Chapter 5

CONCLUSIONS

C O N T E N T S

5.1 PROMINENT FEATURES OF THE STUDY

The present study was conducted to find out the response of plants to gaseous air pollutants under field conditions. The findings revealed the following salient features:

A wide range of concentrations and combination of pollutants at different experimental zones were observed.

Presence of different types of pollution sources including autoexhaust, domestic fuels etc. were identified.

Severe damage due to congestion of large number of industries (369) in a small area (5 Km^2) at zone VII & VIII resulted in deterioration of environmental quality through discharge of various pollutants and causing severe damage to the vegetation.

High damage to crop productivity in field conditions was due to short term peak concentration, heterogenity of pollutants and absence of pollution free periods.

Change in meteorological factors (temperature, rainfall, humidity etc.) and season's impact (wind speed, wind direction etc.) accelerated the pollution injury on plants at all the zones.

5.2 FIELD SURVEY OF COMMON CROPS

Field survey conducted for common crops exhibited diversity and variability of responses to different

pollutant mixtures of crop species. It exhibited differential responses to ambient air plant injury which was also dependent on the distance of the pollution source.

In general field survey, various crops viz. potato, tuwer, tobacco, bringal, millet, wheat, paddy and maize were studied. The damage recorded in above crops on the basis of yield parameters was as following:

Potato>bringal>wheat>paddy>tuwer>millets>maize>tobacco

Potato was most sensitive and tobacco was most resistant crop to mixture of pollutants. This damage was also influenced by different environmental factors.

5.3 POTTED PLANT EXPOSURES

The study was conducted to know the impact of only ambient air pollution by keeping uniform cultural practices like soil, water, seed variety, insecticide, fertilizer etc. The crop species selected for the study were wheat, paddy and maize. All the three crops were adversely affected. Foliar visible injury was not much correlated with the concentration of pollutants.

Reduction in biochemical parameters was recorded even in plants showing no visible foliar injury. Chlorophyll, protein,ascorbic acid, soluble sugars were reduced in all the three crop species at different levels of pollution. Maize showed less damage as compared to other two crops. Less reduction in chlorophyll and presence of high amount of ascorbic acid in maize made it tolerant species to mixture of pollutants. Decrease in total soluble sugars showed the altered metabolism of the exposed plants, which resulted in

growth reductions.

Plants exposed to mixture of pollutants resulted in an increased accumulation of pollutants. Higher sulphur and chloride accumulation in foliar tissues of plants recorded positive correlation with their concentration in the ambient air. The plants affected at the reproductive phase had no time to recover, hence resulted in heavy reduction in the grain yield.

The maize crop was recorded as more tolerant species and can be a better scavenger than the other two crop species as discussed earlier.

5.4 ARTIFICIAL FUMIGATION

To know the impact of single pollutant on crop species under simulated conditions, present study was conducted. The damage recorded in simulated conditions was lesser than in the field conditions. This showed that the plants in artificial fumigation chamber get pollution free periods giving more chance for the recovery from the damage. The toxicity of single pollutant is less than combination of pollutants as in the field conditions, because toxicity of one pollutant is modified by the presence of other pollutants and creates a desperate situation.

5.5. MITIGATION OF POLLUTION DAMAGE

Ascorbic acid in field and simulated conditions and urea in field conditions were applied to ameliorate the growth and yield of plants by mitigation the pollution inuury. Among the plants treated with aqueous solution of urea (U_1,U_2, & U_3) and ascorbic acid (A_1,A_2 & A_3) maximum

economic benefit was gained by least concentration of urea. The recovery in plants was linearly correlated with concentration of urea solutions, whereas the ascorbic at higher concentration reduced the recovery in the field conditions. The increase in recovery was recorded upto 0.01M ascorbic acid solution then it showed decrease, Under simulated conditions the ascorbic acid solution 0.005, 0.0075& 0.01M exhibited linear correlation with recovery of plant yield.

The increase in percentage recovery with the two mitigating agents was most pronounced at the maximum growth rate period where the untreated plants were more susceptible at the same period. Thus mitigating agent can be made more useful if it is applied at right age by determining the age of higher sensitivity of plants to pollution.

Table 1 : **Some of the Major Air Pollution Episodes**

Location	Year	Climatic conditions	Sources of pollutant	Pollutants	Effects
Donara U.S.A.	Oct.,1948	Anti-cyclonic weather,temp. inversion	Highly industrialized areas including steel and zinc plants	SO_x with particulates	17 persons died, and few 1000's were affected
Poza Rica Mexico	Nov.,1950	--	Accidental mishandling of natural gas processing machinary	Accidental spillage of H_2S	22 persons died and 320 affected
London U.K.	Dec.,1952	Anti-cyclonic weather,temp. inversion,Fog	House-hold coal burning etc.	SO_x and solid matter in coal smoke	4000 persons died and many many 100's were affected
Bhopal India	Dec.,1984	Winter	Union Carbide	Methyl Isocyanate	More than 2000 persons died and 30,000 affected
Chernobyl U.S.S.R.	Apr.,1986	Strong wind currents	Nuclear plant	Radio-active emissions Volatile cesium iodine 131	31 persons died and 1000's were immediately affected

Table 2: **Visible Symptoms Produced by Different Air Pollutants**
(Based on Heck and Brandt,1977)

Pollutant	Symptoms
SO_2	Initial water soaked appearance resulting in dry and papery bleached patches of ivory or tan colour interveinal chlorosis, tip and marginal burning of leaf.
NO_x	Silvering of interveinal regions of upper surface at higher concentration of pollutant.
PAN	Glazzing or bronzing of lower surface of leaf. Irregular collapsed bending of leaves in grasses.
Cl_2	Tip and marginal burning at low concentration of pollutant, defoliation at higher concentration.
Flourides	Bronzing, nercosis, necrotic tissue surrounded by brown red band.
O_3	Silvering of interveinal regions of lower surface of leaf, stippling and flecking on upper surface.
NH_3	Collapse of tissue without subsequent loss of chlorophyll.
Ethylene	Epinasty, stimulation of lateral buds and roots, failure of blooming, loss of apical dominance. Abscission of leaves, young fruits and flowers by direct exposure or its production in stressed condition (eg. exposure to any other pollutant).

Table 3 : Meteorological Parameters Recorded in the Study Area*

Month	Temperature °C		Wind Speed (Km/h)	Relative Humidity (%)	Rainfall M m
	Minimum	Maximum			
March	18.9	35.4	6.4	41	
April	19.6	38.3	8.2	52	
May	25.9	39.5	8.5	54	
June	28.1	39.0	13.6	62	78.5
July	26.1	35.2	12.4	74	160.76
August	25.4	31.9	9.7	85	237.58
September	24.8	35.0	7.3	71	44.82
October	23.2	36.5	4.1	55	
November	20.3	31.8	6.3	67	
December	12.1	32.0	5.2	60	
January	12.5	30.2	5.4	57	
February	14.0	30.5	6.0	48	

* Data given are monthly averages for the period 1983-1987; obtained from the Meteorological Observatory M.S.University, Baroda.

Table 4 : **Major Industries and Pollutants of the Study Area**

Industry	Products	Pollutants
A. Large Scale Industries:		
1. Oil Refinery	C_1-C_4 Hydrocarbons (gas fuel), Gasolene (Aviation fuel), Naphtha, Heavy Kerosene, Fuel Kerosene	Ethylene and other hydrocarbons. SO_2, CO
2. Petrochemicals complex	Orthoxylene, Mixed Xylene, Paraxylene, Dimethyl tetraphthalate, Indothene, Ethylene dichloride, Polyethylene glycol, ethylene glycol, Ethylene oxide, acrylonitrile, Acrylic fibre, Vinyl chloride, Indovin PVC, Hydrocynic acid & Benzene etc	SO_2, CO_2, CO, NO_x mixture of malodorus, gases including H_2S & hydrocarbons, Cl_2 SPM(carbon)
3. Fertilizer complex	Diamonium phosphate, Amonium sulphate, Urea, Caprolectum, Liquid ammonia	SO_2, NO_x, NH_3, HF, SPM
4. Phenolics	Formaldehyde, Novalac, Phenolic resins	
5. Alkalies and Chemicals Industries	Caustic soda, liquid chlorine, Mercury, Hydrochloric acid, Sodium Cynide	Cl_2, Hg
B. GIDC Estate's (Nandesari) Medium scale Industries		
1. Deepak Nitrite Ltd	Sodium nitrite, Nitric acid etc.	NO_x
2. Ashok Organic Industries Ltd	Ethylene diamine tetra-acetic acid (EDTA) and its salts, Acetic acid, HCl, Methyl-dichloro acetate	CL_2
3. Benzo Chemicals Combines	Benzyl chloride, Acetyl chloride Amomonium chloride	Cl_2
4. Apex	Paranitro-chloro-benzene	Cl_2

Table 5 : **Average Z Ambient Air Concentration of Major Pollutants**

SO_2 and NO_x (ugm^{-3})

ZONES	MONITORING POINTS	AVERAGE CONCENTRATION					
		ANNUAL		MONSOON		WINTER	
		SO_2	NO_x	SO_2	NO_x	SO_2	NO_x
R_1	1a	4.0 (1.4-8.2)	32.7 (6.8-80.3)	3.0 (1.4-6.9)	27.5 (6.8-67.2)	5.0 (1.6-7.1)	33.9 (7.2-60.4)
R_2	1b	2.5 (1.2-4.3)	12.5 (3.6-18.5)	2.1 (1.2-3.9)	10.1 (3.6-12.5)	2.6 (1.2-4.2)	12.3 (3.9-17.4)
I	2	3.9 (1.2-15.4)	35.8 (11.2-70.1)	3.3 (1.2-7.4)	21.7 (11.2-40.4)	5.7 (2.5-10.0)	46.6 (12.4-49.6)
II	3	5.1 (1.7-18.2)	31.8 (8.6-91.0)	5.8 (1.7-16.2)	28.4 (8.6-72.4)	4.0 (1.4-11.9)	45.9 (10.4-91.0)
III	4	12.7 (1.6-35.8)	30.3 (7.6-83.5)	8.9 (1.9-25.8)	33.0 (15.8-83.5)	3.6 (1.6-14.4)	30.3 (7.6-60.2)
IV V	5	15.1 (1.6-76.1)	44.6 (7.3-116.3)	14.6 (3.2-35.1)	34.0 (7.3-35.1)	22.1 (4.5-76.1)	64.9 (8.3-116.3)
VI	6	13.5 (1.6-96.4)	55.4 (7.8-157.6)	15.3 (3.5-96.4)	43.3 (7.8-76.8)	14.5 (1.6-45.1)	98.8 (22.1-157.6)
VII VIII	7	21.8 (4.6-125.4)	61.2 (9.8-243.0)	22.8 (14.3-125.4)	50.99 (12.8-210.0)	10.0 (4.6-76.5)	46.4 (9.8-146.0)

Values in paranthesis are minimum and maximum values of concentration recorded during the monitoring period. The localised pollutant chlorine was found at zone II & VIII. Zone II had 6.7 & 5.8 and Zone VIII had 15.3 & 32.7 ug/m^3 chlorine during winter and monsoon.

