RESPONSE OF 'CUCUMBER' GENOTYPES TO ETHEPHON APPLICATION

BY

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THESIS

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To

My

Parents

DECLARATION

I hereby declare that this thesis entitled "Response of 'cucumber' genotypes to ethephon application" is a bonafide record of research work done by me during the course of research and that the thesis has not been previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title of any other University or Society.

Vellanikkara,
16-8-1982.

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CERTIFICATE

Certified that the thesis entitled "Response of 'cucumber' genotypes to ethephon application" is a record of research work done independently by Shri. Sadhan Kumar, P.G. under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship or associateship to him.

Dr. K.V. Peter,
Chairman,
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CERTIFICATE

We, the undersigned members of the Advisory Committee of Shri. Sadhan Kumar, P.G. a candidate for the degree of Master of Science in Horticulture agree that the thesis entitled "Response of 'cucumber' genotypes to ethephon application" may be submitted by Shri. Sadhan Kumar, P.G. in partial fulfilment of the requirement for the degree.

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Introduction

INTRODUCTION

Plant growth substances like auxins, gibberellins, cytokinins, morphactins, inhibitors and ethylene are being put to manifold purposes in crop husbandry and as well in plant science research. Externally applied plant growth substances have now been formulated and produced to tailor the developmental phases of plant growth to suit the needs of vegetable growers, vegetable agronomists and breeders. It is used to increase and improve seed germination, to regenerate the lost seed viability, to induce plant vigour, to hasten earliness in flowering and fruiting, to increase fruit yield and to impart hardiness and resistance to withstand environmental stresses and redundant diseases in many crop plants. Ethephon being a cheap and easily available growth regulator is used to programme and control the many growth and development phases in cucurbits especially _Cucumis_ group with the ultimate objective of increasing early and total fruit yield. Before arriving at a solid recommendation for the use of ethephon to increase early and total fruit yield in cucurbits and specific to the _Cucumis_ group, it is necessary to study the differential response, if any, of different _Cucumis_ genotypes to ethephon whole plant sprays. This has become necessary because of the conflicting and concurring reports available on the many uses and different responses obtained when ethephon was sprayed. The response to ethephon appears to be a function of genotypes used in the study, concentration of ethephon applied, nature of plant part(s) sprayed, type of spray given - whole plant sprays, specific plant part sprays etc., the age of plant and season of cultivation. Sex reversal through ethephon sprays is observed as a universal phenomenon. The modification in floral morphology which resulted in sex reversion to favourable female:male ratio due to ethephon sprays requires detailed experimentation. Scanning through the available literature indicates only a limited work on the above aspects.

The present investigation was designed to establish the differential response of Cucumis genotypes to ethephon whole plant sprays and to classify them into positive-responsive, negative-responsive and no responsive groups. The extend of increase or decrease in fruit yield/plant resulting due to ethephon sprays was also estimated. Changes in sex forms measured in terms of consecutive 10 nodes were studied. The results obtained are presented in chapter 4 and the discussion of the findings in chapter 5.

Review of Literature

REVIEW OF LITERATURE

Plant growth substances like auxins, gibberellins, cytokinins and ethylene are used to tailor plant growth and development to desired directions. Plant growth regulators are used these days to increase and improve seed germination (Hsuch and Lou, 1947; Choudhary and Singh, 1960 and Adlakha and Verma, 1965), to induce plant vigour (Choudhary and Singh, 1960), to induce earliness in flowering and fruiting (Zimmerman and Hitchcock, 1944; Leopold and Scott, 1952; Mehrotra et al., 1970 and Gopalakrishnan and Choudhary, 1978), to increase yield (Singh and Choudhary, 1966; Benoit, 1972; Sumpoundlek and Abella, 1974; Bhandari et al., 1974 and Verma and Choudhary, 1980) in many crop plants. Growth regulators are also used to impart hardiness and to withstand environmental stresses (Strogonive and Korowin, 1975 and Belova and Koschnikovich, 1976).

The present review attempts to consolidate the role of ethephon as a growth regulator in improving ultimately the fruit yield in Cucumis genotypes especially cucumber and muskmelon. The first early available report on the use of ethephon to increase the female:male flower ratio in cucumber comes from McMurray and Miller (1968). Ethephon has been used successfully to reduce length of main vine

(Lower and Miller, 1969; Trecoani <u>et</u> <u>al</u>., 1971; Sulikeri and Bhandari, 1973; Lee <u>et</u> <u>al</u>., 1973 and Sumpoundlek and Abella, 1974), to increase primary branches/plant (Boroweki, 1972 and Bhandari <u>et</u> <u>al</u>., 1974), to induce earliness (Shimotsuma and Jones, 1972; Sulikeri and Bhandari, 1973 and Sumpoundlek and Abella, 1974), to increase female:male ratio (Lower and Miller, 1969; McMurray and Miller, 1969; Rudich <u>et</u> <u>al</u>., 1969; Boroweki, 1972; George, 1971 and Verma and Choudhary, 1980) and to increase yield (McMurray and Miller, 1969; Suetikova and Ginterova, 1973; Varma, 1975 and Verma and Choudhary, 1980) in <u>Cucumis</u> genotypes.

A consolidated list on the role of ethephon as a growth regulator in <u>Cucumis</u> genotypes is given in Table 2.1.

Many reports, both conflicting and concurring, are available on the manifold uses to which ethephon has been put to. The conflicting reports may be either due to different <u>Cucumis</u> genotypes used in the investigations or due to an unexplained environmental variation in the place of experimentation. George (1971) reported a differential response to ethephon at 125-500 ppm. The ethephon application increased the number of pistillate flowers in Marketer, Wisconsin SMR 18, Ashley and Spot Free. But the effects were statistically different in magnitude. The ethephon application did

Table 2.1. Effect of ethephon in *Cucumis* genotypes

a. Length of main vine

Crop	Concentration	Stage of application	Effect	Reported by
Cucumber (Improved Long Green)	20-200 mg/10 l	Cotyledon and 2 leaf stage	decreased	Iwahori *et al.* (1969)
Cucumber (SC 23)	240-960 ppm	-	decreased	Lower and Miller (1969)
Cucumber (Monoecious)	240 ppm	First true leaf stage	decreased	McMurray and Miller (1969)
Muskmelon (Charentais melon)	150-600 ppm	1-2 leaf and 3-4 leaf stage	decreased	Treccani *et al.* (1971)
Cucumber (Monastyrski)	240 ppm	2 leaf stage	decreased	Borowski (1972)
Cucumber (SMR 58)	100 ppm	-	decreased	Rodriquez and Lambeth (1972)
Cucumber	120 ppm	-	decreased	Lee *et al.* (1973)
Muskmelon	25-500 ppm	Seedling stage	decreased	Sulikeri and Bhandari (1973)
Cucumber (German variety "9307")	-	-	decreased	Bhandari *et al.* (1974)
Cucumber	100-300 ppm	Seedling stage	decreased	Sumpoundlek and Abella (1974)
Cucumber	40-400 ppm	-	decreased	Varma (1975)

In parenthesis variety used is given

(contd.)

Table 2.1. continued

Crop	Concentration	Stage of application	Effect	Reported by
Cucumber	-	-	decreased	Channon (1976)
Cucumber (Beit Alpha)	-	6 leaf stage single spray	increased	El Bakry *et al.* (1978)
b. Primary branches/plant				
Muskmelon (Charentais melon)	150-600 ppm	1-2 leaf and 3-4 leaf stage	increased	Treccani *et al.* (1971)
Cucumber (Monastyrski)	240 ppm	2 leaf stage	increased	Borowski (1972)
Cucumber	150 ppm	Pre-flowering stage	increased	Kurchi and Govers (1972)
Cucumber (German variety "9307")	-	-	increased	Bhandari *et al.* (1974)
c. Earliness				
Cucumber	120-240 ppm	one leaf stage	early	McMurray and Miller (1968)
Cucumber (Improved Long Green)	20-200 mg/10 l	Cotyledon and 2 leaf stage	early	Iwahori *et al.* (1969)
Cucumber (SC 23)	240-960 ppm	First true leaf stage	early	Lower and Miller (1969)
Cucumber (Monoecious line)	-	-	early	Rudich *et al.* (1969)

In parenthesis variety used is given

(contd.)

Table 2.1. continued

Crop	Concentration	Stage of application	Effect	Reported by
Muskmelon (Andromonoecious line)	-	-	early	Rudich *et al.* (1969)
Muskmelon (Charentais melon)	150-600 ppm	1-2 leaf and 3-4 leaf stage	early	Treccani *et al.* (1971)
Cucumber (Brittex)	60 ppm	4 leaf stage	late	Benoit (1972)
Muskmelon	250-1000 ppm	-	early	Shimotsuma and Jones (1972)
Cucumber (Androecious line)	50 ppm	3-4 leaf stage	early	Augustine *et al.* (1973)
Cucumber (ACP 66-329)	0.4 mg/seedling	Seedling stage	early	Kurata (1973)
Muskmelon	25-500 ppm	Seedling stage	early	Sulikeri and Bhandari (1973)
Cucumber (German variety "9307")	-	-	early	Bhandari *et al.* (1974)
Cucumber	100-300 ppm	Seedling stage	early	Sumpoundlek and Abella (1974)
Cucumber	-	-	early	Shannon (1976)

In parenthesis variety used is given

(contd.)

Table 2.1. continued

d. Female:Male flower ratio

Crop	Concentration	Stage of application	effect	Reported by
Cucumber	120-240 ppm	First leaf stage	increased	McMurray and Miller (1968)
Cucumber (Improved Long Green)	50-100 ppm	Cotyledon and 2 leaf stage	increased	Iwahori *et al.* (1969)
Cucumber (SC 23)	240-360 ppm	-	increased	Lower and Miller (1969)
Cucumber (Monoecious line)	240 ppm	First true leaf stage	increased	McMurray and Miller (1969)
Cucumber (Monoecious line)	-	-	increased	Rudich *et al.* (1969)
Cucumber (Wisconsin SMR-18, Marketmore, Ashley)	125-500 ppm	-	increased	George (1971)
Cucumber (Monoecious line)	500 ppm	-	increased	Loy (1971)
Cucumber (Pickling cucumber)	250 ppm	First true leaf stage	increased	Phatak and Bouw (1971)

In parenthesis variety used is given (contd.)

Table 2.1. continued

Crop	Concentration	Stage of application	Effect	Reported by
Muskmelon (Charentais melon)	150-600 ppm	1-3 leaf and 3-4 leaf stage	increased	Treccani *et al.* (1971)
Cucumber (Monastryrski)	240 ppm	2 leaf stage	increased	Borowski (1972)
Cucumber	200 ppm	3 leaf stage and 3 more sprays for next 28 days	increased	Donato and Fiore (1972)
Cucumber (SMR 58)	100 ppm	-	increased	Rodriquez and Lambeth (1972)
Muskmelon	250-1000 ppm	-	increased	Shimotsuma and Jones (1972)
Cucumber (Androecious line)	50 ppm	3-4 leaf stage	increased	Augustine *et al.* (1973)
Cucumber (ACP 68-250)	0.4 mg/seedling	6 leaf stage	increased	Kurata (1973)
Cucumber	120 ppm	2 leaf stage	increased	Lee *et al.* (1973)
Muskmelon	250 ppm	Seedling stage	increased	Sulikeri and Bhandari (1973)
Cucumber (German variety "9307")	-	-	increased	Bhandari *et al.* (1974)
Muskmelon (Earligold and Sarda)	480 ppm	-	increased	Saimbhi and Chadha (1974)

In parenthesis variety used is given

(contd.)

Table 2.1. continued

Crop	Concentration	Stage of application	Effect	Reported by
Cucumber	100-300 ppm	Seedling stage	increased	Sumpoundlek and Abella (1974)
Cucumber	50-200 ppm	-	increased	Varma (1975)
Cucumber (Odnostebeluyi 33)	240 ppm	First true leaf stage	increased	Pogoda (1976)
Cucumber	-	-	increased	Shannon (1976)
Cucumber (Sagami Hanjiro)	-	-	increased	Matsuoara (1977)
Cucumber	-	-	increased	Yarashyunene and Novitaskene (1977)
Cucumber	200 ppm	Foliar spray	increased	El Beheidi <u>et</u> <u>al</u>. (1978)
Longmelon	50-250 ppm	Foliar spray	increased	Sadhu and Das (1978)
Cucumber (Poonakheera)	50-200 ppm	-	increased	Verma and Choudhary (1980)
e) Yield				
Cucumber (Model, SC 23) and Chipper	120-240 ppm	-	increased	McMurray and Miller (1969)
Cucumber (Brittex)	60 ppm	4 leaf stage	increased	Benoit (1972)

In parenthesis variety used is given (contd.)

Table 2.1. continued

Crop	Concentration	Stage of application	Effect	Reported by
Cucumber (Monastyrski)	120 ppm	2 leaf stage	increased	Borowski (1972)
Cucumber	150 ppm	-	increased	Kurchi and Govers (1972)
Cucumber	2.5 ml in 10 litres	5-6 leaf pair stage	increased	Sustikova and Ginterova (1973)
Cucumber	100-300 ppm	Seedling stage	increased	Sumpoundlek and Aoella (1974)
Cucumber	-	-	increased	Varma (1975)
Cucumber	250 ppm	4th leaf stage and 5 days afterwards	increased	Cantliffe (1977)
Cucumber (Beit Alpha)	-	2-3-leaf and 4-6 leaf stage	increased	El Bakry *et al*. (1978)
Cucumber (C5ND)	100 ppm	6-8 flower stage	increased	Snyder and Fell (1978)
Cucumber (Shahal-22 and Pickmore)	-	-	No effect	Nerson *et al*. (1980)
Cucumber (Poona Kheera)	50-200 ppm	-	increased	Verma and Choudhary (1980)

In parenthesis variety used is given

not change significantly the sex expression in Marketmore and Tokyo while in Wisconsin SMR 18, there was a delay in the onset of flowering. Lee *et al.* (1973) observed marked varietal difference to ethephon (120 ppm) when applied at the two leaf stage. Sustikova and Ginterova (1973) observed that the processing cucumbers showed a greater response to ethephon than salad cucumbers. In a trial conducted by Yarushyunene and Novitoskina (1977), treatment with ethephon at 10^{-3} M at 2-3 leaf stage increased the number of female flowers except for the varieties Moskovski, Teplichnyi and Takha. Snyder and Fell (1978) observed a definite differential response in 6 cucumber varieties to ethephon application.

The review indicated occurrence of differential response in *Cucumis* genotypes to ethephon application. The present study was aimed at elucidating the differential responses, if any, of the different genetic versions of *Cucumis* genotypes to different levels of ethephon.

Materials and Methods

MATERIALS AND METHODS

The present investigation was conducted at the Instructional Farm, College of Horticulture, Kerala Agricultural University, Vellanikkara, Trichur. The Instructional Farm is located at an altitude of 22.25 m above m.s.l. and is situated at 10° 32' N latitude and 76° 10' E longitude. It enjoys a warm humid tropical climate. The experiments were conducted during October-January, 1981-82 and March-May, 1982.

A. Experimental materials

The experimental material comprised of a total of 20 *Cucumis* genotypes. The *Cucumis* genotypes were selected from a germplasm collection of 69 lines maintained at the Department of Olericulture, College of Horticulture. The genotypes were selected in such a way that the possible genetic versions of *Cucumis* genotypes based on growth habit, fruit shape and presence/absence of spineness on fruit were well included in the experiment. The genotypes (CS 1, CS 3, CS 10, CS 26, CS 31, CS 36, CS 37, CS 38, CS 43, CS 44, CS 46, CS 51) were later identified as *Cucumis melo* var. *conomon* and CS 4 as *Cucumis melo* var. *utilissimus*. Accession number CS 35 is commonly called as rock melon (*Cucumis melo*) (Seshadri, 1982)*. The origin and morphological description of the genotypes are given in Table 3.1.

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* Seshadri, V.S. 1982. Personal communication

Table 3.1. Origin and morphological description of <u>Cucumis</u> genotypes

Accession number	Varietal name	Origin	Lamina margin	Lamina shape	Lamina tip
CS 1	-	Trichur	Not serrated	Orbicular	blunt
CS 3	-	Nenmara	Not serrated	Orbicular	blunt
CS 4	-	Pantnagar	Not serrated	Orbicular	blunt
CS 10	-	-	Not serrated	Orbicular	blunt
CS 26	Mudikode Local	Mudikode, Trichur	Not serrated	Orbicular	blunt
CS 27	Poona Kheera	Ahmadnagar	Serrated	Triangular ovate	pointed
CS 28	-	Ernakulam	Serrated	Triangular ovate	pointed
CS 31	-	Trichur	Not serrated	Orbicular	blunt
CS 35	-	Muvattupuzha	Not serrated	Orbicular	blunt
CS 36	-	Trichur	Not serrated	Orbicular	blunt
CS 37	-	Cannanore	Not serrated	Orbicular	blunt
CS 38	-	Trichur	Not serrated	Orbicular	blunt
CS 39	-	-	Not serrated	Orbicular	blunt
CS 43	-	-	Not serrated	Orbicular	blunt
CS 44	-	-	Not serrated	Orbicular	blunt
CS 46	-	-	Not serrated	Orbicular	blunt
CS 49	Pusa Sanyog	IARI, New Delhi	Serrated	Triangular ovate	pointed
CS 50	Japanese Long green	IARI, New Delhi	Serrated	Triangular ovate	pointed

(contd.)

Table 3.1. continued

Accession number	Varietal name	Origin	Lamina margin	Lamina shape	Lamina tip
CS 51	Panniyur	Panniyur	Not serrated	Orbicular	blunt
CS 60	Sweet slice	Yates & Co., Australia	Serrated	Triangular ovate	pointed
CS 62	Green Gem	Yates & Co., Australia	Serrated	Triangular ovate	pointed

Accession number	Fruit rind colour	Fruit surface	Fruit shape	Seediness	Seed colour
CS 1	Yellow with green stripes	Smooth	Oblong elliptical	High	Creamy
CS 3	Green with white splashes	Smooth	Stem end tappered	Medium	Creamy
CS 4	Greenish white	Smooth	Elliptical elongate	Medium	Creamy
CS 10	Golden yellow	Smooth	Oblong ellipsoid	High	Creamy
CS 26	Golden yellow	Smooth	Long oval	High	Creamy
CS 27	Yellowish brown	Spiny	Cylindrical	Low	White
CS 28	Yellowish brown	Spiny	Cylindrical	Low	White
CS 31	Yellow with green splashes	Smooth	Oblong ellipsoid	High	Creamy
CS 35	Ashy	Smooth	Oval	Medium	Creamy
CS 36	Yellow	Smooth	Long oval	High	Creamy
CS 37	Yellow	Smooth	Long oval	Medium	Creamy

High - more than 500 seeds
Medium- between 300 and 500 seeds
Low - Less than 300 seeds

(contd.)

Table 3.1. continued

Accession number	Fruit rind colour	Fruit surface	Fruit shape	Seediness	Seed colour
CS 38	Yellow	Smooth	Long oval	Medium	Creamy
CS 43	Golden yellow	Smooth	Long oval	High	Creamy
CS 44	Golden yellow	Smooth	Long oval	Medium	Creamy
CS 46	Golden yellow	Smooth	Long oval	High	Creamy
CS 49	Yellowish brown	Spiny	Cylindrical	Low	Creamy
CS 50	Yellow	Spiny	Curved oblong ellipsoidal	Low	Creamy
CS 51	Golden yellow	Smooth	Oblong ellipsoid	High	Creamy
CS 60	Yellowish green	Spiny	Long and cylindrical	Low	Creamy
CS 62	Green	Spiny	Cylindrical	Low	White

B. Experimental methods

1. Design and layout

The experiments were conducted in split plot design taking 4 concentrations of ethephon in main plot and the *Cucumis* genotypes in sub-plots in 3 replications (Table 3.2).

Table 3.2. Design, layout and agronomy of the experiments

	Experiment No.1 October-January (E_1)	Experiment No.2 March-May (E_2)
Design	Split plot	Split plot
Main plots	0, 100, 200 and 300 ppm ethephon	0, 100, 200 and 300 ppm ethephon
Sub-plots	20 *Cucumis* genotypes	20 *Cucumis* genotypes
Replications	3	3
Date of sowing	20-10-1981	3-3-1982
Fertilizer applied	NPK at the rate of 50:0:100 kg/ha	50:0:100 kg/ha
Farm yard manure	5 kg/pit	5 kg/pit
Time of application	One spray at 3 leaf stage	One spray at 3 leaf stage
Method of application of ethephon	Whole plant spray	Whole plant spray

There was one pit/genotype/main plot. Two plants/pit were maintained. The spacing was 1.5 m x 2.5 m.

2. Preparation of ethephon solutions

The commercially available Agromor containing 39.2% (W/W) ethephon was used in the experiment. The commercial form is manufactured by Agromor Limited, Bangalore. The required quantity of ethephon solutions at desired concentrations were prepared considering the concentration of ethephon in the solution and the quantity for spray.

