./ha) and ethanol yielded (28.79 Kg/plot) and fruit yield (26.65 t/ha) was also ethanol yielded (28.79 Kg/plot) and fruit yield (26.65 t/ha) was also.

It is concluded that application of Ethanol 300 ppm

in control (7.35)

was recorded in Ethanol 250 ppm (9.20) and minimum tenderness in taste and Ethanol 350 ppm respectively. Highest tenderness

and 7.50) was noted in the treatment control and NAA 125 ppm

fruit colour and cumulative score of cucumber fruit (7.33, 6.50

In regards to organoleptic score, various levels of plant

observed in control

Ethanol 350 ppm. Highest Ascorbic acid (11.20 mg/100g) was

The Total Soluble Solid was recorded maximum (4.73) in
cucumber (4.88%) was recorded in treatment ethanol 200 ppm.
Non-Reducing Sugar of seeds per fruit of cucumber CBR 1.7.25. Highest number of seeds per fruit of cucumber 300 ppm resulted in the highest net return (183770 Rs./ha) and ethanol yielded (28.79 Kg/plot) and fruit yield (26.65 t/ha) was also ethanol yielded (28.79 Kg/plot) and fruit yield (26.65 t/ha) was also.

The quality characters such as maximum reducing sugar

(20.00 Kg/cm³).

Primness of cucumber was observed in NAA 100 and 125 ppm

(85.00/fruit) was observed in Ethanol 200 ppm and highest

CBR 1.7.25. Highest number of seeds per fruit of cucumber

300 ppm resulted in the highest net return (183770 Rs./ha) and

Ethanol yielded (28.79 Kg/plot) and fruit yield (26.65 t/ha) was also ethanol yielded (28.79 Kg/plot) and fruit yield (26.65 t/ha) was also.

16.10/vine and yield (4.79 Kg/vine). Similarly, highest fruit

16.10/vine and yield (4.79 Kg/vine). Similarly, highest fruit
Major Advisor

(A. V. Barad)

Date: 09/05/2011
Place: Junagadh

Placing on first class. He completed this course with an average grade point 7.38/10.00 awarded or degree diploma or other similar title. And he has also supervised and the thesis has not previously formed the basis for the award of a Master's degree in the Junagadh Agricultural University. A record of the Junagadh Agricultural University is a record in the degree of Master of Science (Agronomy) in the department in partial fulfillment of the requirements for the award of a Master's degree submitted by Trivedi Harsh for the expression of quality and yield of cucumber and growth regulators on growth, flowering, sex.

This is to certify that the thesis entitled "Effect of plant..." completed on..."}

Certificate

Junagadh
Junagadh Agricultural University
College of Agriculture
Principal & Dean
DR. A. V. BARAD
This is to certify that Mr. TRIVEDI HARSH NARENDRA has successfully completed the comprehensive/Preliminary examination of major and supporting subjects held on 21/04/2011 as required under the regulation for post graduate studies.

Place: Junagadh
Date: 28/06/2011

(A. V. Barad)
Principal and Dean,
College of Agriculture,
J.A.U., Junagadh.

(R. S. Chovatiya)
Professor and Head,
Department of Horticulture,
College of Agriculture,
J.A.U., Junagadh.
J.A.U., Junagadh.
College of Agriculture,
Professor and Head,
(R. S. Chovatia)

J.A.U., Junagadh.
College of Agriculture,
Principal and Dean,
(A. V. Bared)

Date: 31/06/2011
Place: Junagadh

The course of investigation have been fully acknowledged.
For any other degree, the assistance and help received during
supervision and that no part of this thesis has been submitted
by Mr. Trivedi Harsh Narendra
under my guidance and
Horticulture embraces broadscale research work carried out
submitted for the degree of M. Sc. (Agric.) in the subject of
Cucumber (Cucumis sativus L.) cv. G-111 cucumber
flowering, sex-expression, quality and yield of
plant growth regulators on growth,
This is to certify that the thesis entitled "

II
CERTIFICATE - II
Junagadh
Junagadh Agricultural University
College of Agriculture
The thesis examination was satisfactory, we therefore, recommend that the candidate be approved. The performance of the candidate in the oral examination before the following members of the examination committee, the performance of the candidate was evaluated by the external examiner Mr. Trivedi Harsh Narendra, in the subject of Agricultural (Cucumis sativus L. cv. GJ-Cucumber-1) sex expression, quality and yield of cucumber, plant growth regulators on growth, flowering, effect of...
J. A. U. Junagadh,
College of Agriculture,
Principal and Dean,
Major Guide &
(AG. Var. Bred)

01/07/2011

The author is grateful to receive the necessary guidance and very willing help of the leader, head, assistant professor and dean, college of agriculture, Junagadh university, Junagadh for their valuable kind help during the preparation of the project. The oral examination held on 28/06/2011. The final copies of the theses duly bound and corrected have been submitted on.

CERTIFICATE

JUNAGADH
JUNAGADH AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE
My sincere thanks are also due to Dr. A. N. Mahawana, Dr. R. Vaidya, Dr. K. M. Kanerva, Dr. K. V. Pandey, and Dr. V. V. Vaidya, Directors of Research and PG Dean, Dr. V. N. C. Patel, Honorary Vice Chancellor, Dr. C. K. Bhat, Principal, and Dean, College of Agriculture, Dr. R. S. Chavda, Professor, and Head, Department of Agriculture, and Dr. R. P. Jhunagadh, Principal, and Dean, College of Agriculture, etc. for their valuable guidance and support. I am grateful to them for their encouragement and support during my research work. I am also thankful to Dr. V. V. Vaidya, Director of Research and PG Dean, Dr. C. K. Bhat, Principal, and Dean, College of Agriculture, and Dr. R. S. Chavda, Professor, and Head, Department of Agriculture, for their constant encouragement and support.

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Last but not least, I am in short of words to express how much I feel of the grace of LORD GAVUNTRI which I ever with me.

Place: Junaagadh

Date: 05.10.71 01011

(H. N. TRIDEI)
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**List of Abbreviations and Symbols**
Introduction
The cucumber is good for people suffering from fever and used as an antipyretic (used to prevent or reduce fever). Cucumber are used as a salad and for pickling. It is also consumed during rainy and summer seasons. The immature fruits of cucumbers are called "green beans". It originated in India from where it spread to Asia, Africa, Europe, and Europe. It is one of the most popularly grown vegetables. Cucumber and has been in cultivation since 3000 to 4000 years. Among the cultivated vegetable crops belonging to the family Cucurbiteae, the family Cucurbitaceae consists of about 118 genera and 825 species. Although most of these are known as cucurbits, the family Cucurbitaceae are generally crops belonging to family Cucurbitaceae.

Cucumbers are a rich and cheaper source of nutrients. Balancing diet is a rich and cheaper source of nutrients. Various vegetables grown in India, cucumbers have a high place in the great need of production of more vegetables in India. Of the estimated 800 varieties recommended by dieticians (Singh, 2006), with the large vegetarian population in India, the minimum of about 300 & recommended by dieticians (Singh, 2006) are not low and that is only around 100 & per day as against a very low of about 300 & recommended by dieticians (Singh, 2006). Vegetable consumption per capita in India is supplied carbohydrates for energy and proteinous compounds for an important source of vitamins, minerals and salts. They also play a very important role in daily human diet, since they are most of an important issue of agriculture. Vegetables play a very important role in daily human diet. In the changing global scenario, nutritional security in the

INTRODUCTION

CHAPTER I
have been reported in cucumber (Cucumis sativus L.) was originally monocious, as
the...carbohydrates and 2 mg of vitamin C per 100 g fresh weight
and vitamin C. Also contains 0.4% protein, 2.5% per cent
significantly to dietary intake of carbohydrates, vitamins, and

sex expression probably exists in these plants. A good relationship between growth substances and
cucurbits, A good relationship between growth and ultimately increase the yield in number of
improve fruit set and ultimately increase the yield in number of
production in cucurbits. It can modify growth and flowering.

Plant growth regulators have profound influence on fruit

2002).

ranks first among all major cucumber growing states (Bose et al.,
Karnataka and hilly parts of North India. The Andhra Pradesh
most of the states in India including Gujarat, Andhra Pradesh, in particular
respectively) (Anonymous, 2008). The cucumber is produced in
hectares, 1.05 lakh million tonnes and 750 Kt per hectare
cucumber in country increased consistently which are 1.40 lakh
India rank seventh. The area, production and productivity of
India. Bihar ranks first in area and production, whereas
This crop is cultivated in about 25 countries including
flowers.

female flowers at higher i.e. more distant, nodes than the male
female flowers are typically borne at different nodes, with the
and monoecious cultivars were subsequently bred. Male and
are many modern cucumber cultivars, but monoecious and
Cucumber (Cucumis sativus L.) was originally monoecious, as
The chromosome number in cucumber is 2n = 2x = 14.
Introduction

Introduction

Following objectives.

The plant growth regulators viz., GA₃, NAA, Ethrel, etc. have been reported to influence the sex expression in various cultivars leading to either suppression of male flowers or an increase in number of female flowers by Choudhury and Singh (1970) in cucumber, Sidhu et al. (1982) in muskmelon, Arora et al. (1987) in Ridge Gourd, Jain et al. (1988) in bottle gourd, Sharma et al. (1976) in Ridge Gourd, Randhawa and Singh (1976) and Randhawa, Singh, and Choudhury (1979) reported in Greenhouse trial with cucumber and in watermelon (Gopalakrishnan and Choudhury, 1978). Das et al. (1979) in bottle Gourd (Dubey, 1983), Dubey (1969) in Sponge Gourd (Dubey, 1978), Choudhury and Baber (1969), in Bottle Gourd (Kalia and Dhillon, 1966),

In view of the above consideration and paucity (insufficient) amounts of adequate research evidence, the study entitled, “Effect of plant growth regulators on growth, flowering, sex- and sex-expression and yield of cucumber on the growth, flowering, sex-expression and yield of cucumber information is available. Regarding the effect of growth regulators there by ultimately increase the yield. However, very little increase the number of male flowers on lateral branches and suppress the number of male flowers on lateral branches;

Female flowers on lower nodes and early flowering.

leak stage and just before bud initiation resulted in production of

Application of NAA 100 ppm or Ethrel 250 ppm twice at 4 to 5
I. To study the effect of GA₃, NAA, and Bitrex on growth of cucumber.

2. To study the effect of GA₃, NAA, and Bitrex on flowering and sex expression of cucumber.

3. To find out the most optimum concentration of GA₃, NAA, and Bitrex for maximum yield production of cucumber.

4. To find out the economics for use of growth regulators in cucumber.
LITERATURE REVIEW

CHAPTER II

REVIEW OF LITERATURE
Fruits and yield per vine under Belgaum, Karpatcha conditions. Vine length (50.3:10 cm) at final harvest and increased number of female flowers at 2 and 4 leaf stages in bitter gourd increased in CA 2 ppm at 70, 85 and 100 days after sowing in bitter gourd. Shantapara et al (2005) reported that the application of CA 35 ppm at 70, 85 and 100 days after sowing in bitter gourd produces earlier female flowers and suppressed male flower production.

Gedam et al (1998) observed that the application of CA 35 ppm at 70, 85 and 100 days after sowing in bitter gourd increased female flowers, reduced days taken and reduced number to first male and female flowering. Pusa Do Moura, as seed soaking and observed that it improved weight and yield per plant under IAFR, New Delhi conditions.

2.1 EFFECT OF PLANT GROWTH REGULATORS ON CUCURBITACEOUS CROPS

Watermelon, pumpkin, ridge gourd, squash, melon and cucurbibaceous cucumber like bottle gourd, bitter gourd, thornless, muskmelon, have been reviewed in this chapter. Work done on other briefly reviewed to throw light on our existing knowledge and assess the need for future work. Work done on other briefly reviewed to throw light on our existing knowledge and employ plant regulators treatment in cucumber has been

In the present context, the work done on the improvement

REVIEW OF LITERATURE

CHAPTER II
Summer PruningLong reduced the length of main axis increased
10 ppm at 2 and 4 true leaf stages in bottle ground cv. Pusa
Pandya and Dixit (1997) revealed that foliar spray of G3
of fruits and yield per vine.

Summer PruningLong reduced the wine length, increased length and diameter, number
application of G3 at 25 ppm at 2 and 4 true stages also
IRRI New Delhi conditions. Further, they also observed that an
control in bottle ground cv. Pusa Summer PruningLong under
appearance and lowered made: female sex ratio as compared to
node number and days to first male and female flower
application of GA3 at 25 ppm at 2 and 4 true stages reduced
Growth regulators on three genera of cucurbits and observed that
Singh and Chaudhary (1998) studied for the effect of plant
and total yield per hectare under Hissar (Haryana) conditions.
over control (6.2:1), increased number of fruits, yield per plant
Pusa Summer PruningLong significantly lowered made: female sex ratio (4.4:1)
at 2 and 4 true leaf stages in bottle ground cv. Pusa Summer
Arolla et al. (1998) observed that foliar spray of 25 ppm G3

Bottle Ground

under Mymensingh (Bangladesh) conditions.
also observed that individual fruit weight was found maximum
influenced flowering behavior and flowering characteristics. It was
ppm at pre-flowering stage in bottle ground cv. The significantly
Dosigtikar et al. (2006) studied that the application of G3 25
flowering were partly restored by phytohormones.

Khun and Chaudhary (2006) studied that G3 applied at 40

Review Of Literature
Hybrid, Trifl 19 and Local Super Green gave best result in cucumber (Cucurbita sativa L.) cultivars, namely Pusa Pressed et al. (2003) observed that spray of GA3 at 10 ppm significantly decreased sugars, while reducing sugar content was decreased size of individual fruits and also both ascorbic acid and total number of fruits per plant yield per hectare and increased the concentration decreased the number of flowers, ppm in cucumber cv. Ponssette and Belgrad normal cv. With its Vahid et al. (2010) studied for the effect of GA3 at 5 or 10 ppm in cucumber cv. Ponssette and Belgrad normal cv. With its first female flowers and lowered sex ratio (male: female). The treatment also reduced the number of days taken for yield. The treatment also increased number of female flowers and that GA3 at 20 ppm increased number of female flowers and at 10 ppm 3 times at 10 days interval and concluded Asef et al. (1999) sprayed cucumber seedlings with GA3 5 ppm in cucumber cv. Ponssette and Belgradi normal cv. With its first female flowers and lowered sex ratio (male: female). The treatment also reduced the number of days taken for yield. The treatment also increased number of female flowers and that GA3 at 20 ppm increased number of female flowers and at 10 ppm 3 times at 10 days interval and concluded Asef et al. (1999) sprayed cucumber seedlings with GA3 5 ppm.}\n
\textbf{Cucumber}\n
\textbf{Konkan conditions.} The treatment increased yields at 10 ppm also recorded the highest yield under node per vine and more numbers of fruits per vine as compared number of branches per vine (4.20) and higher number of inter increased number of leaves per vine (9.38), produced higher and 10 ppm at 2 and 4 leaf stages in bottle gourd cv. Santorin, Kore et al. (2003) reported that the application of GA3 5 ppm ultimately yield 27.2 t/ha over control (19.75 t/ha) under Konkan conditions. The treatment increased yield weight and 6.74 t/ha in control. This treatment also increased fruit weight and flowers, lowered male: female sex ratio to 3.6:1. As against female flower appearance, increased number of male and female number of branches, reduced the node number and days to first flowers.
Hybrid, Tiptop-19 and local Super Green gave best result in cucumber (Cucumis sativus L.) cultivars, namely Pusa Prasad et al. (2003) observed that spray of GA3 at 10 ppm

significantly.

Sheirs, while reducing sugar content was decreased size of individual fruits and also both ascorbic acid and total number of fruits per plant, yield per hectare and increased the concentration decreased the number of female flowers, increased concentration decreased the number of female flowers. GA3 at 5 or 10 ppm in cucumber cv. Poinsettia and Belgram Local. GA3 with its 

Wadhia et al. (2001) studied for the effect of GA3 at 5 or 10 first female flower and lowered sex ratio (male: female).

First female flower lowered and lowered sex ratio (male: female). The treatment also reduced the number of days taken for yield. The treatment also increased the number of female flowers and

Asghar et al. (1990) sprayed cucumber seedlings with GA3

Cucumber

Koneran conditions, Konkan conditions, to control. GA3 at 10 ppm also recorded the highest yield under node per vine and more numbers of fruits per vine as compared number of branches per vine (4.20) and higher number of inter increased number of leaves per vine (93.93), produced higher and 10 ppm at 2 and 4 leaf stage in bottle gourd cv. Samrat and 10 ppm at 2 and 4 leaf stages in bottle gourd cv. Samrat and 10 ppm at 2 and 4 leaf stages in bottle gourd cv. Samrat (Cultural conditions.