FIELD SURVEY OF COMMON CROPS

(Tables 6 - 10)

R_1 = Reference zone 1

I - VIII = Polluted zones

ND = No damage

NR = Observations not recorded

Table 6 : Impact of Industrial Air Pollution on Different Crops

YIELD (% Reduction)

CROPS	ZONES							
	I	II	III	IV	V	VI	VII	VIII
Millet	12.0	-	15.0	8.0	18.0	-	43.0	-
Paddy	20.0	-	34.0	25.0	27.0	77.0	-	-
Maize	11.0	-	20.0	-	-	55.0	60.0	-
Wheat	20.0	28.0	35.0	70.0	85.0	71.0	74.0	-
Potato	-	-	0.0	30.0	45.0	35.0	-	-
Pigeonpea	0.0	-	5.0	30.0	48.0	-	-	70.0
Tobacco	5.0	0.0	10.0	20.0	28.0	40.0	42.0	44.0

- Crop not grown

Table 7 : **Triticum aestivum** Linn

7.1 Height (cm/plant)

ZONES	Age of the plants in days			
	20	40	60	80
R_2	23.6	59.92	89.41	109.8
I^2	22.8	57.60	81.5	98.2
II	22.0	55.70	80.6	97.5
III	21.7	54.93	80.43	97.07
IV	19.8	49.30	72.8	88.6
V	19.72	49.27	72.4	80.73
VI	19.90	50.5	74.6	91.0
VII	19.60	48.4	69.8	80.5
VIII	19.40	47.0	67.2	75.4

sd is not more than $\pm$ 1.67

7.2 Total Leaf Area (cm^2/plant)

ZONES	Age of the plants in days			
	20	40	60	80
R_2	195.37	472.16	975.13	889.60
I^2	190.40	430.20	882.26	800.5
II	186.3	406.7	834.5	755.6
III	182.87	394.07	803.63	705.23
IV	169.4	378.60	766.5	691.9
V	168.93	375.97	761.27	680.93
VI	176.4	390.56	776.8	699.5
VII	162.40	350.65	716.5	611.9
VIII	160.5	341.64	675.3	568.4

sd is not more than $\pm$+14.4

7.3 Injury Index (%)

ZONES	Age of the plants in days				
	20	40	60	80	100
I	ND	ND	ND	ND	NR
II	ND	ND	ND	ND	NR
III	ND	ND	ND	ND	NR
IV	ND	ND	12.1	15.7	NR
V	4.2	8.0	18.4	20.0	NR
VI	ND	ND	ND	ND	NR
VII	3.0	7.7	12.5	20.5	NR
VIII	5.6	16.0	24.8	26.9	NR

All the values are average of 25 replicates

Table 7 : **Triticum aestivum** Linn

7.4 Biomass (gms/plant)

ZONES	Age of the plants in days			
	20	40	60	80
R_1	6.8	19.26	28.96	45.31
I	6.5	18.30	35.21	40.65
II	6.2	17.40	34.25	39.54
III	6.1	17.22	33.96	39.0
IV	5.4	14.73	28.75	31.902
V	5.37	14.35	28.5	31.70
VI	5.5	15.24	30.60	34.61
VII	5.3	14.7	27.07	30.05
VIII	5.0	12.80	25.50	28.27

sd is not more than $\pm$ 1.75

7.5 RGR (mg/gm/day)

ZONES	Age of the plants in days			
	20	40	60	80
R_1	123.18	225.71	356.87	115.21
I	117.75	213.76	306.51	98.55
II	112.31	202.89	305.06	96.01
III	110.50	201.44	303.49	91.30
IV	97.82	169.19	253.97	56.28
V	97.22	152.53	235.87	53.46
VI	99.63	176.44	278.25	72.82
VII	96.01	164.48	230.06	53.98
VIII	90.58	141.30	175.72	50.36

7.6 NAR ($mg/cm^2/day$)

ZONES	Age of the plants in days			
	20	40	60	80
R_1	0.024	0.0625	0.179	0.0099
I	0.022	0.0513	0.139	0.0081
II	0.021	0.0447	0.041	0.0076
III	0.020	0.0423	0.118	0.0089
IV	0.0166	0.0354	0.107	0.0045
V	0.0165	0.0316	0.098	0.0040
VI	0.0176	0.0378	0.107	0.0056
VII	0.0156	0.0310	0.084	0.0057
VIII	0.0145	0.0256	0.059	0.00538

Calculated from average values

All the values are average of 25 replicates

Table 8 : **Oryza sativa** Linn

8.1 Height (cm/ plant)

ZONES	Age of the plants in days			
	20	40	60	80
R_1	15.9	31.5	96.7	114.6
I	15.4	29.4	88.6	102.8
II	15.0	27.8	79.7	93.4
III	13.9	23.9	73.3	82.8
IV	14.9	26.6	76.3	87.8
V	14.7	25.8	75.4	87.3
VI	12.6	21.5	65.4	75.6
VII	12.0	20.0	61.3	72.5
VIII	13.2	22.7	69.7	80.4

sd is not more than ± 1.05

8.2 Total Leaf Area (cm^2/plant)

ZONES	Age of the plants in days			
	20	40	60	80
R_1	349.50	1776.00	1994.52	1854.60
I	315.35	1565.74	1748.20	1560.25
II	310.62	1500.86	1680.54	1500.13
III	301.90	1481.70	1589.21	1367.96
IV	314.69	1495.4	1620.05	1465.21
V	308.17	1493.93	1611.38	1460.87
VI	293.2	1460.9	1485.40	1297.05
VII	291.7	1460.4	1464.77	1270.60
VIII	298.5	1474.8	1505.60	1326.30

sd is not more than ± 18.17

8.3 Injury Index (%)

ZONES	Age of the plants in days				
	20	40	60 60	80	100
I	ND	ND	ND	ND	NR
II	ND	ND	ND	ND	NR
III	2.8	3.9	6.4	8.0	NR
IV	ND	ND	ND	ND	NR
V	ND	ND	ND	ND	NR
VI	13.0	16.5	18.0	26.4	NR
VII	14.5	18.4	19.5	28.9	NR
VIII	10.4	14.6	15.6	21.7	NR

All the values are average of 25 replicates

Table 8: Oryza sativa Linn

8.4 Biomass(gms/plant)

ZONES	Age of the plants in days			
	20	40	60	80
R_1	2.67	9.85	33.56	38.79
I^1	2.60	9.08	30.43	35.00
II	2.55	8.64	30.16	34.01
III	2.40	8.55	24.78	28.05
IV	2.46	8.59	27.13	31.0
V	2.43	8.57	25.7	29.5
VI	2.32	8.30	20.80	24.69
VII	2.29	8.28	20.64	23.80
VIII	2.35	8.46	23.12	25.52

sd is not more than $\pm$ 2.04

8.5 RGR (mg/gm/day)

ZONES	Age of the plants in days			
	20	40	60	80
R_1	48.4	130.1	429.5	94.8
I^1	47.0	118.0	405.2	82.6
II	46.2	116.0	385.0	69.92
III	43.6	110.6	294.19	67.39
IV	44.6	111.17	335.86	70.31
V	44.2	111.0	310.49	68.80
VI	41.6	108.3	242.0	55.40
VII	42.7	108.3	266.0	56.16

8.6 NAR ($mg/cm^2/day$)

ZONES	Age of the plants in days			
	20	40	60	80
R_1	0.170	0.186	0.0939	0.0133
I^1	0.0149	0.147	0.0739	0.0155
II	0.0145	0.138	0.0691	0.0126
III	0.0131	0.131	0.0314	0.0149
IV	0.0140	0.132	0.0441	0.0108
V	0.0136	0.131	0.0409	0.0103
VI	0.0123	0.127	0.00594	0.0104
VII	0.0122	0.127	0.00099	0.0105
VIII	0.0128	0.130	0.00818	0.0100

Calculated from average values

All the values are average of 25 replicates

Table 9 : **Zea mays** Linn

9.1 Height (cm / plant)

ZONES	Age of the plants in days			
	20	40	60	80
R_1	35.7	66.7	157.5	221.5
I	35.0	64.5	146.4	201.9
II	34.3	62.4	142.7	195.6
III	31.2	56.06	122.7	170.3
IV	33.6	59.9	130.8	180.8
V	33.4	59.5	130.2	180.0
VI	29.6	53.4	118.1	162.7
VII	28.7	52.6	116.4	160.2
VIII	30.0	53.9	119.6	164.5

sd is not more than ± 1.84

9.2 Total Leaf Area (cm^2 /plant)

ZONES	Age of the plants in days			
	20	40	60	80
R_1	939.90	2994.87	3546.59	3989.35
I	900.07	2860.20	3278.54	3645.60
II	884.62	2774.13	3149.82	3514.76
III	869.63	2497.39	2910.97	3257.03
IV	882.5	2708.36	3160.25	3479.80
V	881.7	2701.43	3074.24	3440.65
VI	863.28	2230.14	2600.37	2906.54
VII	861.47	2209.60	2588.32	2867.85
VIII	865.46	2264.38	2654.60	2949.90

sd is not more than ± 17.9

9.3 Injury Index (%)

ZONES	Age of the plants in days				
	20	40	60	80	100
I	ND	ND	ND	ND	NR
II	ND	ND	ND	ND	NR
III	ND	3.6	4.0	4.9	NR
IV	ND	ND	ND	ND	NR
V	ND	ND	ND	ND	NR
VI	10.6	12.4	14.0	17.5	NR
VII	12.5	13.6	15.8	20.6	NR
VIII	ND	ND	5.8	6.0	NR

All the values are average of 25 replicates

Zea mays Linn

9.4 Biomass (gms/plant)

ZONES	Age of the plants in days			
	20	40	60	80
R_1	3.510	15.740	38.400	60.480
I^1	3.440	14.695	36.006	55.367
II	3.400	14.514	35.345	54.694
III	2.992	12.50	30.495	45.557
IV	3.150	12.880	31.416	48.816
V	3.097	12.672	30.802	48.503
VI	2.930	12.080	25.710	40.205
VII	2.928	12.005	25.656	40.166
VIII	2.976	12.210	28.50	43.420

sd is not more than $\pm$ 1.91

9.5 RGR (mg/gm/day)

ZONES	Age of the plants in days			
	20	40	60	80
R_1	63.4	222.0	410.4	400.00
I^1	62.4	204.0	386.2	350.7
II	61.6	201.0	377.3	350.3
III	54.10	177.0	325.83	272.93
IV	57.71	178.38	328.96	319.67
V	57.24	176.44	328.48	315.2
VI	53.3	166.0	247.5	263.0
VII	52.9	164.0	247.0	262.7
VIII	53.6	167.0	295.3	270.3

9.6 NAR ($mg/cm^2/day$)

ZONES	Age of the plants in days			
	20	40	60	80
R_1	0.0596	0.4556	0.2265	0.1771
I^1	0.0561	0.3998	0.1616	0.1287
II	0.0545	0.3806	0.141	0.127
III	0.047	0.2806	0.114	0.09
IV	0.0505	0.322	0.152	0.142
V	0.049	0.316	0.122	0.101
VI	0.0460	0.227	0.0937	0.0804
VII	0.0456	0.221	0.0915	0.0735
VIII	0.0464	0.234	0.115	0.0798

Calcuated from average values

All the values are average of 25 replicates

Table 10 : **Yield** (Kg/100 M^2 at Harvest)

ZONES	Triticum aestivum Linn.	Oryza sativa Linn.	Zea mays Linn.
R_1	208.02	132.11	414.54
I	190.62	120.53	394.96
II	168.65	117.75	372.25
III	158.40	97.88	353.88
IV	102.44	108.70	360.27
V	80.70	107.72	357.16
VI	117.58	42.05	181.15
VII	55.25	37.63	174.16
VIII	35.60	46.09	206.93

Values are average of 25 observations

POTTED PLANT EXPOSURE

(Tables 11 -29)

R_2 = Reference zone 2

I - VIII = Polluted zones

ND = No damage

DF = Defoliation

0.00 = Observation not recorded

U = Upper epidermis

L = Lower epidermis

Table 11 : Root length (cm/plant)

11.1 Triticum aestivum Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	9.0	12.4	13.0	18.2	25.2
I	8.8	12.0	12.5	16.8	22.6
II	8.7	11.6	12.0	16.2	22.0
III	8.5	11.3	11.7	15.7	21.2
IV	7.9	10.0	10.4	14.0	18.4
V	7.7	9.4	9.6	13.6	18.0
VI	8.0	10.8	11.2	15.0	20.5
VII	8.0	10.0	11.0	14.7	18.7
VIII	7.5	9.2	9.5	13.0	16.2

sd is not more than ± 1.37

11.2 Oryza sativa Linn.

ZONES	Age of the plants in days			
	20	40	60	80
R_2	5.3	8.5	14.6	20.85
I	5.0	7.6	12.0	16.8
II	4.9	7.3	11.2	15.9
III	4.6	6.9	9.6	13.6
IV	4.8	7.1	11.0	15.6
V	4.7	7.0	10.4	14.4
VI	4.2	6.7	9.0	12.6
VII	4.1	6.5	8.8	12.3

sd is not more than ± 1.46

11.3 Zea mays Linn.

ZONES	Age of the plants in days			
	20	40	60	80
R_2	20.28	23.52	26.80	27.50
I	19.96	22.58	24.88	24.90
II	19.50	22.29	24.76	24.80
III	18.65	21.50	24.30	24.55
IV	19.12	22.00	24.66	24.70
V	18.95	21.95	24.52	24.64
VI	18.50	21.20	24.06	24.10
VII	18.32	21.00	23.91	24.00

sd is not more than ± 1.76

all values are average of 8 replicates

Table 12 : Shoot length (cm / plant)

