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EFFECT OF CHLORMEQUAT ON WHEAT (*Triticum aestivum* L.) UNDER DIFFERENT MOISTURE LEVELS.

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The effect of Chlormequat on wheat (cv. LU26S) under different moisture lavels was studied at the University of Agriculture, Faisalabad Pakistan. The seeds of wheat cv. LU26S were soaked in 0, 600, 1000, and 1400 ppm Chlormequat and sowed in the experimental field created three moisture levels. The plant treated with Chlormequat decreased plant height at all moisture levels while the number of tillers per plant, number of fertile tillers per plant, ear length, number of grains per ear, 1000 grain weight, yield per plot, sterile spikelets per ear and fertility ratio increased significantly in Chlormequat treated plant at all levels of moisure. On the other hand the above characters increased significantly with the increase in moisture levels. The best dose of Chlormequat was 1000 ppm and the best moisture level was third moisture level.

INTRODUCTION

There are large number of chemicals which can restrict plant height without hampering gross yield. Chlormequat (2-Chloroethyl) trimethyl ammonium chloride also known as CCC is such a chemical which is said to induce dwarfness in cereals like wheat (Braun and Wild, 1985, Nagy and Tabe, 1982) and thus preventing lodging produced increase in yield (Khan and Wasti, 1980, Gonzalez, 1983, Heyland and Thum, 1983) Chlormequat induces xeromophic characters in plants, making the plant tissues compact with greater development of mechanical tissue and increases leaf area (Baig, 1970, Kazim and Mohsin, 1980 and Adler, 1986). It reduces transpiration, (Giri and Singh, 1984) and brings about increase in osmotic pressure of cell sap (De *et al.*, 1982). Due to the development of the xeromorphic characters plants require less amount of Water (De *et al.*, 1982, Giri and Singh, 1984) Chlormequat enlarges root system of plants and allows more tillers to survive when the soil is dry (El-Damaty *et al.*, 1965). It enables plants to withstand the drought conditions (Baig 1970).

It was for the this a study was undertaken to observe the actual Chlormequat effect on growth, yield and development of wheat under different moisture levels.

MATERIALS AND METHODS

The experiment was laid out in factorial design. The experimental area was divided into three replications. Each replicate again divided into three subreplicates. Each subreplicate divided into four plots which were for 0, 600, 1000 and 1400 ppm Chlormequat treatments. The size of each plot was 16' x 12' with ten rows at a distance of one foot.

Chlormequat treatment

The seeds of wheat cv. LU26S were soaked in 0, 600, 1000 and 1400 ppm Chlormequat separately. After 24 hours, seeds were sown in the field in their respective plots. Each treatment and each moisture level had three replications. Three plots of each treatment were selected for moisture level I, three for moisture level II and similarly three for moisture level III.

Moisture levels

I. *Moisture level-I.*

The plots of each treatment (0, 600, 1000 and 1400 ppm Chlormequat) of Chlormequat treatment which were selected for moisture level I were not irrigated during the growing season.

II. *Moisture level-II (two irrigations)*

The plots of each treament of Chlormequat selected for moisture level-II were irrigrted first at 3 weeks after sowing and second at flowering stage.

III. *Moisture level-III (four irrigations)*

The plots of each treatment of Chlormequat selected for moisture level-III were given first irrigation at early vegetative stage second at late vegetative stage, third at preflowering and fourth at earing. The plant height, number of tillers per plant, number of fertile tillers per plant, ear length, number of grains per ear, 1000 grain weight, yield per plant, number of sterile spikelets per ear and fertility ratio were recorded at final harvest. The fertility ratio was calculated as No. of fertile tillers/No. of sterile tillers. The data were statistically analyzed for Duncans Multiple Range Tese for five percent level of significance (Steel and Torrie, 1960).