3. Observations recorded

Two plants/genotype/main plot were used to take observations in both the seasons. Following quantitative observations were recorded.

a. Length of main vine
b. Primary branches/plant
c. Nodes to first male flower
d. Nodes to first female flower
e. Per cent of female flowers for first 10 nodes
f. Per cent of female flowers for first 20 nodes
g. Per cent of female flowers for first 30 nodes
h. Nodes to first fruit

Fruit characters

a. Fruit length
b. Fruit weight
c. Fruit volume
d. Flesh thickness
e. Seeds/fruit

Yield

a. Fruits/plant

b. Fruit yield/plant

Observations were also recorded on occurrence of parthenocarpic and malformed fruits.

D. Statistical analysis of data

The data were analysed by using the analysis of variance technique for a split plot design (Ostle, 1954).

The pooled data on fruit yield observed over the two seasons were analysed as in a split-split plot design (Snedecor and Cochran, 1967).

The linear and quadratic relationship, if any, between various plant characters and levels of ethephon sprayed was estimated through regression equations (Ostle, 1954) as given below.

$y = a + bx$ (Simple linear equation)

$y = a + bx + cx^2$ (Quadratic equation)

where

y = dependent character

x = levels of ethephon

The expected response of genotypes to different levels of ethephon was estimated by finding the regression coefficient. Coefficient of determination (R^2) was found separately for each variety for each character in order to assess the percentage variation in the dependent variable which could be explained through the fitted regression equation.

Results

RESULTS

Data collected in the present studies were statistically analysed and are presented under the following heads.

A. Response of *Cucumis* genotypes to ethephon application

B. Differential response, if any, of *Cucumis* genotypes to ethephon application

C. Key characteristics for a few of the species of *Cucumis*.

A. Response of *Cucumis* genotypes to ethephon application

Trials involving four levels of ethephon (0, 100, 200 and 300 ppm) in main plots and 20 *Cucumis* genotypes in sub-plots were conducted during two crop seasons (October-January, 1981-82 and March-May, 1982). The levels of ethephon showed significant differences for length of main vine, primary branches/plant, nodes to first male flower, nodes to first female flower, per cent of female flowers for first 10 nodes, per cent of female flowers for first 20 nodes, per cent of female flowers for first 30 nodes, nodes to first fruit, flesh thickness, seeds/fruit and fruit yield/plant (Table 4.1). The levels of ethephon did not exhibit significant differences for fruit length, fruit weight, volume of fruit and fruits/plant. The 20 *Cucumis* genotypes were significantly different for the 15 quantitative

Table 4.1. General analysis of variance

Sources of variation		df	MS x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8
Replications	E_1	2	1063.88	3.28	0.58	0.49	21.27	44.00	30.46	0.43
	E_2	2	10740.89	31.40	8.32	10.86	12.44	14.04	6.00	19.63
Levels of ethephon	E_1	3	12246.05**	57.01**	22.09**	19.34**	377.60**	138.12**	56.57*	15.62**
	E_2	3	46417.25**	79.44**	11.80**	6.74**	203.00**	87.05**	33.92**	5.21*
Error (a)	E_1	6	212.58	1.32	0.59	0.18	17.75	9.38	5.82	0.80
	E_2	6	3888.35	1.41	0.77	0.62	3.90	1.64	1.46	0.74
Genotypes	E_1	19	8960.71**	16.65**	2.58**	3.61**	229.59**	179.45**	135.91**	4.91**
	E_2	19	30745.57**	4.59**	6.74**	11.30**	434.92**	254.02**	168.40**	16.70**
Genotypes x levels of ethephon	E_1	57	218.02	0.80	0.45	0.52	27.36**	10.50**	7.83**	1.09
	E_2	57	2007.19	1.78	0.68	0.53	26.41**	11.98**	7.21**	0.66
Error (b)	E_1	152	362.20	1.26	0.50	0.58	3.97	2.47	1.83	1.09
	E_2	152	1921.93	2.09	0.92	0.86	2.27	1.70	1.40	1.24

* $p = 0.05$
** $p = 0.01$

x_1 = Length of main vine
x_2 = Primary branches/plant
x_3 = Nodes to first male flower
x_4 = Nodes to first female flower
x_5 = Percentage of female flowers for first 10 nodes
x_6 = Percentage of female flowers for first 20 nodes
x_7 = Percentage of female flowers for first 30 nodes
x_8 = Nodes to first fruit

(contd.)

Table 4.1. continued

Sources of variation		df	MS						
			x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}
Replications	E_1	2	3.19	0.52	566952.80	0.003	20937.11	3.39	9.26
	E_2	2	16.79	0.47	294217.75	0.14	4998.02	20.50	37.46
Levels of ethephon	E_1	3	25.79	0.65	584325.64	0.17*	44556.37*	0.32	5.60*
	E_2	3	47.94	2.23	1707024.19	0.60	30109.61**	1.21	24.45
Error(a)	E_1	6	7.41	0.15	160310.60	0.03	7191.67	2.17	0.63
	E_2	6	32.39	1.11	1056400.14	0.15	1613.34	7.38	19.17
Genotypes	E_1	19	289.10**	1.92**	1796174.12**	5.70**	519535.25**	14.00**	14.05**
	E_2	19	498.25**	5.67**	5398227.53**	4.77**	326259.19**	44.44**	52.58**
Genotypes x levels of ethephon	E_1	57	10.64	0.10	106093.62	0.07	8768.28	3.95**	4.53
	E_2	57	10.68	0.19	157014.18	0.15	11344.18	4.83	5.56
Error(b)	E_1	152	14.58	0.14	133817.17	0.13	12787.58	1.89	3.22
	E_2	152	19.67	0.19	182157.40	0.20	18235.95	3.44	6.45

* $p = 0.05$
** $p = 0.01$

x_9 = Fruit length
x_{10} = Fruit weight
x_{11} = Volume of fruit
x_{12} = Flesh thickness
x_{13} = Seeds/fruit
x_{14} = Fruits/plant
x_{15} = Fruit yield/plant

characters studied. The genotypes x levels of ethephon interaction was significant for per cent of female flowers for first 10 nodes, per cent of female flowers for first 20 nodes, per cent of female flowers for first 30 nodes and fruits/plant. Genotypes x levels of ethephon interaction was not significantly different for characters length of main vine, primary branches/plant, nodes to first male flower, nodes to first female flower, nodes to first fruit, fruit length, fruit weight, volume of fruit, flesh thickness, seeds/fruit and fruit yield/plant.

Data on fruit yield, observed in two trials, were analysed and is given in table 4.2. The levels of ethephon did not show significant differences in yield. Genotypes were significantly different. The genotypes x levels of ethephon interaction was not significant. The two seasons of experimentation were significantly different. Seasons x levels of ethephon and seasons x genotypes interactions were statistically significant. The second order interaction seasons x levels of ethephon x genotypes was also significant.

1. Length of main vine

The length of main vine was observed to be decreasing with application of ethephon. Vine length ranged from 2.12 m (CS 60) to 3.45 m (CS 10) during the first season and from 2.42 m (CS 27) to 4.63 m (CS 44) during the second season in

Table 4.2. General analysis of variance for fruit yield combined over 2 seasons

Sources of variation	df	MS
Replications	2	561.00
Levels of ethephon	3	12.70
Error (a)	6	6.64
Genotypes	19	36.66**
Genotypes x Levels of ethephon	57	6.64
Error (b)	152	4.39
Seasons	1	883.98**
Seasons x Levels of ethephon	3	18.55**
Seasons x Genotypes	19	26.78**
Seasons x Levels of ethephon x Genotypes	57	7.68**
Error (c)	160	4.39

** p = 0.01

control. When ethephon was sprayed (100 ppm) the range in vine length was reduced (2.01 m in CS 62 to 3.1 m in CS 4). When concentration was increased to 200 ppm, the vine length was further reduced (1.97 m in CS 50 to 3.04 m in CS 4). The decrease in vine length due to increased doses of ethephon was similarly observed in second season. Significant negative response to ethephon application resulting in reduced vine length was observed in three genotypes (ethephon 100 ppm), six genotypes (ethephon 200 ppm) and eight genotypes (ethephon 300 ppm) during the first season. No genotype was found exhibiting increased vine length due to ethephon application in any of the seasons (table 4.3a).

Response of *Cucumis* genotypes to ethephon sprays for length of main vine was studied. The response could not be explained through linear or quadratic equations (table 4.4a) during both the seasons.

2. Primary branches/plant

The genotypes CS 60 and CS 62 had 3 primary branches each. CS 37 had the highest number of primary branches/plant (6.83) observed during the first season. Primary branches increased with increase in levels of ethephon during both the seasons (table 4.3b). The response was significantly positive in 18 genotypes (ethephon 100 ppm), 19 genotypes (ethephon 200 ppm) and 20 genotypes (ethephon 300 ppm) in

Table 4.3. Effect of ethephon on yield and its component characters in 20 *Cucumis* genotypes

a. Length of main vine (cm)

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em.
CS 1	E_1	254.17	235.30 (-7.42)	223.67 (-12.00)	224.52 (-11.67)	234.41 ± 2.46
	E_2	307.97	312.80 (+1.54)	297.43 (- 3.42)	291.10 (- 5.46)	302.33 ± 5.66
CS 3	E_1	261.17	262.97 (+0.69)	239.30 (- 8.37)	233.40 (-10.63)	249.21 ± 2.46
	E_2	330.95	302.87 (-8.48)	307.87 (- 6.97)	300.95 (- 9.06)	310.66 ± 5.66
CS 4	E_1	317.55	311.57 (-1.88)	303.85 (- 4.31)	295.20 (- 7.04)	307.04 ± 2.46
	E_2	308.37	309.78 (+0.46)	277.07 (-10.15)	275.07 (-10.80)	292.57 ± 5.66
CS 10	E_1	345.67	290.38 (-16.00)	287.72 (-16.76)	265.75 (-23.12)	297.38 ± 2.46
	E_2	394.40	390.52 (-0.98)	378.80 (- 3.96)	378.80 (- 3.96)	385.63 ± 5.66
CS 26	E_1	253.50	242.83 (-4.21)	229.95 (- 9.29)	230.05 (- 9.25)	239.08 ± 2.46
	E_2	431.93	304.95 (-29.40)	303.93 (-29.63)	321.70 (-25.52)	340.63 ± 5.66
CS 27	E_1	241.43	216.13 (-10.48)	198.67 (-17.71)	187.52 (-23.33)	210.94 ± 2.46
	E_2	241.83	218.52 (- 9.64)	203.08 (-16.02)	208.77 (-13.67)	218.05 ± 5.66
CS 28	E_1	270.45	240.02 (-11.25)	220.02 (-18.65)	217.97 (-19.40)	237.11 ± 2.46
	E_2	410.62	301.65 (-26.54)	287.52 (-29.98)	250.55 (-38.98)	312.58 ± 5.66
CS 31	E_1	265.15	256.30 (- 3.34)	238.70 (- 9.98)	240.62 (- 9.25)	250.19 ± 2.46
	E_2	361.55	316.30 (-12.52)	298.37 (-17.47)	307.33 (-15.00)	320.89 ± 5.66
CS 35	E_1	280.68	233.28 (-16.89)	237.57 (-15.36)	237.52 (-15.38)	247.26 ± 2.46
	E_2	361.40	342.38 (- 5.26)	296.80 (-17.87)	292.37 (-19.10)	323.24 ± 5.66
CS 36	E_1	268.23	260.65 (- 2.83)	251.10 (- 6.39)	230.10 (-14.22)	252.52 ± 2.46
	E_2	349.67	362.27 (+ 3.60)	327.48 (- 6.35)	332.55 (- 4.90)	342.99 ± 5.66

C.D. (p=0.05)					
Main plot treatments	E_1	29.13	Sub plot treatments within main plot treatments	E_1	30.46
	E_2	124.58		E_2	70.17
Sub plot treatments	E_1	15.23	Main plot treatments within Sub plot treatments	E_1	30.30
	E_2	35.08		E_2	73.77

Data in parenthesis indicate percentage increase or decrease (contd.)

Table 4.3a continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em.
CS 37	E_1	253.10	236.72 (- 6.47)	233.73 (- 7.65)	227.50 (-10.11)	237.76 ± 2.46
	E_2	334.47	325.05 (- 2.82)	317.70 (- 5.01)	315.45 (- 5.69)	323.17 ± 5.66
CS 38	E_1	252.03	245.68 (- 2.52)	222.27 (-11.81)	237.95 (- 5.59)	239.48 ± 2.46
	E_2	344.88	336.90 (- 2.31)	336.85 (- 2.33)	318.47 (- 7.66)	334.28 ± 5.66
CS 43	E_1	234.97	217.47 (- 7.45)	208.15 (-11.41)	211.35 (-10.05)	217.98 ± 2.46
	E_2	456.97	376.25 (-11.66)	313.60 (-31.37)	312.65 (-31.58)	364.87 ± 5.66
CS 44	E_1	248.70	220.53 (-11.33)	214.32 (-13.82)	215.67 (-13.28)	224.80 ± 2.46
	E_2	482.93	325.60 (-32.58)	393.63 (-18.49)	334.22 (-30.79)	384.10 ± 5.66
CS 46	E_1	273.28	255.60 (- 6.47)	258.38 (- 5.42)	251.88 (- 7.83)	259.79 ± 2.46
	E_2	455.00	395.33 (-11.11)	397.63 (-12.61)	378.53 (-16.81)	406.63 ± 5.66
CS 49	E_1	253.62	235.47 (- 7.16)	236.13 (- 6.90)	214.47 (-15.44)	234.92 ± 2.46
	E_2	357.05	346.02 (- 3.09)	334.50 (- 6.32)	272.60 (-23.65)	327.54 ± 5.66
CS 50	E_1	225.97	214.27 (- 5.18)	196.97 (-12.83)	187.68 (-16.94)	206.22 ± 2.46
	E_2	247.52	244.52 (- 1.21)	239.33 (- 3.31)	223.15 (- 9.45)	238.63 ± 5.66
CS 51	E_1	239.23	232.47 (- 2.83)	218.75 (- 8.56)	219.55 (- 8.23)	227.50 ± 2.46
	E_2	415.35	382.05 (- 8.02)	318.47 (-23.32)	330.67 (-20.39)	361.63 ± 5.66
CS 60	E_1	212.12	202.82 (- 4.38)	198.05 (- 6.63)	195.07 (- 8.04)	202.01 ± 2.46
	E_2	307.93	248.17 (-19.41)	239.23 (-22.31)	222.60 (-27.71)	254.48 ± 5.66
CS 62	E_1	217.22	200.93 (- 7.50)	205.23 (- 5.52)	194.70 (-10.37)	204.52 ± 2.46
	E_2	271.92	243.30 (-10.53)	237.03 (-12.83)	237.45 (-12.68)	247.43 ± 5.66
Mean ± S.Em.	E_1	258.41±4.21	240.57±4.21	231.13±4.21	225.92±4.21	
	E_2	358.64±18.00	319.26±18.00	305.32±18.00	295.25±18.00	

E_1 = Season 1 (October-January, 1981-82)

E_2 = Season 2 (March-May, 1982)

Table 4.3b. Primary branches/plant

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 1	E_1	4.17	5.17 (+23.98)	6.17 (+47.96)	6.67 (+59.95)	5.54 ± 0.14
	E_2	4.67	6.83 (+32.10)	6.17 (+32.11)	7.33 (+56.95)	6.25 ± 0.03
CS 3	E_1	6.33	6.67 (+ 5.37)	6.83 (+ 7.89)	6.33 (0)	6.54 ± 0.14
	E_2	5.17	6.67 (+29.01)	8.50 (+64.41)	7.17 (+38.68)	6.88 ± 0.03
CS 4	E_1	4.83	6.00 (+24.22)	6.33 (+31.05)	6.83 (+41.40)	6.00 ± 0.14
	E_2	4.17	5.67 (+35.97)	6.33 (+51.79)	7.50 (+79.85)	5.92 ± 0.03
CS 10	E_1	5.33	6.00 (+12.57)	6.67 (+25.14)	7.50 (+40.71)	6.38 ± 0.14
	E_2	5.33	6.33 (+18.76)	9.17 (+72.04)	7.00 (+31.33)	6.96 ± 0.03
CS 26	E_1	5.83	7.00 (+20.07)	8.50 (+45.79)	8.83 (+51.45)	7.54 ± 0.14
	E_2	5.50	6.67 (+21.27)	8.50 (+54.54)	8.33 (+51.45)	7.25 ± 0.03
CS 27	E_1	3.67	5.33 (+45.23)	4.83 (+31.60)	5.33 (+45.23)	4.79 ± 0.14
	E_2	4.83	6.17 (+27.74)	6.67 (+38.09)	6.17 (+27.74)	5.96 ± 0.03
CS 28	E_1	4.00	5.00 (+25.00)	5.50 (+37.50)	5.00 (+25.00)	4.88 ± 0.14
	E_2	5.33	8.17 (+53.28)	8.33 (+56.28)	8.00 (+50.09)	7.46 ± 0.03
CS 31	E_1	5.33	6.17 (+15.75)	6.17 (+15.75)	7.50 (+40.71)	6.92 ± 0.14
	E_2	5.50	6.17 (+12.18)	6.67 (+21.27)	8.00 (+45.45)	6.58 ± 0.03
CS 35	E_1	7.67	7.50 (- 2.21)	8.50 (+10.82)	10.00 (+30.37)	8.42 ± 0.14
	E_2	5.33	7.83 (+46.90)	7.67 (+43.90)	7.33 (+37.52)	7.04 ± 0.03
CS 36	E_1	5.67	5.67 (0)	7.00 (+23.45)	8.17 (+44.09)	6.63 ± 0.14
	E_2	4.67	7.67 (+64.24)	8.67 (+85.65)	7.50 (+60.59)	7.13 ± 0.03

C.D. (p=0.05)	Main plot treatments	E_1	2.30	Sub plot treatments within main plot treatments	E_1	1.80
		E_2	2.37		E_2	2.31
	Sub plot treatments	E1	0.90	Main plot treatments within sub plot treatments	E_1	1.83
		E_2	1.16		E_2	0.72

Data in parenthesis indicate percentage increase or decrease (contd.)