12.1 Triticum aestivum Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	22.4	47.0	65.3	98.4	105.7
I	21.5	44.0	60.8	98.6	95.5
II	21.0	43.5	59.4	88.5	93.2
IV	19.3	40.4	50.5	75.5	77.2
V	18.5	38.2	49.6	73.5	76.5
VI	20.0	42.1	52.4	78.6	80.3
VII	18.2	36.4	48.4	70.6	71.5
VIII	17.8	35.0	48.2	65.4	68.5

sd is not more than ± 1.66

12.2 Oryza sativa Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	12.7	26.0	98.5	112.10	115.5
I	12.6	25.20	95.0	108.0	110.0
II	12.0	24.0	90.3	102.0	105.8
III	11.2	20.2	72.5	79.6	79.6
IV	11.6	23.5	89.0	101.0	103.5
V	11.4	22.4	84.6	92.0	94.4
VI	11.0	18.5	68.3	76.7	79.0
VII	10.6	15.0	56.5	58.6	60.8

sd is not more than ± 1.71

12.3 Zea mays Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	28.5	56.9	84.8	129.3	175.8
I	27.2	54.0	79.6	120.7	162.5
II	26.6	53.0	78.7	118.4	158.4
III	25.5	50.0	73.8	110.0	148.6
IV	26.0	51.6	76.3	115.3	155.5
V	25.8	57.0	75.0	112.8	152.6
VI	24.0	47.0	69.5	104.7	141.3
VII	24.0	46.8	68.4	103.6	138.7

sd is not more than ± 2.40

all values are average of 8 replicates.

Table 13: Number of leaves (/ plant)

13.1 Triticum aestivum Linn.

ZONES	Age of the plants in days			
	20	40	60	80
R_2	8.0	14.0	24.0	33.0
I	8.0	12.0	20.0	27.0
II	8.0	12.0	20.0	27.0
III	8.0	12.0	20.0	27.0
IV	6.0	10.0	17.0	23.0
V	5.0	10.0	16.0	23.0
VI	6.0	10.0	17.0	23.0
VII	5.0	10.0	16.0	22.0
VIII	5.0	10.0	16.0	22.0

sd is not more than ± 1.02

13.2 Oryza sativa Linn

ZONES	Age of the plants in days			
	20	40	60	80
R_2	12.0	29.0	58.0	65.0
I	10.0	24.1	48.0	60.0
II	10.0	24.0	47.0	59.0
III	9.0	18.0	35.0	50.0
IV	10.0	23.0	45.0	58.0
V	9.0	20.0	39.0	52.0
VI	8.0	16.0	32.0	42.0
VII	8.0	15.0	29.0	40.0

sd is not more than ± 1.07

13.3 Zea mays Linn.

ZONES	Age of the plants in days			
	20	40	60	80
R_2	8.0	9.0	13.0	14.0
I	7.0	8.0	9.0	12.0
II	7.0	8.0	9.0	12.0
III	6.5	7.2	8.5	11.0
IV	7.0	7.3	9.0	12.0
V	6.5	8.0	8.5	11.0
VI	6.0	7.0	8.0	10.0
VII	6.0	7.0	8.0	10.0

sd is not more than ± 1.15

all values are average of 8 replicates

Table 14 : Total leaf Area (cm^2/plant)

14.1 *Triticum aestivum* Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	190.70	306.29	617.52	868.57	815.20
I	185.20	292.20	586.50	825.36	736.02
II	183.76	289.0	575.20	805.20	700.12
III	180.0	285.15	573.15	800.07	670.25
IV	170.0	270.05	486.30	650.0	592.85
V	169.2	262.40	485.0	642.5	584.60
VI	175.0	278.25	515.0	730.67	598.74
VII	168.2	253.65	480.6	640.05	555.45
VIII	167.5	250.0	470.15	585.12	515.0

sd is not more than ± 11.76

14.2 *Oryza sativa* Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	345.6	944.82	1245.5	1602.02	1582.6
I	310.7	824.6	976.04	1165.9	1130.6
II	304.5	800.05	954.51	1120.0	1100.0
III	294.0	770.4	847.65	1020.5	1005.7
IV	304.4	785.20	940.79	1172.5	1146.5
V	297.7	778.6	895.80	1150.5	1112.6
VI	290.0	758.6	789.90	857.6	842.8
VII	280.0	750.4	776.75	843.0	830.6

sd is not more than ± 12.81

14.3 *Zea mays* Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	909.34	2157.65	2983.70	3245.67	3562.71
I	860.15	2035.60	2800.55	2952.22	3227.0
II	852.0	2010.13	2772.50	2900.00	3176.20
III	832.30	1956.30	2440.0	2605.65	2805.56
IV	846.06	2000.0	2665.32	2876.53	3120.47
V	840.0	1986.20	2590.20	2775.50	3018.40
VI	826.20	1920.55	2356.45	2515.55	2736.63
VII	821.57	1904.5	2240.16	2400.36	2614.42

sd is not more than ± 14.55

all values are average of 8 replicates

Table 15 : Injury index

15.1 Triticum aestivum Linn.

	Age of the plants in days				
	20	40	60	80	100
R_2	Intact	Intact	Intact	Intact	Intact
I	ND	ND	ND	ND	NR
II	ND	ND	ND	ND	NR
III	ND	ND	ND	ND	NR
IV	4.2	4.7	15.7	16.2	NR
V	4.4	5.6	16.5	19.8	NR
VI	ND	ND	ND	ND	NR
VII	4.0	7.6	17.4	25.8	NR
VIII	6.9	9.8	19.6	28.4	NR

15.2 Oryza sativa Linn

	Age of the plants in days				
ZONES	20	40	60	80	100
R_2	Intact	Intact	Intact	Intact	NR
I	ND	ND	ND	ND	NR
II	ND	ND	ND	ND	NR
III	ND	3.7	15.6	19.9	NR
IV	ND	ND	ND	ND	NR
V	ND	ND	ND	ND	NR
VI	4.9	8.4	16.7	22.4	NR
VII	5.5	9.6	19.5	27.9	NR

15.3 Zea mays Linn

	Age of the plants in days				
ZONES	20	40	60	80	100
R_2	Intact	Intact	Intact	Intact	NR
I	ND	ND	ND	ND	NR
II	ND	ND	ND	ND	NR
III	ND	ND	5.2	7.4	NR
IV	ND	ND	ND	ND	NR
V	ND	ND	ND	ND	NR
VI	ND	ND	6.9	9.8	NR
VII	ND	ND	8.6	19.4	NR

sd is insignificant

Table 16 : Foliar Epidermal Structure

Crop Species	Zones	Number of stomata/ 0.1 mm^2	Number of Epidermal cells	Pore length (μ)	Pore width (μ)	Guard cell length (μ)	Guard cell width (μ)	Stomatal index %	Reduction %
	R_2	144	317	1.3	0.35	1.1	1.70	31.24	-
Triticum aestivum Linn.									
	V	112	364	1.1	0.2	0.9	1.2	23.53	24.68
				sd was not more than $\pm$ 1.71					
	R_2	131	289	1.7	0.52	1.2	1.52	31.19	-
Oryza sativa Linn.									
	VII	115	354	1.4	0.3	0.95	1.30	24.52	21.39
				sd was not more than $\pm$ 1.60					

Values are average of 25 observations

Table 17: Biomass (gm / plant)

17.1 Triticum aestivum Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	4.7	11.2	22.5	40.8	52.5
I	4.5	10.7	20.9	37.3	45.6
II	4.4	10.4	20.5	35.0	44.2
III	4.4	10.3	19.5	33.2	42.5
IV	4.2	9.5	17.6	29.2	36.5
V	4.0	9.2	17.0	28.4	34.3
VI	4.3	10.0	18.2	29.6	39.0
VII	3.9	9.0	16.0	26.6	32.5
VIII	3.8	8.7	15.0	26.0	30.5

sd is not more than ± 1.79

17.2 Oryza sativa Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	2.07	5.20	8.57	25.75	39.47
I	2.00	5.00	8.06	24.00	36.47
II	1.98	4.90	7.96	23.87	36.16
III	1.80	4.33	7.09	19.50	29.18
IV	1.90	4.63	7.49	21.54	32.65
V	1.84	4.56	7.35	21.00	31.70
VI	1.62	3.95	6.05	18.06	25.80
VII	1.50	3.71	5.80	17.63	21.95

sd is not more than ± 1.87

17.3 Zea mays Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	1.160	2.950	12.75	35.72	55.35
I	1.150	2.800	12.00	33.00	51.00
II	1.145	2.795	11.90	32.89	50.40
III	1.125	2.700	11.20	27.15	38.00
IV	1.141	2.790	11.76	32.56	50.12
V	1.135	2.716	11.52	28.0	39.45
VI	1.110	2.686	11.0	26.52	37.20
VII	1.102	2.680	10.74	25.05	36.36

sd is not more than ± 1.84

All the values are average of 8 replicates

Table 18: Relative Growth Rate (mg/gm / day)

18.1 Triticum aestivum Linn.

ZONES	Age of the plants in days				
	0-20	20-40	40-60	60-80	80-100
R_2	85.14	117.75	204.70	331.51	211.95
I^2	81.52	112.31	184.77	297.09	176.28
II	79.71	108.69	182.96	262.68	168.47
III	78.76	106.87	175.72	239.18	166.66
IV	76.08	94.20	146.73	192.02	132.24
V	72.46	94.20	141.30	199.27	106.88
VI	76.08	105.07	148.54	206.51	150.35
VII	76.08	92.39	126.81	182.02	106.88
VIII	70.65	90.13	114.13	162.66	81.52

18.2 Oryza sativa Linn.

ZONES	Age of the plant in days				
	0-20	20-40	40-60	60-80	80-100
R_2	37.50	56.88	61.05	31.12	24.85
I^2	36.23	54.35	55.43	28.91	22.61
II	35.87	52.90	55.43	28.84	22.28
III	34.42	45.83	50.00	21.77	14.02
IV	35.87	49.27	51.81	25.47	20.14
V	35.87	46.01	50.54	24.75	19.38
VI	33.33	42.21	38.04	22.50	17.54
VII	27.17	40.03	37,86	21.45	7.83

18.3 Zea mays Linn.

ZONES	Age of the plants in days				
	0-20	20-40	40-60	60-80	80-100
R_2	21.01	32.61	177.53	416.65	355.05
I^2	20.83	29.89	166.66	380.42	326.07
II	20.76	29.89	164.85	380.05	318.10
III	20.29	28.62	153.98	361.58	305.42
IV	20.65	29.89	162.67	376.79	317.38
V	20.58	28.62	159.41	370.99	316.29
VI	20.11	28.55	150.72	353.61	302.15
VII	19.96	28.59	146.01	349.98	295.64

Calculated from average values

Table 19 : Net Assimilation Rate (mg/cm^2/day)

19.1 Triticum aestivum Linn.

ZONES	Age of the plants in days				
	0-20	20-40	40-60	60-80	80-100
R_2	0.016	0.0136	0.0637	0.0832	0.0113
I^2	0.015	0.0120	0.0544	0.0710	0.0106
II	0.0146	0.0114	0.0524	0.0605	0.0105
III	0.0136	0.0112	0.0506	0.0543	0.0104
IV	0.0129	0.00943	0.0315	0.0334	0.0092
V	0.0123	0.0087	0.0308	0.0326	0.00904
VI	0.0133	0.0108	0.0352	0.0445	0.0103
VII	0.0118	0.00789	0.0275	0.0325	0.00614
VIII	0.0115	0.00732	0.0270	0.0210	0.00464

19.2 Oryza sativa Linn.

ZONES	Age of the plants in days				
	0-20	20-40	40-60	60-80	80-100
R_2	0.0130	0.0341	0.0183	0.111	0.0079
I^2	0.0113	0.0257	0.0116	0.0548	0.0054
II	0.0109	0.0250	0.0110	0.0477	0.0048
III	0.0105	0.0197	0.0088	0.0389	0.0034
IV	0.0105	0.0262	0.0106	0.0631	0.0045
V	0.00967	0.0244	0.0092	0.0590	0.0042
VI	0.00967	0.0197	0.0048	0.0149	0.0020
VII	0.0076	0.0187	0.0011	0.0142	0.0015

19.3 Zea mays Linn.

ZONES	Age of the plants in days				
	0-20	20-40	40-60	60-80	80-100
R_2	0.0191	0.0407	0.146	0.109	0.113
I^2	0.0178	0.0349	0.127	0.0687	0.0896
II	0.0176	0.0346	0.125	0.0577	0.0876
III	0.0168	0.0322	0.0745	0.0485	0.0611
IV	0.0175	0.0345	0.122	0.0563	0.0776
V	0.0172	0.0328	0.096	0.0560	0.0768
VI	0.0165	0.0312	0.065	0.0484	0.0608
VII	0.0163	0.0310	0.049	0.0484	0.0603

Calculated from average values

Table 20: Chlorophyll 'a' (mg/gm/fresh wt.)