Ultimately yielded 27.2 t/ha over control (19.75 t/ha) under

Kore et al. (2003) reported that the application of GA3 5

(Review of Literature)
to control. The highest numbers of leaves, steminite and germination rate (94.6%) and higher length of vine as compared before flowering. Significantly affected by early germination, higher cucumber (Cucumis sativus L.) cv. 'Tempo' in greenhouse conditions. However, it reduced the 100 ppm increased the length of primary shoot, branches and number of branches as well as fresh and dry weight in cucumber (Cucumis sativus L. cv. 'Tempo') in greenhouse conditions. (Chaudhary et al. (2006) studied that spray of GA_3 at 25 ppm in cucumber (Cucumis sativus L.) cv. 'Tempo' significantly increased fruit number of primary shoot, and steminite and flowering. It can be concluded that the promote flowering, increasing the number of pistillate and staminate flowers in pot plants in GA_3 at 40 ppm caused precocious flowering, increasing the volume and weight (Chaudhary, Khan and Chaudhary (2006) studied that an application of NO, and NWO) reported that spray of GA_3 at 25 ppm in a parthenocarpic, Fyndicus hybrid cucumber has significant effects of GA_3 on flowering, were partially restored by phytohormones. (Polonez, Polonez, et al. (2004) reported that spray of GA_3 Albertabad (U.P.) conditions during the northern season.
selection, increased node number to first male and female flowers as foliar spray at 2 and 4 true leaf stages in pumpkin cv. Local
Arora and Pararp (1988) observed that C43 25 ppm applied

Pumpkin

of melon fruits remained unchanged.

sugars (fructose, glucose and saccharose) and the soluble solids
promoted the elongation of the first internode and leaf but the
GA3 at 100 micro M in melon (Cucumis melo L.) cv. Calabaspina
Ouzounion et al. (2006) reported that foliar application of
ppm GA3 (total soluble solids) was recorded with seeds soaking at 600
number of fruits per plant, fruit weight, yield per plant and TSS
was observed by soaking in 500 ppm GA3. However, the highest
days taken for staminaile flowers and pistillate flowers to appear
maximum seed germination, Maximum length, least number of
were observed 12 days under Kanpur (U.P.) conditions.
ppm GA3 under Kanpur (U.P.) conditions.
Soluble Solid content was observed with seed soaking at 600
C43. The number of fruits per plant, fruit weight and also Total
pistillate flower induction was noted with soaking at 500 ppm
increased the number of male flowers and decreased the male to female flower ratio (Cucumis melo L.) under greenhouse conditions significantly at the cotyledon stage and at the first true leaf stage. In summer squash, Chenne et al. (2002) studied that a spray of GA3 at 100 ppm of Hiser (Haryana) increased the number of fruits and yield per plant in squash melon. Female-to-male sex ratio (male: female), number of branches, and length of main axis increased at 2 and 4 true leaf stages increased length of main axis and female flowers in squash melon.

Squash melon

conditons.

According to Arora et al. (1987) in application of GA3, Ridge 404, and Hiser (Haryana) conditions, fruits, yield per plant, and yield per hectare increased. Female to male sex ratio increased, number of female flowers increased, length of main axis increased, number of branches increased, and number of fruits per plant increased. Pusa Nasdara, a female hybrid, produced more fruits per plant and per hectare under Hiser (Haryana) conditions.

Akla Chaudhuri under Dharward (Karnataka) conditions, germination were recorded by the control (89%) in pumpkin cv. per cent (92.0) was recorded in GA3 at 25 ppm and the least Prasad et al. (2008) revealed that the highest germination over control (16.4.5.9) under Hiser (Haryana) conditions.

ratio, enhanced fruit yield per plant and per hectare (203.5.9). Appearance, number of male flowers, female flowers and sex ratio increased.
Reduced the male flowers.

PpM increased vine length, number of branches, fruit weight and
Kabir et al (1989) observed that the spray of NAA at 20

Swaraj (1984) reported that the application of NAA 100 ppm significantly increased vegetative growth, number of fruits

Sutherland reported that the application of NAA 100 ppm

conditons.

Bitter

2.1.2. Naphthalene Acetic Acid (NAA).

number of nodes under Chhitale ghar condition.

appearance, caused lower sex ratio and resulted in higher
at lower nodes but late flowering the longest number of days to
shortest number of days to harvest and produced female flowers
watermelon cv. Sugar Baby resulted the initiated early flowering,

Dixit et al (2001) observed that spray of GA at 50 ppm in

Watermelon.

female flower and lowered sex ratio (male : female) in water

female, which reduced the number of days to appear the first
number of branches, fruit set, SS percentage and yield,
ppm at 2 and 4 leaf stages increased the main vine length,

Aura et al (1985) concluded that an application of GA3 25
Female sex ratio and increased the number of fruits per plant to first male and female flowers appearance, narrowed male and number of branches, reduced both node number and days Pusa Summer. Proline long increased the length of main vine (phumary 50 ppm at 2 and 4 true leaf stages in bottle ground or). Sharma et al. (1988) found that foliar spray of NAA

Proline long under Hisar (Haryana) conditions. Pusa Summer per plant and per hectare of bottle ground or. Pusa Summer female sex ratio increased number of fruits per plant, fruit yield increased. However, decreased the node to first female flower, lowered male. Sharma et al. (1983) observed that an application of NAA 50 ppm at 2 and 4 th leaf stages increased the node to first male part (1983) observed that NAA 100 ppm reduced length of

Bottle ground

Under Rahuri (Maharashtra) conditions. Number of seeds per ripe in bottle ground or. Phule Green Cold picking recorded the highest mature fruit yields per vine and number of seeds per ripe, and seed yield. During 2 nd and 3 rd application of NAA 50 ppm recorded highest fruit yield per vine, Mebral and Mushmade (2007) concluded that an

Percentile flower. Per hectare (8+0.00 kg) and days required to appear the first per hectare (8+0.00 kg) and days required to appear the first recorded more number of fruits per vine (16.31) and seed yield. NAA 50 ppm at 2 to 4 leaf stages in bottle ground significantly

Review of Literature
increased fruit set under Dapoli (Maharashtra) conditions. Induction of female flowers and high sex ratio ultimately per vine as compared to control and also most effective for early number of branches per vine and higher number of internodes and 4 leaf stages in bottle gourd cv. Samrat produced higher Kore et al. (2003) studied for the effect of NAA 20 ppm at 2 vine and sex-ratio (male: female) was observed. produced the highest yield. However, the reduction in length of female flowers, number and weight of fruit per vine and ultimately stages, there was increase in number of branches, length and leaf of bottle gourd treated with 100 ppm NAA at 2 and 4th leaf 9 kg/ha (under Hisar (Haryana) conditions).
Yield

Reduced number and days to first male flower and increased fruit
node number and days to first female flower, increased length of
main shoot and number of branches, applied at 2 and 4 leaf stages in pumpkin cv. Local Selection
Azora and Pecan (1988) indicated that NAA 50 ppm

Pumpkin

the sex-ratio, significantly.

First hermaphroditic flower, production of staminate flowers and
50 ppm increased yield and decreased the days taken to appear
enhanced growth and increased number of branches, while NAA
Desai (1983) observed that an application of NAA 25 ppm

Muskmelon

was observed in the fruits.

diameter of fruits and in this treatment there were less seeds set
increased yield contributing characters like length of fruits and
200 ppm at 2, 4 and 6 leaf stages of cucumber cv. Punnet Khira
Refekher et al. (2002) observed that an application of NAA

conditions.

content in fruit of cucumber was ascertained under Assam
highest ascorbic acid content and TSS (total soluble solid) appearance stage as foliar spray during rapid season revealed that
NAA 30 and 100 ppm at 4-5 leaf stage of growth and flower bud
Das and Rabha (1999) indicated that the application of

Review of Literature
Ethephone 250 ppm in bottle ground cv. Pusa Summer Profliic

Panda and Dixit (1997) reported that an application of

Ethephone (250 ppm) in bottle ground cv. Pusa Summer Profliic

increased the production of female flowers.

Gourde (mid season) and Cleavata (late) with Ethephone (3.5 mg)

shoot tips of Luffa sicerata cv. Hispid (early), cv. Depressa,

Vining et al. (1994) found that the treatment of leaves or

under IAR (New Delhi) conditions.

control (3.46:4) in bottle ground cv. Pusa Summer Profliic Long,

produced lower male: female sex ratio (2.08:4) as compared to

Ethrel 100 ppm applied at 2 and 4 leaf stages, decreased male

growth regulators on three genera of cucurbitis and observed that

Singh and Choudhury (1988) studied for the effect of plant

Bottle Ground

under Haryana (India) conditions.

nodes and reduced the total number of female flowers per plant

However, in the appearance of first female flower at the higher

delayed appearance of the first male and first female flowers,

reduced the length of main vine and number of branches,

ppm in bottle ground cv. Pusa Do Mousami during summer season

Negi et al. (2003) observed that spray of Ethephone 250

female (in bottle ground cv. Karela)

ppm increased female flowers and reduced sex ratio (male:

as the concentration increased from 25 to 100 ppm. Ethrel at 25

flowering with the number of male buds decreasing progressively

Chosh and Basu (1983) observed that the Ethrel inhibited

Bitter Ground

2.1.3 Ethrel (Ethephone)
Cucumber

(Upper Pradesh) conditions.

fruits per plant and weight of fruits per plant under Alkalibased
less stages increased average fruit length and girth; number of
ethylene 300 ppm in bottle ground cv. Pusa Naveen at 2 and 4
Sanjay et al. (2006) indicated that the application of

conditions.

nodes ultimately increased yield under Kashmir (India)
1:3.85 (female: male) and produced female flowers at the early
male flowers per plant and showed the minimum sex ratio of
increased number of female flowers and decreased number of
150 ppm in bottle ground cv. SH-BG-I at 2 and 4 true leaf stage
Karako et al. (2005) studied that the application of Ethrel
increased fruit weight and yield under Punjab conditions.

bottle ground cv. Pusap Kromal, lowered male: female ratio and
flower was produced by treatment with Ethrel at 150 ppm in
Kooner et al. (2000) indicated that the earliest female

conditions.

5.6.4:1 in control, enhanced number of branches and female
appearance, lowered male: female sex ratio to 3.25:1 as against
of male flowers and node number and days to first female flower

Review of Literature
Sutar et al. (2006) observed that the foliar application of

higher number of fruits and yield as compared to control

Nikumbh et al. (2006) revealed that the application of

fruit weight per plant, fruit size yield and total yield per plant

Das et al. (2001) observed that Ethrel 250 ppm applied at 4

female flowers, fruit size and early and total fruit yield per plant,

Sinha and Mandal (2000) observed that Ethrel 100

and yield per vine under Rahuri (Maharashtra) conditions.

ratio (4:3:1) over control (9:0:1) and increased number of fruits

Chinese Green, Pusa Sanyog and Purnima, respectively increased the number of nodes, significantly increased the male flowers, internodal length and sex-ratio

to 5 leaf stage and flower initiation stage in cucumber cultivars

Review of Literature
number of days to first male flower and female flower with number ofdays to first maleflower andfemaleflower with Nagahin et al (1999) revealed that an increased fruit yield, compared to control in pumpkin cv. Arka Sugamulch compared to control in pumpkin cv. Arka Sugamulch, solid (TSS) content and higher ascorbic acid content as solid (TSS) content and higher ascorbic acid content as ethanol 500 ppm at 2 and 4 leaf stage gave higher total soluble Carvalhier et al (1990) noticed that the application of Carvalhier et al (1990) noticed that the application of pumpkin pumpkin cv. Orange Fleshed) under Rio Grande do Norte (Brazil) conditions. cv. Orange Fleshed) under Rio Grande do Norte (Brazil) conditions.

Nascimento et al (2005) revealed that an application of 0.2 Nascimento et al (2005) revealed that an application of 0.2

Muskemelon Muskemelon

(72.72%) as compare to control under Bangalore conditions. (72.72%) as compare to control under Bangalore conditions.

Devaraju et al (2002) observed that the application of Devaraju et al (2002) observed that the application of increased crop quality.

improved under Hisar (Haryana) conditions.

number of fruit and fruit yield but fruit weight was slightly number of fruit and fruit yield but fruit weight was slightly
snake gourd (T. anguina) under Gazipur (Bangladesh) conditions. Application of 0-100 ppm Ethrel at 2 and 4 true leaf stage in
fruits per plant and fruit dimension was not significant with
the bottom bearing first male flower but number and weight of
to appearance of first male flower and node number from
days to appearance of first female flower increased the number of female flowers.
Kohinoor and Minh (2005) reported reduction in the days

Snake Gourd

highest seed yield under Daravadi (Karimnagar) conditions.
200 ppm) in pumpkin cv. Arka Chandan recorded significantly
Pusada et al. (2008) revealed that a foliar spray with Ethrel
Bengal (conditions during pre-Kharif season.
plant, and total fruit yield per plant under Coach Bear (West
flower, number of female flowers per plant, number of fruits per
cultivars significantly increased node number for first female
ppm applied at the 2 and 4 leaf stage in pumpkins & local
Karnal and Sary (2006) reported that an Ethrel at 250
resulted in early flowering and higher fruit yield.

ppm in Cucurbita moschata L. cv. Local and Arka Chandan
Bhat et al. (2006) concluded that a spray of Ethrel at 700
July under Commbatore (Tamil Nadu) condition.

semination (93.7%) and yield index (4098 kg) during June-
production (14.20), fruit yield (99.95 kg), seed yield (1397.22
1 significantly increased the number of pistillate flower
at 2 and 4 leaf stage in pumpkin (Cucurbita moschata L.) cv. Co-
Adali et al. (2001) reported that spray of Ethrel 250 ppm

condition.

pumpkin Cucurbita moschata L. cv. Local Selection at Gwalior
application of Ethrel of 200 ppm at 2 and 4 leaf stages in
Materials and Methods
ten years) average rainfall of this area is 684.4 mm. Partial
heavy precipitation, the December-Jaunary for recurring every
of first week of October, July and August are the months of
South-West monsoon commence by third week of June and end
moderately humid monsoon. The rainfall is received from the
characterized by fairly cool and dry summer and warm and
characteristic of June-Nagadh region is typically subtropical.

3.3 Climatic and Weather Conditions

Seacoast under subtropical region. Seacoast and 82 km away from the Arabian
mountain climatic Sierra and 62 km away from the Aridic
metres above mean sea level on the western side at the foothills of
21.5° N latitude and 70.5° E longitude with an altitude of 60
zone of Gujarat State. Geographically, June-Nagadh is situated at
June-Nagadh is situated in South-Saharan Arido Climatic

3.2 Location

Agricultural University, June-Nagadh during summer season 2010.
conducts at Agronomy Instructional Farm, June-Nagadh
of cucumber (Cucumis sativus L. C.V. Guf-Cucumber-1) was
regulators on growth, flowering, sex expression, quality and yield
The present investigation entitled, “Effect of plant growth

3.1 Experimental Site

Experimental work. The present investigation dealt with the details of research material
used, methods followed and techniques adopted for the

Chapter III - Materials and Methods
The land prepared with thorough ploughing, planting

3.6.1 Land Preparation

3.6 Schedule of Cultural Practices

Anand.

And this culture were obtained from Anand Agricultural University, the seeds of cucumber cv. "Culu-Cucumber-1" was used. The seeds of the experimental material comprised of genetically pure

3.5 Experimental Materials

determination are presented in Appendix – II.

The values obtained along with method employed for their composite samples then analyzed for physico-chemical properties.

and 15-30 cm depth of soil before sowing of the crop. The composite soil samples were taken randomly, each from 0-15 cm composite samples from soil but of different properties of soil, two

3.4 Physico-Chemical Properties of Soil

Appendix – I.

during which the trial was conducted are presented in 42°C. Details of some of weather parameters of the year 2010 middle of June, April and May are the hottest months of the year with the mean maximum temperature ranging from 35°C to middle of February, January is the coldest month with the minimum temperature 13.0°C to 15.0°C. Summer season failure of monsoon once in three to four years is common in this area. Winter sets in the month of November and continues till
best and disease etc. were adopted as an when required.

Integration as well as plant protection measures against insect, All the intercultural practices such as hoeing, weeding,

3.6.5 Intercultural Operations

Sowing:

Seed, gap filling and thinning were done after seven days of field, Gap filling and thinning were done after seven days of

To maintain uniform plant population in experimental

3.6.4 Gap Filling and Thinning

2.0 m x 1.0 m between rows and plants, respectively.

of cv. Gu-Cucumber-1, were dippled at each hill at a distance

The seeds were sown on 24th February, 2010. Three seeds

3.6.3 Sowing

Sowing:

applied as basal dose and half as top dressing after 30 days of

K2O were given as a basal dose and half quantity of nitrogen was

50.25:25 N : P2O5:K2O ha-1. The whole quantity of P2O5 and

The fertiliizers were applied at the recommended rate of

3.6.2 Fertilizer Application

experiments was done.

every help of wooden plank. After final levelling the layout of

soil during the last harrowing. The land was leveled with the

Materials and Methods
were as follow: (water spray)

Thus, total 16 treatments
used in present experiment.
Acid (NAA), and Ethrel were
Acid (GA3), Naphthalene Acetic
growth regulator i.e. Gibberellic
Five concentrations of each
3.6 m x 2 m
5.4 m x 2 m
0.6
2.0 m x 1.0 m
 TWO
Three
Summer – 2010.