Table 4.3b continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 37	E_1	6.83	7.33 (+ 7.32)	8.50 (+24.45)	9.33 (+36.60)	8.00 ± 0.14
	E_2	5.83	7.50 (+28.65)	6.33 (+ 8.57)	8.17 (+40.13)	6.96 ± 0.03
CS 38	E_1	5.50	6.17 (+12.18)	6.00 (+ 9.09)	7.33 (+33.27)	6.25 ± 0.14
	E_2	4.50	6.17 (+37.11)	7.00 (+55.55)	7.33 (+62.88)	6.25 ± 0.03
CS 43	E_1	4.67	5.67 (+21.41)	7.17 (+53.53)	8.50 (+82.01)	6.50 ± 0.14
	E_2	5.33	6.00 (+12.57)	6.83 (+28.14)	7.83 (+46.90)	6.50 ± 0.03
CS 44	E_1	5.83	6.83 (+17.15)	7.67 (+31.56)	7.33 (+25.72)	6.92 ± 0.14
	E_2	4.33	6.83 (+57.74)	10.33 (+138.56)	10.50 (+142.49)	8.00 ± 0.03
CS 46	E_1	5.83	6.33 (+ 8.57)	7.67 (+31.56)	8.00 (+37.22)	6.96 ± 0.14
	E_2	4.67	6.00 (+28.48)	7.00 (+49.89)	8.33 (+78.37)	6.50 ± 0.03
CS 49	E_1	3.67	5.17 (+40.87)	6.67 (+81.74)	7.17 (+95.36)	5.67 ± 0.14
	E_2	6.17	7.83 (+26.90)	7.67 (+24.31)	8.33 (+35.00)	7.50 ± 0.03
CS 50	E_1	4.33	5.67 (+30.94)	5.83 (+34.64)	6.67 (+54.04)	5.63 ± 0.14
	E_2	5.67	6.83 (+20.46)	7.33 (+29.27)	6.83 (+20.45)	6.67 ± 0.03
CS 51	E_1	5.67	7.17 (+35.80)	8.50 (+49.91)	9.83 (+73.36)	7.79 ± 0.14
	E_2	6.50	6.50 (0)	7.33 (+12.76)	7.50 (+15.38)	6.96 ± 0.03
CS 60	E_1	3.00	4.17 (+39.00)	4.83 (+61.00)	5.17 (+72.33)	4.29 ± 0.14
	E_2	4.00	7.17 (+79.25)	6.33 (+58.25)	6.67 (+66.75)	6.04 ± 0.03
CS 62	E_1	3.00	4.33 (+44.33)	4.50 (+50.00)	5.00 (+66.66)	4.21 ± 0.14
	E_2	4.17	5.83 (+39.81)	5.33 (+27.81)	5.67 (+59.95)	5.50 ± 0.03
Mean ± S.Em.	E_1	5.06±0.33	5.97±0.33	6.69±0.33	7.33 ± 0.33	
	E_2	5.08±0.34	6.74±0.34	7.41±0.34	7.63 ± 0.34	

Table 4.3o. Nodes to first male flower

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 1	E_1	3.50	4.83 (+38.00)	5.67 (+62.00)	5.67 (+62.00)	4.92 ± 0.09
	E_2	3.00	3.67 (+22.33)	3.50 (+16.67)	4.17 (+39.00)	3.58 ± 0.12
CS 3	E_1	4.00	4.67 (+16.75)	5.00 (+25.00)	4.83 (+20.75)	4.63 ± 0.09
	E_2	3.67	3.50 (- 4.62)	4.83 (+31.61)	4.83 (+31.61)	4.21 ± 0.12
CS 4	E_1	3.00	3.50 (+16.67)	3.83 (+27.67)	3.83 (+27.67)	3.54 ± 0.09
	E_2	2.83	4.50 (+59.01)	4.33 (+53.00)	3.50 (+23.67)	3.79 ± 0.12
CS 10	E_1	3.50	3.83 (+ 9.43)	4.33 (+30.30)	4.00 (+14.29)	3.92 ± 0.09
	E_2	3.67	3.83 (+ 4.36)	3.67 (0)	4.17 (+13.62)	3.83 ± 0.12
CS 26	E_1	3.33	3.67 (+10.30)	4.00 (+20.12)	4.00 (+20.12)	3.75 ± 0.09
	E_2	3.50	3.67 (+ 4.86)	3.67 (+ 4.86)	4.00 (+14.29)	3.71 ± 0.12
CS 27	E_1	3.33	4.83 (+45.05)	4.50 (+35.14)	5.17 (+55.26)	4.46 ± 0.09
	E_2	3.00	5.83 (+94.33)	5.00 (+66.67)	5.50 (+83.33)	4.83 ± 0.12
CS 28	E_1	3.83	5.00 (+30.55)	5.00 (+30.55)	5.33 (+39.16)	4.79 ± 0.09
	E_2	3.83	4.83 (+26.11)	5.00 (+30.55)	5.33 (+39.16)	4.75 ± 0.12
CS 31	E_1	3.67	4.33 (+17.98)	4.66 (+27.25)	5.00 (+36.24)	4.42 ± 0.09
	E_2	3.67	3.33 (- 9.26)	4.17 (+13.62)	4.33 (+17.98)	3.88 ± 0.12
CS 35	E_1	4.00	3.83 (- 4.25)	4.67 (+16.75)	4.83 (+20.75)	4.33 ± 0.09
	E_2	3.67	4.00 (+ 8.99)	4.17 (+13.62)	3.83 (+ 4.36)	3.92 ± 0.12
CS 36	E_1	3.50	4.00 (+14.29)	4.33 (+23.71)	4.17 (+19.14)	4.00 ± 0.09
	E_2	3.17	4.17 (+31.55)	3.67 (+15.77)	4.00 (+26.18)	3.75 ± 0.12

C.D. (p=0.05)						
	Main plot treatments	E_1	1.53	Sub plot treatments within main plot treatments	E_1	1.12
		E_2	1.76		E_2	1.53
	Sub plot treatments	E_1	0.57	Main plot treatments within sub plot treatments	E_1	1.15
		E_2	0.77		E_2	1.54

Data in parenthesis indicate percentage increase or decrease (contd.)

Table 4.3c. continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 37	E_1	3.17	3.67 (+15.77)	4.67 (+47.32)	4.67 (+47.32)	4.04 ± 0.09
	E_2	3.00	3.50 (+16.67)	3.33 (+11.00)	3.83 (+27.67)	3.42 ± 0.12
CS 38	E_1	3.33	4.17 (+25.23)	4.17 (+25.23)	4.33 (+30.03)	4.00 ± 0.09
	E_2	3.83	4.17 (+ 8.88)	4.50 (+17.49)	4.67 (+21.93)	4.29 ± 0.12
CS 43	E_1	3.33	4.67 (+40.24)	4.50 (+35.14)	4.33 (+30.03)	4.21 ± 0.09
	E_2	4.00	4.50 (+12.50)	4.17 (+ 4.25)	4.67 (+16.75)	4.33 ± 0.12
CS 44	E_1	3.50	4.17 (+19.14)	5.17 (+47.71)	5.00 (+42.86)	4.46 ± 0.09
	E_2	4.50	4.50 (0)	5.00 (+11.11)	4.83 (+ 7.33)	4.71 ± 0.12
CS 46	E_1	3.67	5.00 (+36.24)	5.50 (+49.86)	4.83 (+31.61)	4.75 ± 0.09
	E_2	3.33	3.00 (-11.00)	3.33 (0)	4.17 (+25.23)	3.46 ± 0.12
CS 49	E_1	3.33	4.67 (+40.24)	6.00 (+80.18)	6.00 (+80.18)	5.00 ± 0.09
	E_2	4.33	5.83 (+34.64)	5.67 (+30.95)	5.00 (+15.47)	5.21 ± 0.12
CS 50	E_1	4.33	5.67 (+30.95)	6.50 (+50.12)	5.00 (+15.47)	5.38 ± 0.09
	E_2	4.67	6.50 (+39.19)	7.00 (+49.89)	6.33 (+35.54)	6.13 ± 0.12
CS 51	E_1	3.33	4.17 (+25.23)	4.50 (+35.14)	5.33 (+60.06)	4.33 ± 0.09
	E_2	3.50	3.33 (- 4.86)	4.17 (+19.14)	4.00 (+14.29)	3.75 ± 0.12
CS 60	E_1	3.17	5.50 (+73.50)	5.17 (+63.09)	4.50 (+41.96)	4.58 ± 0.09
	E_2	3.67	5.83 (+58.86)	6.67 (+81.74)	6.33 (+72.48)	5.63 ± 0.12
CS 62	E_1	4.17	5.17 (+23.98)	5.33 (+27.82)	5.00 (+19.90)	4.92 ± 0.09
	E_2	4.33	4.83 (+11.55)	5.17 (+19.40)	5.17 (+19.40)	5.17 ± 0.12
Mean ± S.Em.	E_1	3.55±0.22	4.77±0.22	4.88±0.22	4.79±0.22	
	E_2	3.66±0.25	4.37±0.25	4.55±0.25	4.63±0.25	

Table 4.3d. Nodes to first female flower

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 1	E_1	6.67	6.17 (- 7.49)	6.00 (-10.04)	5.50 (-17.54)	6.08 ± 0.09
	E_2	7.83	7.00 (-10.60)	7.33 (- 6.38)	7.33 (- 6.38)	7.38 ± 0.12
CS 3	E_1	7.33	5.33 (-27.28)	4.50 (-38.60)	4.67 (-36.28)	5.46 ± 0.09
	E_2	6.67	7.00 (+ 4.49)	6.83 (+ 2.39)	6.83 (+ 2.39)	6.83 ± 0.12
CS 4	E_1	6.17	4.83 (-21.71)	5.17 (-16.20)	5.33 (-13.61)	5.38 ± 0.09
	E_2	8.00	7.83 (- 2.12)	7.17 (-10.37)	6.00 (-25.00)	7.25 ± 0.12
CS 10	E_1	5.67	5.00 (-11.88)	4.00 (-29.45)	4.67 (-17.63)	4.83 ± 0.09
	E_2	8.67	8.00 (- 7.72)	7.33 (-15.45)	6.83 (-21.22)	7.88 ± 0.12
CS 26	E_1	6.33	5.50 (-13.11)	6.00 (- 5.21)	4.83 (-23.69)	5.67 ± 0.09
	E_2	6.00	5.67 (- 5.50)	5.67 (- 5.50)	5.17 (-13.83)	5.63 ± 0.12
CS 27	E_1	5.33	3.00 (-43.71)	3.00 (-43.71)	3.17 (-40.52)	3.63 ± 0.09
	E_2	4.67	3.67 (-21.41)	3.67 (-21.41)	3.67 (-21.41)	3.92 ± 0.12
CS 28	E_1	6.33	4.50 (-28.90)	4.00 (-36.80)	4.50 (-28.90)	4.83 ± 0.09
	E_2	6.67	6.17 (- 7.49)	5.50 (-17.54)	5.50 (-17.54)	5.96 ± 0.12
CS 31	E_1	6.33	4.50 (-28.90)	5.00 (-21.01)	4.83 (-23.69)	5.17 ± 0.09
	E_2	6.67	5.33 (-20.08)	5.33 (-20.08)	5.00 (-25.03)	5.58 ± 0.12
CS 35	E_1	6.33	5.33 (-15.79)	5.17 (-18.32)	5.33 (-15.79)	5.54 ± 0.09
	E_2	6.50	6.50 (0)	5.33 (-18.00)	6.00 (- 7.69)	6.08 ± 0.12
CS 36	E_1	5.50	4.83 (-12.18)	6.17 (+12.18)	6.00 (- 2.75)	5.63 ± 0.09
	E_2	6.17	5.17 (-16.20)	6.00 (+ 9.09)	5.83 (- 5.51)	5.79 ± 0.12

C.D. (p=0.05)	Main plot treatments	E_1	0.85	Sub plot treatments within main plot treatments	E_1	1.22
		E_2	1.58		E_2	1.47
	Sub plot treatments	E_1	0.61	Main plot treatments within sub plot treatments	E_1	1.22
		E_2	0.74		E_2	1.49

Data in parenthesis indicate percentage increase or decrease (contd.)

Table 4.3d continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 37	E_1	6.33	5.00 (-21.01)	5.00 (-21.01)	5.33 (-15.79)	5.42 ± 0.09
	E_2	5.83	6.00 (+ 2.91)	6.33 (+ 8.57)	5.67 (- 2.74)	6.04 ± 0.12
CS 38	E_1	5.83	5.50 (- 5.66)	4.83 (-17.15)	4.83 (-17.15)	5.25 ± 0.09
	E_2	8.17	8.00 (- 2.08)	7.17 (-12.23)	6.67 (-18.35)	7.50 ± 0.12
CS 43	E_1	5.50	4.67 (-15.89)	4.83 (-12.18)	5.33 (- 3.09)	5.08 ± 0.09
	E_2	5.67	5.17 (- 8.81)	5.17 (- 8.81)	4.83 (-14.81)	5.21 ± 0.12
CS 44	E_1	6.50	5.83 (-10.30)	5.00 (-23.07)	5.17 (-20.46)	5.63 ± 0.09
	E_2	6.50	6.33 (- 2.61)	6.00 (- 7.69)	6.00 (- 7.69)	6.21 ± 0.12
CS 46	E_1	6.83	6.00 (-12.15)	5.50 (-19.47)	5.67 (-16.98)	6.08 ± 0.09
	E_2	5.33	5.00 (- 6.19)	5.17 (- 3.00)	6.00 (+12.57)	5.38 ± 0.12
CS 49	E_1	5.50	5.00 (- 9.09)	4.50 (-18.18)	4.50 (-18.18)	4.88 ± 0.09
	E_2	6.83	7.17 (+ 4.97)	7.00 (+ 2.48)	5.83 (-14.64)	6.71 ± 0.12
CS 50	E_1	5.67	4.83 (-14.81)	4.50 (-20.63)	4.33 (-23.63)	4.83 ± 0.09
	E_2	6.33	5.17 (-18.32)	5.83 (- 8.89)	5.00 (-21.01)	5.58 ± 0.12
CS 51	E_1	6.00	4.83 (-19.50)	4.67 (-22.16)	4.83 (-19.50)	5.08 ± 0.09
	E_2	6.17	6.33 (+ 2.59)	6.67 (+ 8.10)	5.67 (- 8.10)	6.21 ± 0.12
CS 60	E_1	5.33	4.83 (- 9.38)	4.50 (-15.57)	4.17 (-21.76)	4.71 ± 0.09
	E_2	5.33	5.67 (+ 6.37)	4.67 (-12.38)	4.17 (-21.76)	4.96 ± 0.12
CS 62	E_1	6.00	5.67 (- 5.50)	5.17 (-13.83)	5.00 (-16.67)	5.46 ± 0.09
	E_2	5.83	5.17 (-11.32)	5.50 (- 5.67)	4.67 (-19.89)	5.29 ± 0.12
Mean ± S.Em.	E_1	6.75±0.12	5.58±0.12	4.89±0.12	4.90± 0.12	
	E_2	6.49±0.23	6.12±0.23	5.98±0.23	5.88± 0.23	

Table 4.3e. Nodes to first fruit

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em.
CS 1	E_1	6.83	6.83 (0)	6.00 (-12.15)	5.67 (-16.98)	6.33 ± 0.13
	E_2	7.83	7.00 (-10.60)	7.83 (0)	7.83 (0)	7.63 ± 0.14
CS 3	E_1	7.50	6.00 (-20.00)	4.83 (-35.60)	4.67 (-37.73)	5.75 ± 0.13
	E_2	7.33	7.83 (+ 6.82)	7.83 (+ 6.82)	7.50 (+ 2.32)	7.63 ± 0.14
CS 4	E_1	6.33	5.50 (-13.11)	5.50 (-13.11)	5.67 (-10.43)	5.75 ± 0.13
	E_2	9.50	9.67 (+ 1.79)	8.67 (- 8.74)	7.00 (-26.32)	8.71 ± 0.14
CS 10	E_1	6.67	5.50 (-17.54)	4.17 (-37.48)	5.00 (-25.04)	5.34 ± 0.13
	E_2	9.00	9.83 (+ 9.22)	8.50 (- 5.56)	8.83 (- 1.89)	9.04 ± 0.14
CS 26	E_1	6.50	5.83 (-10.31)	6.33 (- 2.62)	5.50 (-15.38)	6.04 ± 0.13
	E_2	6.00	6.17 (+ 2.83)	6.17 (+ 2.83)	6.00 (0)	6.08 ± 0.14
CS 27	E_1	5.67	3.17 (-44.09)	3.17 (-44.09)	3.33 (-41.27)	3.84 ± 0.13
	E_2	5.00	4.00 (-20.00)	3.83 (-23.40)	3.67 (-26.60)	4.13 ± 0.14
CS 28	E_1	6.67	4.83 (-27.59)	5.50 (-17.54)	4.50 (-32.53)	5.38 ± 0.13
	E_2	6.83	6.50 (-14.64)	7.00 (+ 2.49)	6.17 (- 9.66)	6.63 ± 0.14
CS 31	E_1	7.00	5.50 (-14.29)	6.67 (- 4.71)	6.33 (- 9.57)	6.38 ± 0.13
	E_2	6.83	5.83 (-14.64)	5.83 (-14.64)	5.50 (-19.47)	6.00 ± 0.14
CS 35	E_1	6.00	5.67 (- 5.50)	8.17 (+ 36.17)	7.33 (+22.17)	6.79 ± 0.13
	E_2	7.33	7.00 (- 4.50)	6.33 (-13.64)	6.83 (- 6.82)	6.88 ± 0.14
CS 36	E_1	5.67	5.00 (-11.82)	6.33 (+11.64)	6.67 (+17.64)	5.92 ± 0.13
	E_2	6.50	5.50 (-15.38)	6.17 (- 5.08)	6.00 (- 7.69)	6.04 ± 0.14

C.D. (p=0.05)					
Main plot treatments	E_1	1.79	Sub plot treatments within main plot treatments	E_1	1.67
	E_2	1.72		E_2	1.78
Sub plot treatments	E_1	0.84	Main plot treatments within sub plot treatments	E_1	1.68
	E_2	0.89		E_2	1.77

Data in parenthesis indicate percentage increase or decrease (contd.)

Table 4.3e. continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 37	E_1	6.33	5.83 (-14.64)	5.67 (-16.98)	5.67 (-16.98)	6.00 ± 0.13
	E_2	6.17	6.17 (0)	6.50 (+ 5.35)	6.00 (- 2.76)	6.21 ± 0.14
CS 38	E_1	6.17	5.67 (- 8.10)	5.67 (- 8.10)	5.33 (-13.61)	5.71 ± 0.13
	E_2	8.33	9.04 (+ 8.04)	7.17 (-13.93)	8.00 (- 3.96)	8.13 ± 0.14
CS 43	E_1	6.33	5.00 (-21.01)	5.17 (-18.33)	5.67 (-10.43)	5.54 ± 0.13
	E_2	6.17	5.67 (- 8.10)	5.50 (-10.86)	5.50 (-10.86)	5.71 ± 0.14
CS 44	E_1	7.33	6.67 (- 9.00)	5.50 (-24.97)	5.33 (-27.29)	6.21 ± 0.13
	E_2	6.50	6.83 (+ 5.08)	6.33 (- 2.62)	6.33 (- 2.62)	6.50 ± 0.14
CS 46	E_1	7.00	6.33 (- 9.57)	5.83 (-16.71)	5.67 (-19.00)	6.21 ± 0.13
	E_2	6.67	5.33 (-20.09)	5.33 (-20.09)	6.33 (- 5.10)	5.92 ± 0.14
CS 49	E_1	5.83	5.33 (- 8.58)	4.67 (-19.90)	4.50 (-22.81)	5.08 ± 0.13
	E_2	7.00	7.33 (+ 4.71)	7.17 (+ 2.43)	6.33 (- 9.57)	6.96 ± 0.14
CS 50	E_1	6.00	5.17 (-13.83)	4.83 (-19.50)	4.67 (-22.17)	5.17 ± 0.13
	E_2	6.83	5.83 (-14.64)	6.33 (- 7.32)	5.67 (-16.98)	6.17 ± 0.14
CS 51	E_1	6.33	5.17 (-18.33)	4.83 (-23.70)	5.00 (-21.01)	5.25 ± 0.13
	E_2	6.67	6.67 (0)	7.00 (+ 4.95)	5.67 (-14.99)	6.50 ± 0.14
CS 60	E_1	6.00	5.17 (-13.83)	4.67 (-22.17)	5.00 (-16.67)	5.21 ± 0.13
	E_2	6.00	5.83 (- 2.83)	5.00 (-16.67)	4.50 (-25.00)	5.33 ± 0.14
CS 62	E_1	6.17	6.17 (0)	5.33 (-13.61)	5.00 (-18.96)	5.67 ± 0.13
	E_2	6.17	5.50 (-10.86)	5.50 (-10.86)	5.00 (-18.96)	5.54 ± 0.14
Mean ± S.Em.	E_1	6.44±0.26	5.52±0.26	5.44±0.26	6.23±0.26	
	E_2	6.93±0.25	6.68±0.25	6.50±0.25	6.23±0.25	

Table 4.3f. Length of fruit (cm)

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em.
CS 1	E_1	28.80	30.45 (+ 5.73)	17.12 (-40.56)	25.98 (- 9.79)	25.59 ± 0.49
	E_2	31.20	32.48 (+ 4.10)	33.89 (+ 8.62)	33.69 (+ 7.98)	32.82 ± 0.57
CS 3	E_1	31.70	34.95 (+10.52)	34.41 (+ 8.55)	30.39 (- 4.13)	32.86 ± 0.49
	E_2	43.12	40.52 (- 5.96)	43.34 (+ 0.51)	38.30 (-11.18)	41.32 ± 0.57
CS 4	E_1	31.65	32.21 (+ 1.77)	32.83 (+ 3.73)	31.15 (- 1.58)	31.96 ± 0.49
	E_2	42.15	39.70 (- 5.81)	48.20 (+14.35)	37.05 (-12.10)	41.78 ± 0.57
CS 10	E_1	31.29	31.44 (+ 0.48)	32.35 (+ 3.39)	27.95 (-10.67)	30.76 ± 0.49
	E_2	30.94	34.36 (+11.05)	41.68 (+34.71)	37.29 (+20.52)	36.07 ± 0.57
CS 26	E_1	27.60	26.38 (- 4.42)	27.97 (+ 1.34)	24.88 (- 9.86)	26.71 ± 0.49
	E_2	30.28	31.05 (+ 2.54)	34.23 (+13.04)	36.78 (+21.47)	33.09 ± 0.57
CS 27	E_1	19.43	19.62 (+ 0.98)	19.05 (- 1.96)	17.58 (- 9.52)	18.92 ± 0.49
	E_2	17.87	18.20 (+ 1.85)	19.31 (+ 8.06)	18.81 (+ 5.26)	18.55 ± 0.57
CS 28	E_1	22.06	24.48 (+10.97)	25.11 (+13.83)	21.68 (- 1.72)	23.33 ± 0.49
	E_2	22.18	22.35 (+ 0.77)	23.48 (+ 5.86)	22.02 (- 0.72)	22.51 ± 0.57
CS 31	E_1	27.27	31.14 (+14.19)	26.62 (- 2.38)	24.77 (- 9.17)	27.45 ± 0.49
	E_2	30.80	33.51 (+ 8.80)	33.27 (+ 8.02)	28.66 (- 6.95)	31.56 ± 0.57
CS 35	E_1	31.35	30.72 (- 2.10)	30.82 (- 1.69)	27.39 (-12.63)	30.07 ± 0.49
	E_2	30.94	26.12 (-15.58)	28.82 (- 6.85)	23.86 (-22.88)	27.43 ± 0.57
CS 36	E_1	34.72	28.55 (-17.77)	35.15 (+ 1.24)	33.68 (- 3.00)	33.03 ± 0.49
	E_2	28.69	30.53 (+ 6.41)	34.42 (+19.99)	32.79 (+14.29)	31.61 ± 0.57

Data in parenthesis indicate percentage increase or decrease

(contd.)