20.1 Triticum aestivum Linn.

ZONES	Age of the plants in days			
	20	40	60	80
R_2	0.982	2.26	3.56	3.25
I	0.954	2.17	3.24	2.96
II	0.95	2.01	3.16	2.86
III	0.94	1.99	2.86	2.64
IV	0.86	1.76	2.37	2.11
V	0.85	1.68	2.34	2.11
VI	0.88	1.88	2.57	2.31
VII	0.85	1.55	2.25	2.00
VIII	0.82	1.45	2.17	1.94

sd is not more than ± 0.19

20.2 Oryza sativa Linn.

ZONES	Age of the plants in days			
	20	40	60	80
R_2	1.99	2.60	3.108	2.94
I	1.87	2.27	2.68	2.53
II	1.86	2.17	2.55	2.37
III	1.61	1.75	1.99	1.86
IV	1.83	2.06	2.45	2.16
V	1.64	1.81	2.06	1.92
VI	1.60	1.66	1.89	1.79
VII	1.55	1.62	1.85	1.73

sd is not more than ± 0.24

20.3 Zea mays Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	1.47	2.59	2.97	3.49	2.64
I	1.42	2.50	2.64	3.10	2.30
II	1.40	2.47	2.62	3.05	2.30
III	1.259	2.19	2.49	2.86	2.06
IV	1.398	2.42	2.60	3.01	2.27
V	1.267	2.22	2.52	2.95	2.15
VI	1.20	2.00	2.29	2.67	1.85
VII	1.10	1.89	2.11	2.46	1.65

sd is not more than ± 0.21

all values are average of 8 replicates

Table 21 : Chlorophyll 'b' (mg/ gm.Fresh wt.)

21.1 Triticum aestivum Linn.

ZONES	Age of the plants in days			
	20	40	60	80
R_2	0.87	1.77	3.05	2.75
I	0.86	1.69	2.86	2.57
II	0.84	1.67	2.75	2.47
III	0.84	1.66	2.66	2.36
IV	0.82	1.59	2.21	1.95
V	0.81	1.55	2.16	1.89
VI	0.82	1.60	2.36	2.01
VII	0.81	1.43	2.16	1.87
VIII	0.79	1.38	1.96	1.72

sd is not more than ± 0.21

21.2 Oryza sativa Linn.

ZONES	Age of the plants in days			
	20	40	60	80
R_2	1.59	1.81	1.96	1.94
I	1.54	1.68	1.79	1.76
II	1.50	1.57	1.69	1.60
III	1.39	1.42	1.48	1.43
IV	1.49	1.50	1.60	1.56
V	1.41	1.43	1.50	1.46
VI	1.28	1.38	1.30	1.25
VII	1.26	1.30	1.26	1.22

sd is not more than ± 0.24

21.3 Zea mays Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	0.96	0.99	1.26	1.56	1.17
I	0.94	0.97	1.21	1.50	1.10
II	0.93	0.96	1.19	1.48	1.09
III	0.90	0.94	1.17	1.40	1.03
IV	0.93	0.96	1.18	1.43	1.03
V	0.91	0.95	1.18	1.48	1.04
VI	0.89	0.93	1.10	1.48	1.04
VII	0.89	0.92	1.06	1.28	1.95

sd is not more than ± 0.28

all values are average of 8 replicates

Table 22 : **Total Soluble Sugars (mg/gm/Dry wt.)**

22.1 Triticum aestivum Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	14.20	19.78	24.86	30.65	34.84
I	13.46	17.20	21.35	26.00	26.50
II	13.00	16.46	20.16	24.35	25.78
III	12.25	16.0	19.77	23.35	25.0
IV	10.85	16.0	15.32	17.62	18.56
V	10.30	14.0	15.28	17.42	18.00
VI	11.86	15.48	16.40	20.05	21.15
VII	10.00	13.60	14.85	17.30	17.96
VIII	11.0	13.0	14.78	16.50	17.05

sd is not more than ± 0.32

22.2 Oryza sativa Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	22.56	25.29	29.37	33.65	35.16
I	22.0	24.12	27.79	31.18	31.60
II	21.33	23.49	26.46	30.24	31.02
III	18.80	20.93	23.16	26.31	27.85
IV	20.64	22.57	25.68	29.40	29.89
V	19.79	21.84	24.35	27.85	27.96
VI	18.47	20.14	22.59	24.32	25.71
VII	17.95	19.28	21.16	23.47	24.49

sd is not more than ± 0.61

22.3 Zea mays Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	25.70	29.30	32.50	35.70	39.65
I	25.10	28.26	31.25	33.50	36.40
II	24.80	27.85	30.97	32.90	35.80
III	22.75	25.40	28.05	29.80	31.05
IV	24.05	27.05	29.86	31.75	33.35
V	23.45	26.65	28.96	30.20	32.46
VI	21.50	24.05	26.40	27.65	30.20
VII	20.48	23.80	26.25	26.20	29.60

sd is not more than ± 0.51

Table 23 : **Reducing Sugars (mg / gm / dry. wt.)**

23.1 Triticum aestivum Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	9.0	9.90	10.39	12.71	14.80
I	9.24	10.35	11.53	14.72	17.86
II	9.60	11.15	11.76	14.76	17.90
III	9.80	11.29	11.94	14.92	17.98
IV	10.35	12.07	14.0	17.30	20.65
V	10.54	12.39	14.26	17.54	20.82
VI	9.99	11.46	13.63	16.89	20.95
VII	10.60	12.42	14.30	17.74	21.25
VIII	10.88	12.64	14.44	18.55	21.70

sd is not more than ± 0.39

23.2 Oryza sativum Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	10.56	14.76	17.91	21.8	23.6
I	10.70	15.54	19.16	24.5	27.9
II	10.84	15.87	19.76	25.2	28.55
III	11.24	16.75	21.47	25.9	29.3
IV	10.90	16.98	20.34	26.4	30.0
V	10.95	15.98	20.60	27.5	31.2
VI	11.14	17.24	22.05	29.4	33.6
VII	11.65	17.83	25.10	30.9	33.9

sd is not more than ± 0.36

23.3 Zea mays Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	15.7	17.29	21.50	22.67	23.90
I	16.0	18.0	23.05	24.45	26.54
II	16.8	18.5	23.70	25.10	27.30
III	18.5	20.2	25.35	26.96	29.15
IV	17.0	19.4	24.38	25.75	28.10
V	17.5	19.68	24.60	25.99	20.75
VI	18.4	20.5	26.00	27.90	30.20
VII	19.0	21.4	26.70	28.60	30.95

sd is not more than ± 0.49

Table 24 : **Sulphur** (mg/ gm / dry wt.)

24.1 Triticum aestivum Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	1.98	2.01	2.25	2.32	2.53
I^2	2.86	2.99	3.50	3.62	4.03
II	2.94	3.11	3.57	3.71	4.16
III	3.06	3.2	3.68	3.99	4.46
IV	3.24	3.42	3.90	4.19	4.74
V	5.97	6.13	6.90	7.26	8.00
VI	5.28	5.58	6.33	6.65	7.69
VII	5.11	5.30	6.00	6.33	7.36
VIII	3.43	3.97	4.48	4.97	5.48

sd is not more than ± 0.19

24.2 Oryza sativa Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	1.97	2.03	2.29	2.30	2.36
I^2	2.46	2.64	3.00	3.36	3.57
II	2.56	2.86	3.26	3.59	3.80
III	2.78	2.99	3.08	3.69	3.98
IV	3.18	3.35	3.37	4.08	4.24
V	3.48	3.73	4.45	4.76	4.98
VI	4.37	4.59	4.78	5.77	6.05
VII	5.36	5.65	6.42	6.66	6.99

sd is not more than ± 0.17

24.3 Zea mays Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	2.55	2.62	2.75	2.91	3.92
I^2	3.05	3.21	3.39	3.58	3.72
II	3.13	3.30	3.48	3.67	3.88
III	3.17	3.31	3.55	3.79	3.96
IV	3.48	3.59	3.89	4.16	4.57
V	3.63	3.81	4.16	4.49	4.96
VI	3.93	4.09	4.48	4.84	5.36
VII	4.03	4.18	4.51	4.98	5.46

sd is not more than ± 0.22

All the values are average of 8 replicates

Table 25 : **Ascorbic acid** (mg / gm / fresh wt.)

25.1 Triticum aestivum Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	0.215	0.286	0.335	0.328	
I_2	0.205	0.264	0.307	0.295	
II	0.200	0.253	0.292	0.280	
III	0.192	0.238	0.276	0.264	
VI	0.185	0.201	0.230	0.224	
V	0.184	0.196	0.224	0.218	
VI	0.187	0.215	0.245	0.239	
VII	0.182	0.191	0.220	0.214	
VIII	0.180	0.188	0.212	0.207	

sd is not more than ± 0.18

25.2 Oryza sativa Linn.

ZONES	Age of the plants in days			
	20	40	60	80
R_2	0.256	0.290	0.345	0.397
I_2	0.230	0.248	0.280	0.287
II	0.222	0.245	0.276	0.278
III	0.205	0.228	0.248	0.259
IV	0.218	0.242	0.264	0.270
V	0.214	0.238	0.258	0.269
VI	0.200	0.224	0.239	0.256
VII	0.191	0.212	0.237	0.243

sd is not more than ± 0.19

25.3 Zea mays Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	0.68	0.85	1.12	1.40	1.74
I_2	0.64	0.79	1.04	1.29	1.40
II	0.63	0.78	1.02	1.27	1.35
III	0.60	0.74	0.96	1.15	1.25
IV	0.62	0.76	0.99	1.25	1.30
V	0.61	0.75	0.97	1.21	1.28
VI	0.59	0.73	0.90	1.05	1.20
VII	0.58	0.71	0.88	0.96	1.14

sd is not more than ± 0.14

All the values are average of 8 replicates

Table 26 : **Protein** (mg/ gm/ fresh wt.)

26.1 Triticum aestivum Linn.

ZONES	Age of the plants in days			
	20	40	60	80
R_2	16.70	20.51	23.94	22.50
I^2	16.04	18.49	21.45	20.16
II	15.46	18.21	21.19	19.77
III	14.97	17.56	20.09	18.89
IV	13.63	16.38	18.56	17.02
V	13.04	16.06	18.09	16.76
VI	14.00	16.88	19.67	17.59
VII	12.76	15.25	17.65	16.13
VIII	12.0	14.79	16.24	13.79

sd is not more than ± 0.15

26.2 Oryza sativa Linn.

ZONES	Age of the plants in days			
	20	40	60	80
R_2	22.94	24.69	29.63	34.50
I^2	22.25	23.08	27.36	30.25
II	21.96	22.85	26.51	29.74
III	20.75	21.37	24.14	26.51
IV	21.34	22.30	25.94	28.68
V	21.03	21.42	25.26	27.57
VI	20.28	21.11	23.37	25.36
VII	20.12	20.87	22.46	24.05

sd is not more than ± 0.19

26.3 Zea mays Linn.

ZONES	Age of the plants in days				
	20	40	60	80	100
R_2	26.67	28.61	31.42	36.80	30.49
I^2	25.07	25.94	27.94	32.23	26.17
II	24.40	25.26	27.50	31.76	25.60
III	23.19	23.86	26.28	30.15	24.50
IV	24.00	24.70	27.02	31.10	25.06
V	23.76	24.06	26.67	30.82	24.85
VI	22.72	23.51	25.60	29.90	24.32
VII	22.04	22.90	24.38	28.50	23.19

sd is not more than 0.25

All values are average of 8 replicates

Table 27 : **Chloride** (mg / gm / dry wt.)