1. Treatment details
9. Size of net plot
8. Size of gross plot
7. No. of plants per plot
6. Planting distance
5. Number of sprays
4. Stage of sprays
3. No. of replications
2. Season
1. Design

The details of the experiment are as under:

Block Design (RBD).
The experiment was laid out in the field in a Randomized

EXPERIMENTAL DETAILS

Materials and Methods
Plate-1: General view of experimental field of cucumber cv. Guj-cucumber-1.
Fig. 3.1 Layout Plan of Experimental Plot

Repl. 11

Repl. 11

Repl. 10

Repl. 10

Repl. 9

Repl. 9

Repl. 8

Repl. 8

Repl. 7

Repl. 7

Repl. 6

Repl. 6

Repl. 5

Repl. 5

Repl. 4

Repl. 4

Repl. 3

Repl. 3

Repl. 2

Repl. 2

Repl. 1

Repl. 1

Repl. 0

Repl. 0

Repl. 1

Repl. 1

Repl. 2

Repl. 2

Repl. 3

Repl. 3

Repl. 4

Repl. 4

Repl. 5

Repl. 5

Repl. 6

Repl. 6

Repl. 7

Repl. 7

Repl. 8

Repl. 8

Repl. 9

Repl. 9

Repl. 10

Repl. 10

Repl. 11

Repl. 11
Quantity of distilled water just before spraying and 150 ppm, respectively, were prepared by addition of required at 150, 200, 250, 300, and 350 ppm and NAA 50, 75, 100, 125, 150, 200, 250, and 300 ppm. Ether solutions of GA, I2, I5, and I7 ppm were made up to 1.0 Iiter by adding distilled water. Mixed with small quantity of distilled water and final volumes were dissolved in small quantity of 95% ethyl alcohol, ether is when dissolved in small quantity of GA and NAA were weighed separately. GA and NAA quantity of GA and NAA were weighed separately. For the preparation of polar spray solution, the required

REGULATORS
PREPARATION OF SOLUTION OF GROWTH

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3.8.3 Naphthalene Acetic Acid (NAA)

The distilled water, 150 ppm solution of NAA, was made up to 1 liter by adding the distilled water. 150 ppm solution was taken from stock solution for preparing 50, 75, 100, 125, and 200 ppm solutions. The required quantity of stock solution was considered as stock solution concentration of 1000 ppm. It was considered as stock solution. Then using formula \( N' = \frac{V}{N_2} \), the required quantity of solution was taken from stock solution. It was considered as stock solution. Then using formula \( N' = \frac{V}{N_2} \), 1 liter by adding distilled water to obtain volume of NAA in small quantity of 95 per cent absolute alcohol and 0.8 distilled water. The stock solution of NAA was prepared by dissolving 1.0 g

3.8.2 Ether

The distilled water, ppm solution of GA3, was made up to 1 liter by adding the distilled water. 10, 15, 20, and 25 ppm solution was taken from stock solution for preparing 5, 10, 15, 20, and 25 ppm solutions. The required quantity of solution was considered as stock solution. Then using formula \( N' = \frac{V}{N_2} \), the required quantity of stock solution was taken from stock solution. It was considered as stock solution. Then using formula \( N' = \frac{V}{N_2} \), 1 liter by adding distilled water to obtain volume of GA3 in small quantity of 95 per cent absolute alcohol and 0.18 distilled water. The stock solution of GA3 was prepared by dissolving 0.18 g
recorded at the time of final harvesting of the crop. The numbers of node per vine in each treatment were

3.10.1.3  **Number of node per vine.**

recorded at 60, 90, and 120 DAS of the crop. The numbers of branches per vine in each treatment were

3.10.1.2  **Number of Branches per Vine at 60, 90, and 120 DAS**

was measured with measuring tape and recorded at 60, 90, and 120 DAS of the crop. The length of main axis in meter of vine in each treatment was measured with main axis at 60, 90, and 120 DAS (m).

3.10.1.1  **Length of Main Axis at 60, 90, and 120 DAS (m).**

3.10 GROWTH PARAMETERS:

However, yield and quality characters, each net plot to record the observations with regard to growth, in the present investigation, four vines were selected from

3.10 OBSERVATIONS RECORDED

Sprayer till the both sides of leaves completely wet.

respective, during morning hours with the help of "Cansheh" "April leaf shed" on 15th March 2010 and 24th March 2010.

The sprays of respective treatments were applied at 2% and 9.9

3.9 METHOD ADOPTE FOR POLAR SPRAY
3.10.2.1 Days taken to first male flower appearance.

The number of days required for the appearance of first male flower per vine was recorded in each treatment after sowing.

3.10.2.2 Days taken to first female flower appearance.

The number of days required for the appearance of first female flower per vine was recorded in each treatment after sowing.

3.10.2.3 Number of female flowers per vine at 60, 90, 120 DAS.

The number of female flowers born per vine in each treatment were recorded at an interval of 60, 90, 120 days after sowing. The total number thus summed up for female flowers were used for representing sex expression.

3.10.2.4 Number of male flowers per vine at 60, 90, 120 DAS.

The number of male flowers born per vine in each treatment were recorded at an interval of 60, 90, 120 days after sowing. The total number thus summed up for male flowers were used for representing sex expression.

3.10.2.5 Male: female sex ratio at 60, 90, 120 DAS.

The sex ratio was obtained by dividing total number of male flowers with total number of female flowers in each treatment.
Materials and Methods

3.10.2.7 Node no. to first male flower appearance

3.10.2.6 Node no. to first female flower appearance

3.10.3.7 Yield parameters

3.10.3.6 Fruit length (cm)

3.10.3.2 Fruit girth (cm)

3.10.3.3 Number of fruits per vine

3.10.3.4 Fruit yield kg per vine

3.10.3.1 Fruit length (cm)

3.10.3.0 Fruit girth (cm)

3.10.2.4 Well-developed, tender and edible fruits were harvested 6-7 times and recorded per total number of fruits per vine.

3.10.2.3 Number of fruits per vine.

Record the mean values of fruit length measured with vernier caliper in cm at the middle of the fruit to calculate the mean fruit length.

Five fruits from each vine were selected randomly and five fruits from each fruit were measured with vernier caliper in cm.

3.10.2.2 Fruit girth (cm)

3.10.2.1 Fruit length (cm)

3.10.2.0 Fruit girth (cm)

3.10.1.0 all parameters:

The node number on which first male flower appeared was noted from the first node at the base of stem to subsequent per vine under each treatment.

3.10.0.7 Node no. to first male flower appearance.

The node number on which first female flower appeared was noted from the first node at the base of stem to subsequent per vine under each treatment.

3.10.0.6 Node no. to first female flower appearance.
rectangular prism and observations were recorded. Three crushed, juice was extracted through cheese cloth on crushed fruit. Juice was allowed to stand for four hours and gently stirred. Product, 10 g of product was dissolved in distilled water in 1:4 (product: water) ratio. Keeping in case of average of the TSS in per cent, while in case of the refractometer prism and three readings were taken and average of the readings were taken and fresh cucumber pulp, the pulp was crushed and extract placed in brine hand refractometer. To obtain TSS (total soluble solids) of

The Total Soluble Solids in sample were recorded by using

3.10.4.1 TSS (Total Soluble Solid).

3.10.4 QUALITY PARAMETERS:

each plant and average fruit weight was calculated.

in gram by weighing machine and four fruits are taken from The fruits are harvested 6-7 times from each plant weighed

3.10.3.7 Fruit weight (g).

dividing Kg per hectare with 1000 and it was expressed in t/ha.

The fruit yield Kg per plot in converted and calculated in Kg.

3.10.3.6 Fruit Yield Tones per ha.

per vine and average fruit weight (Kg) per plot was calculated by multiplying the

3.10.3.5 Fruit Yield Kg per plot.

per vine. "Materials and Methods"
Materials and Methods

3.10.4.3 Reducing Sugars (%)

\[
10 \text{ ml} \\
\text{Alcohol of extract taken for estimation} \\
\times \text{Weight of sample} \\
\times 100 \\
(100\text{ml}) \\
\times 0.02 \\
\text{Volume} \\
\text{Dye} \\
\text{Ascorbic acid} \\
\text{mg/100 g} \\
\text{Reduction equivalent by adopting following formula:}
\]

- Pink colour faded. Ascorbic acid was expressed in terms of per cent alcohol of extract taken for estimation. The colour was noted when the indophenol dye solution, the titration was noted when the ml of beaker and titrated against standard 2, 6-dichlorophenol indophenol ml of beaker. From this, 10 ml aliquot was taken in a 100 ml conical flask. From this, 10 ml aliquot was taken in a 100 ml volumetric flask and volume was made up with 3% metaphosphoric acid. The solution was well mixed and transferred to 100 ml volumetric flask and volume was made up to 100 ml. The method described by Ranganna (1979) was adopted. A known quantity of the homogenized sample was taken and readings were taken and averaged out to express the TSS in per cent (Ranganna, 1979).
(1 ml) 
Aliquot sample x 
Weight of sample
---------------------------------------
\[ \text{Sugar (%) } \]
\[ = \frac{10 \times 0.05}{10 \times 0.05} \]
\[ \text{Non-reducing sugar} \]
\[ \text{Total volume extract} \]

To the following formula:
Percentage of reducing sugar was calculated according to the following:

Percent of reducing sugars was determined by the following procedure:

1. By adding 1 N NaOH drop wise form a pipette. Maintain by adding 1 N NaOH drop wise form a pipette. Maintain
2. Neutralize the contents. Cool the tubes and
3. Mixtures by heating at 490C for 30 minutes. Cool the tubes and
4. Hydrolyze the out 1 ml of extract and add 1 ml of 1 N H2SO4. Hydrolyze the
5. Water bath. Add 10 ml of water and dissolve the sugars. Pipette
6. Each time. Then collect the supernatant and evaporate an
7. mg of sample and extract the sugars with hot 80% alcohol twice
8. Estimated either by Nelson-Somogyi or DNS method. Weight 100
9. Extracts were first hydrolyzed with either sulphuric acid or formic
10. Extracts were considered as the total reducing sugars. Then, the total reducing sugars are
11. Calculated according to the following formula:

\[ \text{Reducing sugar} \]
\[ = \frac{10 \times 0.05}{10 \times 0.05} \]
\[ \text{Reducing sugar} \]
\[ \text{Reducing sugar} \]

The estimation of non-reducing sugars present in the plant

3.10.4.4 Non-reducing sugars (%)

Material and Methods
Potentiometer.

under pressure, solid or hard). It was measured by using

The state of quality of being firm (not yielding easily

3.10.4.7.1 Firmness.

3.10.4.7.2 Fruit quality.

to record the mean values of number of seeds per fruit.
and then seeds were extracted and counted the seeds per fruit.
Five fruits were selected randomly and allowed to mature

3.10.4.6 Number of Seeds per Fruit

<table>
<thead>
<tr>
<th>Acceptability</th>
<th>Tender</th>
<th>Fruit texture</th>
<th>Aroma</th>
<th>Taste</th>
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<th>1 to 16</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

Format detailed below: headonic scale procedure as described by Rangana (2000) in

 hedonic scale procedure as described by Rangana (2000) in

 panelists were instructed to evaluate the samples as per

 evaluation panel consisted of 5 trained panelists and the

 unacceptable from the quality point of view. Organoleptic score

 scoring less than 5 points out of 10 point was treated as

 attribute was given a separate score of 10 points. Product

 aroma, texture, fruit colour and overall acceptability. Each

 treatments for organoleptic score characteristics viz., taste,

 The slices of cucumber were prepared under watered

 3.10.4.5 Organoleptic score.

 content;

 by subtracting the reducing sugars from total carbohydrates.

 The content of non-reducing sugars can also be calculated.
CBR = \frac{\text{Total cost of cultivation (Rs./ha)}}{\text{Cross realization (Rs./ha)}}

was calculated on the basis of the formula given below. The cost benefit ratio was calculated on the basis of the formula given below. The net realization per hectare was calculated by subtracting the cost of cultivation from the gross realization for each treatment and recorded accordingly. The cost benefit ratio deduction the cost of cultivation from the gross realization for each treatment and recorded accordingly. The cost benefit ratio was calculated by subtracting the cost of cultivation from the gross realization for each treatment and recorded accordingly.

The net realization per hectare was calculated by

fruit yield per hectare of each treatment and prevailing market

The gross realization was worked out on the basis of mean

added.

Growth regulators applied to each treatment were compared and Land to harvesting of the crop including cost of inputs viz.,

incurred on all cultural operations right from the preparation of and to ascertain the most remunerative treatment, the expenses

In order to evaluate the effectiveness of different treatments, in

3.12 ECONOMICS

Treatment means where the treatment effects were significant,

per cent level of probability was worked out to compare the two

calculated in each case and the critical difference (C.D.) at five

appropriate standard error of mean (S.E.) was

were tested by “t” test of significance on the basis of null

randomized block design was used. The treatment differences

The data of all characters were subjected to

3.11 STATISTICAL ANALYSIS
Experimental Results
control which was at par with NAA 150 ppm (1.00 m). The maximum length of main axis was recorded in 125 ppm (1.68 m) and Ethrel 350 ppm (1.66 m). On the other hand, minimum length of main axis (0.90 m) was recorded in 10 ppm (1.08 m), which was at par with GA3 20 ppm (1.70 m). NAA increased the length of main axis over control except NAA 150 ppm. It was observed that all the treatments significantly increased the length of main axis at 60 DAS as depicted graphically in Fig. 4.4.1. The data pertaining to length of main axis at 60 DAS are presented in Table 4.1 and 4.2. The data presented in Table 4.1 and 4.2 have been affected by various levels of GA3, Ethrel, and NAA. The data pertaining to each character are presented in this chapter. The present experiment entitled, "Effect of plant growth regulators on growth, flowering, sex expression, quality and yield parameters of cucumber (Cucumis sativus L.) cv. Guj-Cucumber-1", was carried out during summer 2010 at Agriculture Farm, Krishibid bangladesh Agricultural University, Jhungedai, Thank you very much.
Graphically in Fig. 4.2. Ethrel are presented in Table 4.2. They are also illustrated

The data on the growth in terms of number of branches per

I. Number of branches per vine at 60 DAS.

II. Length of main axes at 90 DAS (m).

1.1.2 Effect of growth regulators on number of branches

150 ppm (2.65 m), NAA 125 ppm (2.63 m) and control (2.60 m).

with Ethrel 350 ppm (2.72 m), Ethrel 250 ppm (2.70 m), Ethrel

least was found in Ethrel 200 ppm (2.55 m) which was at par

length of main axes was recorded in GAA 10 ppm (3.50 m). The

The examination of data revealed that significantly longest

Table 4.1 and depicted graphically in Fig. 4.1.

by various levels of GA₃, Ethrel, and NAA have been presented in

The data on length of main axes at 120 DAS as exaggerated

III. Length of main axes at 120 DAS (m).

1.50 m).

control was recorded significantly shortest length of main axes

NAA 75 ppm (2.32), and Ethrel 300 ppm (2.30 m), however, the

10 ppm (2.50 m), which was at par with NAA 50 ppm (2.40 m),

control. The maximum length of main axis was recorded in GAA

regulators significantly increased the length of main axis over

The inspection of data revealed that all the growth

presented in Table 4.1 and depicted graphically in Fig. 4.1.

affected by various levels of GA₃, Ethrel, and NAA have been

The data pertaining to length of main axes at 90 DAS as

Experimental Results
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<td>Length of main axis (m)</td>
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</table>

Table 4.1: Effect of Growth Regulators on Length of main axes in cucumber (m).
Length of main axis at 60, 90, 120 DAS (m).

Fig. 4.1. Effect of growth regulators on length of main axis at 60, 90, 120 DAS (m).
having highest value as well as lowest value (7).

It was surprising result that the treatment (T2, T3, T7, T8, and T15) were found at par with the and NAA 150 ppm (11.30/vine), GA3 25 ppm (12.30/vine), GA3 5 ppm (11.90/vine), 12.40/vine), GA3 15 ppm (12.50/vine), NAA 125 ppm was at par with Ethrel 350 ppm (11.00/vine), GA3 15 ppm (12.50/vine), NAA 125 ppm which least was found in control (11.00/vine) and Ethrel 200 ppm (12.00/vine), GA3 20 ppm (13.10/vine), NAA 100 ppm which was at par with NAA 50 ppm (13.60/vine), NAA 75 ppm branches per vine was recorded in GA3 10 ppm (14.00/vine) branches per vine was recorded in GA3 10 ppm (14.00/vine).

The examination of data revealed that maximum number of branches per vine was recorded in GA3 10 ppm (14.00/vine).