Table 4.3f. continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em.
CS 37	E_1	31.78	32.92 (+ 3.59)	33.95 (+ 6.83)	33.57 (+ 5.63)	33.06 ± 0.49
	E_2	30.39	32.70 (+ 7.60)	32.97 (+ 8.85)	29.58 (- 2.67)	31.41 ± 0.57
CS 38	E_1	30.09	30.72 (+ 2.09)	29.43 (- 2.19)	28.78 (- 4.35)	29.76 ± 0.49
	E_2	29.47	30.76 (+ 4.38)	31.58 (+ 7.16)	30.11 (+ 2.17)	30.48 ± 0.57
CS 43	E_1	32.19	28.55 (-11.31)	31.35 (- 2.61)	32.48 (+ 0.90)	31.14 ± 0.49
	E_2	28.48	29.02 (+ 1.90)	28.00 (- 1.69)	28.69 (+ 0.74)	28.55 ± 0.57
CS 44	E_1	28.33	24.48 (-13.59)	25.45 (-10.34)	27.15 (- 4.17)	26.35 ± 0.49
	E_2	31.24	30.49 (- 2.40)	31.83 (+ 1.89)	31.94 (+ 2.24)	31.38 ± 0.57
CS 46	E_1	29.01	29.77 (+ 2.62)	28.68 (- 1.14)	30.79 (+ 6.14)	29.56 ± 0.49
	E_2	30.38	30.44 (+ 0.20)	31.79 (+ 4.64)	31.37 (+ 3.26)	31.00 ± 0.57
CS 49	E_1	19.91	22.37 (+12.36)	20.75 (+ 4.22)	21.90 (+ 9.99)	21.23 ± 0.49
	E_2	21.28	20.19 (- 5.12)	20.80 (- 2.26)	17.67 (-16.96)	19.99 ± 0.57
CS 50	E_1	35.99	38.71 (+ 7.56)	37.37 (+ 3.83)	36.97 (+ 2.72)	37.26 ± 0.49
	E_2	37.13	36.66 (- 1.27)	35.15 (- 5.33)	38.30 (+ 3.15)	36.81 ± 0.57
CS 51	E_1	29.92	29.83 (- 0.30)	28.27 (- 5.51)	29.12 (- 2.67)	29.29 ± 0.49
	E_2	31.09	30.02 (- 3.44)	35.69 (+14.80)	31.89 (+ 2.57)	32.17 ± 0.57
CS 60	E_1	24.57	25.35 (+ 3.17)	25.03 (+ 1.87)	21.98 (-10.54)	24.23 ± 0.49
	E_2	26.20	25.13 (- 4.08)	24.79 (- 5.38)	24.98 (- 4.67)	25.28 ± 0.57
CS 62	E_1	20.26	20.70 (+ 2.17)	20.50 (+ 1.18)	18.39 (- 9.32)	19.96 ± 0.49
	E_2	19.68	20.83 (+ 5.84)	19.52 (- 0.81)	18.72 (- 4.88)	19.69 ± 0.57
Mean ± S.Em.	E_1	28.40±0.79	28.67±0.79	28.11±0.79	27.33±0.79	
	E_2	29.68±1.64	29.75±1.64	31.64±1.64	29.63±1.64	

Table 4.3g. Weight of fruit (kg)

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em.
CS 1	E_1	1.34	1.51 (+12.69)	1.18 (-11.94)	1.19 (-11.19)	1.31 ± 0.04
	E_2	1.98	1.84 (- 7.07)	2.13 (+ 7.58)	2.54 (+28.28)	2.12 ± 0.05
CS 3	E_1	1.33	1.44 (+ 8.27)	1.48 (+11.28)	1.38 (+ 3.76)	1.41 ± 0.04
	E_2	2.03	2.07 (+ 1.97)	2.79 (+37.44)	2.98 (+46.80)	2.54 ± 0.05
CS 4	E_1	1.95	1.41 (-27.69)	1.26 (-35.38)	0.96 (-50.77)	1.40 ± 0.04
	E_2	1.93	1.91 (- 1.04)	2.53 (+31.09)	1.83 (- 5.18)	2.05 ± 0.05
CS 10	E_1	1.67	1.51 (- 9.58)	1.61 (- 3.59)	1.21 (-27.54)	1.50 ± 0.04
	E_2	1.89	2.27 (+20.11)	3.24 (+71.43)	2.53 (+33.86)	2.48 ± 0.05
CS 26	E_1	1.61	1.27 (-21.12)	1.53 (- 4.97)	1.15 (-28.57)	1.39 ± 0.04
	E_2	1.52	1.93 (+26.97)	2.43 (+59.87)	2.61 (+71.71)	2.12 ± 0.05
CS 27	E_1	0.62	0.63 (+ 1.61)	0.60 (- 3.23)	0.37 (-40.32)	0.56 ± 0.04
	E_2	0.50	0.54 (+ 8.00)	0.65 (+30.00)	0.55 (+10.00)	0.56 ± 0.05
CS 28	E_1	0.85	0.99 (+16.47)	0.95 (+11.76)	0.74 (-12.94)	0.88 ± 0.04
	E_2	0.64	0.59 (- 7.81)	0.80 (+25.00)	0.64 (0)	0.67 ± 0.05
CS 31	E_1	1.24	1.34 (+ 8.06)	1.13 (- 8.87)	1.00 (-19.35)	1.18 ± 0.04
	E_2	1.68	2.22 (+32.14)	1.88 (+11.90)	1.87 (+11.31)	1.91 ± 0.05
CS 35	E_1	2.06	1.40 (-32.04)	1.97 (- 4.37)	1.16 (-43.69)	1.65 ± 0.04
	E_2	1.69	1.29 (-23.67)	1.50 (-11.24)	1.57 (- 7.10)	1.51 ± 0.05
CS 36	E_1	1.62	1.59 (- 1.85)	1.56 (- 3.70)	1.32 (-18.52)	1.52 ± 0.04
	E_2	1.80	1.74 (- 3.33)	2.58 (+43.33)	2.42 (+34.44)	2.14 ± 0.05

Data in parenthesis indicate percentage increase or decrease

(contd.)

Table 4.3g. continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 37	E_1	1.41	1.43 (+ 1.42)	1.55 (+ 9.93)	1.59 (+12.77)	1.50 ± 0.04
	E_2	2.08	2.15 (+ 3.37)	2.57 (+23.56)	1.70 (-18.27)	2.13 ± 0.05
CS 38	E_1	1.74	1.98 (+13.79)	1.48 (-14.61)	1.52 (-14.47)	1.65 ± 0.04
	E_2	1.35	1.64 (+21.48)	2.19 (+62.22)	1.90 (+40.74)	1.77 ± 0.05
CS 43	E_1	2.13	1.34 (-37.09)	1.27 (-40.38)	1.59 (-25.35)	1.58 ± 0.04
	E_2	1.63	1.65 (+ 1.23)	2.21 (+35.58)	2.00 (+22.70)	1.87 ± 0.05
CS 44	E_1	1.30	1.34 (+ 3.08)	1.39 (+ 6.92)	1.35 (+ 3.85)	1.35 ± 0.04
	E_2	1.46	1.63 (+11.64)	2.33 (+59.59)	1.83 (+25.34)	1.81 ± 0.05
CS 46	E_1	1.30	1.23 (- 5.69)	1.03 (-20.77)	1.08 (-16.92)	1.16 ± 0.04
	E_2	1.90	1.56 (-17.89)	2.05 (+ 7.89)	2.42 (+27.37)	1.98 ± 0.05
CS 49	E_1	0.51	0.58 (+13.73)	0.59 (+17.65)	0.71 (+39.22)	0.60 ± 0.04
	E_2	0.58	0.50 (- 3.79)	0.46 (-20.69)	0.46 (-20.69)	0.50 ± 0.05
CS 50	E_1	0.50	0.62 (+24.00)	0.60 (+20.00)	0.62 (+24.00)	0.59 ± 0.04
	E_2	0.46	0.65 (+41.30)	0.69 (+50.00)	0.69 (+50.00)	0.62 ± 0.05
CS 51	E_1	1.84	1.50 (-18.48)	1.30 (-29.35)	1.23 (-33.15)	1.47 ± 0.04
	E_2	1.77	1.65 (- 6.78)	2.11 (+19.21)	2.05 (+15.82)	1.90 ± 0.05
CS 60	E_1	0.79	0.70 (-11.39)	0.76 (- 3.80)	0.65 (-17.72)	0.73 ± 0.04
	E_2	0.76	0.72 (- 5.26)	0.66 (-13.16)	0.74 (- 2.63)	0.72 ± 0.05
CS 62	E_1	0.56	0.44 (-21.43)	0.61 (+ 8.93)	0.45 (-19.64)	0.50 ± 0.04
	E_2	0.54	0.62 (+14.81)	0.56 (+ 3.70)	0.51 (- 5.56)	0.56 ± 0.05
Mean ± S.Em.	E_1	1.32±0.11	1.21±0.11	1.19±0.11	0.91±0.11	
	E_2	1.41±0.30	1.46±0.30	1.82±0.30	1.69±0.30	

Table 4.3h. Volume of fruit (ml)

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em.
CS 1	E_1	1270.17	1374.80 (+ 8.24)	1133.67 (-10.75)	1122.00 (-11.67)	1225.16±47.23
	E_2	1886.33	1719.33 (- 8.85)	2004.67 (+ 6.27)	2397.67 (+27.10)	2002.00±55.10
CS 3	E_1	1254.13	1360.73 (+ 8.50)	1383.00 (+10.28)	1294.33 (+ 3.21)	1323.05±47.23
	E_2	1910.00	1938.00 (+ 1.47)	2515.33 (+31.69)	2783.50 (+45.73)	2286.71±55.10
CS 4	E_1	1853.50	1320.00 (-28.78)	1166.67 (-37.06)	900.00 (-51.44)	1310.04±47.23
	E_2	1802.00	1770.17 (- 1.77)	2313.83 (+28.40)	1710.00 (- 5.11)	1899.00±55.10
CS 10	E_1	1563.27	1426.33 (- 8.76)	1593.33 (+ 1.92)	1084.00 (-30.66)	1416.73±47.23
	E_2	1827.33	2202.17 (+20.51)	3029.73 (+65.80)	2352.83 (+28.76)	2353.02±55.10
CS 26	E_1	1520.17	1176.67 (-23.00)	1426.67 (- 6.15)	1126.67 (-54.26)	1312.55±47.23
	E_2	1391.83	1816.67 (+30.52)	2147.00 (+54.26)	2105.50 (+79.73)	1865.25±55.10
CS 27	E_1	567.00	617.17 (+ 8.85)	567.17 (+ 0.03)	347.08 (-38.79)	524.61±47.23
	E_2	426.33	465.00 (+ 9.07)	554.67 (+30.10)	488.83 (+14.54)	483.71±55.10
CS 28	E_1	789.58	890.00 (+12.72)	800.67 (+ 1.40)	667.17 (-15.50)	736.86±47.23
	E_2	587.00	544.50 (- 7.24)	740.17 (+26.09)	599.33 (+ 2.10)	617.75±55.10
CS 31	E_1	1159.17	1291.92 (+11.45)	986.67 (-14.88)	935.25 (-19.32)	1116.02±47.23
	E_2	1580.17	2038.67 (+29.02)	1816.00 (+14.92)	1751.50 (+10.84)	1796.59±55.10
CS 35	E_1	1925.33	1341.00 (-30.35)	1896.83 (- 1.51)	1078.83 (-43.97)	1560.50±47.23
	E_2	1392.33	1348.33 (- 3.16)	1240.67 (-10.89)	1395.00 (+ 0.19)	1344.08±55.10
CS 36	E_1	1531.17	1492.00 (- 2.56)	1526.67 (- 0.29)	1231.67 (-19.56)	1445.38±47.23
	E_2	1725.83	1714.13 (- 0.68)	2446.67 (+41.77)	2295.83 (+33.03)	2045.62±55.10

Data in parenthesis indicate percentage increase or decrease

(contd.)

Table 4.3h. continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 37	E_1	1328.00	1412.50 (+ 6.36)	1440.33 (+ 8.46)	1377.50 (+ 3.73)	1389.58±47.23
	E_2	1994.67	2071.00 (+ 3.83)	2414.17 (+21.03)	1593.50 (-20.11)	2018.34±55.10
CS 38	E_1	1563.33	1889.33 (+20.85)	1268.67 (-18.85)	2414.17 (+21.03)	1783.88±47.23
	E_2	1259.00	1551.67 (+23.25)	2037.67 (+61.85)	2037.67 (+61.85)	1721.50±55.10
CS 43	E_1	2024.00	1269.33 (-37.29)	1178.83 (-41.76)	1477.58 (-27.00)	1487.44±47.23
	E_2	1555.00	1555.67 (+ 0.04)	2108.50 (+35.59)	1917.50 (+23.31)	1784.17±55.10
CS 44	E_1	839.93	1201.50 (+43.05)	1206.00 (+43.58)	1184.27 (+41.00)	1107.93±47.23
	E_2	1360.00	1514.33 (+11.35)	2164.67 (+59.17)	1742.50 (+28.13)	1695.38±55.10
CS 46	E_1	1215.50	1081.50 (-11.02)	953.00 (-21.60)	993.67 (-18.25)	1060.92±47.23
	E_2	1790.17	1409.67 (-21.25)	1886.00 (+ 5.35)	1973.33 (+10.23)	1432.85±55.10
CS 49	E_1	438.00	544.83 (+14.48)	550.67 (+25.72)	622.93 (+42.22)	539.11±47.23
	E_2	531.17	473.33 (-10.89)	417.67 (-21.37)	429.00 (-19.23)	462.79±55.10
CS 50	E_1	457.67	558.00 (+21.92)	515.83 (+12.71)	533.33 (+16.53)	516.21±47.23
	E_2	506.33	434.33 (-14.22)	615.00 (+21.46)	470.83 (- 7.01)	506.62±55.10
CS 51	E_1	1738.17	1398.50 (-19.54)	1202.50 (-30.82)	1142.67 (-34.26)	1370.46±47.23
	E_2	1632.67	1577.33 (- 3.39)	2010.67 (+23.15)	1904.33 (+16.46)	1781.25±55.10
CS 60	E_1	662.67	597.33 (- 9.86)	618.50 (- 6.67)	549.50 (-17.08)	607.00±47.23
	E_2	675.33	660.67 (- 2.17)	593.00 (-12.19)	664.67 (- 1.58)	648.42±55.10
CS 62	E_1	517.33	359.00 (-30.61)	513.17 (+ 0.80)	381.00 (-26.35)	442.63±47.23
	E_2	467.83	563.67 (+20.49)	495.50 (+ 5.91)	455.33 (- 2.63)	495.58±55.10
Mean ± S.Em.	E_1	1210.90±115.58	1130.12±115.58	1096.44±115.58	973.41±115.58	
	E_2	1315.07±296.70	1368.43±296.70	1677.58±296.70	1561.64±296.70	

Table 4.31. Flesh thickness (cm)

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em.
CS 1	E_1	3.38	3.09 (- 8.57)	3.12 (- 7.69)	2.90 (-14.12)	3.12 ± 0.04
	E_2	3.12	1.92 (-38.46)	2.82 (- 9.61)	2.88 (- 7.69)	2.69 ± 0.05
CS 3	E_1	2.05	2.29 (+11.70)	2.38 (+16.09)	2.27 (+10.73)	2.45 ± 0.04
	E_2	2.66	3.07 (+15.41)	2.77 (+ 4.13)	3.22 (+21.05)	2.93 ± 0.05
CS 4	E_1	1.37	1.20 (-12.40)	1.22 (-10.94)	1.08 (-21.16)	1.22 ± 0.04
	E_2	2.90	3.08 (+ 6.20)	3.28 (+13.10)	3.03 (+ 4.48)	3.07 ± 0.05
CS 10	E_1	2.73	2.70 (- 1.09)	2.48 (- 9.15)	2.28 (-16.48)	2.55 ± 0.04
	E_2	3.16	2.97 (- 6.01)	3.18 (+ 0.63)	3.02 (- 4.43)	3.08 ± 0.05
CS 26	E_1	2.27	2.47 (+ 8.81)	2.42 (+ 6.60)	2.30 (+ 1.32)	2.36 ± 0.04
	E_2	2.93	3.06 (+ 4.43)	3.32 (+13.31)	3.22 (+ 9.89)	3.13 ± 0.05
CS 27	E_1	1.52	1.52 (0)	1.45 (- 4.60)	1.35 (-11.18)	1.46 ± 0.04
	E_2	1.58	1.60 (+ 1.26)	1.78 (+12.65)	1.90 (+20.25)	1.72 ± 0.05
CS 28	E_1	2.10	2.08 (- 0.95)	2.07 (- 1.42)	1.88 (-10.47)	2.03 ± 0.04
	E_2	1.91	2.00 (+ 4.71)	2.22 (+16.22)	1.79 (- 6.28)	1.93 ± 0.05
CS 31	E_1	3.07	2.88 (- 6.18)	2.88 (- 6.18)	2.72 (-11.40)	2.89 ± 0.04
	E_2	2.40	2.97 (+23.75)	2.93 (+22.08)	3.38 (+40.83)	2.92 ± 0.05
CS 35	E_1	2.98	2.92 (- 2.01)	3.00 (+ 0.67)	2.65 (-11.07)	2.89 ± 0.04
	E_2	2.47	2.23 (- 9.71)	2.38 (- 3.64)	2.37 (- 4.04)	2.36 ± 0.05
CS 36	E_1	3.38	3.42 (+ 1.18)	3.37 (- 0.29)	3.17 (- 6.21)	3.33 ± 0.04
	E_2	2.72	2.73 (+ 0.36)	3.15 (+15.80)	3.10 (+13.97)	2.93 ± 0.05

C.D. (p=0.05)	Main plot treatments	E_1	0.33	Sub plot treatments within main plot treatments	E_1	0.59
	Sub plot treatments	E_1	0.29	Main plot treatments within sub plot treatments	E_1	0.55

Data in parenthesis indicate percentage increase or decrease (contd.)