27.1 Triticum aestivum Linn.

ZONES	Age of the plants in days			
	20	40	60	80
R_2	0.207	0.214	0.220	0.240
I^2	0.206	0.212	0.219	0.240
II	0.222	0.248	0.279	0.306
III	0.203	0.208	0.211	0.239
IV	0.201	0.204	0.219	0.238
V	0.203	0.207	0.219	0.238
VI	0.206	0.212	0.218	0.239
VII	0.202	0.206	0.220	0.238
VIII	0.368	0.417	0.489	0.546

sd is not more than ± 0.94

27.2 Oryza sativa Linn.

ZONES	Age of the plants in days			
	20	40	60	80
R_2	0.424	0.429	0.501	0.524
I^2	0.406	0.417	0.492	0.507
II	0.415	0.506	0.627	0.708
III	0.412	0.425	0.497	0.520
IV	0.414	0.424	0.499	0.519
V	0.413	0.425	0.500	0.521
VI	0.413	0.425	0.500	0.521
VII	0.420	0.421	0.497	0.519

sd is not more than ± 1.36

27.3 Zea mays Linn.

ZONES	Age of the plants in days			
	20	40	60	80
R_2	0.150	0.184	0.209	0.267
I^2	0.149	0.180	0.208	0.267
II	0.178	0.227	0.268	0.353
III	0.146	0.181	0.207	0.260
IV	0.145	0.183	0.206	0.262
V	0.146	0.181	0.206	0.265
VI	0.150	0.184	0.205	0.265
VII	0.149	0.183	0.209	0.267

sd is not more than ± 1.04

All the values are average of 8 observations

Table 28 : **Yield**

28.1 Triticum aestivum Linn

ZONES	Number of ears/plant	Number of ears/M^2	Number of grains/ear	Number of grains/ Bigha	Weight of 1000 grains (gms)	Kg/100 M^2	% Reduction
R_2	10	160	45	9631872	38.75	27.92	-
I^2	10	160	40	8561664	33.0	21.14	24.28
II	9	144	40	7705497	30.80	17.75	36.41
III	9	144	40	7705497	30.50	17.58	37.63
IV	8	128	35	5993164	17.65	17.62	72.70
V	6	96	28	3595898	15.00	4.04	85.55
VI	8	128	35	5993164	23.80	10.67	61.78
VII	6	96	30	3852748	15.70	4.53	83.79
VIII	6	96	25	3210624	17.00	3.12	88.82

28.2 Oryza sativa Linn

R_2	14	448	274	163423053	8.200	100.66	-
I^2	13	416	270	140066259	8.106	91.05	9.55
II	11	352	260	122340265	7.925	72.53	27.95
III	8	256	242	85552640	7.500	46.46	53.85
IV	10	320	255	10180416	7.545	61.6	38.80
V	8	256	250	82814955	7.510	48.06	52.26
VI	7	224	230	68869875	7.00	36.06	64.06
VII	6	192	222	56978058	6.55	28.35	71.84

28.3 Zea mays Linn

ZONES	No.of Cobs /plant	Length of cob	Weight of cob with covering (gms)	Weight of cob without covering(gms)	Total grains/ cob	Weight of 1000 grains in(gms)	Kg/100M^2	Reduction %
R_2	2	32.6	230.60	159.40	440	170.72	240.37	-
I^2	2	32.2	220.27	154.45	436	168.40	231.72	3.60
II	2	32.0	212.54	150.26	427	162.26	221.71	7.76
III	2	30.4	204.59	131.74	409	146.37	191.57	20.30
IV	2	30.6	210.00	145.20	420	160.00	215.04	10.54
V	2	31.5	210.34	148.38	420	160.53	215.75	10.24
VI	1	26.5	198.64	120.31	386	140.25	86.62	63.16
VII	1	26.2	195.47	107.50	380	140.00	82.54	64.59

Table 29: Analysis of variance for paddy and maize plants

(Calculated F values)

SOURCE	PARAMETERS			
	Degree of freedom	Total leaf area	Biomass	Chlorophyll content
Due to zones (Z)	7	1874.08	881.77	14.98
Due to species (sp)	1	164797.66	6913.607	138.82
Interaction z x sp	7	39.11	56.958	1.016
Errors	64	-	-	-
Totals	79	-	-	-

F values are singificant at P < 0.05 level

Correlation of different parameters of exposed wheat plants

Parameters	Leafarea	Biomass	Chlorophyll	Sulphur	Yield
Leaf area	1.0000	0.9132	0.7841	-.6260	.9194
Biomass	0.9132	1.0000	0.8139	-.7422	.9859
Chlorophyll	0.7841	0.8139	1.0000	-.6201	.8204
Sulphur	-0.6260	-0.7422	-0.6201	1.0000	-0.7866

ARTIFICIAL FUMIGATION

(Tables 30 - 33)

UE = Unexposed plants

E = Exposed plants

ND = No damage

NR = Observations not recorded

Table 30 : Triticum aestivum Linn.

30.1 Growth Parameters

Parameters		Age of the plants in days 20	40	60	80	100
Root length (cm/plant)	UE	7.50	8.14	13.3	13.90	
	E	6.98	7.05	10.85	10.95	
Shoot length (cm / plant)	UE	28.93	42.21	60.50	107.65	
	E	22.10	30.10	42.85	74.60	
Number of leaces(/plant)	UE	9.5	23.4	25.6	26.7	
	E	8.8	20.5	22.0	22.7	
Total leaf area (cm^2/plant)	UE	126.70	298.39	603.43	815.00	
	E	99.85	224.75	432.07	582.79	
Injury index (%)	UE	Intact	Intact	Intact	Intact	
	E	ND	7.6	19.5	21.8	
Biomass (gm/plant)	UE	5.70	15.36	24.71	40.55	48.89
	E	4.85	12.60	20.25	30.62	32.74
RGR (mg/gm/day)	UE	10.33	17.49	18.00	25.07	18.70
	E	8.79	14.04	14.67	18.79	11.09
NAR (mg/cm^2/day)	UE	0.013	0.030	0.0549	0.0534	
	E	0.0087	0.0172	0.0304	0.028	
pH of soil	UE	NR	6.7	6.9	7.3	
	E	NR	6.8	6.8	6.5	

All values are averged of 5 observations

SD in
Root length is not more than ± 1.70
Shoot length is not more than ± 1.19
No. of leaves is not more than ± 0 88
Total leas area is not more than ± 18.76
Biomass is not more than ± 2.48
Injury index , RGR, NAR is insignificant

Table 30: **Triticum aestivum** Linn.

30.2 Biochemical parameters

Parameters		Age of the plants in days 20	40	60	80	100
Chlorophyll-a (mg./gm. fr.wt.)	UE	0.96	2.06	3.27	3.05	
	E	0.85	1.68	2.14	1.94	
Chlorophyll-b (mg/gm.fr.wt.)	UE	0.93	1·66	2.79	2.55	
	E	0.88	1.48	2.05	1.81	
Protein (mg./gm.fr.wt.)	UE	15.70	18.76	23.52	21.68	
	E	13.25	15.48	16.60	14.80	
Soluble sugars (mg./gm dry.wt.)	UE	15.70	18.48	24.25	29.90	28.60
	E	12.60	14.75	17.84	21.45	19.68
Reducing sugar (mg./gm.dry.wt.)	UE	9.50	10.05	11.50	12.65	15.30
	E	11.24	12.60	14.75	16.40	20.69
Ascorbic acid (mg./gm.fr.wt.)	UE	0.212	0.275	0.327	0.321	
	E	0.195	0.220	0.228	0.210	
Sulphur in lvs (mg./gm dry wt.)	UE	1.94	2.01	2.04	2.14	
	E	3.92	4.14	4.39	4.69	
Sulphur in soil (mg./gm.dr.wt.)	UE	1.08	1.37	1.37	1.49	1.52
	E	1.20	1.56	1.70	1.87	1.96

Values are average of 5 observations

sd in : Biochemical parameters is not more than ± 1.76

Table 31 : Oryza sativa Linn.

31.1 Growth Parameters

Parameters		Age of the plants in days 20	40	60	80	100
Root length (cm / plant)	UE	4.6	8.54	10.92	13.12	
	E	4.0	7.0	7.95	9.08	
Shoot length (cm / plant)	UE	15.06	23.85	88.17	104.87	
	E	12.56	18.37	63.40	67.29	
Number of leaves (/ plant)	UE	11.0	24.0	47.0	55.0	55.00
	E	8.0	16.0	31.0	35.6	35.6
Number of tillers (/ plant	UE	4	7	14.3	16	16
	E	3	4.5	9.0	10	10
Total leaf area (cm^2/plant)	UE	276.9	857.50	1489.25	1623.38	1670.76
	E	215.07	587.70	960.25	990.56	996.06
Injury index (%)	UE	-	-	-	-	-
	E	ND	15.5	20.1	22.40	NR
Biomass (gm./plant)	UE	1.34	3.25	8.05	22.60	30.70
	E	1.00	2.14	5.15	13.70	17.58
RGR (mg./gm./day)	UE	24.3	34.6	86.9	264.0	146.7
	E	18.0	21.0	54.5	155.0	70.0
NAR (mg./cm^2/day)	UE	.0067	.0201	.055	.035	.024
	E	.0039	.0067	.023	.0047	.003

Values are average of five observations

sd in : Root length is not more than ± 1.60
Shoot length is not more than ± 1.46
No. of leaves is not more than ± 0.98
Total leaf area is not more than ± 18.92
Biomass is not more than ± 1.07
Injury index, RGR & NAR is insignificant

Oryza sativa Linn.

31.2. Biochemical Paramaters

Paramaters		Age of the plants in days				
		20	40	60	80	100
Chlorophyll-a (mg/gm.fr.wt)	UE	2.35	2.87	2.97	2.67	-
	E	1.92	2.21	2.28	1.75	-
Chlorophyll-b (mg./gm.fr.wt.)	UE	2.02	2.20	2.60	2.38	
	E	1.88	1.92	2.16	1.78	
Protein (mg./gm.fr.wt.)	UE	18.60	24.70	29.35	20.70	
	E	15.75	19.27	22.00	20.88	
Ascorbic acid (mg./gm.fr.wt.)	UE	0.279	0.299	0.368	0.347	
	E	0.216	0.224	0.236	0.220	
Soluble sugars (mg./gm.dry.wt)	UE	19.67	23.75	27.60	32.46	31.90
	E	16.24	19.41	21.65	23.18	21.46
Reducing sugars (mg./gm. dry.wt.)	UE	9.95	14.36	18.65	21.25	19.5
	E	11.90	17.80	23.70	28.92	27.0
Sulphur in lvs (mg./gm.dry.wt)	UE	2.01	2.15	2.18	2.28	2.29
	E	4.68	5.29	5.54	6.02	6.99
Sulphur in soil (mg./gm.dry.wt.)	UE	0.14	0.14	0.14	0.15	0.15
	E	0.11	0.16	0.17	0.19	0.20

Values are average of 5 observations

sd in : Bio-chemical parameters is not more than $\pm$ 1.76

Table 32 : Zea mays Linn.

32.1 Growth Parameters

Parameters		Age of the plants in days 20	40	60	80	100
Root length (cm/plant)	UE	20.00	26.3	35.6	42.4	-
	E	19.4	24.5	32.0	34.4	-
Shoot length (cm/plant)	UE	16.7	55.6	76.7	88.6	
	E	15.5	50.4	62.5	64.4	
Number of leaves (/ plant)	UE	7.0	8.5	12.4	13.5	
	E	6.0	7.0	10.0	10.0	
Total leafarea (cm^2 / plant)	UE	509.84	1150.47	2856.70	3147.84	
	E	479.64	1008.92	2250.45	2300.52	
Injury index (%)		ND	3.67	12.40	15.75	NR
Biomass (mg./gm. dry.wt)	UE	3.80	10.85	21.6	32.40	40.70
	E	3.55	9.05	16.68	24.45	28.56
RGR (mg./gm./day)		68.84	127.89	194.96	195.64	150.35
		64.13	99.63	138.40	140.93	74.63
NAR ($mg/cm^2/day$)		.0351	.0819	.332	.070	
		.0307	.043	.171	.007	

All values are average of 5 observations

sd in : Root length is not more than $\pm$ 1.14
Shoot length is not more than $\pm$ 1.21
Total leaf area is not more than $\pm$ 12.50
Total no. of leaves is not more than $\pm$ 0.75
Biomass is not more than $\pm$ 0.97
Injury index, RGR & NAR is insignificant

Table 32 : Zea mays Linn.