In Table 4.2. They are also illustrated Graphically in Fig. 4.2. The data on number of branches per vine at 90 DAS as

<table>
<thead>
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<th>Number of Branches per Vine at 90 DAS</th>
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</thead>
</table>
| 150 ppm (8.80/vine), NAA 75 ppm (9.10/vine) GA3 5 ppm (6.90/vine) and NAA with number of branches (8.00/vine) which was also found at par GA3 15 ppm (11.00/vine), however, the control recorded minimum GA3 25 ppm (11.32/vine) NAA 100 ppm (11.10/vine) and NAA 125 ppm (11.47/vine) Ethrel 350 ppm (11.43

Among all the treatments maximum numbers of branches was recorded in Ethrel was found significantly superior in sense of more number of branches per vine as compared to control. Among all

The pursuit of the data revealed that all the concentrations...
### Table 4.2: Effect of Growth Regulators on number of branches per vine

<table>
<thead>
<tr>
<th>Treat.</th>
<th>0DAS</th>
<th>120DAS</th>
<th>60DAS</th>
<th>90DAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>15.00</td>
<td>11.00</td>
<td>9.00</td>
<td>8.00</td>
</tr>
<tr>
<td>GA3: 10 ppm</td>
<td>12.10</td>
<td>12.00</td>
<td>11.90</td>
<td>11.90</td>
</tr>
<tr>
<td>GA3: 15 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 20 ppm</td>
<td>11.90</td>
<td>11.90</td>
<td>11.90</td>
<td>11.90</td>
</tr>
<tr>
<td>GA3: 25 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 30 ppm</td>
<td>12.20</td>
<td>12.30</td>
<td>12.30</td>
<td>12.30</td>
</tr>
<tr>
<td>GA3: 35 ppm</td>
<td>13.10</td>
<td>13.10</td>
<td>13.10</td>
<td>13.10</td>
</tr>
<tr>
<td>GA3: 40 ppm</td>
<td>12.10</td>
<td>12.10</td>
<td>12.10</td>
<td>12.10</td>
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<td>GA3: 45 ppm</td>
<td>11.90</td>
<td>11.90</td>
<td>11.90</td>
<td>11.90</td>
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<tr>
<td>GA3: 50 ppm</td>
<td>12.00</td>
<td>12.00</td>
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</tr>
<tr>
<td>GA3: 55 ppm</td>
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</tr>
<tr>
<td>GA3: 60 ppm</td>
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<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
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<td>GA3: 65 ppm</td>
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<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 70 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 75 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 80 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 85 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
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</tr>
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<td>GA3: 90 ppm</td>
<td>12.00</td>
<td>12.00</td>
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<td>12.00</td>
</tr>
<tr>
<td>GA3: 95 ppm</td>
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<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 100 ppm</td>
<td>12.00</td>
<td>12.00</td>
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<tr>
<td>GA3: 105 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 110 ppm</td>
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<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 115 ppm</td>
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<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 120 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
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</tr>
<tr>
<td>GA3: 125 ppm</td>
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<td>12.00</td>
<td>12.00</td>
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<tr>
<td>GA3: 130 ppm</td>
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<td>12.00</td>
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<td>12.00</td>
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<tr>
<td>GA3: 135 ppm</td>
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<td>12.00</td>
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<tr>
<td>GA3: 140 ppm</td>
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<td>GA3: 145 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 150 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 155 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 160 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
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</tr>
<tr>
<td>GA3: 165 ppm</td>
<td>12.00</td>
<td>12.00</td>
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<td>GA3: 170 ppm</td>
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<td>12.00</td>
<td>12.00</td>
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</tr>
<tr>
<td>GA3: 175 ppm</td>
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<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 180 ppm</td>
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<td>12.00</td>
<td>12.00</td>
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<tr>
<td>GA3: 185 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 190 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 195 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 200 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 205 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 210 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 215 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 220 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
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<tr>
<td>GA3: 225 ppm</td>
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<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 230 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 235 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 240 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 245 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 250 ppm</td>
<td>12.00</td>
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<td>12.00</td>
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<tr>
<td>GA3: 255 ppm</td>
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<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
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<tr>
<td>GA3: 260 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 265 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 270 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 275 ppm</td>
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<td>12.00</td>
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<td>GA3: 280 ppm</td>
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<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
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<tr>
<td>GA3: 285 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
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<tr>
<td>GA3: 290 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 295 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>GA3: 300 ppm</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
</tbody>
</table>

### Notes
- Per vine in cucumber.
- Experimental Results.

### Analysis
- The table shows the effect of various growth regulators on the number of branches per vine at different concentrations.
- The data includes treatments from 0DAS to 120DAS, with 60DAS and 90DAS observations.
- GA3 is the primary growth regulator used, with concentrations ranging from 5 ppm to 300 ppm.
- The treatment details are not explicitly listed but can be inferred from the concentration levels.
Number of branches per vine at 60, 90, 120 DAS.

Fig 4.2. Effect of growth regulators on number of branches per vine at 60, 90, 120 DAS.
nodes per vine was recorded in control (16.33/vine), which was in GA3 10 ppm (25.00/vine). In contrast, minimum number of significantly maximum number of nodes per vine was recorded inspection of data revealed that among all the treatments all five concentrations of their respective growth regulators. The ethrel at 300 ppm and NAA at 50 ppm were found best amount GC3, Ethrel, and NAA, it was observed that GA3 at 10 ppm, number of nodes per vine. After observing the five treatments of was found significantly superior than all the treatments for The assessment of the data exposed that GA3 at 10 ppm.

The data pertaining to number of nodes per vine as

Table 4.3. Number of nodes per vine.

<table>
<thead>
<tr>
<th>Concentration</th>
<th>NAA 125 ppm</th>
<th>Ethrel 250 ppm</th>
<th>Ethrel 150 ppm</th>
<th>Ethrel 100 ppm</th>
<th>Ethrel 50 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA3 10 ppm</td>
<td>1.98</td>
<td>2.48</td>
<td>2.56</td>
<td>2.63</td>
<td>2.73</td>
</tr>
<tr>
<td>GA3 15 ppm</td>
<td>2.12</td>
<td>2.62</td>
<td>2.70</td>
<td>2.78</td>
<td>2.88</td>
</tr>
<tr>
<td>GA3 20 ppm</td>
<td>2.26</td>
<td>2.76</td>
<td>2.84</td>
<td>2.92</td>
<td>3.02</td>
</tr>
</tbody>
</table>

The perusal of the data revealed that GA3 at 10 ppm was

The data pertaining to number of branches per vine at 120 DAS.

The data pertaining to number of branches per vine at 120 DAS.

Figure 4.2. They are also illustrated graphically in Table 4.2. They are also illustrated graphically in Figure 4.2.
<table>
<thead>
<tr>
<th>Vine</th>
<th>No. of nodes per treatment</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.3: Effect of Growth Regulators on number of nodes per vine in cucumber.
Number of nodes per vine.

Fig 4.3. Effect of growth regulators on number of nodes per vine.

Number of nodes per vine:
0  5  10  15  20  25  30
1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16
all five concentrations of individual growth regulators. Minimum
number of days taken to first female flower appearance among
and NAA, Ethrel at 250 ppm, and NAA 100 ppm gave minimum
It was observed that among all five treatments of Ethrel

preferentially presented in Fig. 4.4.

of GA3, NAA, and Ethrel are presented in Table 4.4 and
appearance of cucumber significantly affected by various levels
The changes in number of days taken to first female flower

4.2.1 DAYS TAKEN TO FIRST FEMALE FLOWER APPEARANCE.

(48.50 days) and Ethrel 250 ppm (47.20 days).
On the other hand, maximum number of days was recorded in
NAA 75 ppm (49.10 days), which was at par with NAA 50 ppm
in GA3 5 ppm (43.00 days), and GA3 10 ppm (36.20 days).
Ethrel 15 ppm (35.00 days) which was at par with control (36.20
days), GA3 5 ppm (36.00 days), and GA3 10 ppm (35.30 days).
Ethrel 15 ppm (35.00 days) which was at par with control (36.20
in GA3 15 ppm (35.00 days) which was at par with control (36.20
Ethrel 15 ppm (35.00 days) which was at par with control (36.20
Ethrel 15 ppm (35.00 days) which was at par with control (36.20

It was observed that among all five treatments of Ethrel

Ethrel 15 ppm (35.00 days) which was at par with control (36.20

The mean data on number of days taken to first make

4.2.2 DAYS TAKEN TO FIRST FEMALE FLOWER APPEARANCE.

Experimental Results
<table>
<thead>
<tr>
<th>Days taken</th>
<th>Appearance</th>
<th>Test</th>
<th>Treatment Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.49</td>
<td>4.29</td>
<td>C.V.</td>
<td>%</td>
</tr>
<tr>
<td>3.48</td>
<td>2.92</td>
<td>C.D.</td>
<td>at 5%</td>
</tr>
<tr>
<td>1.205</td>
<td>1.012</td>
<td>S.E.M.</td>
<td>+ 1.76</td>
</tr>
<tr>
<td>46.80</td>
<td>41.33</td>
<td>NAA : 150 ppm</td>
<td></td>
</tr>
<tr>
<td>47.80</td>
<td>42.50</td>
<td>NAA : 125 ppm</td>
<td></td>
</tr>
<tr>
<td>45.00</td>
<td>39.50</td>
<td>NAA : 100 ppm</td>
<td></td>
</tr>
<tr>
<td>56.20</td>
<td>49.10</td>
<td>NAA : 75 ppm</td>
<td></td>
</tr>
<tr>
<td>54.00</td>
<td>48.50</td>
<td>NAA : 50 ppm</td>
<td></td>
</tr>
<tr>
<td>53.50</td>
<td>47.20</td>
<td>Ether : 350 ppm</td>
<td></td>
</tr>
<tr>
<td>49.30</td>
<td>43.00</td>
<td>Ether : 300 ppm</td>
<td></td>
</tr>
<tr>
<td>42.50</td>
<td>38.00</td>
<td>Ether : 250 ppm</td>
<td></td>
</tr>
<tr>
<td>43.10</td>
<td>38.30</td>
<td>Ether : 200 ppm</td>
<td></td>
</tr>
<tr>
<td>44.30</td>
<td>39.00</td>
<td>Ether : 150 ppm</td>
<td></td>
</tr>
<tr>
<td>50.20</td>
<td>43.80</td>
<td>GA3 : 25 ppm</td>
<td></td>
</tr>
<tr>
<td>47.20</td>
<td>41.00</td>
<td>GA3 : 20 ppm</td>
<td></td>
</tr>
<tr>
<td>40.10</td>
<td>35.00</td>
<td>GA3 : 15 ppm</td>
<td></td>
</tr>
<tr>
<td>40.60</td>
<td>35.30</td>
<td>GA3 : 10 ppm</td>
<td></td>
</tr>
<tr>
<td>41.20</td>
<td>36.00</td>
<td>GA3 : 5 ppm</td>
<td></td>
</tr>
<tr>
<td>42.00</td>
<td>36.20</td>
<td>CONTROL</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.4 Effect of Growth Regulators on days taken to first 

made and female flower appearance in cucumber.
Figure 4.4. Effect of growth regulators on days taken to first female and male flower appearance.

Days taken to first male flower appearance

Days taken to first female flower appearance
II. Number of female flowers per vine at 90 DAS.

I. Number of female flowers per vine at 60 DAS.

4.2. Effect of Growth Regulators on number of Female Flowers

Experimental Results

(32.50/Vine) Significantly minimum number of female flowers GA3 15 ppm (32.00/Vine) which was at par with GA3 10 ppm.

The maximum number of female flowers was recorded in GA3 15 ppm (32.00/Vine). However, the NAA 75 ppm recorded significantly the maximum number of female flowers (42.00/Vine), which was at par with GA3 10 ppm.

The data on number of female flowers per vine at 90 DAS

Treatment:

minimum number of female flowers (4.25/Vine) among all the

(20.20/Vine). However, the NAA 75 ppm recorded significantly

GA3 15 ppm (20.40/Vine), which was at par with GA3 10 ppm.

The data on number of female flowers per vine at 60 DAS.

The number of female flowers per vine at 60, 90, 120 DAS.

Etrel 350 ppm (53.50 days) which was at par with NAA 50 ppm (54.00 days) and female flower appearance were recorded in NAA 75 ppm (56.20). Female flower appearance were recorded to first (42.00 days), while the maximum number of days taken to first and 10 ppm (41.20 and 40.60 days respectively), and control and 42.50 days respectively), two concentrations of GA3 i.e., 5 with two concentrations of Etrel i.e., 200 and 250 ppm (43.10 days) were noted in the treatment (GA3 15 ppm, which was at par number of days taken to first female flower appearance (40.10 days).
<table>
<thead>
<tr>
<th>No. of Female Flowers/Vine</th>
<th>Treatment Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 DAS</td>
<td>CONTROL</td>
</tr>
<tr>
<td>90 DAS</td>
<td></td>
</tr>
<tr>
<td>120 DAS</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.5 Effect of Growth Regulators on number of female flowers/vine in cucumber.
Number of female flowers per vine at 60, 90, 120 DAS.

Fig 4.5. Effect of growth regulators on number of female flowers per vine at 60, 90, 120 DAS.
The maximum number of male flowers was recorded in GA4.

Presences in Table 4.6 and graphically depicted in Fig. 4.6.

The data pertaining to number of male flowers per vine at 90 DAS are presented in Table 4.6 and graphically depicted in Fig. 4.6.

The mean data on number of male flowers per vine at 60 DAS.

I. Number of male flowers per vine at 60, 90, 120 DAS.

4.2.4 Effect of Growth Regulators on number of male flowers.

Reccorded minimum number of female flowers (18.40/vine).

At par with GA4 10 ppm (39.10/vine). However, the NAA 75 ppm found significantly superior than all the treatments, which was also observed at 120 DAS that GA4 at 15 ppm (40.20/vine) was observed in Table 4.5 and graphically depicted in Fig. 4.5.

The data on number of female flowers per vine at 120 DAS.

III. Number of Female flowers per vine at 120 DAS.

Experimental Results.
<table>
<thead>
<tr>
<th>Treatment Details</th>
<th>No. of male flowers/vine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>23.4</td>
</tr>
<tr>
<td>GA3 : 5 ppm</td>
<td>33.8</td>
</tr>
<tr>
<td>GA3 : 10 ppm</td>
<td>34.8</td>
</tr>
<tr>
<td>GA3 : 15 ppm</td>
<td>34.5</td>
</tr>
<tr>
<td>GA3 : 20 ppm</td>
<td>28.0</td>
</tr>
<tr>
<td>GA3 : 25 ppm</td>
<td>27.3</td>
</tr>
<tr>
<td>Ethrel : 200 ppm</td>
<td>21.2</td>
</tr>
<tr>
<td>Ethrel : 250 ppm</td>
<td>22.0</td>
</tr>
<tr>
<td>Ethrel : 300 ppm</td>
<td>26.9</td>
</tr>
<tr>
<td>Ethrel : 350 ppm</td>
<td>22.0</td>
</tr>
<tr>
<td>NAA : 75 ppm</td>
<td>13.0</td>
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<tr>
<td>NAA : 100 ppm</td>
<td>20.5</td>
</tr>
<tr>
<td>NAA : 125 ppm</td>
<td>18.4</td>
</tr>
<tr>
<td>NAA : 150 ppm</td>
<td>26.4</td>
</tr>
<tr>
<td>S.B.m. + 30.87</td>
<td>19.7</td>
</tr>
<tr>
<td>2.19</td>
<td>0.379</td>
</tr>
<tr>
<td>2.12</td>
<td>1.48</td>
</tr>
<tr>
<td>3.16</td>
<td>0.368</td>
</tr>
<tr>
<td>3.18</td>
<td>1.47</td>
</tr>
<tr>
<td>3.82</td>
<td>0.359</td>
</tr>
</tbody>
</table>
Number of male flowers per vine at 60, 90, 120 DAS.

Fig 4.6. Effect of growth regulators on number of male flowers per vine at 60, 90, 120 DAS.
other hand, NAA 75 ppm (1:2.4) slightly increased the sex ratio, and 15 ppm (1:1.34 and 1:1.27) and control (1:1.33). On the other hand, NAA 75 ppm (1:2.4) and control (1:1.33), NAA 15 ppm (1:1.36 and 1:1.35 respectively), and GA3 (1:1.36 and 1:1.35 respectively), two concentrations of GA3 (1:1.36 and 1:1.35 respectively), were found to be the most effective in GA3 10 ppm (1:1.23), which was at par with these concentrations of Ethrel (1:1.38, 150, 200, and 250 ppm) (1:1.38). The lowest sex ratio was recorded in GA3 10 ppm (1:1.23), which was at par with these concentrations of Ethrel (1:1.38), which was found inferior in recording significantly more number of female: male ratio. The evaluation of data revealed that NAA at 75 ppm was

The data pertaining to female: male ratio at 60, 90, and 120 DAS are presented as

<table>
<thead>
<tr>
<th>Female: Male Sex Ratio at 60, 90, and 120 DAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2.5 Effect of Growth Regulators on Female: Male Sex Ratio</td>
</tr>
</tbody>
</table>

Table 4.7. They are also illustrated graphically in Figure 4.7. The data pertains to all other treatments. The lowest sex ratio was recorded in GA3 10 ppm (1:1.23), which was at par with GA3 15 ppm (1:1.36), and GA3 5 ppm (1:1.36). The minimum number of flowers was recorded in GA3 15 ppm (1:1.36), and flowers per vine were found in NAA 75 ppm (1:2.40/vine). The minimum number of flowers per vine was at par with NAA 75 ppm (1:2.50/vine).

The data on the number of flowers per vine at 120 DAS as

<table>
<thead>
<tr>
<th>Number of Flowers per Vine at 120 DAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.6 Number of flowers per vine at 120 DAS</td>
</tr>
</tbody>
</table>

Table 4.6 and graphically depicted in Figure 4.6. The data on the number of flowers per vine at 120 DAS as

<table>
<thead>
<tr>
<th>Flowers per Vine at 120 DAS</th>
</tr>
</thead>
</table>
Plate-2: Female and male flower of cucumber
cv. Guj-cucumber-1.
<table>
<thead>
<tr>
<th>Treatment</th>
<th>60 DAS</th>
<th>90 DAS</th>
<th>120 DAS</th>
<th>C.V. %</th>
<th>C.D. at 5%</th>
<th>S.E.M. +</th>
<th>Treatment Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:1.11</td>
<td>0.33</td>
<td>0.067</td>
<td>0.053</td>
<td>5.98</td>
<td>0.15</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1:1.09</td>
<td>0.19</td>
<td>1:1.15</td>
<td>1:1.46</td>
<td>1.56</td>
<td>1:1.78</td>
<td>1:1.24</td>
<td></td>
</tr>
<tr>
<td>1:1.60</td>
<td>1:1.32</td>
<td>1:1.52</td>
<td>1:1.77</td>
<td>1:1.56</td>
<td>1:1.78</td>
<td>1:1.24</td>
<td></td>
</tr>
<tr>
<td>1:1.91</td>
<td>9:1</td>
<td>1:1.31</td>
<td>1:1.44</td>
<td>1:1.35</td>
<td>1:1.36</td>
<td>1:1.31</td>
<td></td>
</tr>
<tr>
<td>1:1.30</td>
<td>1:1.20</td>
<td>1:1.45</td>
<td>1:1.70</td>
<td>1:1.22</td>
<td>1:1.22</td>
<td>1:1.22</td>
<td></td>
</tr>
<tr>
<td>1:1.60</td>
<td>1:1.80</td>
<td>1:1.64</td>
<td>1:1.35</td>
<td>1:1.30</td>
<td>1:1.25</td>
<td>1:1.27</td>
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</tr>
<tr>
<td>1:1.12</td>
<td>1:1.18</td>
<td>1:1.36</td>
<td>1:1.27</td>
<td>1:1.10</td>
<td>1:1.25</td>
<td>1:1.27</td>
<td></td>
</tr>
<tr>
<td>1:1.80</td>
<td>6:1.00</td>
<td>1:4.60</td>
<td>1:1.00</td>
<td>1:1.00</td>
<td>1:1.25</td>
<td>1:1.27</td>
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</tr>
<tr>
<td>1:1.20</td>
<td>1:1.06</td>
<td>1:1.54</td>
<td>1:1.54</td>
<td>1:1.00</td>
<td>1:1.25</td>
<td>1:1.27</td>
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</tr>
<tr>
<td>1:1.21</td>
<td>1:1.00</td>
<td>1:1.23</td>
<td>1:1.23</td>
<td>1:1.00</td>
<td>1:1.25</td>
<td>1:1.27</td>
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</tr>
<tr>
<td>1:1.22</td>
<td>1:1.06</td>
<td>1:1.34</td>
<td>1:1.34</td>
<td>1:1.00</td>
<td>1:1.25</td>
<td>1:1.27</td>
<td></td>
</tr>
</tbody>
</table>

**Table 4.7: Effect of Growth Regulators on Female: Male sex ratio in cucumber.**

*Experimental Results*
Fig. 4.7. Effect of growth regulators on female: male sex ratio.

