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EFFECT OF SOWING DATES AND SEED TREATMENT ON GRAIN YIELD AND QUALITY OF WHEAT

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The study was conducted to ascertain a suitable planting time and seed treatment for wheat. Different planting times included November15, November 30 and December 15. The seed treatments were comprised of un-soaked, water soaked and 1% $NaHCO_3$ soaked seed. The water soaked and 1% $NaHCO_3$ seed treatments produced higher yield of 4.618 t ha^{-1} and maximum average grain yield of 5.09 t ha^{-1} was produced by sowing of wheat on November 15. Water soaked seeds sowing at November 15 was superior in all respect.
Key Words: wheat, sowing dates, seed treatment, grain yield.
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INTRODUCTION

Wheat (*Triticum aestivum* L) is an important cereal grown as food grain in the world. The grain contains 60-80 percent carbohydrates, 8-15 percent protein, 1.5-2.0 percent fat, 1.5-2.0 percent inorganic ions and vitam (B-complex & E) in small amounts (Schellenberger, 1969). In Pakistan, wheat was grown on an area of 8137 thousands hectare with total production of 18535 thousand tones and an average yield of 2278 kg ha^{-1} (Anonymous, 2005). This yield is much lower than the potential yield of any wheat variety. Seed treatment with certain salts and water give high yield than untreated wheat seeds. The seed treatment enhances the yield by enhancing germination. Water soaked seeds gave higher yields (4283 kg ha^{-1}) as stated by Akram (1992). In Pakistan main cause of low yield is late sowing of wheat. Sowing date affects the growth and yield of wheat by affecting its environment. Early sowing always gives high yield than late sowing mainly due to longer duration of growth. Each day delay in sowing from 20th November onward decreases grain yield @ 39 kg ha^{-1} (Singh and Uttam 1994).

In our country little work has been done on combined studies of sowing dates and seed treatments. With the determination of optimum sowing time and better seed treatment, we may improve the yield. The present study was, therefore, undertaken to determine optimum sowing dates and seed treatments for getting higher yields in wheat.

MATERIALS AND METHODS

Studies pertaining to the effect of seed treatments and sowing dates on the growth, yield and quality of wheat cultivars “MH-97” was carried out at the Agronomic Research Area, University of Agriculture, Faisalabad during 2005-2006. The experiment was laid out in a randomized complete block design with split plot arrangement having three replications. Net plot size measured 2m X 4m. The treatments were control, un-soaked, water soaked and 1 percent sodium bicarbonate.

Pre-sowing seed treatments were comprised with water and sodium bicarbonate solution 1 percent for 12-hours duration. The crop was sown on a well prepared seed bed with the help of single row hand drill on three different sowing dates i.e. 15 November, 30 November and 15 December in 22 cm apart rows. Urea and triple super phosphate was used as source of Nitrogen and Phosphorus respectively. Harvesting of crop was done on May 1, 2005.

Half of the N and full dose of P_2O_5 (100 kg P_2O_5 $ha^{-1)}$ was applied at the time of sowing. The remaining half of the N was broadcasted in two equal splits with first and second irrigation. All other agronomic practices were kept normal and uniform for all the treatments. The crop was harvested manually on 15 April 2006.

The data on the following parameters were recorded during the course of study. The observation regarding plant height at maturity (cm), total number of fertile tillers (m^{-2}), Average spike length (cm), Number of grains per spike, 1000 grains weight (g), grain yield (t ha^{-1}). 20 tillers were selected at random from each plot and height was recorded by meter rod. Total numbers of fertile tillers were taken at random from each. Plot from 1 m^2 area and then average was recorded. The grains separated by thrashing manually to know the grain yield of each plot and then converted into t/hac. Micro kieldahls’ apparatus (Jackson 1960) was used to record grain protein percentage. Data collected were analyzed statistically using the fisher analysis of variance. Techniques and treatments means were compared for significance by using LSD Test at 0.0.5 (Steel and Torrie, 1984).

RESULTS AND DISCUSSIONS

Grain yield (t ha^{-1})

It is evident from tables that seed treatments did not affect grain yield of wheat significantly. Seed treated with $NaHCO_3$ and water produced same grain yield (4.618 t ha^{-1}) as produced by un-treated seeds (4.617 t ha^{-1}). According to metrological data, just before harvesting, rain accompanied with high speed wind has occurred and crop lodged. The plants treated with $NaHCO_3$ and water affects more, as they were taller than un-soaked seeds. These results are in contradictory to those stated by Paul and Chaudhry (1991).

As regard to sowing times, the crop sown on November 15 (5.092 t ha^{-1}) and November 30 (4.954 t ha^{-1}) gave significantly higher grain yield than December 15 sowing (3.806 t ha^{-1}). The grain yield reduced with delay in sowing as the duration of growth and development become short. November sowing gave higher yields than December sowing. Similar results were also reported by Rajender *et al.* (1998).