RESULTS AND DISCUSSION

The data in Table 1 revealed that plant height was signaficantly influenced by the various concentrations of Chlormequat. There was a progressive decrease in plant height with increasing level of Chlormequat application. Plants, grew significantly shorter than plants growing at control. It was further observed that the differences among Chlormequat concentrations were also significant. The decrease in plant height was attributed to the effect of application. These results are in confirmity to the findings of Wooley (1982) and Herbert (1982), who reported that the plant height was decreased but base diameter of the plant increased. This was due to the inhibition of gibberellin biosynthesis (El-Damaty *et al.*, 1965).

Considering the effect of moisture level, the plants treated with third moisture level grew significantly taller than second moisture level and first moisture level which also differed significantly. The variations due to different moisture levels were due to greater uptake of nutrients.

Number of tillers (fertile and sterile) per plant and number of fertile tillers per plant were significantly affected by Chlormequat at all concentrations. The plants treated with Chlormequat showed significantly more number of tillers and more fertile tillers than that of control. The difference between Chlormequat levels was also significant. These findings are in accordance with that of Khan Wasti (1930) Fraggatt *et al.* (1982) and Pikush and Sakharov (1982) also reported that application of Chlormequat inhibited auxin effect in the apical part of the plant, thus decreasing apical dominance and stimulating the release of nodes and lateral branches, however the differences among the three moisture levels were significant. The maximum number of tillers and fertile tiller per plant was observed at 1000 ppm Chlormequat and moisture level third. The results are similar to those of Giri and Singh (1984). Pikush and Sakharov (1982) found through their experiments on winter wheat by applying Chlormequat and irrigation increased number of tillers and number of fertile tillers per plant. Ear length and number of grains per ear, 1000 grain weight and total yield per plot (Table 1) were significantly influenced by Chlormequat. The maximum ear length and number of grains per ear, 1000 grain weight and total yield per plot were observed at 1000 ppm Chlormequat. The differences among moisture levelst

Table 1. *Wheat growth and yield components as affected by various CCC treatments and moisture levels.*

Treatment	Plant height (cm)	Number of tillers/ plant	Number of fertile tillers per plant	Length of the ear (cm)	Number of grains per ear	1000 grain weight	Yield per plot (g)	Sterile spike-lets	Fertility ratio
CCC									
Control	58.21a	8.60d	18.60d	12,68b	58.4b	49.24N.S	1337.7b	0.62N.S	0.94N.S
600 ppm CCC	55.70b	9.65c	10.19c	13.64a	64.0a	50.30 ,,	1677.9a	0.30 ,,	0.99 ,,
1000 ppm CCC	54.73c	10.30a	12.80a	13.16a	64.3a	51.50 ,,	1764.9a	0.04 ,,	1.00 ,,
1400 ppm CCC	53.94d	10 05b	12.0 b	13.16a	64.1a	51.35 ,,	1387,0b	0.42 ,,	0,99 ,,
Moisture levels									
I (zero irrigation)	55.3c	9.33b	10.60b	13.21N.S	62.29b	50.60N.S	1525.1b	0.33N.S	0.97N.S
II (two irrigations)	55.62b	9.39b	10.85b	13.26 ,,	62.60b	50.62 ,,	1650.1a	0.29 ,,	0.98 ,,
III (four irrigations)	56.02a	9.98a	11.26a	13.34 ,,	13.15a	50.67 ,,	1674.6a	0.30 ,,	0.99 ,,

N.S. = Non-significant

Values followed by same letter do not differ significantly at 5% level.

were also significant. The moisture level III had significantly more ear length, number of grains per ear, 1000 grain weight and total yield per plot than level II and I which were at par with each other for above mentioned characters. Similar results were reported by Giri and Singh (1984) Khan and Wasti (1980), Pikush and Sakharov (1982) who applied Chlormequat for increasing yield of irrigated winter wheat and found that Chlormequat increased ear length, number grains per ear, 1000 grain weight, and total yield.

The number of sterile spikelets per ear differed non-significanly at both Chlormequat and moisture levels. But fertility ratio was significantly more in plants treated with Chlormequat. The differences among the different Chlormequat treatments were non-significant and the fertility ratio at moisture levels was also non-significant. These results are in accordance with Pikush and Shakarov (1982).

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