Table 4.3i continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 37	E_1	3.12	3.18 (+ 1.92)	3.35 (+ 7.37)	3.03 (- 2.88)	3.17 ± 0.04
	E_2	2.68	2.73 (+ 1.86)	3.05 (+13.80)	2.78 (+ 3.73)	2.81 ± 0.05
CS 38	E_1	2.75	2.80 (+ 1.81)	2.62 (- 4.72)	2.70 (- 1.81)	2.72 ± 0.04
	E_2	2.75	2.83 (+ 2.90)	3.81 (+38.54)	3.18 (+15.63)	3.15 ± 0.05
CS 43	E_1	3.10	2.93 (- 5.48)	2.72 (-12.25)	3.07 (- 0.96)	2.95 ± 0.04
	E_2	3.02	2.43 (-19.53)	2.70 (-10.50)	3.05 (+ 0.99)	2.80 ± 0.05
CS 44	E_1	3.02	2.18 (-27.81)	2.55 (-15.56)	2.90 (- 3.97)	2.66 ± 0.04
	E_2	2.78	2.63 (- 5.39)	2.94 (+ 5.75)	2.77 (- 0.34)	2.78 ± 0.05
CS 46	E_1	2.65	2.70 (+ 1.88)	2.65 (0)	2.45 (- 7.54)	2.61 ± 0.04
	E_2	2.97	3.55 (+19.52)	3.27 (+10.10)	3.22 (+ 8.41)	3.25 ± 0.05
CS 49	E_1	1.37	1.58 (+15.32)	1.65 (+20.43)	1.65 (+20.43)	1.56 ± 0.04
	E_2	1.67	1.85 (+10.77)	1.68 (+ 0.59)	1.71 (+ 2.39)	1.73 ± 0.05
CS 50	E_1	1.47	1.48 (+ 0.68)	1.33 (- 9.52)	1.57 (+ 6.80)	1.46 ± 0.04
	E_2	1.43	1.41 (- 1.39)	1.40 (- 2.09)	1.31 (- 8.39)	1.39 ± 0.05
CS 51	E_1	2.90	2.83 (- 2.41)	2.45 (-15.51)	2.58 (-11.03)	2.69 ± 0.04
	E_2	2.58	2.61 (+ 1.16)	2.80 (+ 8.52)	2.90 (+12.40)	2.72 ± 0.05
CS 60	E_1	1.28	1.42 (+10.93)	1.47 (+14.84)	1.45 (+13.28)	1.40 ± 0.04
	E_2	1.52	1.53 (+ 0.65)	1.64 (+ 7.89)	1.53 (+ 0.65)	1.56 ± 0.05
CS 62	E_1	1.42	1.38 (- 2.81)	1.47 (+ 3.52)	1.34 (- 5.63)	1.40 ± 0.04
	E_2	1.64	1.47 (-10.36)	1.42 (-13.41)	1.48 (- 9.75)	1.50 ± 0.05
Mean ± S.Em.	E_1	2.40±0.04	2.35±0.04	2.33±0.04	2.27±0.04	
	E_2	2.44±0.11	2.43±0.11	2.63±0.11	2.59±0.11	

Table 4.3j. Seeds/fruit

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em.
CS 1	E_1	672.33	694.00 (+ 3.22)	582.00 (-13.43)	483.50 (-28.08)	607.96 ± 14.60
	E_2	493.50	447.00 (- 9.42)	505.58 (+ 2.44)	527.33 (+ 6.85)	493.35 ± 17.43
CS 3	E_1	346.17	266.83 (-23.06)	337.67 (- 2.45)	302.17 (-12.71)	313.21 ± 14.60
	E_2	503.17	370.83 (-26.30)	319.33 (-36.53)	344.00 (-31.63)	384.33 ± 17.43
CS 4	E_1	268.50	304.67 (+13.47)	256.00 (- 4.65)	255.83 (- 4.71)	271.25 ± 14.60
	E_2	363.17	364.33 (+ 0.31)	307.17 (-15.41)	354.33 (- 2.43)	347.25 ± 17.43
CS 10	E_1	610.13	633.60 (+ 3.84)	335.99 (-44.93)	519.50 (-14.85)	524.81 ± 14.60
	E_2	412.75	436.00 (+ 5.63)	416.33 (+ 0.86)	482.83 (+16.97)	436.98 ± 17.43
CS 26	E_1	504.97	444.83 (-11.76)	450.83 (-10.57)	419.50 (-16.79)	454.85 ± 14.60
	E_2	537.83	301.89 (-43.86)	382.50 (-28.88)	465.67 (-13.41)	421.97 ± 17.43
CS 27	E_1	218.17	200.83 (- 7.94)	177.00 (-18.87)	168.00 (-22.99)	191.00 ± 14.60
	E_2	137.83	88.17 (-36.02)	94.17 (-31.67)	76.44 (-44.54)	99.15 ± 17.43
CS 28	E_1	131.17	145.67 (+11.05)	128.50 (- 2.03)	124.83 (- 4.83)	132.54 ± 14.60
	E_2	87.83	91.72 (+ 4.42)	91.00 (+ 3.60)	88.00 (+ 0.19)	89.64 ± 17.43
CS 31	E_1	641.33	654.00 (+ 1.97)	682.83 (+ 6.47)	680.00 (+ 6.02)	664.54 ± 14.60
	E_2	418.50	249.00 (-40.50)	150.37 (-64.07)	338.17 (-19.19)	289.01 ± 17.43
CS 35	E_1	520.17	374.67 (-27.97)	421.50 (-18.96)	461.83 (-11.21)	444.54 ± 14.60
	E_2	442.17	391.67 (-11.42)	348.83 (-21.10)	218.33 (-50.62)	350.25 ± 17.43
CS 36	E_1	626.67	623.33 (- 0.53)	538.67 (-14.04)	579.67 (- 7.49)	592.08 ± 14.60
	E_2	529.42	437.00 (-17.45)	510.00 (- 3.66)	400.50 (-24.35)	469.23 ± 17.43

C.D. (p=0.05)	Main plot treatments	E_1	169.44	Sub plot treatments within main plot treatments	E_1	180.97
		E_2	85.08		E_2	216.11
	Sub plot treatments	E_1	90.49	Main plot treatments within sub plot treatments	E_1	179.90
		E_2	108.06		E_2	211.19

Data in parenthesis indicate percentage increase or decrease

(contd.)

Table 4.3j. continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em.
CS 37	E_1	475.50	667.17 (+40.30)	691.00 (+45.32)	644.00 (+35.43)	619.42 ± 14.60
	E_2	468.83	408.00 (-12.97)	424.50 (- 9.45)	479.67 (+ 2.31)	445.25 ± 17.43
CS 38	E_1	681.00	554.61 (-18.55)	572.17 (-15.98)	537.67 (-21.04)	586.36 ± 14.60
	E_2	346.92	371.50 (+ 7.08)	423.00 (+21.93)	548.67 (+58.15)	422.52 ± 17.43
CS 43	E_1	702.33	588.44 (-16.21)	625.17 (-10.98)	600.50 (-14.49)	629.11 ± 14.60
	E_2	384.33	430.67 (+12.05)	368.33 (- 4.16)	315.33 (-17.95)	374.67 ± 17.43
CS 44	E_1	618.83	599.67 (- 3.09)	582.83 (- 5.81)	517.83 (-16.32)	579.79 ± 14.60
	E_2	337.17	326.67 (- 3.11)	458.50 (+35.98)	374.00 (+10.92)	374.08 ± 17.43
CS 46	E_1	535.67	498.67 (- 6.90)	407.00 (-24.02)	467.83 (-12.66)	477.29 ± 14.60
	E_2	471.67	434.75 (- 7.82)	578.33 (+22.61)	431.75 (- 8.46)	479.13 ± 17.43
CS 49	E_1	210.67	190.11 (- 9.75)	144.33 (-31.49)	138.50 (-34.25)	170.90 ± 14.60
	E_2	55.72	62.17 (+11.57)	72.58 (+30.25)	63.33 (+13.65)	63.45 ± 17.43
CS 50	E_1	121.50	105.83 (-12.89)	122.83 (+ 1.09)	77.50 (-36.21)	106.92 ± 14.60
	E_2	96.17	96.92 (+ 0.77)	82.47 (-14.24)	84.00 (-12.65)	89.89 ± 17.43
CS 51	E_1	707.17	566.67 (-19.86)	498.83 (-29.46)	526.83 (-25.50)	574.88 ± 14.60
	E_2	656.00	374.00 (-42.98)	433.78 (-33.87)	472.83 (-27.92)	484.15 ± 17.43
CS 60	E_1	86.11	112.83 (+31.03)	88.00 (+ 2.19)	82.00 (- 4.77)	92.24 ± 14.60
	E_2	80.00	67.58 (-15.52)	62.83 (-21.46)	66.00 (-17.50)	69.10 ± 17.43
CS 62	E_1	179.00	93.89 (-47.54)	122.83 (-31.37)	98.17 (-45.15)	123.47 ± 14.60
	E_2	53.50	77.11 (+44.30)	54.00 (+ 0.93)	62.50 (+16.82)	61.78 ± 17.43
Mean ± S.Em.	E_1	442.83±24.48	416.02±24.48	388.30±24.48	384.28±24.48	
	E_2	343.82±12.29	291.35±12.29	304.18±12.29	309.68±12.29	

Table 4.3k. Fruit yield/plant (kg)

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 1	E_1	2.80	4.50 (+60.71)	2.33 (-16.78)	3.66 (+30.71)	3.32 ± 0.23
	E_2	8.10	10.00 (+23.45)	7.45 (- 8.02)	7.14 (-11.85)	8.20 ± 0.33
CS 3	E_1	5.81	3.27 (-43.71)	5.97 (+ 2.75)	6.70 (+15.31)	5.44 ± 0.23
	E_2	6.79	7.74 (+13.99)	11.28 (+66.12)	7.48 (+10.16)	8.32 ± 0.33
CS 4	E_1	3.28	2.21 (-32.62)	3.71 (+13.10)	3.13 (+ 4.57)	3.09 ± 0.23
	E_2	7.71	3.46 (-55.12)	8.17 (+ 5.96)	5.49 (-29.31)	6.20 ± 0.33
CS 10	E_1	5.74	5.48 (- 4.52)	4.63 (-19.33)	5.12 (-10.80)	5.24 ± 0.23
	E_2	7.68	8.87 (+15.49)	12.48 (+62.50)	9.93 (+29.29)	9.74 ± 0.33
CS 26	E_1	6.70	3.85 (-42.53)	5.32 (-20.59)	4.44 (-33.73)	5.08 ± 0.23
	E_2	9.80	7.02 (-28.36)	12.54 (+27.95)	13.62 (+38.97)	10.75 ± 0.33
CS 27	E_1	1.37	3.38 (+146.71)	5.79 (+322.62)	3.51 (+156.20)	3.51 ± 0.23
	E_2	4.42	4.18 (- 5.42)	6.64 (+ 50.22)	7.99 (+ 80.76)	5.81 ± 0.33
CS 28	E_1	4.28	4.09 (- 4.43)	3.94 (- 7.94)	2.38 (- 44.39)	3.67 ± 0.23
	E_2	4.79	5.00 (+ 4.38)	6.05 (+26.30)	6.05 (+ 26.30)	5.93 ± 0.33
CS 31	E_1	5.17	5.20 (+ 0.58)	4.00 (-22.63)	1.87 (- 63.82)	4.06 ± 0.23
	E_2	9.41	8.57 (- 8.92)	11.02 (+17.10)	9.38 (- 0.31)	9.60 ± 0.33
CS 35	E_1	7.08	4.44 (-37.28)	4.33 (-38.84)	5.00 (- 29.37)	5.21 ± 0.23
	E_2	6.61	7.10 (+ 7.41)	5.94 (-10.13)	4.21 (- 36.30)	5.96 ± 0.33
CS 36	E_1	5.25	5.73 (+ 9.14)	6.48 (+23.42)	5.47 (+ 4.19)	5.73 ± 0.23
	E_2	6.63	6.91 (+ 4.22)	8.88 (+33.93)	10.41 (+ 57.01)	8.18 ± 0.33

C.D. (p=0.05)	Main plot treatments	E_1 E_2	1.59	Sub plot treatments within main plot treatments	E_1	2.58
	Sub plot treatments	E_1	1.44	Main plot treatments within sub plot treatments	E_1	2.84

Data in parenthesis indicate percentage increase or decrease

(contd.)

Table 4.3k. continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 37	E_1	5.10	6.31 (+23.72)	6.81 (+33.52)	6.33 (+24.11)	6.14 ± 0.23
	E_2	4.52	8.01 (+77.21)	7.38 (+63.27)	7.09 (+56.85)	6.75 ± 0.33
CS 38	E_1	5.56	4.23 (-23.92)	2.18 (-60.79)	3.74 (-32.73)	3.77 ± 0.23
	E_2	5.64	8.69 (+54.07)	8.78 (+55.67)	7.01 (+24.29)	7.53 ± 0.33
CS 43	E_1	7.21	4.21 (-41.60)	8.10 (+12.34)	2.85 (-60.47)	5.60 ± 0.23
	E_2	8.98	8.43 (- 6.12)	9.82 (+ 9.35)	8.81 (- 1.89)	9.01 ± 0.33
CS 44	E_1	4.67	6.58 (+40.89)	3.53 (-24.41)	5.24 (+12.20)	5.01 ± 0.23
	E_2	8.53	8.85 (+ 3.75)	7.59 (-11.01)	8.60 (+ 0.82)	8.39 ± 0.33
CS 46	E_1	5.06	3.11 (-38.53)	2.94 (-41.89)	3.56 (-29.64)	3.67 ± 0.23
	E_2	6.64	6.81 (+ 2.50)	6.40 (- 3.61)	6.93 (+ 4.36)	6.69 ± 0.33
CS 49	E_1	1.97	2.92 (+48.22)	3.08 (+56.34)	3.65 (+85.27)	2.91 ± 0.23
	E_2	4.09	3.40 (-16.87)	5.43 (+32.76)	3.62 (-11.49)	4.14 ± 0.33
CS 50	E_1	2.97	5.53 (+86.19)	3.70 (+24.57)	2.84 (- 4.37)	3.76 ± 0.23
	E_2	1.65	3.06 (+85.45)	5.46 (+230.90)	4.70 (+184.84)	3.72 ± 0.33
CS 51	E_1	7.41	4.83 (-34.81)	3.65 (-50.74)	3.71 (-49.93)	4.90 ± 0.23
	E_2	7.85	7.58 (- 3.43)	7.72 (- 1.65)	6.52 (-16.94)	7.42 ± 0.33
CS 60	E_1	2.92	2.95 (+ 1.02)	3.13 (+ 7.19)	2.27 (-22.26)	2.82 ± 0.23
	E_2	4.16	4.47 (+ 7.45)	3.66 (-12.01)	2.70 (-35.09)	3.74 ± 0.33
CS 62	E_1	2.20	3.92 (+78.18)	3.55 (+61.36)	1.84 (+16.36)	2.88 ± 0.23
	E_2	2.62	3.41 (+30.15)	4.85 (+85.11)	3.56 (+35.87)	3.85 ± 0.33
Mean ± S.Em	E_1	4.63±0.23	4.34±0.23	4.36±0.23	3.87±0.23	
	E_2	6.33±1.26	6.58±1.26	7.87±1.26	7.06±1.26	

the second season. No genotypes with significant negative response was observed in the entire study. Three primary branches in CS 60 increased to 4.17 (ethephon 100 ppm), 4.63 (ethephon 200 ppm) and to 5.17 (ethephon 300 ppm) during the first season. This increased trend was observed during the second season also.

Response to ethephon application was found highly significant (p=0.01) and the response curve was significantly linear (table 4.4a). Ninetynine per cent of the variation in primary branches/plant could be explained through linear effect of increased levels of ethephon.

3. Nodes to first male flower

The line CS 4 had only three nodes to first male flower while CS 50 had 4.3 nodes to first male flower during the first season in control (table 4.3c). Nodes to first male flower increased with increased levels of ethephon application during both the seasons. Nodes to first male flower being a measure of early appearance of male flowers reflect changes in the sex behaviour due to ethephon application. Delay in male flower appearance due to ethephon application was observed. No genotype was observed where first male flower appeared at lower nodes than that of control due to different levels of ethephon application.

Table 4.4a. Mean performance (a), regression coefficients (b,c) and coefficient of determination

Characters		a		b	c	R^2	
		L	Q			L	Q
Length of main vine	E_1	234.51	224.94	-6.25	1.91	0.68	0.89
	E_2	319.62	310.47	-10.06	1.81	0.87	0.96
Primary branches/ plant	E_1	6.26	6.34	0.38	-0.02	0.99**	0.99
	E_2	6.72	7.17	0.42	-0.09	0.87	0.99
Nodes to first male flower	E_1	4.42	4.74	0.21	-0.63	0.77	0.99
	E_2	4.30	4.50	0.15	-0.04	0.79	0.96
Nodes to first female flower	E_1	5.23	4.91	-0.19	0.06	0.70	0.97
	E_2	6.16	6.21	-0.15	-0.02	0.96*	0.99
Nodes to first fruit	E_1	5.67	5.41	-0.17	0.05	0.74	0.96
	E_2	6.59	6.59	-0.11	-0.001	0.99**	0.99
Flesh thickness	E_1	23.93	24.08	-0.78	-0.03	0.94*	0.94
Seeds/fruit	E_1	407.86	400.74	-10.17	1.42	0.93*	0.97
	E_2	312.26	294.16	-4.48	3.62	0.15	0.46
Fruit yield/ plant	E_1	4.29	4.36	-0.10	-0.01	0.08	0.13

* p = 0.05

** p = 0.01

Table 4.4b. Mean performance (a), regression coefficients (b,c) and coefficient of determination (R^2) of 20 *Cucumis* genotypes for the character per cent of female flowers for first 10 nodes

Genotypes	Trial I						Trial II					
	a		b	c	R^2		a		b	c	R^2	
	L	Q			L	Q	L	Q			L	Q
CS 1	11.31	9.86	1.73	0.29	0.69	0.75	11.03	10.29	1.19	0.15	0.64	0.67
CS 3	7.92	7.52	0.64	0.08	0.64	0.67	7.24	7.11	0.07	0.26	0.03	0.50
CS 4	10.96	9.70	1.03	0.25	0.68	0.79	7.69	8.37	0.09	-0.14	0.07	0.60
CS 10	10.54	9.30	1.28	0.25	0.76	0.85	8.27	7.19	0.81	0.22	0.77	0.95
CS 26	10.33	9.44	1.17	0.18	0.72	0.77	8.40	8.42	0.60	-0.005	0.45	0.45
CS 27	23.46	19.47	4.98	1.80	0.52	0.74	32.30	30.88	6.10	0.28	0.87	0.87
CS 28	15.81	18.70	1.32	-0.58	0.48	0.78	20.06	23.37	0.76	-0.66	0.18	0.63
CS 31	8.01	8.00	0.86	0.001	0.90	0.90	7.40	6.06	0.54	0.27	0.50	0.90
CS 35	8.41	8.67	0.57	-0.05	0.58	0.60	6.56	6.60	0.003	-0.007	0.0003	0.007
CS 36	8.66	10.30	0.40	-0.33	0.16	0.51	6.60	6.75	0.03	0.03	0.01	0.03
CS 37	8.35	9.41	-0.22	-0.21	0.15	0.63	6.92	7.71	-0.10	-0.16	0.03	0.26
CS 38	9.09	10.21	0.66	-0.22	0.47	0.65	8.74	9.70	0.37	-0.19	0.10	0.19
CS 43	7.98	7.58	0.03	0.08	0.51	0.54	8.43	9.66	0.02	-0.25	0.001	0.33
CS 44	8.03	8.00	-0.07	0.005	0.01	0.01	7.58	7.64	0.22	-0.01	0.12	0.12
CS 46	7.28	6.46	0.46	0.17	0.48	0.68	7.75	8.36	0.34	-0.12	0.34	0.48
CS 49	18.74	17.25	3.69	0.30	0.83	0.84	23.42	22.45	0.05	0.20	0.002	0.09
CS 50	13.62	13.03	1.26	0.12	0.93*	0.95	13.83	14.61	0.95	-0.16	0.58	0.63
CS 51	9.35	10.11	0.25	-0.15	0.04	0.10	8.41	9.25	0.47	-0.17	0.45	0.63
CS 60	22.82	31.00	1.97	-1.64	0.17	0.56	28.33	38.89	2.34	-2.11	0.24	0.86
CS 62	14.40	16.40	1.19	-0.40	0.52	0.71	17.20	16.64	2.67	0.11	0.81	0.82

* $P < 0.05$

Table 4.4c. Mean performance (a), regression coefficients (b,c) and coefficient of determination (R^2) of 20 *Cucumis* genotypes for the character per cent of female flowers for first 20 nodes

Geno-types	Trial I						Trial II					
	a		b	c	R^2		a		b	c	R^2	
	L	Q			L	Q	L	Q			L	Q
CS 1	12.81	12.36	0.90	0.09	0.52	0.54	13.22	13.24	0.42	-0.005	0.29	0.29
CS 3	12.32	9.55	0.49	0.55	0.12	0.61	10.77	10.65	-0.02	0.02	0.001	0.01
CS 4	11.83	11.26	0.23	0.12	0.11	0.20	10.11	10.70	-0.19	-0.12	0.14	0.30
CS 10	14.24	15.10	1.05	-0.17	0.46	0.51	10.49	9.79	0.70	0.14	0.72	0.81
CS 26	13.20	13.15	1.14	0.12	0.46	0.46	11.48	11.17	0.63	0.06	0.51	0.53
CS 27	27.70	24.44	2.50	0.65	0.56	0.68	29.20	28.49	4.19	0.14	0.90	0.91
CS 28	20.11	24.29	0.89	-0.84	0.17	0.66	21.24	23.89	0.70	-0.53	0.18	0.53
CS 31	10.49	10.13	0.45	0.07	0.24	0.25	10.08	9.41	0.31	0.14	0.54	0.87
CS 35	11.48	11.40	0.34	0.02	0.08	0.08	10.12	10.24	-0.24	-0.25	0.26	0.26
CS 36	11.53	13.39	0.07	-0.37	0.01	0.48	9.34	9.44	0.24	-0.19	0.33	0.33
CS 37	9.76	10.89	0.11	0.23	0.03	0.46	8.49	8.58	0.34	-0.02	0.16	0.16
CS 38	10.54	12.50	0.41	-0.39	0.18	0.71	9.83	10.11	0.30	-0.06	0.10	0.11
CS 43	10.22	11.14	0.20	-0.18	0.11	0.40	11.24	12.82	-0.02	-0.32	0.02	0.31
CS 44	11.42	11.50	-0.28	-0.02	0.24	0.25	10.58	10.80	0.24	-0.04	0.25	0.28
CS 46	7.96	7.89	0.35	0.02	0.40	0.40	10.94	11.17	0.35	-0.05	0.38	0.40
CS 49	18.52	17.89	1.76	0.13	0.74	0.75	22.20	22.36	-0.23	-0.03	0.08	0.08
CS 50	16.31	16.66	1.11	0.07	0.68	0.69	15.09	15.57	0.74	-0.10	0.69	0.73
CS 51	12.74	13.20	0.64	-0.09	0.16	0.17	10.73	11.68	0.24	-0.19	0.21	0.62
CS 60	23.67	26.89	1.12	0.65	0.24	0.50	26.08	31.27	1.68	-1.04	0.35	0.78
CS 62	16.12	18.04	-0.23	-0.38	0.05	0.54	17.96	17.38	1.21	0.12	0.64	0.66