Treatment:
Female: male sex ratio at 60, 90, 120 DAS.

Fig 4.7: Effect of growth regulators on female: male sex ratio at 60, 90, 120 DAS.
ppm (3.63), which was at par with Cal 20 ppm (4.33) and Ca 25 ppm (3.32), which was at par with Cal 20 ppm (4.33) and Ca 25 ppm (3.32). On the other hand, maximum node number was recorded in Ca 0 ppm (1.06), which was at par with NAA 125 ppm and NAA 150 ppm (1.04). In contrast, NAA 0 ppm (1.02) showed slightly increased the sex ratio which was at par with the remaining treatments except NAA 125 ppm and NAA 150 ppm (1.04). NAA 75 ppm (1.15) and NAA 150 ppm (1.18) significantly increased the sex ratio with the female: male ratio of Ca 3 ppm and NAA 75 ppm (1.86) and NAA 150 ppm (1.20), Etirhel 200 ppm (1.17), and NAA 150 ppm (1.22 and 1.12), respectively. Ca 3 ppm and NAA 75 ppm (1.25), two concentrations of Etirhel, Ca 3 ppm and NAA 150 ppm (1.06), which was at par with all other treatments. Minimum sex ratio was recorded in Ca 10 ppm and 15 ppm (1.02) which was at par with NAA 125 ppm (1.00) and NAA 150 ppm (1.02). Cyanocobalamin (0.6) inoculated significantly increased the sex ratio with the female: male ratio of Ca 3 ppm and NAA 75 ppm (1.31) and NAA 150 ppm (1.25) significantly increased the sex ratio with the female: male ratio of Ca 3 ppm and NAA 75 ppm (1.31). This was found from the data that NAA at 75 ppm was found significantly more number of female: male. It was also found that NAA at 75 ppm was found significant in increasing the sex ratio with the female: male ratio of Ca 3 ppm and NAA 75 ppm (1.15) and NAA 125 ppm (1.20) which was at par with the remaining treatments. Observations pertaining to effect of Ca, Etirhel, and NAA on node number to first make lower appearance are presented in Table 4.8. The lowest sex ratio was recorded in NAA 125 ppm (1.00), NAA 150 ppm (1.01), and NAA 0 ppm (1.04). They are also illustrated graphically in Figure 4.7. The data on female: male sex ratio at 90 days as affected by the application of Ca, NAA, and Etirhel are presented in Table 4.7. The data on female: male sex ratio at 90 days as affected by the application of Ca, NAA, and Etirhel are presented in Table 4.7. The data on female: male sex ratio at 90 days as affected by the application of Ca, NAA, and Etirhel are presented in Table 4.7. The data on female: male sex ratio at 90 days as affected by the application of Ca, NAA, and Etirhel are presented in Table 4.7.
<table>
<thead>
<tr>
<th>C.V. %</th>
<th>C.D. at 5%</th>
<th>S.Bm. +</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.33</td>
<td>10.19</td>
<td></td>
</tr>
<tr>
<td>1.41</td>
<td>1.38</td>
<td></td>
</tr>
<tr>
<td>0.49</td>
<td>0.48</td>
<td></td>
</tr>
<tr>
<td>9.62</td>
<td>9.32</td>
<td></td>
</tr>
<tr>
<td>10.03</td>
<td>9.48</td>
<td></td>
</tr>
<tr>
<td>10.50</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>11.53</td>
<td>6.50</td>
<td></td>
</tr>
<tr>
<td>10.65</td>
<td>7.72</td>
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<td>6.69</td>
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<td>6.43</td>
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<td>6.44</td>
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<td>9.96</td>
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<td>11.06</td>
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<td>13.53</td>
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<td>11.16</td>
<td>7.53</td>
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</tr>
<tr>
<td>8.83</td>
<td>3.32</td>
<td></td>
</tr>
<tr>
<td>10.53</td>
<td>7.40</td>
<td></td>
</tr>
<tr>
<td>12.73</td>
<td>5.79</td>
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</tr>
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<table>
<thead>
<tr>
<th>Treatment Details</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>control</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>cucumber</th>
<th>Experimental Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node no. to first male flower appearance</td>
<td>Node no. to first female flower appearance</td>
</tr>
</tbody>
</table>

Table 4.8: Effect of growth regulators on node number to first female and male flower appearance
4.2.7 Node number to first female flower appearance.

The data on node number to first female flower appearance as influenced by various levels of GA3, Ethrel, and NAA have been presented in Table 4.8 and graphically depicted in Fig. 4.8. The lowest node number was recorded in GA3 10 ppm (8.83), which was followed by NAA 125 ppm (10.03), Ethrel 200 ppm (9.96), Ethrel 350 ppm (9.69), NAA 150 ppm (9.43); all are statistically at par with GA3 10 ppm. The maximum node number was recorded in GA3 25 ppm (13.53), which was at par with control (12.73).

4.3 YIELD PARAMETERS

4.3.1 Fruit length (cm).

The data given in Table 4.9 revealed that various levels of GA3, Ethrel, and NAA gave an effect on average fruit length in cucumber and are graphically depicted in Fig. 4.9. It was recorded that GA3 at 15 ppm was found superior in recording significantly maximum fruit length over all other treatments, except Ethrel 300 ppm and NAA 75 ppm. On observations of all five treatments of GA3, Ethrel and NAA, it was found that GA3 at 15 ppm, Ethrel at 300 ppm, and NAA at 75 ppm gave maximum fruit length in their respective group. The maximum fruit length was recorded in GA3 15 ppm (26.2 cm), which was at par with Ethrel 300 ppm (25.5 cm), NAA 75 ppm (25.1 cm) and NAA 125 ppm (24.7 cm); however, minimum
Plate 3: Effect of plant growth regulators on fruit length of cucumber.

- T.15: NAA 125 ppm
- T.13: NAA 75 ppm
- T.10: Ethenol 300 ppm
- T.4: GA3 15 ppm
Table 4.9 Effect of growth regulators on fruit length and fruit girth in cucumber (cm).

<table>
<thead>
<tr>
<th>Treat. Treatment Details</th>
<th>Fruit Girth (cm)</th>
<th>Fruit Length (cm)</th>
<th>S.Em. +</th>
<th>C.D. at 5%</th>
<th>C.V. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>T&lt;sub&gt;1&lt;/sub&gt; CONTROL</td>
<td>7.10</td>
<td>21.10</td>
<td>0.58</td>
<td>1.68</td>
<td>4.58</td>
</tr>
<tr>
<td>T&lt;sub&gt;2&lt;/sub&gt; GA&lt;sub&gt;3&lt;/sub&gt;: 5 ppm</td>
<td>5.30</td>
<td>18.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T&lt;sub&gt;3&lt;/sub&gt; GA&lt;sub&gt;3&lt;/sub&gt;: 10 ppm</td>
<td>8.20</td>
<td>22.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T&lt;sub&gt;4&lt;/sub&gt; GA&lt;sub&gt;3&lt;/sub&gt;: 15 ppm</td>
<td>11.30</td>
<td>26.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T&lt;sub&gt;5&lt;/sub&gt; GA&lt;sub&gt;3&lt;/sub&gt;: 20 ppm</td>
<td>9.00</td>
<td>23.30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T&lt;sub&gt;6&lt;/sub&gt; GA&lt;sub&gt;3&lt;/sub&gt;: 25 ppm</td>
<td>9.30</td>
<td>24.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T&lt;sub&gt;7&lt;/sub&gt; Ethrel: 150 ppm</td>
<td>5.80</td>
<td>19.30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T&lt;sub&gt;8&lt;/sub&gt; Ethrel: 200 ppm</td>
<td>7.80</td>
<td>21.60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T&lt;sub&gt;9&lt;/sub&gt; Ethrel: 250 ppm</td>
<td>5.50</td>
<td>18.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T&lt;sub&gt;10&lt;/sub&gt; Ethrel: 300 ppm</td>
<td>10.80</td>
<td>25.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T&lt;sub&gt;11&lt;/sub&gt; Ethrel: 350 ppm</td>
<td>5.10</td>
<td>17.30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T&lt;sub&gt;12&lt;/sub&gt; NAA: 50 ppm</td>
<td>8.70</td>
<td>22.80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T&lt;sub&gt;13&lt;/sub&gt; NAA: 75 ppm</td>
<td>10.50</td>
<td>25.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T&lt;sub&gt;14&lt;/sub&gt; NAA: 100 ppm</td>
<td>6.50</td>
<td>20.90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T&lt;sub&gt;15&lt;/sub&gt; NAA: 125 ppm</td>
<td>9.90</td>
<td>24.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T&lt;sub&gt;16&lt;/sub&gt; NAA: 150 ppm</td>
<td>6.00</td>
<td>20.40</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Highest number of fruits per vine than all other treatments, (16.10/vine) was found significantly superior in recording, a reprise of data revealed that Ethrel at 600 ppm

Fig. 4.10. They are also illustrated graphically in Table 4.1.0. They are also illustrated graphically in

The data pertaining to number of fruits per vine as

4.3.2 Number of Fruits per Vine.

ppm (5.80 cm and 5.50 cm respectively) and CAA 5 ppm (5.30

ppm respectively) two concentrations of Ethrel i.e. 150 and 250

concentrations of NAA i.e. 100 and 150 ppm (6.50 cm and 6.00

concentration was recorded in Ethrel 350 ppm, which was at par with two.

respective growth regulators. The minimum fruit length (5.10 cm)

maximum fruit length amongst all five concentrations of

found that CAA 15 ppm, Ethrel 300 ppm and NAA 75 ppm gave

inspection of all five treatments of CAA, Ethrel and NAA, it was

individual

ppm (10.50 cm) and NAA 125 ppm (9.90 cm). On individual

other treatments except Ethrel 300 ppm (10.80 cm), NAA 75

superior in recording significantly maximum fruit length over all

It was observed that CAA at 15 ppm (11.30 cm) was found

Table 4.9 and graphically depicted in Fig. 4.9.

The data pertaining to average fruit length as affected by

4.3.2 Fruit length (cm).

(18.00 cm) and CAA 5 ppm

was at par with Ethrel 250 ppm (18.70 cm) and CAA 5 ppm, which
Plate 4: Effect of plant growth regulators on fruit girth of cucumber

T-15  NAA 125 ppm
T-13  NAA 75 ppm
T-10  Ethrel 300 ppm
T-4  GA3 15 ppm
ppm (171.00 ppm) fruit. Ethereal 250 ppm (177.70 ppm), and GA4 5 ppm (174.40 ppm) were at par with NAA 150 ppm (199.70 ppm) which was recorded in ethereal 350 ppm which was 281.30 and 265.00 ppm respectively. While, the lowest fruit weight (165.50 ppm) was recorded in GA4 5 ppm while the lowest fruit weight (281.30 and 265.00 ppm) were recorded in GA4 5 ppm respectively. The maximum fruit weight (304.00 ppm) was recorded in GA4 5 ppm which was at par with ethereal 300 ppm. The maximum fruit weight (6) amounted all five concentrations of NAA i.e., 15, 22, 125, 110, and 50 ppm respectively. GA4 at 15 ppm, ethereal at 300 ppm, and NAA at 75 ppm gave maximum fruit weight. 

A perusal of data revealed that GA4 at 15 ppm was found significantly superior in recording maximum fruit weight (6) over all other treatments except ethereal 300 ppm, three concentrations of GA4 i.e., 15, 22, 125, and 50 ppm, and three concentrations of NAA i.e., 15, 22, and 75 ppm respectively. Thus, the concentration of GA4 at 15 ppm was found significantly superior in recording maximum fruit weight (6) over all other treatments except ethereal 300 ppm, three concentrations of GA4 i.e., 15, 22, 125, and 50 ppm, and three concentrations of NAA i.e., 15, 22, and 75 ppm respectively. 

The data pertaining to fruit weight (6) are also illustrated graphically in Fig. 4.1. Table 4.10. They are also illustrated graphically in Fig. 4.1. The data pertaining to fruit weight (6) as exaggerated by experimental results.
<table>
<thead>
<tr>
<th>Treatment Details</th>
<th>Experimented Results</th>
<th>Fruit per Vine</th>
<th>Fruit Weight (g)</th>
<th>Foliar Yield (kg/vine)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>T16</td>
<td>14.9</td>
<td>2.17</td>
<td>1.84</td>
</tr>
<tr>
<td>NAA : 125 ppm</td>
<td>T15</td>
<td>14.7</td>
<td>2.15</td>
<td>1.83</td>
</tr>
<tr>
<td>NAA : 100 ppm</td>
<td>T14</td>
<td>14.5</td>
<td>2.14</td>
<td>1.82</td>
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<tr>
<td>NAA : 75 ppm</td>
<td>T13</td>
<td>14.3</td>
<td>2.13</td>
<td>1.81</td>
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<td>T12</td>
<td>14.1</td>
<td>2.12</td>
<td>1.80</td>
</tr>
<tr>
<td>Ethrel : 350 ppm</td>
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<td>13.9</td>
<td>2.11</td>
<td>1.79</td>
</tr>
<tr>
<td>Ethrel : 300 ppm</td>
<td>T10</td>
<td>13.7</td>
<td>2.10</td>
<td>1.78</td>
</tr>
<tr>
<td>Ethrel : 250 ppm</td>
<td>T9</td>
<td>13.5</td>
<td>2.09</td>
<td>1.77</td>
</tr>
<tr>
<td>Ethrel : 200 ppm</td>
<td>T8</td>
<td>13.3</td>
<td>2.08</td>
<td>1.76</td>
</tr>
<tr>
<td>Ethrel : 150 ppm</td>
<td>T7</td>
<td>13.1</td>
<td>2.07</td>
<td>1.75</td>
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<td>CA3 : 25 ppm</td>
<td>T6</td>
<td>12.9</td>
<td>2.06</td>
<td>1.74</td>
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<tr>
<td>CA3 : 20 ppm</td>
<td>T5</td>
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<td>2.05</td>
<td>1.73</td>
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<tr>
<td>CA3 : 15 ppm</td>
<td>T4</td>
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<td>2.04</td>
<td>1.72</td>
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<tr>
<td>CA3 : 10 ppm</td>
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<td>CA3 : 5 ppm</td>
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<td>Control</td>
<td>T1</td>
<td>11.9</td>
<td>2.01</td>
<td>1.69</td>
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</tbody>
</table>

Table 4.10 Effect of growth regulator on number of fruit, fruit weight (g) and foliar yield (kg/vine) in cucumber.
Figure 4.10. Effect of growth regulators on number of fruits per vine and fruit yield (kg/vine) per treatment.

Treatments

Number of fruits per vine

Fruit yield (kg/vine)
Fig 4.11. Effect of growth regulators on fruit weight (g).
live concentrations of respective growth regulators. Minimum NAA at 20 ppm gave maximum fruit yield (kg/plot) amounting all NAA, it was found that CA3 at 25 ppm, Ethrel at 300 ppm, and individual inspection of all live treatments of CA3, Ethrel and which was at par with NAA 50 ppm (27.91 kg/plot). On higher fruit yield (kg/plot) as compared to all other treatments, (28.79 kg/plot) was found significantly superior in recording it was revealed from the data that Ethrel at 300 ppm (kg/plot) in cucumber and depicted graphically in Fig. 4.12. CA3, Ethrel, and NAA gave to exert an effect on fruit yield The data given in Table 4.11 revealed that various levels of 4.3.6 Fruit yield (kg/plot).