32.2 Biochemical Parameters

Parameters		Age of the plants in days 20	40	60	80	100
Chlorophyll-a (mg/gm. fr.wt.)	UE	1.75	2.46	3.06	3.46	2.75
	E	1.55	1.98	2.07	2.17	1.67
Chlorophyll-b (mg./gm. fr.wt.)	UE	0.99	1.55	1.77	1.85	1.62
	E	0.87	1.35	1.47	1.52	1.31
Protein (mg./gm fr.wt.)	UE	25.46	29.19	32.48	34.82	32.63
	E	22.18	23.50	25.84	26.65	24.39
Ascorbic acid (mg./gm. fr.wt.)	UE	0.76	0.81	1.05	1.44	1.38
	E	0.67	0.69	0.795	0.998	0.918
Soluble sugars (mg./gm. dry.wt)	UE	25.75	29.55	33.90	34.50	35.0
	E	23.26	25.60	28.76	29.16	29.50
Reducing sugars (mg./gm. dry.wt.)	UE	15.70	18.40	20.65	21.07	22.50
	E	20.85	24.65	27.80	28.45	31.86
Sulphur in/vs (mg./gm. dry.wt.)	UE	1.98	2.05	2.13	2.19	2.31
	E	3.08	3.48	3.79	4.06	4.37
Sulphur in soil (mg./gm.dry.wt.)	UE	0.15	0.18	0.20	0.21	0.22
	E	0.16	0.20	0.24	0.26	0.28

All the values are average of 5 observations

sd in : Biochemical parameters is not more than $\pm$ 2.27

Table 33: Yield

33.1 *Triticum aestivum* Linn.

SO_2 Conc. in ppm	Length of ears in gm	No. of ears/ plant	No. of grains/ ear	Wt. of grain/ plant(gm)	No. of grains/ M^2	Wt. of 1000 grains (gm)	Wt. of grains / M^2	Reduction
UE	9.8	5	48	9.63	12,000	40.12	0.481	-
E (0.2)	9.2	2	40	2.40	4,000	30.00	0:120	75.01

33.2 *Oryza sativa* Linn.

UE	11.2	12	246	23.51	147600	7.965	1175.63	-
E (0.2)	10.7	7	186	10.56	65100	5.890	383.44	67.39

33.3 *Zea mays* Linn.

SO_2 Conc. in ppm	No.of Cobs/ plant	Length of Cob in cms	Wt. of Cobs with covering (g)	Wt. of Cob without covering (g)	Total No. of grains/ cob	Wt. of 1000 grains (gms)	Kg/100M^2	Reduction %
UE	2	30.6	211.75	165.77	401	152.60	195.82	-
E (0.2)	1	30.2	205.49	158.42	386	115.37	71.25	63.61

MITIGATION OF POLLUTION DAMAGE UNDER SIMULATED CONDITIONS

(Tables '34 - '47)

UTUE = Untreated and unexposed

T_1 = Treated with 0 005 M ascorbic acid & unexposed

T_2 = Treated with 0 0075 M ascorbic acid & unexposed

T_3 = Treated with 0.01 M ascorbic acid & unexposed

T_1E = Treated with 0.005 M ascorbic acid & exposed

T_2E = Treated with 0.0075 M ascorbic acid & exposed

T_3E = Treated with 0.01 M ascorbic acid & exposed

UTE = Untreated and exposed

ND = No damage

NR = Observation not recorded

Table 34 : **Root length (cm/plant)**

34.1 Triticum aestivum Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	6.5	8.4	10.7	14.6
T_1	6.6	8.7	11.2	15.3
T_2	6.7	8.8	11.5	15.7
T_3	6.8	8.9	11.7	16.0
UTE	6.3	8.1	10.0	12.2
T_1E	6.35	8.25	10.2	12.8
T_2E	6.4	8.3	10.4	13.0
T_3E	6.4	8.3	10.5	13.4

34.2 Oryza sativa Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	6.2	11.4	15.0	19.6
T_1	6.5	12.0	16.0	21.2
T_2	6.7	12.5	16.6	22.0
T_3	7.0	12.8	16.9	22.4
UTE	5.6	10.2	13.4	16.0
T_1E	5.8	10.6	14.0	17.9
T_2E	5.9	11.0	14.6	18.2
T_3E	6.0	11.2	14.8	18.6

34.3 Zea mays Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	28.5	41.0	42.5	44.6
T_1	30.4	44.4	46.4	49.5
T_2	31.9	46.5	48.3	52.5
T_3	32.8	47.9	50.8	54.6
UTE	24.6	33.8	34.9	35.8
T_1E	26.4	36.5	38.3	40.2
T_2E	27.2	37.6	39.7	41.8
T_3E	27.5	39.0	40.8	42.6

All the values are average of 5 observations

sd is not more than $\pm$ 1.08

Table 35 : **Shoot length** (cm/plant)

35.1 *Triticum aestivum* Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	23.4	42.4	70.0	95.0
T_1	24.7	45.9	76.8	108.5
T_2	25.9	48.6	80.6	112.9
T_3	26.4	49.5	82.4	120.0
UTE	21.5	36.7	56.6	74.8
T_1E	22.0	37.9	58.8	82.5
T_2E	22.6	38.8	60.4	84.6
T_3E	23.0	39.9	62.6	89.2

sd is not more than ± 1.74

35.2 *Oryza sativa* Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	20.06	42.5	85.4	99.6
T_1	21.0	45.4	92.4	108.5
T_2	21.8	46.2	93.5	109.5
T_3	22.6	48.3	97.2	114.0
UTE	18.2	37.5	72.4	81.3
T_1E	18.7	40.0	79.5	90.4
T_2E	18.9	40.6	82.4	93.5
T_3E	19.0	41.0	84.6	95.6

sd is not more than ± 1.64

35.3 *Zea mays* Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	32.0	61.4	109.8	135.6
T_1	32.6	63.5	114.6	142.5
T_2	33.0	64.0	114.2	143.6
T_3	33.5	64.8	116.4	144.4
UTE	29.8	56.5	98.2	120.5
T_1E	30.0	57.0	100.5	123.4
T_2E	30.4	58.4	103.8	127.5
T_3E	30.8	59.2	104.6	128.9

sd is not more than ± 1.83

All the values are average of 5 observations

Table 36 : **Number of leaves** (/ plant)

36.1 Triticum aestivum Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	8.0	15.0	20.0	21.0
T_1	8.2	15.5	21.5	22.9
T_2	8.9	16.9	23.0	24.5
T_3	9.3	17.8	24.2	26.2
UTE	17.0	11.0	14.5	14.8
T_1E	7.5	12.0	16.2	17.2
T_2E	7.5	12.5	17.4	17.9
T_3E	7.5	13.0	18.0	18.5

36.2 **Oryza sativa** Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	15.0	40.0	53.0	58.0
T_1	16.0	43.0	57.0	63.0
T_2	16.0	44.0	59.0	65.0
T_3	16.0	45.0	59.5	66.0
UTE	14.0	33.0	42.0	45.0
T_1E	14.2	35.0	45.0	49.0
T_2E	14.4	36.0	47.0	51.0
T_3E	14.7	37.0	48.0	52.0

36.3 **Zea mays** Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	8.0	9.0	11.0	12.0
T_1	9.0	10.0	12.0	14.0
T_2	10.0	11.0	12.0	14.0
T_3	10.0	11.0	12.0	14.0
UTE	6.0	7.0	9.0	10.0
T_1E	7.0	8.0	11.0	11.0
T_2E	8.0	8.0	9.0	12.0
T_3E	8.0	9.0	11.0	12.0

All the values are average of 5 observations
sd is not more than $\pm$ 0.71

Table 37 : Total leaf area (cm^2/plant)

38.1 **Triticum aestivum** Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	186.80	298.90	645.65	850.40
T_1	195.46	339.45	742.50	984.75
T_2	197.20	347.68	756.65	999.45
T_3	199.48	354.25	782.41	1027.35
UTE	169.70	256.65	517.50	648.60
T_1 E	178.30	280.79	583.49	734.85
T_2E	189.54	292.70	598.38	780.63
T_3E	194.72	296.81	602.40	771.80

37.2 **Oryza sativa** Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	266.8	840.7	1536.5	1595.7
T_1	279.7	885.6	1647.5	1798.4
T_2	289.4	930.4	1708.7	1864.4
T_3	302.5	957.9	1782.9	1926.5
UTE	230.2	716.9	1240.7	1921.4
T_1E	240.6	754.8	1315.5	1375.0
T_2E	244.7	778.9	1370.6	1446.6
T_3E	250.7	785.4	1382.8	1490.2

37.3 **Zea mays** Linn.

Treatments	Age of the plants in days				
	20	40	60	80	100
UTUE	887.5	1095.57	2956.4	3199.5	3492.40
T_1	893.02	1198.40	3320.8	3602.8	3949.67
T_2	935.17	1207.65	3324.4	3635.5	3968.50
T_3	930.26	1213.30	3390.2	3685.8	4065.27
UTE	854.0	984.23	2540.8	2664.5	2901.59
T_1E	875.5	1016.0	2680.8	2817.80	3150.18
T_2E	898.9	1074.9	2776.8	2957.62	3305.32
T_3E	915.06	1095.0	2845.9	3015.91	3390.26

sd is not more than ± 9.01

All the values are average of 5 observations

Table 38: Biomass (mg/gm.dry wt.)

38.1 Triticum aestivum Linn.

Treatments	Age of the plants in days				
	20	40	60	80	100
UTUE	4.0	10.5	21.6	39.57	53.27
T_1	4.3	11.6	24.5	45.60	62.54
T_2	4.5	12.0	25.2	47.85	65.06
T_3	4.6	12.5	26.9	50.0	69.50
UTE	3.6	8.4	17.0	27.50	35.45
T_1E	3.8	8.9	18.5	30.80	42.70
T_2E	3.9	9.2	19.7	34.50	47.05
T_3E	4.0	9.4	20.4	37.81	49.68

38.2 Oryza sativa Linn.

Treatments	Age of the plants in days				
	20	40	60	80	100
UTUE	1.50	4.75	8.70	22.85	32.25
T_1	1.57	5.05	9.30	25.45	36.05
T_2	1.62	5.32	10.0	26.60	38.50
T_3	1.70	5.55	10.25	27.30	38.95
UTE	1.35	3.85	6.75	16.65	22.45
T_1E	1.40	4.10	7.25	19.22	26.89
T_2E	1.44	4.18	7.60	19.80	27.05
T_3E	1.47	4.24	7.84	20.10	27.40

38.3 Zea mays Linn.

Treatments	Age of the plants in days				
	20	40	60	80	100
UTUE	4.0	6.87	22.70	35.45	43.71
T_1	4.2	7.38	25.15	39.42	48.90
T_2	4.3	7.60	25.60	40.20	50.25
T_3	4.4	7.75	26.25	41.36	52.20
UTE	3.5	5.9	19.05	28.50	34.70
T_1E	3.6	6.2	20.70	31.24	39.30
T_2E	3.65	6.45	20.90	31.70	40.26
T_3E	3.72	6.50	21.10	32.00	41.70

sd is not more than $\pm$ 2.24

All values are average of 5 observations

Table 39 : Relative Growth Rate (mg/gm/day)

39.1 Triticum aestivum Linn.

Treatments	Age of the plants in days				
	0-20	20-40	40-60	60-80	80-100
UTUE	72.46	117.7	201.08	325.70	248.18
T_1	77.89	132.2	233.68	306.9	306.89
T_2	81.52	135.9	239.12	409.39	311.58
T_3	83.33	143.1	260.86	420.27	353.24
UTE	65.21	86.90	155.79	190.20	144.20
T_1E	68.84	92.38	173.90	222.81	215.57
T_2E	70.65	96.01	190.21	268.10	227.52
T_3E	72.46	97.82	199.27	315.20	215.21

39.2 Oryza sativa Linn.

Treatments	Age of the plants in days				
	20	40	60	80	100
UTUE	27.17	59.05	71.73	257.0	170.0
T_1	28.44	63.04	77.17	293	192
T_2	29.35	67.03	67.03	301	216
T_3	32.06	68.47	68.48	309	211
UTE	24.46	45.29	63.40	179	105
T_1E	25.36	48.91	57.24	217	136
T_2E	26.09	49.64	61.95	221	132
T_3E	26.81	50.36	65.21	222	132

39.3 Zea mays Linn.

Treatments	Age of the plants in days				
	20	40	60	80	100
UTUE	72.46	52.17	286.9	231.1	149.6
T_1	76.08	55.79	322.0	258.6	171.7
T_2	78.25	59.79	326.0	264.4	182.2
T_3	79.70	60.86	335.1	273.8	196.3
UTE	63.40	43.47	238.3	171.3	112.3
T_1E	65.21	47.09	262.6	190.9	146.0
T_2E	67.38	50.72	261.9	195.6	155.0
T_3E	67.38	50.35	261.9	197.4	175.7

Table 40:**Net Assimilation Rate**

40.1 **Triticum aestivum** Linn.