Table 4.4d. Mean performance (a), regression coefficients (b, c) and coefficient of determination (R^2) of 20 *Cucumis* genotypes for the character per cent of female flowers for first 30 nodes

Genotypes	Trial I						Trial II					
	a		b	c	R^2		a		b	c	R^2	
	L	Q			L	Q	L	Q			L	Q
CS 1	12.90	12.25	0.27	0.13	0.08	0.14	11.91	12.47	-0.001	-0.11	0.02	0.09
CS 3	13.47	9.99	0.20	0.68	0.02	0.62	10.80	10.76	-0.41	0.01	0.34	0.34
CS 4	11.03	11.02	0.12	0.003	0.08	0.08	9.43	10.14	-0.13	-0.14	0.07	0.38
CS 10	13.16	14.47	0.74	-0.26	0.44	0.62	10.07	8.89	0.26	0.24	0.10	0.38
CS 26	12.04	12.28	0.74	-0.05	0.49	0.50	9.38	9.12	0.40	0.05	0.52	0.54
CS 27	24.12	24.57	2.01	-0.09	0.65	0.65	22.22	22.19	2.75	0.01	0.87	0.87
CS 28	17.89	21.42	0.57	-0.71	0.11	0.66	18.34	19.89	0.63	-0.31	0.33	0.59
CS 31	9.68	9.60	0.41	0.02	0.47	0.48	8.67	8.37	0.20	0.06	0.42	0.54
CS 35	10.80	12.46	0.35	-0.33	0.19	0.74	10.75	10.65	-0.21	0.02	0.26	0.27
CS 36	9.72	11.75	4.08	-0.40	0.002	0.59	9.89	9.73	0.19	0.03	0.10	0.11
CS 37	8.68	9.65	0.02	-0.19	0.003	0.50	8.14	9.08	0.18	-0.19	0.06	0.27
CS 38	9.26	10.94	0.25	-0.34	0.08	0.54	9.64	10.75	0.26	-0.26	0.11	0.44
CS 43	10.24	11.27	-0.16	0.21	0.08	0.47	10.32	11.14	0.11	-0.16	0.04	0.30
CS 44	9.60	9.63	-0.23	- 0.01	0.37	0.38	8.85	9.21	0.13	-0.07	0.12	0.26
CS 46	7.53	7.45	0.05	0.02	0.03	0.03	9.42	9.56	0.28	-0.03	0.52	0.54
CS 49	16.60	15.35	0.88	0.25	0.57	0.71	20.38	20.31	-0.50	0.01	0.56	0.56
CS 50	15.11	15.29	0.98	-0.04	0.69	0.69	14.57	14.59	0.42	-0.005	0.67	0.67
CS 51	10.82	10.91	0.09		0.01	0.02	10.83	11.54	0.24	-0.14	0.16	0.33
CS 60	19.04	20.38	0.58	-0.27	0.08	0.14	22.03	25.89	1.13	-0.77	0.32	0.81
CS 62	15.41	16.08	-0.30	-0.13	0.19	0.31	15.64	14.77	0.63	0.17	0.45	0.56

Table 4.4e. Mean performance (a), regression coefficients (b,c) and coefficient of determination (R^2) of 20 *Cucumis* genotypes for the character fruits/plant observed in October-January 1981-82 season

Genotypes	a		b	c	R^2	
	L	[illegible]			L	[illegible]
CS 1	2.67	2.77	0.10	-0.02	0.40	0.46
CS 3	3.87	2.87	0.18	0.20	0.16	0.82
CS 4	2.17	2.27	-0.0005	-0.02	0.00003	0.16
CS 10	3.54	2.99	-0.01	0.11	0.001	0.51
CS 26	3.88	3.08	-0.18	0.16	0.25	0.86
CS 27	6.46	6.11	1.28	0.07	0.99	0.99
CS 28	4.21	4.76	-0.11	-0.11	0.23	0.99
CS 31	3.04	3.84	-0.19	-0.16	0.32	0.99
CS 35	3.08	2.58	0.12	0.10	0.20	0.67
CS 36	3.67	4.02	-0.05	-0.07	0.05	0.40
CS 37	3.42	3.72	0.10	-0.06	0.42	0.94
CS 38	2.54	1.77	-0.22	0.16	0.39	0.99
CS 43	4.08	4.60	-0.22	-0.10	0.14	0.23
CS 44	3.83	4.17	-0.07	-0.07	0.022	0.093
CS 46	3.13	2.87	-0.08	0.05	0.18	0.45
CS 49	4.79	4.94	0.14	-0.03	0.69	0.79
CS 50	5.79	6.47	-0.24	-0.14	0.42	0.85
CS 51	3.38	2.91	-0.24	0.09	0.67	0.99
CS 60	4.42	5.14	-0.02	-0.15	0.003	0.83
CS 62	5.08	5.28	0.24	-0.04	0.22	0.24

The linear and quadratic equations did not explain the response of Cucumis genotypes to ethephon application for nodes to first male flower (table 4.4a).

4. Nodes to first female flower

Nodes to first female flower being a measure of early appearance of female flowers by the application of ethephon was observed. The response was significantly positive in 6 genotypes (ethephon 100 ppm), 9 genotypes (ethephon 200 ppm) and 7 genotypes (ethephon 300 ppm) in the first season (table 4.3d). No genotype showed a significant negative response (higher node number) in both the seasons. The line CS 27 had 3.33 nodes (ethephon 0 ppm), 3.00 nodes (ethephon 100 ppm), 3.00 nodes (ethephon 200 ppm) and 3.17 nodes (ethephon 300 ppm) for the appearance of first female flower in the first season. Decrease in node number to first female flower due to increased doses of ethephon was similarly observed in the second season.

Response to ethephon application was found highly significant (p=0.05) and the response curve was significantly linear (table 4.4a).

5. Nodes to first fruit

The lines CS 27 and CS 36 had only 5.67 nodes to first fruit while the line CS 3 had 7.5 nodes to first fruit in the first season (table 4.3e). In the second season, the line CS 27 had only 5 nodes to first fruit while the line CS 4 had 9.5 nodes to first fruit. There was a tendency for appearance of first fruit at lower nodes with the application of ethephon. In the line CS 27, the nodes to first fruit was 5.67 (ethephon 0 ppm), 3.17 (ethephon 100 ppm), 3.17 (ethephon 200 ppm) and 3.33 (ethephon 300 ppm). The response was observed significantly positive in 2 genotypes (ethephon 100 ppm), 4 genotypes (ethephon 200 ppm) and 4 genotypes (ethephon 300 ppm) during the first season. No genotype excepting CS 35 (ethephon 200 ppm) with significant negative responsive (higher node number) was observed in the entire study.

Response to ethephon application was found highly significant (p=0.01) and the response curve was linear (table 4.4a).

6. Fruit length

There was no significant effect of different levels of ethephon on fruit length. But the genotypes differed significantly with respect to first length (table 4.3f). The line CS 27 had a fruit length of 19.43 cm while the line CS 50 had a fruit length of 35.99 cm during the first season.

7. Fruit weight

The genotypes differed significantly with respect to fruit weight. The range was from 0.50 kg (CS 50) to 2.13 kg

(CS 43) during first crop and from 0.46 kg (CS 50) to 2.08 kg (CS 37) during second season in control (table 4.3g). There was no significant effect in fruit weight due to ethephon application.

8. Volume of fruit

The genotypes differed significantly with respect to fruit volume. Fruit volume ranged from 436 ml (CS 49) to 2024 ml (CS 43) during first season and from 426.38 ml (CS 27) to 1994.67 ml (CS 37) during second season in control (table 4.3h). The different levels of ethephon did not affect significantly the fruit volume (table 4.3h).

9. Flesh thickness

The line CS 60 had only a flesh thickness of 1.28 cm while the line CS 1 had a flesh thickness of 3.38 cm during the first season in control (table 4.3i). In CS 44, the flesh thickness was 3.02 cm (ethephon 0 ppm), 2.18 cm (ethephon 100 ppm), 2.55 cm (ethephon 200 ppm) and 2.90 cm (ethephon 300 ppm). During second season, there was no significant effect of different levels of ethephon on flesh thickness.

The response to ethephon application was found significant ($p=0.05$) and the response curve was linear (table 4.4a).

10. Seeds/fruit

The line CS 60 had only 86 seeds/fruit during the first season while the line CS 51 had 707 seeds/fruit (table 4.3j). There was a significant increase in seeds/fruit in CS 37 (ethephon 100 ppm and 200 ppm) while there was significant reduction in seeds/fruit in CS 10 and CS 51 (ethephon 200 ppm) and in CS 1 and CS 51 (ethephon 300 ppm) during the first season. During second season, there was significant reduction in seeds/fruit in CS 26 and CS 51 (ethephon 100 ppm), CS 31 and CS 51 (ethephon 200 ppm) and CS 35 (ethephon 300 ppm).

Response of Cucumis genotypes to ethephon sprays for seeds/fruit was studied. Response to ethephon application was found significant (p=0.05) and the response curve was significantly linear (table 4.4a).

11. Fruit yield/plant

The line CS 27 yielded 1.37 kg while the line CS 51 gave a yield of 7.41 kg during first season in control (table 4.1k). There was significant increase in yield by application of ethephon (200 ppm) in CS 27. The increase in yield in CS 27 was 326.62% (5.79 kg). The yield of CS 27 in unsprayed control was 1.37 kg/plant. There was significant reduction in yield in CS 26 (3.85 kg) and CS 43 (4.21 kg) when sprayed with ethephon 100 ppm and in CS 38 (2.18 kg) and CS 51 (3.65 kg) when sprayed with ethephon 200 ppm. The yield reduction was significant in CS 31 (1.87 kg), CS 43 (2.85 kg) and CS 51 (3.71 kg) when sprayed with ethephon 300 ppm during the first season. During the second season, there was significant difference among the genotypes with respect to yield, but there was no significant effect of different levels of ethephon on fruit yield/plant.

The linear and quadratic equations did not explain the response of Cucumis genotypes to ethephon application for fruit yield (table 4.4a).

B. Differential response of Cucumis genotypes to ethephon application

1. Per cent of female flowers for the first 10 nodes

The lines CS 1, CS 28, CS 51 and CS 60 showed a significant positive response to ethephon (100 ppm) resulting in increased per cent of female flowers for the first 10 nodes during the first season. Eight lines (CS 10, CS 28, CS 31, CS 36, CS 38, CS 49, CS 60 and CS 62) showed significant positive response to ethephon (200 ppm) while 14 lines (CS 1, CS 3, CS 4, CS 10, CS 26, CS 27, CS 28, CS 31, CS 35, CS 43, CS 49, CS 50, CS 60 and CS 62) showed significant positive response to ethephon (300 ppm) during the first season (table 4.5a).

Table 4.5. Effect of ethephon on yield and its component characters in 20 *cucumis* genotypes

a. Per cent of female flowers for first 10 nodes

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 1	E_1	6.60 (14.88)	10.46 (+58.48) (18.87)	9.70 (+46.97) (18.14)	18.26 (+176.67) (25.29)	(19.30 ± 0.26)
	E_2	7.38 (15.76)	11.05 (+49.73) (19.41)	9.71 (+31.57) (18.51)	15.81 (+114.23) (23.43)	(19.19 ± 0.20)
CS 3	E_1	6.21 (14.43)	6.94 (+11.76) (15.28)	8.24 (+32.69) (16.68)	10.14 (+63.28) (18.57)	(16.24 ± 0.26)
	E_2	7.37 (15.75)	6.39 (-13.30) (14.64)	7.87 (+ 6.78) (16.29)	7.30 (- 0.95) (15.68)	(15.59 ± 0.20)
CS 4	E_1	8.99 (17.45)	8.02 (-10.79) (16.45)	11.82 (+31.48) (20.11)	13.82 (+53.73) (21.82)	(18.96 ± 0.26)
	E_2	6.98 (15.32)	7.87 (+12.75) (16.29)	8.58 (+22.92) (17.03)	7.32 (+ 4.87) (15.70)	(16.09 ± 0.20)
CS 10	E_1	8.02 (16.45)	7.25 (- 9.60) (15.62)	11.81 (+47.26) (20.10)	15.00 (+87.03) (22.79)	(18.74 ± 0.26)
	E_2	6.68 (14.98)	6.68 (0) (14.98)	8.11 (+21.41) (16.55)	11.57 (+73.20) (19.89)	(16.60 ± 0.20)
CS 26	E_1	7.83 (16.25)	7.59 (- 3.07) (15.99)	11.56 (+47.64) (19.87)	14.23 (+81.74) (22.16)	(18.57 ± 0.26)
	E_2	6.68 (14.98)	7.50 (+12.28) (15.90)	9.20 (+37.72) (17.66)	10.00 (+49.70) (18.44)	(16.75 ± 0.20)

C.D. (p=0.05)	Main plot treatments	E_1 4.21 E_2 1.97	Sub plot treatments within main plot treatments	E_1 3.19 E_2 2.41
	Sub plot treatments	E_1 1.60 E_2 1.20	Main plot treatments within sub plot treatments	E_1 3.63 E_2 2.50

Data in parenthesis on the right side indicate percentage increase or decrease.
Data in parenthesis given below indicate transformed values

(contd.)

Table 4.5a. continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 27	E_1	19.69 (26.35)	19.36 (- 1.68) (26.11)	(22.97 (+16.66) (28.63)	51.54 (+161.76) (45.88)	(31.74 ± 0.26)
	E_2	16.62 (24.06)	20.55 (+23.65) (26.96)	41.70 (+150.90) (40.22)	50.23 (+202.23) (45.13)	(34.09 ± 0.20)
CS 28	E_1	9.32 (17.78)	17.26 (+85.19) (24.55)	18.91 (+102.90) (25.77)	17.56 (+88.41) (24.77)	(23.22 ± 0.26)
	E_2	14.32 (22.24)	24.32 (+69.83) (29.55)	21.03 (+46.86) (27.29)	20.47 (+42.95) (26.90)	(26.49 ± 0.20)
CS 31	E_1	5.61 (13.71)	6.60 (+17.65) (14.89)	9.39 (+67.38) (17.85)	10.39 (+85.20) (18.80)	(16.31 ± 0.26)
	E_2	6.68 (14.98)	6.26 (- 6.29) (14.49)	6.39 (- 4.34) (14.64)	10.26 (+53.59) (18.68)	(15.70 ± 0.20)
CS 35	E_1	6.15 (14.36)	9.01 (+46.50) (17.46)	8.17 (+32.85) (16.61)	10.23 (+66.34) (18.65)	(16.77 ± 0.26)
	E_2	6.53 (14.80)	6.55 (+ 0.31) (14.83)	6.61 (+ 1.23) (14.90)	6.53 (0) (14.80)	(14.83 ± 0.20)
CS 36	E_1	6.65 (14.94)	7.95 (+19.55) (16.38)	11.92 (+79.25) (20.19)	8.02 (+20.60) (16.45)	(16.99 ± 0.26)
	E_2	6.26 (14.49)	7.00 (+11.82) (15.34)	6.39 (+ 2.08) (14.64)	6.68 (+ 6.71) (14.98)	(14.86 ± 0.20)
CS 37	E_1	8.08 (16.52)	9.55 (+18.19) (18.00)	8.80 (+ 8.91) (17.26)	6.91 (-14.48) (15.24)	(16.75 ± 0.26)
	E_2	6.30 (14.54)	8.32 (+32.06) (16.77)	6.68 (+ 6.03) (14.98)	6.25 (- 0.79) (14.48)	(15.19 ± 0.20)
CS 38	E_1	6.46 (14.72)	8.61 (+32.28) (17.06)	11.29 (+74.77) (19.63)	9.89 (+53.10) (18.33)	(17.44 ± 0.26)
	E_2	6.90 (15.23)	8.75 (+26.81) (17.21)	9.91 (+43.62) (18.35)	8.86 (+28.41) (17.32)	(17.03 ± 0.20)
CS 43	E_1	6.18 (14.40)	7.70 (+24.60) (16.11)	7.58 (+22.65) (15.98)	10.32 (+66.99) (18.74)	(16.31 ± 0.26)
	E_2	7.25 (15.62)	9.68 (+33.52) (18.12)	9.00 (+24.14) (17.46)	7.61 (+ 4.97) (16.01)	(16.80 ± 0.20)

(contd.)

Table 4.5a. continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 44	E_1	8.06 (16.49)	8.51 (+ 5.58) (16.96)	7.35 (- 8.81) (15.73)	8.01 (- 0.62) (16.45)	(16.41 ± 0.26)
	E_2	7.30 (15.67)	5.94 (-18.63) (14.11)	9.31 (+27.53) (17.76)	7.71 (+ 5.62) (16.12)	(15.92 ± 0.20)
CS 46	E_1	6.67 (14.97)	6.40 (- 5.55) (14.65)	6.83 (+ 2.40) (15.15)	9.36 (+40.33) (17.81)	(15.65 ± 0.26)
	E_2	6.62 (14.91)	6.78 (+ 2.42) (15.10)	9.66 (+46.22) (18.13)	7.90 (+19.34) (16.32)	(16.11 ± 0.20)
CS 49	E_1	9.32 (17.78)	11.77 (+26.29) (20.07)	23.00 (+146.78) (28.66)	30.35 (+225.64) (33.44)	(24.98 ± 0.26)
	E_2	24.53 (29.69)	21.03 (-14.27) (27.29)	24.23 (- 1.22) (29.49)	23.75 (- 3.18) (29.16)	(28.91 ± 0.20)
CS 50	E_1	10.26 (18.68)	12.00 (+16.96) (20.27)	14.29 (+39.28) (22.21)	17.90 (+74.46) (25.03)	(21.55 ± 0.26)
	E_2	9.69 (18.13)	15.52 (+60.17) (23.20)	13.36 (+37.87) (21.44)	16.71 (+72.45) (24.13)	(21.73 ± 0.20)
CS 51	E_1	7.26 (15.63)	11.75 (+61.85) (20.05)	7.93 (+ 9.23) (16.36)	10.11 (+39.26) (18.54)	(17.64 ± 0.26)
	E_2	6.46 (14.72)	8.17 (+26.47) (16.61)	9.90 (+53.25) (18.34)	9.00 (+39.32) (17.46)	(16.78 ± 0.20)
CS 60	E_1	12.03 (20.29)	22.26 (+85.05) (28.15)	35.97 (+199.00) (36.85)	20.48 (+70.24) (26.91)	(28.05 ± 0.26)
	E_2	13.36 (21.44)	32.81 (+145.58) (34.95)	40.60 (+203.89) (39.58)	26.21 (+96.18) (30.80)	(31.69 ± 0.20)
CS 62	E_1	9.76 (18.20)	13.10 (+34.22) (21.22)	18.81 (+92.73) (25.71)	15.81 (+61.99) (23.43)	(22.14 ± 0.26)
	E_2	10.62 (19.02)	11.05 (+ 4.05) (19.41)	22.39 (+110.83) (28.24)	24.63 (+131.92) (29.76)	(24.11 ± 0.20)
Mean ± S.Em	E_1	(16.71±1.22)	(18.70±1.22)	(20.87±1.22)	(22.45±1.22)	
	E_2	(17.32±0.57)	(19.28±0.57)	(21.08±0.57)	(21.26±0.57)	

C.D., Mean and S.Em are calculated from the transformed values.

Table 4.5b. Per cent of female flowers for first 20 nodes

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 1	E_1	10.60 (19.00)	11.09 (+ 4.62) (19.45)	13.61 (+28.40) (21.65)	15.70 (+48.11) (23.34)	(20.86 ± 0.20)
	E_2	11.54 (19.86)	13.90 (+20.45) (21.89)	12.51 (+ 8.41) (20.72)	14.82 (+28.42) (22.64)	(21.28 ± 0.17)
CS 3	E_1	13.30 (21.39)	7.85 (-40.98) (16.27)	12.28 (- 7.67) (20.51)	15.39 (+15.71) (23.10)	(20.32 ± 0.20)
	E_2	11.11 (19.47)	10.01 (- 9.90) (18.44)	11.33 (+ 1.98) (19.67)	10.55 (- 5.04) (18.95)	(19.13 ± 0.17)
CS 4	E_1	11.87 (20.15)	10.17 (-14.32) (18.60)	12.53 (+ 5.56) (20.73)	12.65 (+ 6.57) (20.84)	(20.08 ± 0.20)
	E_2	10.53 (18.93)	9.75 (- 7.41) (18.19)	11.40 (+ 8.26) (19.74)	8.73 (-16.78) (17.18)	(18.51 ± 0.17)
CS 10	E_1	11.15 (19.50)	11.58 (+ 3.86) (19.89)	18.16 (+62.87) (25.22)	15.89 (+42.51) (23.50)	(22.03 ± 0.20)
	E_2	9.08 (17.54)	8.86 (- 2.42) (17.32)	10.98 (+20.93) (19.35)	12.99 (+43.06) (23.12)	(18.83 ± 0.17)
CS 26	E_1	10.56 (18.96)	9.74 (- 7.77) (18.18)	16.31 (+54.45) (23.82)	15.91 (+50.66) (23.51)	(21.12 ± 0.20)
	E_2	9.90 (18.34)	10.39 (+ 4.95) (18.80)	12.03 (+21.52) (20.30)	13.48 (+36.16) (21.54)	(19.74 ± 0.17)
CS 27	E_1	22.93 (28.61)	22.11 (- 3.58) (28.04)	27.93 (+21.94) (31.91)	37.53 (+63.67) (37.78)	(31.59 ± 0.20)
	E_2	17.93 (25.09)	21.80 (+21.58) (27.83)	35.43 (+96.94) (36.53)	41.46 (+130.46) (40.09)	(32.39 ± 0.17

C.D. (p=0.05)	Main plot treatments	E_1 3.06	E_2 1.28	Sub plot treatments within main plot treatments	E_1 2.51	E_2 2.08
	Sub plot treatments	E_1 3.06	E_2 1.04	Main plot treatments within sub plot treatments	E_1 2.79	E_2 2.10

Data in parenthesis on the right side indicate percentage increase or decrease
Data in parenthesis given below indicate transformed values.