1.44 kg/vine,

(2.01 kg/vine), CA3 5 ppm (1.50 kg/vine) and control was at par with Ethrel 350 ppm (2.19 kg/vine), NAA 150 ppm which fruit yield (1.39 kg/vine) was recorded in Ethrel 150 ppm which was recorded in Ethrel 300 ppm which was at par with NAA 50 ppm respectively. The maximum fruit yield (4.79 kg/vine) was NAA at 50 ppm gave maximum fruit yield kg per vine in their ppm and CA3 25 ppm. CA3 at 25 ppm, Ethrel at 300 ppm, and yield kg per vine among all other treatments, apart from NAA 50 yield kg per vine. Among all other treatments, the data Ethrel 300 ppm was

Graphically in Fig. 4.10. The mean data on fruit yield (kg/vine) of cucumber as

Experimental Results,
<table>
<thead>
<tr>
<th>Treatment Details</th>
<th>Fruit Yield (t/ha)</th>
<th>Fruit Yield (kg/plot)</th>
<th>S.P.M. +</th>
<th>S.D. %</th>
<th>C.D. % at 5%</th>
<th>C.V. %</th>
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<td>Tr19</td>
<td>1000</td>
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Table 4.11: Effect of Growth Regulators on Fruit Yield (kg/plot) and Fruit Yield (t/ha) in Cucumber

Experimental Results
Fig 4.12: Effect of growth regulators on fruit yield (kg/plot) and fruit yield (t/ha).
(82.67, 81.00, and 75.00 /fruit respectively), two concentrations of Ethrel i.e. 300, 250, and 200 ppm
fruit among all other growth regulators, which was at par with
(85.00 /fruit) was significantly give highest number of seeds per
It was indicated from the data that Ethrel at 200

4.4.1 Number of seeds per Fruit

4.4 QUALITY PARAMETERS

ppm (8.36 /ha) and control (8.05 /ha).

minimum in Ethrel 150 ppm (7.27 /ha), being at par with CA 3
par with NAA 50 ppm (23.99 /ha), however it was recorded
yield was recorded in Ethrel 300 ppm (26.65 /ha) which was at
concentrations of their respective group. The maximum fruit

CA 3, Ethrel, and NAA give an effect on fruit yield (t/ha)

in cucumber and depicted graphically in Fig. 4.12.

The data given in Table 4.1 I revealed that various levels of

4.3.7 Fruit yield (t/ha)

(8.69 Kg/plot), and control
was at par with CA 3 5 ppm (6.03 Kg/plot) and control
fruit yield was recorded in Ethrel 150 ppm (8.39 Kg/plot), which

Experimental Results
three concentrations of Ethrel i.e. 300, 250, and 350 ppm
fruit amongst all other growth regulators, which was at par with
(82.67, 81.00, and 75.00 /fruit respectively), two concentrations
of GA3 and GA4 (85.00/fruit) was significantly gave highest number of seeds per
fruit (P<0.05). It was indicated from the data that Ethrel at 200 ppm
in Table 4.1.2. They are also illustrated graphically in Fig. 4.1.3.
affecting by various levels of GA3, Ethrel, and NAA are presented.
The data on number of seeds in cucumber fruit was

4.4.1 Number of Seeds per Fruit.

4.4 QUALITY PARAMETERS

ppm (8.36 t/ha), whereas the control (6.05 t/ha). Minimum in Ethrel 150 ppm (7.77 t/ha), and there at par with GA3
percent in Ethrel 150 ppm (7.77 t/ha), however, it was recorded
par with NAA 50 ppm (2.99 t/ha), which was at yield was recorded in Ethrel 300 ppm (2.65 t/ha) which was at
maximum levels of their respective groups. The maximum fruit
concentrations of their respective groups. The maximum fruit
NAA at 50 ppm gave maximum fruit yield (t/ha) and
amount at all five
NAA. It was found that GA3 at 25 ppm; Ethrel at 300 ppm, and
individual inspection of all five treatments of GA3, Ethrel and
compared to all other treatments except NAA 50 ppm. On
found significantly superior in recording higher fruit yield (t/ha)
It was revealed from the data that Ethrel at 300 ppm was
in cucumber and depicted graphically in Fig. 4.1.2.
GA3, Ethrel, and NAA give to exert an effect on fruit yield (t/ha).
The data given in Table 4.1.1 revealed that various levels of

4.3.7 Fruit Yield (t/ha).

(8.69 Kg/plot), was at par with GA3 5 ppm (9.03 Kg/plot) and control
and control
350 ppm (6.00 Kt/cm³) which was at par with Ethrel 250 ppm regulators. In contrast, lowest firmness was recorded in Ethrel noted best amongst their concentrations of respective growth. At 15 ppm Ethrel at 300 ppm and NAA at 100 and 125 ppm were treatments of CA, Ethrel, and NAA it was observed that CA at with NAA 150 ppm (19.00 Kt/cm³). On observation of the five firmness as compared to all other treatments, which was at par (Kt/cm³) were found superior in recording significantly more.

It was observed that NAA at 100 and 125 ppm (20.00

Graphically in Fig. 4.13, variance are presented in Table 4.12. They are also illustrated different levels of CA, NAA, Ethrel, and their analyses of

The mean data on firmness (Kt/cm³) of fruit as affected by

4.4.2 Firmness (Kt per cm³).

and Ethrel 150 ppm (66.33/fruit), 50, and 125 ppm (62.67, 62.00, and 59.67/fruit respectively), 38.00 per fruit (respectively), three concentrations of NAA i.e., 7.5, 5 and 10 ppm (65.00, 62.00, and recorded in control which was at par with, three

In contrast, lowest number of seeds per fruit (55.00/fruit) was

seeds per fruit among concentrations of their respective group. 20 ppm; Ethrel 200 ppm, and NAA 100 ppm noted maximum

five treatments of CA, Ethrel, and NAA it was observed that CA,

respectively), and CA 20 ppm (77.00/fruit), after observing the

of NAA i.e., 100 and 150 ppm (81.33 and 75.00/fruit.

Experimental Results
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<th>Treat.</th>
<th>No. of seeds/fruit</th>
<th>Treatment Details</th>
<th>Concentration (μM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROL</td>
<td>55.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Experimental Results

The maximum ascorbic acid content was recorded in

controls at 350 ppm, and NAA at 25 ppm gave maximum ascorbic acid

content of 1.3% Ethrel and NAA. It was found that CA at 25 ppm, Ethrel

and NAA at 300 ppm, 150 ppm, and 100 ppm gave maximum TSS per cent

of 1.3%. It was found that CA at 25 ppm, Ethrel, and NAA at 350 ppm,

and NAA at 100 ppm gave maximum TSS per cent.

It was observed that Ethrel at 350 ppm (4.73%) was found

in Table 4.13 and depicted graphically in Fig. 4.14.

The total soluble solids of cucumber fruit are influenced by

Table 4.14, and depicted graphically in Fig. 4.14.

The data pertaining to ascorbic acid (mg/100g) as affected

4.4.3 Total Soluble Solid (%)
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<tr>
<th>Treatment Details</th>
<th>TSS %</th>
<th>Ascorbic acid (mg/100g)</th>
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<tr>
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<td>3.87</td>
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<tr>
<td>$T_1$ GA$_3$ : 5 ppm</td>
<td>3.10</td>
<td>9.30</td>
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<td>$T_2$ GA$_3$ : 10 ppm</td>
<td>2.77</td>
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<td>$T_3$ GA$_3$ : 15 ppm</td>
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<td>7.50</td>
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<td>$T_4$ GA$_3$ : 20 ppm</td>
<td>3.50</td>
<td>7.10</td>
</tr>
<tr>
<td>$T_5$ GA$_3$ : 25 ppm</td>
<td>4.00</td>
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</tr>
<tr>
<td>$T_6$ Ethrel : 150 ppm</td>
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<td>$T_9$ Ethrel : 300 ppm</td>
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<td>4.40</td>
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<td>$T_{14}$ NAA : 125 ppm</td>
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<tr>
<td>$T_{15}$ NAA : 150 ppm</td>
<td>3.47</td>
<td>10.30</td>
</tr>
</tbody>
</table>

S.E.m. +  | 0.211     | 0.542  | 1.17  | 10.17  |

C.D. at 5%  | 0.60     | 1.56   | 10.24  |

C.V. %
Total Soluble Solid% and Ascorbic acid (mg/100g).

Fig 4.14. Effect of growth regulators on Total Soluble Solid% and Ascorbic acid (mg/100g).
In Table 4.14 and graphically depicted in Fig. 4.15, the data on non-reducing sugar (%) in cucumber fruit was affected by various levels of CA, Ethrel and NAA are presented. Ethrel and NAA were present at 200 ppm, which was at par with reducing sugar percentage of cucumber fruit (3.10%) this was at 200 ppm recorded minimum whereas, the treatment Ethrel at 350 ppm recorded maximum reducing sugar percentage of cucumber fruit (5.25%) was observed in treatment Ethrel at 200 ppm, which was at par with other four concentrations of their respective group. The highest NAA at 150 ppm gave maximum reducing sugar content than NAA, it was found that CA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm was recorded 7.50% which was found at par with three concentrations of CA (i.e., 10, 15, and 20 ppm) (8.10, 7.50, and 7.10 mg/100g), which was found at par with three concentrations of CA, Ethrel and NAA are presented respectively. In Table 4.14 and graphically depicted in Fig. 4.15, the data on reducing sugar (%) in cucumber fruit was affected by various levels of CA, Ethrel and NAA were present at 150 ppm (7.80 mg/100g), which was found at par with three concentrations of CA (i.e., 350 and 300 ppm) (10.00 and 9.80 mg/100g respectively), two concentrations of Ethrel and 10.30 mg/100g (respectively), two concentrations of NAA (i.e., 10.00, 10.80, and 11.20 mg/100g), which was found at par with three concentrations of CA (i.e., 10, 15, and 20 ppm) (8.10, 7.50, and 7.10 mg/100g), which was found at par with three concentrations of CA, Ethrel and NAA are presented respectively.
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<th>Treatment Details</th>
<th>Non-reducing Sugar (%)</th>
<th>Reducing Sugar (%)</th>
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<td>0.186</td>
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</table>

**Experimental Results**

Table 4.14 Effect of Growth Regulators on Reducing Sugar (%) in Cucumber.
Fig. 4.15. Effect of growth regulators on reducing sugar and non-reducing sugar (%).
Table 4.15. It is also illustrated graphically in Fig. 4.16. 

The various levels of CAA, Ethrel and NAA did not influence significantly on the texture after harvesting of fruit of cucumber.

4.5.2 Texture.

Table 4.15. It is also illustrated graphically in Fig. 4.16. Ethrel and NAA on aroma was found non-significant shown in the data showed that the effect of various levels of CAA.

4.5.1 Aroma.

Find out the most acceptable treatment panel of judges on hedonic scale by allotting marks out of 10 to a score were carried out periodically after harvest of fruit by a aroma, texture, taste, fruit colour, tenderness and cumulative aromatic evaluation of cucumber fruit in terms of

Orochemical evaluation of cucumber fruit

4.5 ORGANOLOGIC ANALYSIS

(3.15% and NAA 50 ppm (2.85%),

(3.15%) and NAA 50 ppm (2.85%) this was found at par with control of cucumber fruit (2.70%) that reduces minimum non-reducing sugar percentage at 3.50 ppm recorded minimum non-reducing sugar percentage concentrations of growth regulators. While, the treatment Ethrel maximum non-reducing sugar content amount at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave the treatments of CAA, Ethrel and NAA, it 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treatments of CAA, Ethrel and NAA, it was found that CAA at 15 ppm, Ethrel at 200 ppm, and NAA at 150 ppm gave. The examination of the data revealed that Ethrel at 200 ppm.
and 125 ppm (7.20 and 6.80 respectively).

at par with control (6.80) and two concentrations of NAA i.e. 50
of cucumber fruit (6.50) was noted in Ethrel 350 ppm which was
Ethrel except Ethrel 350 ppm. Whereas, minimum colour scores
ppm (9.10 and 8.55 respectively), and all concentrations of
and 8.87 respectively), two concentrations of NAA i.e. 75 and 100
where concentrations of GA3 i.e. 10, 15, and 25 ppm (8.60, 8.30,
recorded at treatment Ethrel 300 ppm which was at par with
The maximum colour score of cucumber fruit (9.17) was

illustrated graphically in Fig. 4.17.

analyses of variance are presented in Table 4.15. It is also
affected by different levels of GA3, Ethrel and NAA and their
The mean data on colour score of cucumber fruit as

4.5.4 Fruit colour

respectively.

which was at par with NAA 75 and 100 ppm (7.65 and 7.43).

cucumber fruit (7.33) was noted in control and NAA 125 ppm,
colour scores of

with all remaining treatments except control, NAA 75 ppm. NAA
was recorded in treatment Ethrel 300 ppm, which was at par
Significantly highest taste score of cucumber fruit (9.20)
also illustrated graphically in Fig. 4.16.

levels of GA3, Ethrel and NAA are presented in Table 4.15. It is
The changes in taste of cucumber fruit affected by various

Experimental Results
which was at par with Ethereal 350 ppm and NAA 125 ppm (7.70).

Ethereal 150 ppm (8.81), while, minimum cumulative score was
ppm (9.15), which was at par with Ethereal 250 ppm (8.95) and
minimum cumulative score was recorded in Ethereal 300

4.1.7. Figure 4.1.7. It is also illustrated graphically in

The data pertaining to cumulative score of cucumber fruit

4.5.6 Cumulative score:

ppm (7.95 and 7.65 respectively), and two concentrations of Ethereal i.e. 150 and 350
concentrations of NAA i.e. 50 and 125 ppm (7.80 and 7.42
concentrations of NAA i.e. 7.35) which was at par with two
recorded in control (7.77). Minimum tenderness scores of cucumber fruit was

The highest tenderness score of cucumber fruit was

4.1.7. Table 4.1.5. It is also illustrated graphically in Figure 4.1.7.

The changes in tenderness of cucumber fruit are presented by

4.5.5 Tenderness.
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<th>Treatment</th>
<th>Active Cucumber</th>
<th>Less Cucumber</th>
<th>Colour</th>
<th>Tendrils</th>
<th>Fruit</th>
<th>Taste</th>
<th>Aroma</th>
<th>Texture</th>
<th>C.V. %</th>
<th>C.D. at 5%</th>
<th>S.E.M. ±</th>
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Table 4.15 Effect of Growth Regulators on Organoleptic score in cucumber.

Experimental Results
Aroma, Texture and Taste.

Fig. 4.16. Effect of growth regulators on aroma, texture and taste (score out of ten).
Fig 4.17. Effect of growth regulators on fruit colour, tenderness and cumulative (score out of ten).
CBR (Cost Benefit Ratio) values, it was observed that the highest return was obtained in control (3620 Rs./ha), as regards to the return obtained in Ethri 300 ppm (183770 Rs./ha) and the lowest net return was observed from data that highest net return was graphically in Fig. 4.18.

They are also illustrated in Table 4.16 and Appendix - III and IV. Table 4.16 and Appendix - III and IV with cost of crop cultivation were worked out and presented in the economics of all the growth regulator treatments along with economic results.
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Price of Cucumber (₹ Rs./kg)</th>
<th>NAA 150 ppm</th>
<th>NAA 125 ppm</th>
<th>NAA 100 ppm</th>
<th>NAA 75 ppm</th>
<th>NAA 50 ppm</th>
<th>Ethrel 350 ppm</th>
<th>Ethrel 300 ppm</th>
<th>Ethrel 250 ppm</th>
<th>Ethrel 200 ppm</th>
<th>Ethrel 150 ppm</th>
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<th>GA2 20 ppm</th>
<th>GA3 15 ppm</th>
<th>GA4 5 ppm</th>
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Table 4.16: Effect of Growth Regulator on net realization and cost benefit ratio in cucumber.

Experimental Results
DISCUSSION
Similar findings have also been obtained by Shenlapa et al. the effect of GA$_3$ to enhance cell elongation and cell division. Respectively were recorded in GA$_3$ 10 ppm. This may be due to 120 DAS was 1:1.10/vine, 1:4.00/vine, and 2:2.00/vine, 120 DAS was 1:8.00, 2:50 m, and 3:50 m, respectively and highest number of branches at 60, 90, and 120 DAS was 1:80, 2:10, and 3:10, respectively Maximum length of main axis at 60, 90, and 120 DAS was 1:80, 2:10, and 3:10, respectively. Among the GA$_3$ concentrations, maximum length of and 4.2. Among the GA$_3$ concentrations, maximum length of 120 DAS for number of branches per vine (Table 4.1 control, except GA$_3$ 5 ppm at 120 DAS for length of main axis number of branches per vine at 60, 90, and 120 DAS than increased the length of main axis at 60, 90, and 120 DAS and significantly The result of the study revealed that GA$_3$ significantly

5.1 Influence of GA$_3$

5.1 INFLUENCE OF GROWTH REGULATORS.

Following heads.

For convenience of discussion, the chapter has been divided into to find out the rationality, validity and reliability of the results. As well as the clarifications available. The attempt is also made findings of the present investigation with the height of information. In this chapter, an endeavor has been made to discuss the variations due to different treatments were observed.

(Cucumis sativus L.) CV. GUI-Cucumber-1, many significant growth, flowering, sex-expression, quality and yield of cucumber carried out to ascertain the effect of plant growth regulators onDuring the course of presenting the result of investigation

**DISCUSSION**

**CHAPTER V**
In point of view the number of female and male flowers at 60, 90, and 120 DAS, the effect of GA3 was found significant over watermelon. Kore et al. (2003) in bottle gourd, Dixit et al. (2001) in bitter gourd, and Ram et al. (2003) in muskmelon, given by Ram et al. (2001) in muskmelon, explanation. It could also be explained in the similar reasoning due to that induce female flower and reduce male flowers for 40. 10 days, GA3 will convert male flower into female flower and maximum number of days taken to first female flowers was recorded in GA3 15 ppm (Table 4.4). Among all the concentrations of GA3, significantly increased the number of days taken to first female flowers appearance (4.3, 80 days) was recorded in GA3 25 ppm. Number concentrations of GA3, maximum number of days taken to first male flowers were taken for GA3 5, 10, and 15 ppm (Table 4.4). Almost all the concentrations except GA3 5, 10, and 15 ppm (Table 4.4) increased days taken to first male flower appearance then control were increased. It was found that all the concentrations of GA3 significantly increased.