Treatments	Age of plants in days			
	20	40	60	80
UTUE	13.54	13.20	69.72	66.69
T_1	15.23	19.04	94.19	92.59
T_2	16.08	19.44	97.79	99.67
T_3	16.62	22.15	111.69	102.48
UTE	11.07	7.56	40.64	24.94
T_1E	12.27	9.40	52.64	33.73
T_2E	13.39	9.47	58.14	48.86
T_3E	14.11	9.91	61.17	59.70

40.2 **Oryza sativa** Linn

Treatments	Age of plants in days			
	20	40	60	80
UTUE	7.25	33.89	49.71	15.89
T_1	8.01	38.20	58.80	44.17
T_2	8.49	42.96	65.98	46.82
T_3	9.32	45.83	70.24	44.37
UTE	5.59	22.04	27.52	9.09
T_1E	6.10	25.15	32.10	12.91
T_2E	6.38	26.52	41.79	16.79
T_3E	6.68	26.92	38.96	23.85

40.3 **Zea mays** Linn

Treatments	Age of plants in days				
	20	40	60	80	100
UTUE	64.31	10.86	533.94	56.20	43.83
T_1	67.94	16.29	683.60	72.94	59.57
T_2	72.84	17.23	690.21	80.97	60.69
T_3	74.15	17.59	729.54	82.28	74.51
UTE	54.15	5.67	371.07	21.33	26.37
T_1E	57.09	15.78	437.28	26.16	48.53
T_2E	59.60	20.60	445.79	33.57	53.97
T_3E	61.66	21.19	463.08	35.38	65.76

Calculated from average values

Table 41: Chlorophyll-a (mg./gm. fresh wt.)

41.1 : Triticum aestivum Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	0.96	2.25	2.37	2.08
T_1	1.00	2.46	2.69	2.57
T_2	1.10	2.59	2.80	2.68
T_3	1.14	2.75	2.99	2.79
UTE	0.91	1.70	1.66	1.45
T_1E	0.95	1.86	1.92	1.73
T_2 E	0.97	2.15	2.15	1.89
T_3E	1.00	2.16	2.20	1.98

41.2 Oryza sativa Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	1.82	2.16	2.95	2.58
T_1	1.91	2.36	3.35	3.00
T_2	1.95	2.49	3.59	3.25
T_3	1.98	2.56	3.65	3.30
UTE	1.56	1.76	2.05	1.80
T_1E	1.67	1.96	2.42	2.27
T_2E	1.69	2.00	2.49	2.31
T_3E	1.75	2.16	2.58	2.36

41.3 Zea mays Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	1.95	2.16	3.06	2.82
T_1	2.06	2.35	3.33	3.13
T_2	2.12	2.43	3.53	3.27
T_3	2.17	2.49	3.61	3.36
UTE	1.66	1.81	2.46	2.15
T_1E	1.74	1.95	2.66	2.41
T_2E	1.78	2.00	2.75	2.57
T_3E	1.89	2.15	2.97	2.61

All the values are average of 5 observations

sd is not more than $\pm$ 1.37

Table 42 : Chlorophyll -b (mg./gm.fresh)

42.1 Triticum aestivum Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	0.80	0.96	1.00	0.93
T_1	0.85	1.08	1.13	1.08
T_2	0.86	1.11	1.18	1.10
T_3	0.87	1.13	1.21	1.18
UTE	0.71	0.80	0.82	0.75
T_1E	0.74	0.85	0.90	0.87
T_2E	0.76	0.88	0.93	0.89
T_3E	0.77	0.92	0.96	0.90

42.2 Oryza sativa Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	1.01	1.13	1.50	1.38
T_1	1.04	1.20	1.58	1.48
T_2	1.08	1.23	1.69	1.60
T_3	1.10	1.26	1.71	1.65
UTE	0.86	0.95	1.25	1.12
T_1E	0.90	1.00	1.33	1.24
T_2E	0.93	1.10	1.45	1.31
T_3E	0.96	1.11	1.47	1.35

42.3 Zea mays Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	1.21	1.55	1.98	2.85
T_1	1.27	1.65	2.14	2.00
T_2	1.28	1.69	2.22	2.09
T_3	1.31	1.75	2.27	2.15
UTE	1.10	1.39	1.64	1.52
T_1E	1.13	1.46	1.76	1.64
T_2E	1.17	1.50	1.82	1.70
T_3E	1.20	1.52	1.88	1.76

All the values are average of 5 observations
sd is not more than $\pm$ 0.81

Table 43: Total Soluble Sugars (mg./gm.dry wt.)

43.1 Triticum aestivum Linn.

Treatments	Age of the plants in days				
	20	40	60	80	100
UTUE	12.64	17.98	24.82	33.50	35.47
T_1	13.58	19.86	27.80	37.79	40.36
T_2	13.70	20.17	28.71	38.95	41.68
T_3	13.90	20.64	29.26	39.47	42.94
UTE	10.56	14.86	18.66	24.80	25.68
T_1E	11.74	16.90	21.26	28.38	29.49
T_2E	12.48	17.68	22.76	30.82	32.71
T_3E	12.80	18.29	23.50	31.56	33.68

43.2 Oryza sativa Linn.

Treatments	Age of the plants in days				
	20	40	60	80	100
UTUE	18.57	23.76	28.49	29.56	31.77
T_1	19.74	25.32	30.57	31.89	34.37
T_2	20.67	26.65	32.40	33.97	36.79
T_3	21.32	27.34	33.18	34.86	37.74
UTE	16.69	20.30	23.47	24.17	25.65
T_1E	17.78	21.80	25.64	27.27	29.36
T_2E	18.49	22.51	26.70	27.84	30.25
T_3E	19.58	24.79	28.82	29.96	32.59

43.3 Zea mays Linn.

Treatments	Age of the plants in days				
	20	40	60	80	100
UTUE	10.51	12.67	15.76	23.64	28.50
T_1	11.15	14.20	18.00	27.21	33.48
T_2	11.87	14.96	19.25	28.94	34.98
T_3	12.43	15.13	19.84	29.81	36.50
UTE	8.89	10.45	12.56	17.87	21.0
T_1E	9.02	10.92	13.35	19.25	22.86
T_2E	9.27	11.00	13.70	19.97	23.88
T_3E	9.36	11.30	14.09	20.45	24.92

All the values are average of 5 observations
sd is not more than $\pm$ 1.06

Table 44 : **Protein** (mg./gm. fresh wt.)

44.1 **Triticum aestivum** Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	15.25	19.46	23.57	25.64
T_1	16.49	21.45	26.43	29.14
T_2	17.09	22.62	28.52	31.38
T_3	17.78	24.48	29.71	32.78
UTE	12.26	15.37	17.39	18.42
T_1E	13.04	16.87	19.25	20.56
T_2E	13.81	17.44	20.64	22.89
T_3E	14.64	18.39	21.18	23.57

44.2 **Oryza sativa** Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	20.36	23.27	27.75	32.84
T_1	21.57	25.10	30.43	36.70
T_2	22.49	26.74	32.40	38.43
T_3	23.30	27.56	33.27	39.56
UTE	17.57	18.85	22.40	24.63
T_1E	18.64	20.80	24.79	27.38
T_2E	19.40	21.74	25.87	29.46
T_3E	19.89	22.46	26.86	30.07

44.3 **Zea mays** Linn.

Treatments	Age of the plants in days			
	20	40	60	80
UTUE	26.47	29.67	32.29	35.73
T_1	27.23	30.54	34.14	37.81
T_2	28.78	32.46	35.60	38.39
T_3	29.16	33.29	37.17	41.49
UTE	21.84	23.79	25.79	27.60
T_1E	22.48	24.62	26.71	29.19
T_2E	23.87	26.28	28.84	30.92
T_3E	24,52	27.30	29.86	32.07

All the values are average of 5 observations

not more than $\pm$ 0.66

Table 45 : Ascorbic acid (mg./gm./fresh wt.)

45.1 Triticum aestivum Linn.

Treatments	Age of the plants in days				
	20	40	60	80	100
UTUE	0.206	0.268	0.308	0.330	0.311
T_1	0.219	0.296	0.345	0.372	0.356
T_2	0.228	0.310	0.362	0.389	0.371
T_3	0.234	0.334	0.380	0.409	0.393
UTE	0.174	0.205	0.224	0.238	0.216
T_1E	0.180	0.214	0.263	0.282	0.265
T_2E	0.190	0.236	0.275	0.296	0.270
T_3E	0.198	0.251	0.282	0.300	0.280

45.2 Oryza sativa Linn.

Treatments	Age of the plants in days				
	20	40	60	80	100
UTUE	0.305	0.339	0.368	0.390	0.319
T_1	0.324	0.362	0.396	0.433	0.371
T_2	0.340	0.381	0.424	0.469	0.407
T_3	0.345	0.396	0.446	0.492	0.436
UTE	0.266	0.270	0.281	0.285	0.248
T_1E	0.275	0.294	0.298	0.318	0.314
T_2E	0.283	0.296	0.327	0.344	0.345
T_3E	0.289	0.317	0.349	0.361	0.358

45.3 Zea mays Linn.

Treatments	Age of the plants in days				
	20	40	60	80	100
UTUE	0.58	0.84	1.24	1.39	1.84
T_1	0.60	0.87	1.33	1.52	2.06
T_2	0.64	0.91	1.45	1.64	2.21
T_3	0.68	0.99	1.50	1.70	2.29
UTE	0.49	0.68	0.98	1.07	1.35
T_1E	0.52	0.74	1.10	1.22	1.58
T_2E	0.55	0.79	1.15	1.26	1.62
T_3E	0.58	0.82	1 .19	1.33	1.68

All the values are average of 5 observations

sd is not more than + 0.49

Table 46: Sulphur (mg/gm. dry wt.)

46.1 *Triticum aestivum* Linn.

Treatments	Age of the plants in days				
	20	40	60	80	100
UTUE	1.54	1.94	2.31	2.43	2.50
T_1	1.48	1.83	2.04	2.12	2.15
T_2	1.43	1.77	1.88	1.96	1.99
T_3	1.39	1.72	1.79	1.84	1.88
UTE	2.80	3.94	4.89	5.36	5.94
T_1E	2.67	3.70	4.47	4.89	5.27
T_2E	2.58	3.49	4.12	4.36	4.68
T_3E	2.40	3.17	3.88	4.13	4.34

46.2 *Oryza sativa* Linn.

Treatments	Age of the plants in days				
	20	40	60	80	100
UTUE	1.64	1.97	2.35	2.39	2.45
T_1	1.59	1.85	2.11	2.14	2.18
T_2	1.51	1.78	2.04	2.07	2.12
T_3	1.47	1.70	1.96	1.99	2.03
UTE	2.48	2.75	4.65	4.80	4.99
T_1E	2.18	2.32	3.87	3.95	4.00
T_2E	2.02	2.16	3.59	3.70	3.80
T_3E	1.91	2.04	3.42	3.49	3.59

46.3 *Zea mays* Linn.