(contd.)

Table 4.5b. continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 28	E_1	14.49 (22.37)	21.27 (+46.79) (27.47)	25.49 (+75.91) (30.33)	18.89 (+30.37) (25.84)	(26.50 ± 0.20)
	E_2	16.72 (24.13)	23.44 (+40.19) (28.96)	23.13 (+38.34) (28.75)	21.48 (+28.47) (27.61)	(27.36 ± 0.17)
CS 31	E_1	10.14 (18.56)	7.64 (-24.65) (16.05)	12.76 (+25.84) (20.93)	11.37 (+12.13) (19.70)	(18.31 ± 0.20)
	E_2	9.68 (18.13)	9.28 (- 4.13) (17.74)	9.80 (+ 1.24) (18.24)	11.56 (+19.42) (19.87)	(18.50 ± 0.17)
CS 35	E_1	7.75 (16.16)	11.02 (+42.19) (19.39)	11.74 (+51.48) (20.04)	11.66 (+50.45) (19.97)	(18.89 ± 0.20)
	E_2	10.86 (19.25)	10.02 (- 7.73) (18.46)	10.39 (- 4.33) (18.80)	9.14 (-15.84) (17.60)	(18.53 ± 0.17)
CS 36	E_1	10.39 (18.81)	11.20 (+ 7.80) (19.55)	14.80 (+42.44) (22.63)	9.68 (- 6.83) (18.12)	(19.77 ± 0.20)
	E_2	8.29 (16.74)	9.84 (+18.70) (18.28)	8.97 (+ 8.20) (17.43)	10.23 (+23.40) (18.65)	(17.77 ± 0.17)
CS 37	E_1	9.28 (17.74)	10.42 (+12.28) (18.83)	10.84 (+16.81) (19.22)	8.43 (- 9.16) (16.87)	(18.16 ± 0.20)
	E_2	6.88 (15.21)	9.64 (+40.12) (18.09)	7.32 (+ 6.40) (15.70)	9.95 (+44.62) (18.39)	(16.84 ± 0.17)
CS 38	E_1	8.11 (16.54)	10.57 (+30.33) (18.97)	13.61 (+67.82) (21.65)	9.81 (+20.96) (18.26)	(18.86 ± 0.20)
	E_2	8.61 (17.06)	9.81 (+13.94) (18.25)	10.09 (+17.19) (18.52)	10.45 (+21.49) (18.87)	(18.17 ± 0.17)
CS 43	E_1	8.90 (17.36)	10.72 (+20.45) (19.11)	11.16 (+25.39) (19.52)	10.00 (+12.36) (18.44)	(18.61 ± 0.20)
	E_2	9.84 (18.29)	12.68 (+28.66) (20.84)	12.21 (+24.09) (20.45)	9.95 (+ 0.22) (18.39)	(19.49 ± 0.17)
CS 44	E_1	12.01 (20.27)	12.19 (+ 1.50) (20.44)	10.75 (-10.49) (19.14)	10.66 (-11.24) (19.05)	(19.73 ± 0.20)
	E_2	9.89 (18.33)	9.88 (-0.10) (18.32)	11.60 (+17.29) (19.91)	10.92 (+10.41) (19.29)	(18.96 ± 0.17)

(contd.)

Table 4.58. continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 46	E_1	7.23 (15.60)	6.75 (- 6.84) (15.06)	9.03 (+24.90) (17.49)	8.75 (+21.02) (17.21)	(16.34 ± 0.20)
	E_2	10.11 (18.54)	9.60 (- 5.04) (18.05)	12.64 (+25.02) (20.82)	11.41 (+12.86) (19.74)	(19.29 ± 0.17)
CS 49	E_1	14.19 (22.13)	14.77 (+ 4.09) (22.60)	21.16 (+4[illegible].12) (27.39)	23.78 (+67.58) (29.19)	(25.33 ± 0.20)
	E_2	23.20 (28.79)	21.22 (- 8.53) (27.43)	23.43 (+ 0.99) (28.95)	20.88 (+10.00) (27.19)	(28.09 ± 0.17)
CS 50	E_1	12.57 (20.77)	15.84 (+26.01) (23.45)	17.34 (+37.95) (24.61)	19.37 (+54.10) (16.11)	(23.33 ± 0.20)
	E_2	12.45 (20.66)	14.87 (+19.44) (22.68)	16.05 (+28.92) (23.61)	16.95 (+36.14) (24.31)	(22.82 ± 0.17)
CS 51	E_1	9.96 (18.40)	13.42 (+34.74) (21.49)	12.67 (+27.21) (20.85)	14.28 (+43.37) (22.20)	(20.74 ± 0.20)
	E_2	9.43 (17.88)	10.67 (+13.15) (19.07)	12.28 (+30.22) (20.51)	10.51 (+11.45) (18.92)	(19.10 ± 0.17)
CS 60	E_1	18.27 (25.31)	23.16 (+26.77) (28.77)	29.15 (+59.55) (32.68)	23.78 (+30.16) (29.18)	(28.98 ± 0.20)
	E_2	17.70 (24.88)	26.08 (+47.34) (30.71)	34.36 (+94.12) (35.89)	26.01 (+46.95) (30.67)	(30.54 ± 0.17)
CS 62	E_1	15.13 (22.89)	18.19 (+20.22) (25.24)	17.05 (+12.69) (24.39)	14.00 (- 7.47) (21.97)	(23.62 ± 0.20)
	E_2	15.45 (23.15)	14.22 (- 7.96) (22.15)	20.73 (+34.17) (27.09)	21.36 (+38.25) (27.53)	(24.98 ± 0.17)
Mean ± S.Em	E_1	(2[illegible].03±0.88)	(20.84±0.88)	(23.24±0.88)	(22.71±0.88)	
	E_2	(2[illegible].01±0.37)	(21.08±0.37)	(22.55±0.37)	(22.43±0.37)	

C.V., Mean and S.Em are calculated from the transformed values

Table 4.5c. Per cent of female flowers for first 30 nodes

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 1	E_1	13.19 (21.30)	10.29 (-21.99) (18.71)	14.34 (+ 8.72) (22.25)	13.64 (+ 3.41) (21.67)	(20.98 ± 0.17)
	E_2	11.51 (19.83)	12.07 (+ 4.87) (20.33)	12.52 (+ 8.77) (20.72)	11.37 (- 1.21) (19.71)	(20.15 ± 0.14)
CS 3	E_1	16.27 (23.79)	8.24 (-49.35) (16.68)	13.07 (-19.67) (21.19)	15.97 (- 1.84) (23.55)	(21.30 ± 0.17)
	E_2	11.99 (20.26)	11.30 (- 5.75) (19.64)	10.23 (-14.68) (18.66)	9.56 (-20.27) (18.01)	(19.14 ± 0.14)
CS 4	E_1	10.85 (19.23)	10.36 (- 4.52) (18.78)	11.66 (+ 7.47) (19.97)	11.20 (+ 3.23) (19.55)	(19.38 ± 0.17)
	E_2	9.50 (17.95)	9.28 (- 2.32) (17.73)	10.72 (+12.84) (19.11)	8.20 (-13.68) (16.64)	(17.86 ± 0.14)
CS 10	E_1	10.44 (18.85)	11.80 (+13.03) (20.09)	16.58 (+58.81) (24.03)	13.77 (+31.90) (21.78)	(21.19) ± 0.17)
	E_2	10.39 (18.80)	8.09 (-22.14) (16.53)	10.15 (- 2.31) (18.50)	11.51 (+10.78) (19.84)	(18.44 ± 0.14)
CS 26	E_1	9.93 (18.37)	10.54 (+ 6.14) (18.95)	13.78 (+38.77) (21.79)	13.73 (+38.27) (21.75)	(20.21 ± 0.17)
	E_2	8.35 (16.79)	8.86 (+ 6.11) (17.32)	9.47 (+13.41) (17.92)	10.78 (+29.10) (19.17)	(17.80 ± 0.14)
CS 27	E_1	18.23 (25.28)	20.79 (+14.04) (27.13)	27.99 (+53.54) (31.94)	29.22 (+60.29) (32.72)	(29.27 ± 0.17)
	E_2	14.16 (22.11)	18.33 (+29.60) (25.39)	25.98 (+83.47) (30.64)	30.11 (+112.64) (33.28)	(27.86 ± 0.14)

C.D. (p=0.05)	Main plot treatments	E_1 2.41 E_2 1.21	Sub plot treatments within main plot treatments	E_1 2.16 E_2 1.5[illegible]
	Sub plot treatments	E_1 1.08 E_2 0.95	Main plot treatments within sub plot treatments	E_1 2.35 E_2 1.91

Data in parenthesis on the right side indicate percentage increase or decrease.
Data in parenthesis given below indicate transformed values.

(contd.)

Table 4.5c. continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 28	E_1	13.19	20.48 (+55.27)	20.80 (+57.70)	16.91 (+28.20)	
		(21.29)	(26.91)	(27.14)	(24.28)	(24.90 ± 0.17)
	E_2	14.85	19.93 (+34.21)	19.16 (+29.02)	19.34 (+30.24)	
		(22.66)	(26.52)	(25.96)	(26.09)	(25.31 ± 0.14)
CS 31	E_1	8.78	8.42 (- 4.10)	10.81 (+23.12)	10.68 (+21.64)	
		(17.23)	(16.87)	(19.19)	(19.08)	(18.09 ± 0.17)
	E_2	8.22	8.45 (+ 2.80)	8.39 (+ 2.07)	9.58 (+16.55)	
		(16.66)	(16.90)	(16.84)	(18.03)	(17.10 ± 0.14)
CS 35	E_1	8.42	11.75 (+39.55)	12.48 (+48.22)	10.48 (+24.47)	
		(16.87)	(20.05)	(20.69)	(18.89)	(19.12 ± 0.17)
	E_2	11.51	10.73 (- 6.78)	10.61 (- 7.82)	10.12 (-12.08)	
		(19.83)	(19.12)	(19.01)	(18.55)	(19.13 ± 0.14)
CS 36	E_1	8.52	9.67 (+13.50)	12.99 (+52.46)	7.68 (- 9.86)	
		(16.98)	(18.12)	(21.13)	(16.09)	(18.08 ± 0.17)
	E_2	9.14	10.47 (+14.55)	9.02 (- 1.31)	10.83 (+18.49)	
		(17.60)	(18.88)	(17.48)	(19.22)	(18.29 ± 0.14)
CS 37	E_1	7.92	9.16 (+15.66)	9.70 (+22.47)	7.89 (- 0.38)	
		(16.34)	(17.62)	(18.15)	(16.31)	(17.10 ± 0.17)
	E_2	6.48	9.79 (+51.08)	7.87 (+21.45)	8.31 (+28.24)	
		(14.75)	(18.23)	(16.29)	(16.75)	(16.51 ± 0.14)
CS 38	E_1	7.62	9.05 (+18.77)	12.10 (+58.79)	8.22 (+ 7.87)	
		(16.02)	(17.51)	(20.30)	(16.66)	(17.64 ± 0.17)
	E_2	7.72	10.00 (+29.53)	11.05 (+43.13)	9.11 (+18.01)	
		(16.13)	(18.43)	(19.42)	(17.57)	(17.89 ± 0.14)
CS 43	E_1	10.00	10.86 (+ 8.66)	11.24 (+12.40)	8.79 (-12.10)	
		(18.44)	(19.24)	(19.59)	(17.24)	(18.63 ± 0.17)
	E_2	9.23	11.08 (+20.04)	10.84 (+17.44)	10.05 (+ 8.88)	
		(17.68)	(19.44)	(19.22)	(18.48)	(18.71 ± 0.14)
CS 44	E_1	10.18	10.07 (- 1.08)	9.16 (-10.02)	8.94 (-12.18)	
		(18.61)	(18.51)	(17.62)	(17.40)	(18.03 ± 0.17)
	E_2	8.36	8.48 (+ 1.44)	9.77 (+16.87)	8.76 (+ 4.78)	
		(16.81)	(16.93)	(18.22)	(17.22)	(17.29 ± 0.14)

(contd.)

Table 4.5c. continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 46	E_1	7.47	7.18 (- 3.88)	7.74 (+ 3.61)	7.67 (+ 2.68)	
		(15.86)	(15.55)	(16.15)	(16.08)	(15.91 ± 0.17)
	E_2	8.61	8.85 (+ 2.79)	10.18 (+18.23)	10.02 (+16.38)	
		(17.06)	(17.31)	(18.61)	(18.45)	(17.86 ± 0.14)
CS 49	E_1	15.04	14.35 (- 4.59)	16.82 (+11.84)	20.10 (+33.64)	
		(22.82)	(22.26)	(24.21)	(26.63)	(23.98 ± 0.17)
	E_2	22.15	20.18 (- 8.89)	20.46 (- 7.63)	18.69 (-15.62)	
		(28.08)	(26.70)	(26.89)	(25.62)	(26.82 ± 0.14)
CS 50	E_1	11.91	14.62 (+22.75)	15.88 (+33.33)	17.94 (+50.63)	
		(20.19)	(22.48)	(23.45)	(25.06)	(22.80 ± 0.17)
	E_2	13.27	14.22 (+ 7.16)	14.94 (+12.58)	15.81 (+19.14)	
		(21.36)	(22.16)	(22.74)	(23.43)	(22.42 ± 0.14)
CS 51	E_1	10.22	11.45 (+12.04)	10.29 (+ 0.68)	11.10 (+ 8.62)	
		(18.65)	(19.77)	(18.71)	(19.46)	(19.15 ± 0.17)
	E_2	9.63	10.75 (+11.63)	11.97 (+24.30)	10.86 (+12.77)	
		(18.08)	(19.14)	(20.24)	(19.24)	(19.18 ± 0.14)
CS 60	E_1	16.31	19.17 (+17.54)	20.49 (+25.63)	19.55 (+19.87)	
		(23.82)	(25.96)	(26.91)	(26.24)	(25.73 ± 0.17)
	E_2	16.06	22.46 (+39.85)	27.76 (+72.85)	21.77 (+35.55)	
		(23.62)	(28.29)	(31.79)	(27.81)	(27.88 ± 0.14)
CS 62	E_1	15.59	16.63 (+ 6.67)	15.23 (- 2.31)	14.10 (- 9.5[illegible])	
		(23.26)	(24.06)	(22.97)	(22.06)	(23.09 ± 0.17)
	E_2	14.73	13.50 (- 8.35)	16.35 (+11.00)	17.92 (+21.66)	
		(22.57)	(21.55)	(23.85)	(25.04)	(23.25 ± 0.14)
Mean ± S.Em	E_1	(19.66±0.70)	(20.26±0.70)	(21.87±0.70)	(21.13±0.70)	
	E_2	(19.43±0.35)	(20.33±0.35)	(21.11±0.35)	(20.91±0.15)	

C.V., Mean and S.Em are calculated from the transformed values.

Table 4.5d. Fruits/plant

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em
CS 1	E_1	2.17	3.00 (+38.25)	2.50 (+15.21)	3.00 (+38.25)	2.67 ± 0.18
	E_2	4.50	5.50 (+22.22)	3.50 (-22.27)	2.67 (-40.67)	4.04 ± 0.24
CS 3	E_1	4.33	2.33 (-46.19)	3.83 (-11.55)	5.00 (+15.47)	3.87 ± 0.18
	E_2	4.00	4.00 (0)	4.17 (+ 4.25)	2.67 (-33.25)	3.71 ± 0.24
CS 4	E_1	2.17	2.00 (- 7.83)	2.50 (+15.21)	2.00 (- 7.83)	2.17 ± 0.18
	E_2	4.00	2.33 (-41.75)	3.00 (-25.00)	2.83 (-29.25)	3.04 ± 0.24
CS 10	E_1	3.83	3.67 (- 4.18)	2.50 (-34.73)	4.17 (+ 8.88)	3.54 ± 0.18
	E_2	4.17	4.33 (+ 3.84)	4.50 (+ 7.91)	3.83 (- 8.15)	4.21 ± 0.24
CS 26	E_1	5.17	3.00 (-41.97)	3.50 (-32.30)	3.83 (-25.92)	3.88 ± 0.18
	E_2	6.83	3.67 (-42.27)	5.33 (-21.96)	5.67 (-16.98)	5.38 ± 0.24
CS 27	E_1	2.83	5.17 (+82.69)	7.17 (+153.36)	10.67 (+277.03)	6.46 ± 0.18
	E_2	9.00	8.17 (- 9.22)	9.83 (+ 9.22)	14.50 (+61.11)	10.38 ± 0.24
CS 28	E_1	4.17	4.50 (+ 7.91)	4.83 (+15.83)	3.33 (-20.14)	4.21 ± 0.18
	E_2	10.17	7.83 (-20.01)	8.00 (-21.34)	7.83 (-23.01)	8.46 ± 0.24
CS 31	E_1	3.00	3.83 (+27.67)	3.50 (+16.67)	1.83 (-39.00)	3.04 ± 0.18
	E_2	5.17	4.50 (-12.96)	5.67 (+ 9.67)	4.67 (- 9.67)	5.00 ± 0.24
CS 35	E_1	3.00	3.00 (0)	2.33 (-22.33)	4.00 (+33.33)	3.08 ± 0.18
	E_2	4.00	5.50 (+37.50)	3.83 (- 4.25)	3.00 (-25.00)	4.08 ± 0.24
CS 36	E_1	3.50	3.83 (+ 9.43)	4.33 (+23.57)	3.00 (-14.29)	3.67 ± 0.18
	E_2	5.00	4.00 (-20.00)	3.67 (-26.60)	4.33 (-13.40)	4.25 ± 0.24

C.D. (p=0.05)

Main plot treatments	E_1	2.94	Sub plot treatments within main plot treatments	E_1	2.20
Sub plot treatments	E_1	1.18	Main plot treatments within sub plot treatments	E_1	2.25

Data in parenthesis indicate percentage increase or decrease

(contd.)

Table 4.5d. continued

Genotypes		0 ppm	100 ppm	200 ppm	300 ppm	Mean ± S.Em.
CS 37	E_1	2.83	3.67 (+29.68)	3.67 (+29.68)	3.50 (+23.67)	3.42 ± 0.18
	E_2	2.17	3.33 (+76.50)	3.17 (+46.08)	3.33 (+53.46)	3.13 ± 0.24
CS 38	E_1	3.83	2.17 (-43.34)	1.67 (-56.40)	2.50 (-48.24)	2.54 ± 0.18
	E_2	4.33	5.33 (+23.09)	4.17 (- 3.70)	4.00 (- 7.62)	4.46 ± 0.24
CS 43	E_1	4.83	3.17 (-34.37)	5.83 (+20.70)	2.50 (-48.24)	4.13 ± 0.18
	E_2	5.50	5.00 (- 9.09)	4.17 (-24.18)	4.33 (-21.27)	4.75 ± 0.24
CS 44	E_1	3.67	5.33 (+45.23)	2.50 (-31.88)	3.83 (+ 4.36)	3.83 ± 0.18
	E_2	6.67	5.33 (-20.09)	3.33 (-50.07)	3.50 (-47.53)	4.71 ± 0.24
CS 46	E_1	3.67	2.67 (-27.25)	3.17 (-13.62)	3.00 (-18.26)	3.13 ± 0.18
	E_2	2.83	4.50 (+59.01)	2.67 (- 5.65)	3.50 (+23.67)	3.38 ± 0.24
CS 49	E_1	4.17	5.00 (+19.90)	4.83 (+15.83)	5.17 (+23.98)	4.88 ± 0.18
	E_2	[illegible].83	7.00 (-20.72)	9.67 (+ 9.51)	7.50 (-15.06)	8.25 ± 0.24
CS 50	E_1	5.83	7.00 (+20.07)	5.67 (- 2.74)	4.67 (-19.90)	5.88 ± 0.18
	E_2	3.17	4.83 (+52.37)	8.50 (+168.14)	7.00 (+120.82)	5.88 ± 0.24
CS 51	E_1	4.50	3.17 (-17.78)	2.83 (-37.11)	3.00 (-33.33)	3.38 ± 0.18
	E_2	4.50	4.17 (- 7.33)	3.67 (-18.44)	3.17 (-29.56)	3.88 ± 0.24
CS 60	E_1	4.00	4.67 (+16.75)	5.33 (+33.25)	3.67 (-8.25)	4.33 ± 0.18
	E_2	4.83	6.17 (+27.74)	5.17 (+ 7.04)	3.67 (-24.02)	4.96 ± 0.24
CS 62	E_1	3.83	6.67 (+74.15)	5.67 (+48.04)	4.17 (+ 8.88)	5.08 ± 0.18
	E_2	4.83	5.50 (+13.87)	8.67 (+79.50)	6.67 (+38.10)	6.42 ± 0.24
Mean ± S.Em	E_1	3.77±0.42	3.93±0.42	3.91±0.42	3.83±0.42	
	E_2	5.23±0.78	5.08±0.78	5.23±0.78	4.93±0.78	

Significant positive response to ethephon application resulting in increased per cent of female flowers for the first 10 nodes was observed in 6 genotypes (ethephon 100 ppm), 10 genotypes (ethephon 200 ppm) and 10 genotypes (ethephon 300 ppm) during the second season. No genotype showed significant negative response during both the seasons.