Discussion

The result of the study exposed that GA3 significantly increased the number of nodes per vine due to increased the length of main axis and number of branches per vine, due to the effect of GA3 to enhance cell elongation and cell division.

way as that of high temperature and long days, there by
ultimately resulted in promotion of more vegetative growth
enhanced the cell elongation and cell division in plant tissue and
have increased the endogenous level of GAs in plants, thereby
have increased the endogenous level of GAs in plants, thereby
Effect on Female: make sex ratio at 60, 90, and 120 DAS

1988) in pumpkin.
and Koozer et al. (2003) in bottle gourd and auroa and Piplap
and Postgrof et al. (2006) in bitter gourd, Panpaya and Dicot (1997)
and Postgrof et al. (2006) in bitter gourd, Panpaya and Dicot (1997)
reason for production of more numbers of female by GAs
increased the number of female. This seems to be a possible
way as that of high temperature and long days, there by
Koozer et al. (2000) in bottle gourd, and probably acts in some
and Postgrof et al. (2006) in bitter gourd, Panpaya and Dicot (1997)
from (Table 4.6). Among the GA concentrations, significantly
maximum number of female flowers at 60, 90, and 120 DAS.
maximum number of male flowers at 60, 90, and 120 DAS.
maximum number of female flowers at 60, 90, and 120 DAS.
maximum number of female flowers at 60, 90, and 120 DAS.
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maximum number of female flowers at 60, 90, and 120 DAS.
maximum number of female flowers at 60, 90, and 120 DAS.
to synthesize one or more hormones which initiate and function of terrestrial ovules or seeds in relation to growth of fruit. The report of Cran and Overbeek (1965), who stated that sole fruits. Another possible reason may be explained in the light of photosynthesis, which resulted in increased weight and size of to greater accumulation of carbohydrates owing to remnant higher than the check (Audus, 1960). This may be due to respiration and photosynthesis of treated plants was due to respiration and photosynthesis of treated plants of fruit GA4 15 ppm. The probable reason for increased in fruit length (26.20 cm) and fruit girth (11.30 cm) was recorded in 10 ppm (Table 4.9). Among the GA3 concentrations, maximum effect was found significant over control, excluding GA3 at 5 and 15 ppm (Table 4.3). GA3 concentrations, minimum node number to first female and reduced node number to first female and make lower appearance. The present finding was in accordance with "bottle gourd and pumpkin". In bottle gourd and pumpkin, pandya and Dixit (1977) in bottle gourd, Doster et al. (2006) in bottle gourd, pandya and Dixit (1977) in bottle gourd and Arora and Pratap (1988) in bottle gourd make lower appearance was recorded in GA3 10 ppm (3.32). GA3 concentration with Doster et al. (2006) in bottle gourd, close corroboration with Doster et al. (2006) in bottle gourd, female: male sex ratio increases. The present findings were in respect to the node number to first female and make increased the number of female and male flowers and due to that.
Agreement with those of Dostojer et al. (2006) in bitter gourd, into maximum average fruit weight (F). The above results were in
stock for the developing flowers and fruits, ultimately resulted
remained physiologically more active to build up sufficient food
trained plants may further attributed to the reason that plants
were recorded in G4, 25 ppm. An increase in fruit yield in
(Kg/vine), fruit yield (Kg/plot) and fruit yield (t/ha), and G4
was recorded in G4, 15 ppm, and maximum fruit yield (4.19
the G4 concentrations, maximum fruit weight (30.40 Kg/fruit)
and 10 ppm in fruit weight (8) (Table 4.10 and 4.11). Among all
(Kg/vine), fruit yield (Kg/plot) and fruit yield (t/ha), and G4
castor oil than control, excluding G4, 5 ppm in fruit yield
fruit yield (Kg/vine), fruit yield (Kg/plot) and fruit yield (t/ha) of
s significance increased the fruit yield attributes, fruit weight (8),
It was found that all the concentrations of G4 were
al (2007) in berkin. in cucumber and Mutthy et
in bottle gourd, Belanger et al. (2006) in cucumber and Mutthy et
and Dostojer et al. (2006) in bitter gourd, Belhekar et al. (2006)
and present findings were in consonance with Gedam et al. (1998).
The more number of female flowers by G4, 10 ppm treatment. The
4.10). The increased fruit number might be due to production of
Table G4, 25 ppm significantly increased the number of fruit (Table
of fruits per vine than control. Among the G4 concentrations,
that all the concentrations of G4, significantly increased number
As regard to the number of fruit per vine it was observed
(2005) and Dostojer et al. (2006) in bitter gourd, Kore et al
were in agreement with the Gedam et al. (1998), Shandappa et al.
translocated from parts of plant towards the fruits. These results
maintain a metabolic gradient along which foods can be
Tenderness and cumulative score of cucumber fruit (7.33, 6.80, 7.35 and 7.50 respectively) was noted in control (Table 4.15). In GA3 10 ppm (8.80), whereas minimum tress, fruit colour, and maximum tenderness was recorded in GA3 25 ppm and 8.66 respectively was score of cucumber fruit (8.87) and GA3 15 ppm, while highest fruit colour and cumulative treatment GA3 25 ppm was recorded in cucumber’s fruit (8.87) was recorded in agreement with those of Vaidhern et al. (2001) in cucumber. That non-reducing sugar increased. The above results were in and reducing sugar and total sugar was increased and due to and minerals from soil will increase by GA3 treatment was observed in treatment of cucumber fruit (4.87%) and GA3 15 ppm. The absorption of non-reducing sugar (%) of cucumber fruit (4.87% and 4.20%) was all the concentrations of GA3, maximum reducing sugar (%) (Table 4.14) were significantly increased than the control. Among The reducing sugar (%) and non-reducing sugar (%) cucumber, in bitter gourd and Nowaczyk and Nowaczyk (2004) in agreement with those of Cadrin et al. (1999), Shankarpa et al. number of seeds was increased. The above results were in ppm as compared to control. Due to more fruit length and length 16.00 Kc/cm3) was recorded in GA3 15 ppm and firmness (77.00 seeds/fruit) was recorded in GA3. More number of seeds (77.00 seeds/fruit) than control (Table 4.12). was observed that GA3 (15 ppm and 20 ppm) significantly more As regard to the number of seeds per fruit and firmness, it and Ram et al. (2003) in muskmelon. and Ram et al. (2003) in cucumber, Ram et al. (2001), (2004) and Baltia et al. (2006) in cucumber, Nowaczyk and Nowaczyk.
on the number of female flowers, number of male flowers and various levels of Ethrel did not significantly influence


This seems to be a reasonable explanation for the early induction of transformation of male flowers in to female flowers, both the sets of sex organs and application of growth regulators and Saigo (1974) that ethylene primordia stimulate all the flowers carry with control and it was non-significant. It was reported by the control was conducted in Ethrel 250 ppm (4.2-5.0 days) which was at par with Ethrel, minimum number of days taken to first female flowers recorded in Ethrel 350 ppm. Among all the concentrations of Ethrel, minimum number of days taken to first female flowers recorded in Ethrel 350 ppm. Among all the concentrations, maximum increased days taken to first female flowers were recorded in Ethrel 300 and 350 ppm significantly.

It was found that Ethrel at 300 and 350 ppm significantly increased the number of nodes per vine. The result of the study exposed that Ethrel at 300 and 350

\textit{Discussion}
The present findings were in accordance with the results of appearance of male flowers with respect to node number and the early appearance of female flowers. This seems to be reasonable explanation for growth regulators induce transformation of male flowers into buds. It was reported by Ito and Saito (1994) that at perimodal stage, all the male flowers carry both the sets of sex orgens and application of ethylene was not affected (Table 4.8). Among the ethylene concentrations, ppm in which the node number to first male flower appearance (6.43) was not affected (Table 4.8). Among the ethylene concentrations, flower appearance as compared to control, except ethereal at 350 ppm was increased. The node number to first male flower appearance and increased the node number to first male ethereal significantly lowered the node number to first male flower appearance, it was observed that all the concentrations of ethereal, in respect to the node numbers to first female and male cucumber.

(1995), Singha and Mandal (2000) and Nirmal et al. (2006) in bottle, in bottle, and Karkoo et al. (2005) in bottle, Kshihaser et al. (1997) and Karkoo et al. (2003) in bottle, Gour, Pandya, and Dixit with those of Negi et al. (2003). The above findings were in accordance higher level of ethereal the above findings were in accordance make flowers and thereby lowered female: male sex ratio at make increased number of female flowers, decreased number of for increased number of female flowers, decreased number of

Reports by Rutherford et al. (1972). This may be probable reason gibberellins and increased level of auxin after ethereal spray was (Table 4.5, 4.6, and 4.7). The reduced level of endogenous makes sex ratio at 60 DAS in ethereal 300 ppm over control. female: male sex ratio at (60, 90, and 120 DAS), except female: Discussion
ultimately increased number of fruits and produced more yield. However, and promoted the number of female flowers there by due to the fact that Ethrel suppressed the number of male flowers recorded in Ethrel 300 ppm (16.10 fruits/vine). This may be different levels of Ethrel, maximum number of fruits per vine were observed at Ethrel 300 ppm (Table 4.10). Amount the number of fruits per vine than control. Among the effect of different levels of Ethrel significantly increased the number of fruits per vine, it was observed that

Sinha and Mandal (2000) in cucumber,

Sinha and Mandal (2000) in butter ground, Sanjay et al. (2006) in bottle ground and transplanted from the parts of the plants towards the fruits, maintain a metabolic gradient along which foods can be synthesized in the fruits to synthesize one or more hormones which inhibit to function or fertilized ovules or seeds in relation to growth of the report of Crane and Overbeck (1960), who stated that sole fruit. The another possible reason may be explained in light of micromight have been resulted in to increased weight and size of accumulation of carbohydrates owing to higher photosynthetic rate (Anjum, 1960). As a result greater a ripening agent and it will increase respiration and fruit length and girth was due to respiration and photosynthesis. Ethrel 300 ppm, the probable reason for increase in recorded in Ethrel 300 ppm. The probable reason for increase in fruit length (27.50 cm) and maximum fruit girth (10.80 cm) was among the Ethrel concentrations, maximum fruit length and girth was found significantly than control.

In the present investigation the effect of Ethrel at 300 ppm


Discussion
cucumber and Prasad et al. (2008) in pumpkin. Leonard, Vakil et al. (2001) and Reference et al. (2001) in bitter gourd, Neel et al. (2003) and Sandumyan et al. (1998) in bitter melon, and Cegem and Reference et al. (2008) in melon. The presentation findings were in agreement with the result of Cegem et al. (2008). The seeds obtained from the cultivar had higher fruit length and fruit width. The maximum number of seeds recorded in concentrations, maximum number of seeds was recorded in 26.65 kg/ha (150 ppm) and the highest number of seeds were obtained from concentration of 26.65 kg/ha (150 ppm). Among the cultivars, Bitter melon, and Melon, the highest number of seeds was obtained from concentration of 26.65 kg/ha (150 ppm). The above results were in consonance with those of Cegem et al. (2008) who found that Bitter melon, and Melon, the highest number of seeds was obtained from concentration of 26.65 kg/ha (150 ppm). The above results were in accordance with those of Dornahar et al. (2007) for all the cultivars, and Dornahar et al. (2008) for all the cultivars.
cumulative score of cucumber fruit (7.33, 7.35 and 7.50 ppm (9.20)), while the minimum taste, tenderness and in Ethrel 300 ppm and tenderness was highest in Ethrel 250 cucumber fruit (9.20, 9.17 and 9.15 respectively) was recorded.

The highest taste, fruit colour and cumulative score of
(Table 4.15).
The aroma and texture after harvesting of fruit of cucumber
The various levels of Ethrel did not significantly influence
in close comparison with Vaidhji et al. (2001) in cucumber.
soluble solids than other treatments. The present findings were,
and ultimately pulp of bitter gourd fruits containing more total
which resulted in more nutrient accumulation in bitter gourd fruits
might be affected on physiological process of bitter gourd plant;
absorption of plant nutrients and mineral from the soil and it
processes within the plant of bitter gourd and affect the
Ethrel 200 ppm. The spaying of Ethrel influenced physiological
of cucumber fruit (5.25 % and 4.88 %) was observed in
Ethrel, maximum reducing sugar (%) and non-reducing sugar
(Table 4.14) were significantly increased than the control,
(4.73 %). The reducing sugar (%) was recorded in Ethrel 350 ppm
(Table 4.13). The maximum TSS (%) was recorded in fruit of cucumber (Table
Soluble Solid (%) was found significant over control in fruit of cucumber
Ethrel at 300 ppm on TSS (Kg/cm³) was found
Discussion

concentrations, maximum fruromess was recorded in Ethrel 300
Ethrel at 300 ppm on frurrossness (Kg/cm³) was found
results were in consonance with ShantaRappa et al (2005) in bitter melon, and Patel (1992) and Shrama et al (1988) in bottle gourd and green gram. ShantaRappa et al. (1992) observed that all the above treatments increased the net return and CBR values. The highest yield and attributes by ethrel (150 ppm) was recorded in ethrel 150 ppm followed by ethrel 200 ppm (Table 4.19). Thus, the highest CBR (1.21.5) was recorded in ethrel 150 ppm as compared to control, except ethrel 200 ppm and 250 ppm (1.5.20 and 1.3.69) respectively. Ethrel 150 ppm (Table 4.16) was found to be the highest value (33550 Rs./ha) was obtained in ethrel 200 ppm which was followed by ethrel 200 ppm and 250 ppm (1.21.540 and 7.853.3 Rs./ha) respectively. The lowest net return (183770 Rs./ha) was recorded in ethrel 350 ppm (6.50) (Table 4.15).
appearance and increased the node number to first male flower.

NAAs significantly reduced the node number to first female flower.

lower appearance, it was observed that all the concentrations of

flower, respectively.

Among the NAAs concentrations, maximum female: male sex ratio

and 75 ppm at 90 DAS over control (Table 4.7). Except female: male sex

ratio at 60 DAS in NAA 50, 75 and 120 ppm, and also NAA at 50

ppm at 60, 90, and 120 DAS.

The various levels of NAA were found non-significant for

number of male flowers, number of male flowers and female:

number of female flowers ratio at 60, 90, and 120 DAS.

The above finding was in agreement with the results of Marhaud

reasoning given by Ito and Satoh (1954) already stated earlier.

(4.10 days) (Table 4.4). It could also be explained in the similar

taking to male flower appearance was recorded in NAA 75 ppm

100 ppm, which was at par with control and maximum days

first female flower appearance (4.50 days) was recorded in NAA

Among the NAA concentrations, minimum days taken to

increased number of nodes per vine.

that reason number of branches per vine increased and it also

1957), which in turn resulted into promotion of growth due to

enhancement, cell division and differentiation (primarily et al.

pm (2.150/vine). This may be due to the action of NAA on cell

maximum number of nodes per vine. Among the NAA concentrations,

vine than control (Table 4.3). Among the NAA concentrations;

The result of the study exposed that NAA at all the

Discussion
Discussion

Results were in consonance with Shanthappa et al. (2005) in bitter translocated from parts or plants towards the fruits. These maintained a metabolic gradient along which foods can be fruits is to synthesize one or more hormones which initiate and sole function of fertilized ovules or seeds in relation to growth of Light of the report of Crane and Overbeek (1965), who stated that of fruit. The another possible reason may be explained in the to photosynthesis which resulted into increased weight and size Thus, there may be greater accumulation of carbohydrates within photosynthesis of treated plants than the check (Audus, 1969). For increased in girth of fruit was due to higher respiration and ppm (2.5,10 cm and 10.50 cm) respectively. The possible reason maximum fruit length and fruit girth was recorded in NAA 75 compared to control (Table 4.9). Among the NAA concentrations, ppm for fruit length and NAA 50, 100, and 150 ppm as length and girth was found significant, except NAA 100 and 150 In the present investigation the response of NAA on fruit bottle gourd.

with Shanthappa et al. (2005) in bitter gourd and Patel (1992) in node number and days. The present findings were in accordance and delayed appearance of male flower with respect to of NAA 75 to be a reasonable explanation for the early appearance of female make flower buds into female flowers in bitter gourd. This seems to a primordial stage all the flowers carry both the sex of sex organs and application of Growth regulators induce transformation of made flower appearances were recorded in NAA 150 and NAA 100 male female flower and maximum node number (9.49) to first appearance over control, excluding NAA 75 ppm (Table 4.8).
physiologically more active to build up sufficient food stock for plants may be attributed to the reason that plants remained recorded in NAA 50 ppm. An increase in fruit yield in treated (23.99 kg/ha) and fruit yield (25.91 kg/plot) and fruit yield (23.99 kg/ha) was (1/ha) (Table 4.11). Among the NAA concentrations, maximum yield (1/ha) over control, apart from NAA 150 ppm in fruit yield significantly increased the fruit yield (kg/plot) as well as fruit yield (1/ha) (Table 4.11) in cucumber. It was found that all the concentrations of NAA al (1995) and Reacherker et al (2002) in bitter gourd, Khristafer et al, and Maridal and Musmade (2007) in bitter gourd, Khristafer et al. above results were in accordance with Shapiro et al. (2005). Ultimate result led to maximum average fruit weight (g). The up sufficient food stock for the developing flowers and fruits, reason that plants remained physiologically more active to build in fruit yield in treated plants may further attributed to the fruit female flowers there by increased number of fruits. An increase suppressed the number of male flowers and promoted number of concentrations, maximum fruit weight (296.50 g/fruit) was recorded in NAA 75 ppm. This may be due to fact that NAA 100 and 150 ppm (Table 4.10). Among the NAA concentrations, except that NAA (15.70/plot) and fruit yield (4.31 kg/vine). It was found that NAA 150 ppm in NAA 50 ppm were significantly increased the fruit weight over control, except yield (kg/vine) (Table 4.10). Among the NAA concentrations, maximum number of fruits was recorded in NAA 50 ppm. As regard to the number of fruits per vine and fruit yield (kg/vine), it was observed that all the concentrations of NAA (kg/vine), Board, Patel al (1992) and Kore et al (2003) in cucumber.
The data indicated the effect of various levels of NAA on Total Soluble Solid (%) and ascorbic acid (mg/100g) in bitter gourd, Marhala and Muskmade with those of Shanstrappa et al. (2005) and Bhardwaj and Das (1997) in bitter gourd (2007) in bitter gourd, Bhardwaj and Das (1997) in bitter gourd. The above results were in agreement with the developing flowers and fruits, ultimately leading the increase in number of seeds per fruit. The decrease in number of seeds per fruit was recorded in NAA 100 ppm (81.33 seeds/fruit), whereas, NAA concentrations, maximum number of seeds per fruit was found non-significant in fruit of cucumber (Table 4.13). All the concentrations of NAA were significantly increased reducing sugar (%) except NAA at 50 ppm and NAA at 150 ppm (4.63% and 3.87%) was observed in NAA 150 ppm.