Treatments	Age of the plants in days				
	20	40	60	80	100
UTUE	2.05	2.25	2.47	2.78	3.50
T_1	1.94	2.19	2.36	2.59	3.15
T_2	1.86	2.09	2.28	2.48	3.09
T_3	1.80	1.99	2.18	2.41	2.99
UTE	3.08	3.56	3.98	4.57	5.79
T_1E	2.90	3.08	3.41	3.89	4.89
T_2E	2.79	2.95	3.27	3.68	4.63
T_3E	2.64	2.86	3.12	3.56	4.48

All the values are average of 5 observations

sd is not nore than $\pm$ 0.93

Table 47 : Yield

47.1 Triticum aestivum Linn.

	Number of ears /plant	Length of ear	Number of ears /plant	Number of grains /ear	Total grains M^2	Wt. of 1000 grains in gms	Kg./100M^2	% Recovery
UTUE	20	15.4	640	35	22400	42.76	95.78	-
T_1	22	15.5	704	37	26048	45.20	117.74	22.93
T_2	25	15.8	768	39	29952	46.75	140.03	46.20
T_3	24	15.3	800	43	34400	47.30	162.71	69.88
UTE	10	10.8	320	25	8000	35.75	28.60	31.05
T_1E	12	10.9	384	27	10368	36.15	37.48	52.73
T_2E	13	11.3	416	28	11648	37.50	43.68	56.40
T_3E	13	11.8	416	28	11648	38.40	44.73	70.14
47.2	**Oryza**	**sativa** Linn						
UTUE	12.0	14.0	384	35	13440	34.80	46.77	-
T_1	13.0	14.4	416	38	15808	35.00	55.33	18.30
T_2	14.0	14.3	450	40	17920	36.25	64.96	38.89
T_3	15.0	14.5	448	40	18000	36.50	65.70	40.47
UTE	8.0	10.5	256	27	6912	29.50	20.39	56.40
T_1E	9.0	11.4	286	29	8352	30.0	29.22	22.90
T_2E	9.0	11.9	288	32	9216	31.70	29.22	43.31
T_3E	10.0	12.5	300	33	6912	32.40	32.08	57.33

47.3 **Zea mays** Linn

	No. of cobs/ plant	Wt. of cobs with covering (g.)	Wt. of cobs wihtout covering (g.)	Total no.of grains/ cob	Wt. of 1000 grains (g.)	No.of grains/ 100 M^2	Kg/100M^2	% Reduction
UTUE	2	215.70	168.78	405	154.79	12960	200.61	-
T_1	2	218.45	173.35	419	157.72	13408	211.47	5.51
T_2	2	215.64	175.64	431	160.66	13792	221.56	10.46
T_3	2	220.40	176.42	435	162.72	13920	226.51	12.91
UTE	1	176.76	143.84	365	128.50	5840	75.04	62.59
T_1E	1	180.40	146.72	392	146.60	6272	91.95	22.53
T_2E	1	182.66	149.39	395	148.32	6320	93.74	24.92
T_3E	1	185.70	152.50	398	150.34	6368	95.74	27.59

MITIGATION OF POLLUTION DAMAGE UNDER FIELD CONDITIONS

Triticum aestivum Linn

(Tables 48 - 53)

C = Untreated with any chemical

A_1 = Treated with 0.005 M ascorbic acid

A_2 = Treated with 0 01 M ascorbic acid

A_3 = Treated with 0 02 M ascorbic acid

U_1 = Treated with 0.16 M urea

U_2 = Treated with 0 32 M urea

U_3 = Treated with 0.64 M urea

ND = No damage

Table 48 : Triticum aestivum Linn.

48.1 Root length (cm./plant)

Treatments	Age of the plants in days 20	40	60	80
C	9.7	12.0	15.2	15.3
A_1	9.9	12.5	16.0	16.4
A_2	10.8	13.5	17.9	19.5
A_3	10.2	13.0	17.4	18.6
U_1	10.5	13.0	17.4	19.6
U_2	10.8	13.6	19.2	21.3
U_3	11.2	14.4	20.5	22.7

sd is not more than ± 0.91

48.2 Shoot length (cm / plant)

C	26.7	48.9	75.8	77.9
A_1	30.5	59.7	94.5	98.6
A_2	35.3	65.8	102.8	106.5
A_3	34.6	64.5	101.5	105.9
U_1	32.6	61.5	95.7	98.9
U_2	35.9	66.0	102.4	106.6
U_3	36.8	67.9	105.5	109.5

sd is not more than ± 0.95

48.3 Number of leaves (/ plant)

C	10	19.0	24.0	30.0
A_1	10.6	20.6	26.5	34.5
A_2	12.0	23.0	30.0	37.8
A_3	11.5	22.0	28.0	35.0
U_1	11.5	22.0	30.0	35.0
U_2	11.8	23.0	29.5	37.5
U_3	12.5	24.5	31.8	40.0

sd is not more than ± 0.38

All values are average of 8 observations

Table 49 : Triticum aestivum Linn.

49.1 Total leaf area (cm^2/ plant)

Treatments	Age of the plants in days				
	20	40	60	80	100
C	169.8	260.40	485.7	650.7	
A_1	179.4	284.9	548.54	746.28	
A_2	195.4	299.74	597.38	815.26	
A_3	184.6	292.65	578.92	781.84	
U_1	180.6	285.42	550.21	749.40	
U_2	189.7	295.67	582.27	796.57	
U_3	197.8	304.49	604.78	815.13	

sd is not more than 19.47

49.2 : Biomass (gm/plant)

C	4.0	9.5	16.8	29.2	32.0
A_1	4.2	10.0	18.4	32.5	35.7
A_2	4.5	11.05	19.64	34.21	37.9
A_3	4.25	10.6	18.8	33.40	36.8
U_1	4.3	10.4	18.8	32.8	36.0
U_2	4.36	10.9	19.4	33.82	37.1
U_3	4.70	11.26	20.05	34.89	38.5

sd ia not more than $\pm$ 1.84

49.3 Injury index (%)

C	4.6	8.5	12.6	17.9
A_1	ND	ND	6.4	10.4
A_2	ND	ND	5.0	7.9
A_3	ND	ND	ND	5.0
U_1	ND	ND	7.0	8.6
U_2	ND	ND	ND	4.2
U_3	ND	ND	ND	ND

All values are average of 8 observations

Table 50: Triticum aestivum Linn.

50.1 Relative growth rate (mg./gm./day)

Treatments	Age of the plants in days				
	0-20	20-40	40-60	60-80	80-100
C	72.5	99.6	132.2	224.6	50.7
A_1	76.0	105.0	149.0	255.0	58.0
A_2	81.5	119.0	156.0	264.0	66.8
A_3	77.0	115.0	152.0	264.0	61.6
U_1	77.9	110.0	152.0	254.0	58.0
U_2	79.0	118.0	154.0	258.0	63.0
U_3	85.0	119.0	159.0	269.0	65.4

Calculated from average values

50.2 Net assimilation rate ($mg/cm^2/day$)

C	0.012	0.009	0.030	0.037
A_1	0.0137	0.011	0.040	0.048
A_2	0.0037	0.012	0.0464	0.0549
A_3	0.014	0.0144	0.043	0.053
U_1	0.014	0.011	0.040	0.048
U_2	0.0149	0.0126	0.044	0.053
U_3	0.0168	0.0127	0.0478	0.0632

Calculated from average values

50.3 Protein (mg / g. fresh wt.)

C	16.35	18.40	19.0	17.20
A_1	17.0	19.17	19.97	18.76
A_2	18.65	21.07	22.0	20.50
A_3	18.0	20.84	21.57	19.64
U_1	17.20	19.56	20.29	19.0
U_2	18.17	20.90	21.66	20.14
U_3	18.74	21.32	22.45	20.87

sd is not more than $\pm$ 0.91

All values are average of 8 observations

Table 51 : Triticum aestivum Linn.

51.1 Chlorophyll - a (mg/gm. fresh wt.)

Treatments	Age of the plants in days			
	20	40	60	80
C	0.98	2.53	2.60	2.04
A_1	1.02	2.69	2.89	2.36
A_2	1.26	3.30	3.39	2.76
A_3	1.12	2.90	3.11	2.56
U_1	1.02	2.69	2.89	2.45
U_2	1.13	2.95	3.26	2.69
U_3	1.20	3.35	3.48	2.85

sd is not more than ± 0.41

51.2 Chlorophyll-b (mg./gm.fresh et.)

C	0.85	0.94	0.98	0.90
A_1	0.86	0.97	1.05	0.98
A_2	0.91	1.11	1.22	1.15
A_3	0.90	0.99	1.11	1.09
U_1	0.87	0.96	1.07	0.99
U_2	0.90	1.02	1.12	1.10
U_3	0.93	1.15	1.23	1.15

sd is not more than ± 0.42

51.3 Total Chlorophylll (mg./gm.fresh wt.)

Treatments				
C	3.05	5.24	5.76	5.39
A_1	3.12	5.49	6.15	5.86
A_2	3.44	5.98	6.60	6.22
A_3	3.30	5.76	6.36	5.97
U_1	3.16	5.49	6.16	5.87
U_2	3.35	5.89	6.52	6.21
U_3	3.51	6.08	6.80	6.54

not more than ± 0.52

Table 52 : *Triticum aestivum* Linn.

52.1 Ascorbic acid (mg/gm. fresh wt.)

Treatments	Age of the plants in days				
	20	40	60	80	100
C	0.205	0.251	0.334	0.306	
A_1	0.219	0.279	0.388	0.360	
A_2	0.260	0.327	0.457	0.425	
A_3	0.242	0.306	0.417	0.385	
U_1	0.214	0.265	0.355	0.326	
U_2	0.220	0.278	0.382	0.352	
U_3	0.232	0.285	0.392	0.365	

sd is not more than ± 0.56

52.2 Total soluble sugars (mg./gm.dry wt.)

C	10.25	12.76	13.29	18.90	20.52
A_1	10.82	13.65	14.56	21.27	23.20
A_2	11.96	15.25	16.32	24.50	27.80
A_3	11.40	14.26	15.74	23.35	25.60
U_1	11.0	13.70	14.60	22.0	24.12
U_2	11.54	15.00	15.83	23.54	25.75
U_3	12.05	15.66	16.92	25.05	28.10

sd is not more than ± 0.50

52.3 Reducing sugars (mg./gm.dry wt.)

C	10.46	11.72	13.82	17.05	20.80
A_1	9.95	11.00	12.84	15.50	18.60
A_2	9.56	10.53	11.67	14.26	17.00
A_3	9.64	10.78	12.60	15.18	18.27
U_1	9.90	10.89	12.40	15.15	17.94
U_2	9.50	10.64	12.05	14.82	17.68
U_3	9.43	10.35	11.97	14.40	17.29

sd is not more than ± 0.68

All values are average of 8 observations

Table 53 :Triticum aestivum Linn.

53.1 Sulphur (mg/gm. dry wt.)

Treatments	Age of the plants in days				
	20	40	60	80	100
C	6.05	6.47	6.67	6.89	7.05
A_1	5.55	5.68	5.83	6.01	6.11
A_2	5.38	5.49	5.63	5.74	5.84
A_3	5.46	5.57	5.73	5.89	5.99
U_1	5.44	5.62	5.72	5.89	5.96
U_2	5.38	5.51	5.65	5.78	5.83
U_3	5.19	5.43	5.53	5.65	5.76

sd is not more than ± 0.38

All values are average of 8 observations

53.2 Yield Kg/100 M^2 at harvest

Treatments	Number of ears /plant	Length of ear	Number of ear /M^2	Number of grains /ear	Weight of 1000 grains	Kg/ $100M^2$	% Recovery
UTE	14	14.0	448	38	17024	62.65	-
A_1	15	13.7	480	42	20160	75.60	20.67
A_2	16	14.6	502	47	23594	89.65	43.10
A_3	15	14.2	480	45	21600	82.40	31.52
U_1	15	14.3	480	43	20640	78.43	25.19
U_2	16	14.8	500	45	22500	85.84	37.02
U_3	17	15.0	514	49	25186	97.47	55.58