Response of Cucumis genotypes to ethephon sprays for per cent of female flowers for the first 10 nodes were studied. In CS 50, the response was strictly linear. The response of other genotypes could not be explained through linear and quadratic equations (table 4.4b).

2. Per cent of female flowers for the first 20 nodes

There was a significant positive response to ethephon sprays resulting in increased per cent of female flowers observed in 4 genotypes (ethephon 100 ppm), 10 genotypes (ethephon 200 ppm) and 10 genotypes (ethephon 300 ppm) during the first season. Only one genotype (CS 3) showed a significant negative response to ethephon application for per cent of female flowers for the first 20 nodes (table 4.5b). During second season, there was significant positive response to ethephon application resulting in increased per cent of female flowers for the first 20 nodes observed in 5 genotypes (ethephon 100 ppm), 5 genotypes (ethephon 200 ppm) and in 9 genotypes (ethephon 300 ppm).

The linear and quadratic equations did not explain the response of Cucumis genotypes to ethephon application for per cent of female flowers for the first 20 nodes (table 4.4c).

3. Per cent of female flowers for the first 30 nodes

There was significant positive response in two genotypes (ethephon 100 ppm), 9 genotypes (ethephon 200 ppm) and in 7 genotypes (ethephon 300 ppm) for per cent of female flowers for the first 30 nodes while there was significant negative response in two genotypes (ethephon 100 ppm) and one genotype (ethephon 200 ppm) during the first season (table 4.5c). Similarly there was a significant positive response in 5 genotypes (ethephon 100 ppm), 5 genotypes (ethephon 200 ppm) and in 7 genotypes (ethephon 300 ppm) while there was significant negative response in one genotype (ethephon 100 ppm) and in two genotypes (ethephon 300 ppm) during the second season.

Linear and quadratic equations did not explain the response of Cucumis genotypes to ethephon application for per cent of female flowers for the first 30 nodes (table 4.4d).

4. Fruits/plant

In first season, significant interaction was observed between genotypes and levels of ethephon for fruits/plant.

There was significant increase in fruits/plant in two genotypes (ethephon 100 ppm) and in one genotype each (ethephon 200 and 300 ppm). Only one genotype (CS 43) showed significant negative response to ethephon (300 ppm) for fruits/plant (table 4.5d). Levels of ethephon and genotypes x levels of ethephon were not significantly different in second season. Only genotypes differed significantly.

In CS 27, the response was significantly linear ($p=0.01$). In other genotypes, the response could not be explained through linear and quadratic equations (table 4.4e).

General observations were made on effects of ethephon application on fruit shape and plant stature. Parthenocarpic fruits and a solitary case of vivipary were observed in ethephon treated plants. No apparent fruit or plant malformation was observed.

C. Key characteristics for a few of the species of <u>Cucumis</u>

Whitaker (1962) has used presence or absence of prickles on the fruits to distinguish <u>Cucumis melo</u> (non-prickled) from <u>Cucumis sativus</u> (prickled). The present study revealed that all the genotypes named as <u>C. melo</u> (Seshadri, 1962) had orbiculate leaves and nonserrated laminal margins along with blunt laminal tips. The genotypes under <u>C. sativus</u> had triangular ovate leaves, laminal margin serrated and laminal tip pointed.

Discussion

DISCUSSION

Cucumis genotypes essentially consists of cucumbers and melons. Many of the melons are of Indian origin and are in the process of 'evolution' to meet varied human needs. Profuse and luxuriant vegetative growth, male flower dominated sex ratio and poor source-sink relationship have made the oriental melons less productive. A wide gap exists between potential fruit productivity and realised productivity. As pointed out above, the reasons may be genetical, physiological or even of unavailability of scientific crop management practices. Definite attempts have been made in cucumbers to evolve high yielding lines. Studies have also been conducted to work out ideotypes in cucumber to meet varied requirements. Such attempts are rather limited in oriental melons.

Much headway has been made in crop management with the advent and use of growth regulators (Thomas, 1976). Verma and Choudhary (1980) reported effectiveness of ethephon application to increase yield in cucumber (var. Poona Kheera). A comprehensive review of literature revealed the effectiveness of ethephon as a growth regulator to modify and tailor plant behaviour according to specific needs (Iwahori *et al.*, 1969; Lower and Miller, 1969; Borowski, 1972; Lee *et al.*, 1973; Sumpoundlek and Abella, 1974; Varma, 1975; Cantliffe, 1977 and Verma and Choudhary, 1980). Choice of ethephon as an effective growth regulator stems from the easy and ready availability, low cost, easiness in application and non-toxic effects both on plant and in humans.

Response to ethephon application was observed to be affected by crop genotypes, seasons of crop growth, mode and time of application and plant part(s) sprayed. Of course, this would remain as the most important limitation in the advocacy of ethephon as an effective growth regulator. The present study was undertaken to investigate into the possible use of ethephon as a crop management tool especially in oriental melons. Any attempt to check the luxurient vegetative growth, change in sex ratio favouring femaleness and induction of earliness would be highly welcomed. No work seems to have been done in this direction.

The 20 genotypes in the present study consisted of 6 cucumbers (Cucumis sativus, 2n=14), 12 oriental melons (Cucumis melo var. conomon, 2n=24), one rock melon (Cucumis melo, 2n=24) and one snakemelon (Cucumis melo var. flexuosus, 2n=24) depicting a good range of edible Cucumis types. The levels of ethephon were appropriately decided based on previous reports to cause effective and visible changes in crop canopy.

Plant characters chosen for observation were important economic attributes, earliness and its components, vegetative growth and its components, productivity and its components, plant stature and malformations, if any. There was definite decrease in length of main vine due to ethephon application. No genotype was observed with increased vine length due to ethephon application in the entire course of study. This lends to the possible and important use of ethephon to check excessive vegetative growth in Cucumis genotypes as a whole. Primary branches/plant were observed increasing in number with application of the growth regulator. The theoretical possible role of ethephon at specific concentrations to regulate apical dominance is being manifested in this particular observation. The increased trend in primary branches/plant was observed during both the seasons implying effectiveness of the growth regulator to modify primary branches/plant.

Role of ethephon to modify sex expression is confirmed through the observation of delayed male flower appearance in the 20 genotypes studied. Cucurbits in general and Cucumis in particular is known for the appearance of male flowers first and then the female flowers. This particular behaviour is attributed to the low productivity of the crop and the lateness of many varieties. Changing the sex expression in favour of femaleness is an important need and that is what precisely has been achieved in the present study. Female flowers appeared in lower nodes in treated plants as compared to the untreated control. Further this was manifested through appearance of first fruit in the lower nodes. McMurray and Miller (1968), Iwahori et al. (1969), Lower and Miller (1969), Rudich et al. (1969), George (1971), Borowski (1972), Donato and Fiore (1972), Rodriquez and Lambeth (1972), Augustine et al. (1973), Kurata (1973), Lee et al. (1973), Bhandari et al. (1974), Sumpoundlek and Abella (1974), Pogoda (1976), Shannon (1976), Matsubara (1977) and Verma and Choudhary (1980) also reported along the similar lines.

The effect of ethephon on fruit length was not significant over all the genotypes though the genotypes differed significantly for fruit length. Similarly, the effects of ethephon on fruit weight and volume of fruit were not statistically significant. The effect of ethephon on flesh thickness was significant during one season. Ethephon application had significant effect on seeds/fruit resulting in reduced seeds/fruit in treated genotypes. The observation on unaltered fruit weight and volume of fruit in spite of the reduced seed number in ethephon treated Cucumis genotypes is a matter for further study. The observation of parthenocarpy in treated plants is also to be considered in this context.

Effect of ethephon on fruit yield/plant was examined in detail. The effects were significantly different in the first season (October-January, 1981-82) and was observed nonsignificant during the second season (March-May, 1982). Significant increase in yield was observed only in one genotype CS 27. The yield increase was 326.62% (5.79 kg) in the treatment ethephon 200 ppm while in control it was only 1.37 kg. Significant reduction in yield due to ethephon application was also observed. The differential response thus observed was further examined in detail (Table 5.1). The genotypes x ethephon interaction was significant for per cent of female flowers for first 10 nodes, per cent of female flowers for first 20 nodes, per cent of female flowers for first 30 nodes and fruits/plant. This implied interaction between specific genotype and specific ethephon treatment. Such interactions make the applicability of ethephon as a growth regulator to limited uses. Only two groups (positive responsive and no responsive) could be observed for per cent of female flowers for first 10 nodes while the genotypes could be classified into three groups (positive responsive, non responsive and negative-responsive) for per cent of female flowers for the first 20 nodes and per cent of female flowers for the first 30 nodes (Table 5.2).

Table 5.1. Classification of _Cucumis_ genotypes based on response to ethephon application for different characters

Characters		Positive response			No response			Negative response		
		100 ppm	200 ppm	300 ppm	100 ppm	200 ppm	300 ppm	100 ppm	200 ppm	300 ppm
Length of main vine	E_1	0	0	0	17	14	12	3	6	8
	E_2	0	0	0	16	15	12	4	5	8
Primary branches/ plant	E_1	0	8	16	20	12	4	0	0	0
	E_2	18	19	20	2	1	0	0	0	0
Nodes to first male flower	E_1	8	12	10	12	8	10	0	0	0
	E_2	4	3	3	16	17	17	0	0	0
Nodes to first female flower	E_1	6	9	7	14	11	13	0	0	0
	E_2	0	0	4	20	20	16	0	0	0
Nodes to first fruit	E_1	2	4	4	18	15	16	0	1	0
	E_2	0	0	1	20	20	19	0	0	0
Flesh thickness	E_1	0	0	0	19	20	20	1	0	0
	E_2									
Seeds/fruit	E_1	1	1	0	19	17	18	0	2	2
	E_2	0	0	0	18	18	19	2	2	1
Fruit yield/ plant	E_1	0	1	0	18	17	17	2	2	3

Table 5.2. continued

Characters	100 ppm			200 ppm			300 ppm		
	Positive response E_1	No response E_1	Negative response E_1	Positive response E_1	No response E_1	Negative response E_1	Positive response E_1	No response E_1	Negative response E_1
	CS 27	CS 1	-	CS 27	CS 1	-	CS 27	CS 1	CS 43
	CS 62	CS 3			CS 3			CS 3	
		CS 4			CS 4			CS 4	
		CS 10			CS 10			CS 10	
		CS 28			CS 26			CS 26	
		CS 31			CS 28			CS 27	
		CS 35			CS 31			CS 28	
		CS 36			CS 35			CS 31	
Fruits/Plant		CS 37			CS 36			CS 35	
		CS 38			CS 37			CS 36	
		CS 44			CS 38			CS 37	
		CS 46			CS 43			CS 38	
		CS 49			CS 44			CS 44	
		CS 50			CS 46			CS 46	
		CS 51			CS 49			CS 49	
		CS 60			CS 50			CS 50	
					CS 51			CS 51	
					CS 60			CS 60	
					CS 62			CS 62	

The present study could reveal the following definite conclusions. Vegetative characters, length of main vine and primary branches/plant could be altered through ethephon application. Definite change in sex expression favouring femaleness was observed. Constancy in fruit length, fruit weight and fruit volume despite reduction in seed number in ethephon sprayed plants is a matter of considerable interest. Response of Cucumis genotypes to ethephon application for fruit yield/plant depends on genotype and the season of cultivation.

Summary

SUMMARY

The present investigation "The response of 'cucumber' genotypes to ethephon application" was conducted at the Instructional Farm, College of Horticulture, Kerala Agricultural University, Vellanikkara, Trichur during October-January, 1981-82 and March-May, 1982. The experimental materials consisted of 20 <u>Cucumis</u> genotypes.

2. Four levels of ethephon (0, 100, 200 and 300 ppm) were taken as main plot treatments and the genotypes as sub-plot treatments in a split plot design with three replications. Ethephon was sprayed as whole plant sprays at third true leaf stage. Observations were recorded on length of main vine, primary branches/plant, nodes to first male flower, nodes to first female flower, per cent of female flowers for first 10 nodes, per cent of female flowers for first 20 nodes, per cent of female flowers for first 30 nodes, nodes to first fruit, fruit length, fruit weight, fruit volume, flesh thickness, seeds/fruit, fruits/plant and fruit yield/plant from the two trials.

3. The 20 genotypes in both the trials were significantly different for length of main vine, primary branches/ plant, nodes to first male flower, nodes to first female flower, per cent of female flowers for first 10 nodes, per cent of female flowers for first 20 nodes, per cent of female

flowers for first 30 nodes, nodes to first fruit, length of fruit, weight of fruit, volume of fruit, flesh thickness, seeds/fruit, fruits/plant and fruit yield/plant.

4. The four levels of ethephon showed significant differences for length of main vine, primary branches/plant, nodes to first male flower, nodes to first female flower, per cent of female flowers for first 10 nodes, per cent of female flowers for first 20 nodes, per cent of female flowers for first 30 nodes, nodes to first fruit and seeds/fruit in both seasons. The effect of ethephon was significant only during October-January, 1981-82 for flesh thickness and fruit yield/plant.

5. The 20 Cucumis genotypes interacted significantly with the four levels of ethephon whole plant sprays for per cent of female flowers for first 10 nodes, per cent of female flowers for first 20 nodes and per cent of female flowers for first 30 nodes during both the seasons. The genotypes x levels of ethephon interaction for fruits/plant was significant only during the first season.

6. The three levels of ethephon (100, 200 and 300 ppm) caused reduction in the length of main vine, nodes to first female flower and nodes to first fruit in both the seasons. Primary branches/plant, nodes to first male flower, per cent of female flowers for first 10 nodes, per cent of female

flowers for first 20 nodes and per cent of female flowers for first 30 nodes were increased by ethephon application in both the seasons. The effect of ethephon on fruit length, fruit weight and volume of fruit were not significant in both the seasons. Seeds/fruit was found to decrease in two seasons while significant reduction in flesh thickness was recorded during the first season only.

7. During the first season, the application of ethephon (200 ppm) resulted in an increase of 326.62% in yield in CS 27 while there was significant reduction in yield in CS 26 (42.53%) and CS 43 (41.60%) for ethephon 100 ppm, in CS 38 (60.7?%) and CS 51 (50.74%) for ethephon 200 ppm and in CS 31 (63.82%), CS 43 (60.47%) and CS 51 (49.93%) for ethephon 300 ppm.

8. The 20 Cucumis genotypes in the two seasons were classified into positive-responsive, negative-responsive and no responsive groups.

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* Originals not seen

Appendices

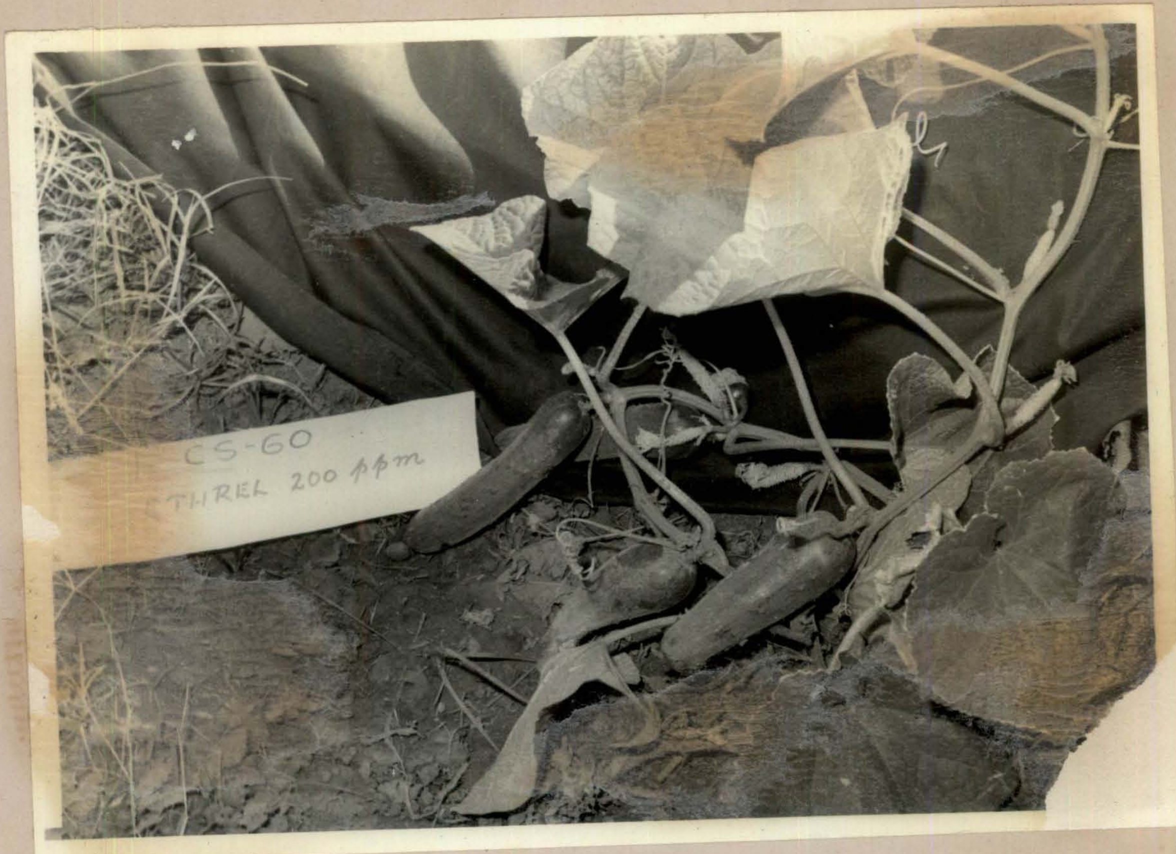

CS-60


CS-60
ETHREL 0 ppm

Plate 1. continued

c. Ethephon 200 ppm

d. Ethephon 300 ppm


CS-60
THREL 200 ppm

RESPONSE OF 'CUCUMBER' GENOTYPES TO ETHEPHON APPLICATION

BY

SADHAN KUMAR, P. G.

ABSTRACT OF THE THESIS

Submitted in partial fulfilment of the requirement for the Degree

Master of Science in Horticulture

Faculty of Agriculture

Kerala Agricultural University

Department of Olericulture

COLLEGE OF HORTICULTURE

Vellanikkara - Trichur

1982

ABSTRACT

Investigations were carried out during two seasons (October-January, 1981-82 and March-May, 1982) to find out the response of 20 *Cucumis* genotypes to four levels of ethephon (0, 100, 200 and 300 ppm) at the Instructional Farm, College of Horticulture, Kerala Agricultural University, Vellanikkara. Ethephon caused significant reduction in length of main vine, nodes to first female flower, nodes to first fruit, seed number and flesh thickness. Nodes to first male flower and primary branches/plant were significantly increased. There was no significant effect of ethephon on fruit length, fruit weight and fruit volume during both the seasons. There was an increase in yield in CS 27 (326.62%) while definite reduction in yield was observed in CS 26 (42.53%), CS 43 (60.47%), CS 38 (60.79%), CS 51 (50.74%) and CS 31 (63.82%) during the first season. During second season there was no significant effect of ethephon on fruit yield.

Effect of ethephon sprays on plant to alter vegetative characters is further confirmed in the present study. Despite reduction in seed number due to ethephon application, no appreciable change was observed for fruit weight, fruit volume and fruit length. This is a matter for worth investigation.

Reduction in vine length and increase in primary branches could be attributed to effects of ethephon to effect the phenomenon of apical dominance. The study proved that response of *Cucumis* genotypes to ethephon is governed by genotype, season of cultivation and concentration of ethephon used.