The result of the study revealed that NAA significantly increased number of seeds per fruit and NAA 50 ppm for NAA 100 ppm (81.33 seeds/fruit). The above results were in agreement with those of Marhala yield. The above results were in agreement with those of Marhala yield. The above results were in agreement with those of Marhala yield. The above results were in agreement with those of Marhala yield.
fruit (4.63% and 3.87%) was observed in NAA 150 ppm. Reducing sugar (%) and non-reducing sugar (%) of cucumber (Table 4.14). Among all the concentrations of NAA, maximum significantly increased non-reducing sugar (%) over control (%) except NAA at 50 ppm and NAA at 150 ppm concentrations of NAA were significantly increased reducing sugar on total soluble solid (%) and ascorbic acid (mg/100g) was found non-significant in fruit of cucumber (Table 4.13). All the data indicated that the effect of various levels of NAA and Rehker et al. (2002) in cucumber and Rehker et al. (2002) in bitter gourd, Barnual and Das (1997) in bitter gourd, Shanthappa et al. (2005) and Marshal and Mushmade (2007) in bitter gourd with those of Shanthappa et al. (2005) and Marshal and Mushmade (2007) in bitter gourd were in agreement with the developing flowers and fruits, ultimately leading to the increase the physiological more active to build up sufficient food stock for may further attributed to the reason that plants remain high and increase in average fruit yield in treated plants and 125 ppm. An increase in average fruit yield in treated plants maximum firmness (20.00 Kg/cm²) was observed in NAA 100 ppm (81.33 seeds/plant) whereas, NAA concentrations, maximum number of seeds per plant was recorded in NAA 100 ppm (81.33 seeds/plant). Among the per fruit and NAA 50 ppm for firmness (Table 4.12). Among the control, excluding NAA 50 ppm, 75%, and 125 ppm for number of seeds control, excluding NAA 50 ppm, 75%, and 125 ppm for number of seeds over increased number of seeds per fruit and firmness (Kg/cm²) over the developing flowers and fruits, ultimately leading to the higher yield. The above results were in agreement with those of Marshal and Prasad et al. (2003) in bitter gourd, Kore et al. (2003) in bitter gourd and Marshal (2007) in bitter gourd, and Marshal and Mushmade (2003) in bitter gourd with those of Marshal and Mushmade (2003) in bitter gourd, and Marshal and Mushmade (2003) in bitter gourd with those of Marshal and Mushmade (2003) in bitter gourd.
NAA treatment the net return and CBR value were increased in control (Table 4.16). Due to higher fruit yield attributes by as compared to control. Thus, lowest CBR (1:2.28) was recorded (1:5.33 and 1:4.98) respectively. NAA were recorded highest CBR obtained in NAA 50 ppm followed by NAA 75 ppm and 100 ppm as regard the CBR values, the highest CBR (1:6.78) was return (36205 Rs. /ha) was obtained in control (Table 4.16).

The production and net returns from NAA treatments were the NAA concentrations increased the net returns than control. ppm and 100 ppm (122890 and 113145 Rs. /ha) respectively. All was obtained with NAA 50 ppm, which was followed by NAA 75 treatments separately. The highest net return (163595 Rs. /ha) treatment separately. The highest net return (163595 Rs. /ha)

The economics of crop production worked out for each ppm and control (7.33 and 6.80) respectively (Table 4.15).

and minimum taste and fruit colour was recorded in NAA 125 cucumber fruit (7.35 and 7.50 respectively) was noted in control, while the minimum tenderness and cumulative score of fruit colour and tenderness was higher in NAA 75 ppm (9.10 and 8.81 and 8.55 respectively) was recorded in NAA 150 ppm and (Table 4.15).

The highest taste and cumulative score of cucumber fruit

The aroma and texture after harvesting of fruit of cucumber

The various levels of NAA did not significantly influence on
Conclusion and Summary
number of branches at 60, and 90 DAS (8.00/vine and 12.10/vine, 14.00/vine, and 22.00/vine respectively), least and 120 DAS was recorded in the treatment C4, 10 ppm 2. Significantly highest number of branches per vine at 60, 90, 95 \( (2.5 \text{ cm}) \).

noted in control, while at 120 DAS it was in either 200 ppm axes at 60, and 90 DAS (0.90 m and 1.50 m respectively) was 2.50 m, 3.50 m respectively, and minimum length of main significantly highest in the treatment C4, 10 ppm (1.80 m, 1. The length of main axis of vine at 60, 90, and 120 DAS was summarized as below.

results presented and discussed in the previous chapters are on 15th March 2010 and 24th March 2010, respectively. The sprays of growth regulators were done at 2 and 4 true leaf stages Randomized Block Design with three replications. The two factors

Randomized Block Design with three replications. The two factors

and 150 ppm), and a control. The experiment was laid out in a

and 150 ppm (150, 200, 250, 300 and 350 ppm), NAA (50, 75, 100, 125

five concentrations each of GA3 (0.15, 20, 25, 50, and 75 ppm),

Junnagadh. The experiment included sixteen treatments namely

Agriculture Farm, Junnagadh, Junnagadh Agricultural University,

Arnabology Farm, Kutchakas, Junnagadh Agricultural University,

C. \( \text{CI-Cucumber} - I \) was carried out during summer 2010, at

effect of plant growth regulators on growth, flowering, sex-

The present investigation was carried out to study the

SUMMARY AND CONCLUSION

CHAPTER VI
120 DAS in NAA 125 ppm (1:0.60),
(1:1.23), at 90 DAS in GA, 10 and 15 ppm (1:1.06), and at
8. Lowest female : make sex ratio at 60 DAS in GA, 10 ppm
and 44.20/vine (respecitivity).
and 44.20/vine (respecitivity).
flowers was recorded in GA, 15 ppm (26.00/vine, 35.00/vine,
19.20/vine, and 25.10/vine), but maximum number of male
flowers was recorded in NAA 75 ppm (11.00/vine,
120 DAS was recorded in NAA 75 ppm (11.00/vine,
and 10.00/vine, and 18.00/vine respectively).
whereas the minimum number of female flowers at 60, 90,
with GA, 10 ppm (20.20/vine, 32.10/vine, and 39.10/vine),
and 120 DAS was recorded in NAA 75 ppm (4.50/vine,
with GA, 10 ppm (20.20/vine, and 40.20/vine respectively),
and 120 DAS was recorded in NAA 75 ppm (4.50/vine,
whereas the minimum number of female flowers at 60, 90,
with GA, 10 ppm (20.20/vine, and 40.20/vine respectively),
and 120 DAS was recorded in NAA 75 ppm (4.50/vine,
and 120 DAS was recorded in NAA 75 ppm (4.50/vine,
whereas the minimum number of female flowers at 60, 90,
with GA, 10 ppm (20.20/vine, and 40.20/vine respectively),
and 120 DAS was recorded in NAA 75 ppm (4.50/vine,
whereas the minimum number of female flowers at 60, 90,
with GA, 10 ppm (20.20/vine, and 40.20/vine respectively),
and 120 DAS was recorded in NAA 75 ppm (4.50/vine,
whereas the minimum number of female flowers at 60, 90,
with GA, 10 ppm (20.20/vine, and 40.20/vine respectively),
and 120 DAS was recorded in NAA 75 ppm (4.50/vine,
whereas the minimum number of female flowers at 60, 90,
with GA, 10 ppm (20.20/vine, and 40.20/vine respectively),
and 120 DAS was recorded in NAA 75 ppm (4.50/vine,
whereas the minimum number of female flowers at 60, 90,
with GA, 10 ppm (20.20/vine, and 40.20/vine respectively),
and 120 DAS was recorded in NAA 75 ppm (4.50/vine,
whereas the minimum number of female flowers at 60, 90,
with GA, 10 ppm (20.20/vine, and 40.20/vine respectively),
and 120 DAS was recorded in NAA 75 ppm (4.50/vine,
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with GA, 10 ppm (20.20/vine, and 40.20/vine respectively),
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with GA, 10 ppm (20.20/vine, and 40.20/vine respectively),
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with GA, 10 ppm (20.20/vine, and 40.20/vine respectively),
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whereas the minimum number of female flowers at 60, 90,
with GA, 10 ppm (20.20/vine, and 40.20/vine respectively),
and 120 DAS was recorded in NAA 75 ppm (4.50/vine,
16. The maximum fruit yield (28.79 Kt./plot) was observed in
referred in Either 350 ppm (165.50 Kt./plot).

15. Highest fruit weight (6) was recorded in GA 1.5 ppm
(1.139 Kt./vine).

Minimum fruit yield Kt. per vine was recorded in Either 1.50
50 ppm and GA 25 ppm (4.31 and 4.19 respectively),
was recorded in Either 300 ppm which was at par with NAA.

14. Maximum fruit yield Kt. per vine of cucumber (4.79 Kt./vine)
was recorded in GA 15.70 ppm and NAA 100 ppm (15.10/vine). The
was recorded in Either 300 ppm which was followed by NAA 90.

13. The maximum number of fruits per vine (16.10/vine) was
recorded in Either 350 ppm.

12. The maximum number of fruit girth was recorded in GA 15
ppm (11.30 cm). The minimum fruit girth (5.10 cm) was
(recorded in Either 350 ppm). But it was minimum in Either 350 ppm

11. The maximum number of fruit length was recorded in GA 15
ppm (13.50 cm).

10. Node number to first female flowers appearance was
recorded lowest in GA 10 ppm (3.32), minimum node number to first male flowers appearance was
recorded in NAA 100 ppm (9.49). Minimum node number was recorded

9. The foliar application of plant growth regulators significantly
recorded in Either 350 ppm (25.91 Kt./plot). The minimum fruit yield was
referred in Either 300 ppm which was followed by treatment

recorder in Either 150 ppm (8.39 Kt./plot).
Reducing sugar per cent was recorded in Ethyl 350 ppm (2.70 %). Minimum non-reducing sugar per cent in fruit of cucumber was at par with Ethyl 300 ppm (4.25 %). Minimum non-reducing sugar per cent in Ethyl 200 ppm, which was recorded in treatment Ethyl 200 ppm, was found in Ethyl 200 ppm (6.80 mg/100g). Whereas, minimum ascorbic acid content (11.20 mg/100g). Whereas, minimum ascorbic acid content in cucumber fruit was recorded in Ethyl 350 ppm (2.77 %). Maximum reducing sugar per cent recorded in Ethyl 220 ppm (6.80 mg/100g).

21. Ascorbic acid in cucumber fruit was recorded maximum in cucumber 100 ppm (4.40 %) in cucumber fruit. The minimum TS% per 100 ppm (4.73 %) followed by Ethyl 200 ppm (4.67 %) and NAA ppm (4.73 %). Total Soluble Solid (%) was found maximum in Ethyl 350 ppm (7.00 K/eq/cm³), which was observed in Ethyl 150 ppm (19.00 K/eq/cm³). On the other hand, least Firmness 125 ppm (20.00 K/eq/cm³), which was at par with NAA 100 ppm (19.00 K/eq/cm³). The highest Firmness of cucumber was observed in NAA 100 ppm (19.00 K/eq/cm³).

19. The highest number of seeds per fruit was observed in Ethyl 150 ppm (7.77/fruit). The minimum number of seeds per fruit was observed in Ethyl 350 ppm (8.30/fruit). The highest number of seeds per cucumber recorded in Ethyl 150 ppm (7.77/fruit). The minimum number of seeds per cucumber was recorded in Ethyl 350 ppm (8.30/fruit). The highest number of seeds per cucumber recorded in Ethyl 150 ppm (7.77/fruit). The minimum number of seeds per cucumber was recorded in Ethyl 350 ppm (8.30/fruit). The highest number of seeds per cucumber recorded in Ethyl 150 ppm (7.77/fruit). The minimum number of seeds per cucumber was recorded in Ethyl 350 ppm (8.30/fruit).
and firmness (Kg/cm²). CA 15 ppm gave maximum days taken 2 ppm gave maximum node number to make flower appearance and 120 DAS, fruit length, fruit girth and fruit weight. NAA 100 ppm gave maximum female and male flowers. At 60, 90, 120 DAS, number of flowers per vine and fruit yield increased. Application of Ethrel 300 ppm was found superior to round female flowers and minimum node number to first female flower branches per vine at 60, 90, 120 DAS. Number of nodes per branch was highly effective to increase the length of main axis. Number of application of CA at 10 ppm twice at 2 and 4 true leaf stage was found.

From the present findings it can be concluded that foliar application in Ethrel 150 ppm (1:2.15); water recorded in Ethrel 300 ppm and lowest was obtained in Ethrel 150 ppm (3330 Rs./ha). As regard the CBR (cost benefit ratio) values, it was observed that the highest CBR recorded in Ethrel 250 ppm (9.20) and Ethrel 350 ppm respectively. Highest tenderness was noted in the treatment control and NAA 125 ppm in taste cumulative of cucumber fruit (7.33, 6.50 and 7.50) was 900 ppm, while the minimum taste, fruit colour and tenderness of cucumber fruit (7.33, 6.50 and 7.50) was recorded in treatment Ethrel 250 ppm. The highest taste, fruit quality and cumulative of cucumber fruit (7.33, 6.50 and 7.50) was recorded in treatment Ethrel 250 ppm.

The highest levels of plant growth regulators did not influence significantly on the aroma and texture after harvesting of cucumber fruit.

SUMMARY AND CONCLUSION

Conclusions

- Ethrel 150 ppm (1:2.15) recorded in Ethrel 300 ppm and lowest was obtained in Ethrel 150 ppm (3330 Rs./ha). As regard the CBR (cost benefit ratio) values, it was observed that the highest CBR recorded in Ethrel 250 ppm (9.20) and Ethrel 350 ppm respectively.
- Highest tenderness was noted in the treatment control and NAA 125 ppm in taste cumulative of cucumber fruit (7.33, 6.50 and 7.50) was 900 ppm, while the minimum taste, fruit colour and tenderness of cucumber fruit (7.33, 6.50 and 7.50) was recorded in treatment Ethrel 250 ppm. The highest taste, fruit quality and cumulative of cucumber fruit (7.33, 6.50 and 7.50) was recorded in treatment Ethrel 250 ppm.
- The highest levels of plant growth regulators did not influence significantly on the aroma and texture after harvesting of cucumber fruit.

From the present findings it can be concluded that foliar application in Ethrel 150 ppm (1:2.15); water recorded in Ethrel 300 ppm and lowest was obtained in Ethrel 150 ppm (3330 Rs./ha). As regard the CBR (cost benefit ratio) values, it was observed that the highest CBR recorded in Ethrel 250 ppm (9.20) and Ethrel 350 ppm respectively. Highest tenderness was noted in the treatment control and NAA 125 ppm in taste cumulative of cucumber fruit (7.33, 6.50 and 7.50) was 900 ppm, while the minimum taste, fruit colour and tenderness of cucumber fruit (7.33, 6.50 and 7.50) was recorded in treatment Ethrel 250 ppm. The highest taste, fruit quality and cumulative of cucumber fruit (7.33, 6.50 and 7.50) was recorded in treatment Ethrel 250 ppm.
respectively. Control gave highest TSS % and ascorbic acid (mg/100g).

Ethrel 200 ppm, Ethrel 350 ppm and number of seeds per fruit, reducing sugar and non-reducing sugar (%) were recorded in Ethrel 200 ppm. Ethrel 350 ppm and maximum female: male sex-ratio at 60, 90, and 120 DAS. Maximum to male and female flower appearance. NAA 75 ppm increases.
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and yield of bottle gourd (Lagenaria Siceraria) mol.
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and fruiting of muskmelon (Cucumis melo L.) Harpygan

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Appendices
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<th>Max</th>
<th>Min</th>
<th>Relative Humidity (%)</th>
<th>Rainfall (mm)</th>
<th>Sun</th>
<th>No. of Week</th>
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### A. Physical Determination

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### Water Ratio

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<td>Organic Carbon (%)</td>
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<td>Available Phosphorus (kg/ha)</td>
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<td>Available Nitrogen (kg/ha)</td>
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### Soil Ph (1:2.5 soil: water)

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<td>Particulars</td>
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<td>1. Ploughing &amp; harrowing by tractor (two time)</td>
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Appendix - IV: Cost of Plant Return (Rs./ha)