Total number of fertile tillers m^{-2}

The economic yield of most of the cereal is determined by the number of productive tillers. Fertile tillers depend on a genotype and the conditions to which crop exposed during its growth. The number of fertile tillers were maximum (495.11) when seeds treated with water followed by $NaHCO_3$ soaked seeds (491.667) and control seeds (451.222). Water soaked seeds and $NaHCO_3$ soaked seeds produced significantly more number of fertile tillers than un-soaked seeds. It may be attributed to the general hypothesis that plants in their initial stages of development may adapt much easily to their environment. These results supported to those reported by Singh and Singh (1991).

Sowing on December 15 produced significantly more number of fertile tillers (499.778) than the crop sown on November (475.333) and November 30 (462.889). As the sowing date advances from November, he numbers of ears per unit area increased significantly due to change in environmental conditions. These results are in consistent with those of Spink *et al.* (2000).

Plant height at maturity (cm)

Plant height is mainly controlled by the genetic make up of a genotype, but it is also affected by environmental conditions. To seed treatments, $NaHCO_3$ soaked seeds (88.194) did not differ significantly from water soaked seeds (87.168) but both of these produced significantly taller plants than that of un-soaked seeds (85.566). The results are in confirmatory with those of Nayyer *et al.* (1995). The plant height was decreased with delay in sowing. The crop sown on November 15 produced significantly taller plants (88.739) than that sown on November 30 (86.777) and December 15 (85.412). The crop sown on November 15 might have enjoyed better environmental conditions especially of temperature and solar radiations resulting in more plant height. Melladoze (1980) had reported the similar results.

Spike length (cm)

Spike length of wheat plays an important role towards the number of grains/spike and ultimately the final yield. As regards seed treatments, the seeds soaked in $NaHCO_3$ solution produced longer spikes (9.903) followed by water soaked seeds (9.741) and unsoaked seeds (9.479) respectively.

The crop sown on November 15 produced the longest spikes (10.33) that were statistically same to those produced by November 30 sowing (9.865), while both of these crops significantly differed from the crop sown on December 15 which produced spikes of length 8.928 cm. This may be due to longer growing period. These results are in accordance with those reported by Waraich *et al.* (1981).

Number of grain/spike

Number of grains/spike is very important parameter contributing toward grain yield. Number of grains per spike depends on the length of spike and it is determined by genetic make up and environmental factors prevailing during the growth period. Number of grains per spike has a direct bearing on the final grain yield in wheat and varies with growing conditions. The data evinced that seed treatments and sowing date affected the grain number of grains per spike significantly. The seeds treated with $NaHCO_3$ solution gave maximum number of grain/spike (48.872) which differed significantly from water soaked (45.206) and unsoaked seeds (45.561). The numbers of grains/spikes produced by water soaking were non-significant from unsoaked sees. These findings confirmed the results as reported by Singh and Singh (1991) that treated seeds gave more number of grains per spike than untreated seeds.

The crop sown on November 15 produced significantly higher number of grains (52.472) followed by November 30 (47.500) and December 15(39.667) respectively. The crop sown on November 15 may have enjoyed longer duration for growth as compared to others and produce maximum number of grains per spike. The results are inconsistent with those of Ali *et al.* (1982).

1000-grains weight (g)

Among the seed treatments un-soaked seeds produced the maximum 1000-grains weight (29.604), which differed non-significantly from water soaked seeds (29.480) but both of these significantly differ from NaHCO3 soaked seeds (28.981). This may be due to the production of more number of grains/ear with lighter weight. These results are in contradictory with those of Singh and Singh (1991). The earlier sowing resulted in better development of the grains accordingly. The earlier sowing results in better development of the grain due to longer growing period. These findings are strongly supported by those of Joshi and Singh (1983).

Protein (%)

We need food to provide us with building materials to build the cells in our bodies. The nutrients which provide the most important building materials are proteins, fat, vitamins and minerals. Proteins also take part in metabolic reactions as all enzymes are protein in nature. Quality of wheat is decided on the protein, it contains. Protein contents of wheat greatly affected by the genotype and prevailing conditions during its growth period. It was obvious from data that seed treatments and sowing dates significantly altered the protein contents.

As regards the seed treatments water soaked seeds significantly gave higher protein contents (13.633) as compared to un-soaked (12.635) and $NaHCO_3$ soaked seeds (12.635). These results are in confirmatory with Sallam (1992).

Among sowing dates, early sowing (November 15) produced grains with higher protein contents (13.965) followed by November 30 (12.968) and December 15 (11.970) sowing respectively. Spink *et al.* (1993) and Hussain *et al.* (1994) also obtained similar results.

CONCLUSION

It is concluded and recommended that water soaked seeds and November 15 sowing should be used for getting higher yield and better quality grains for wheat.

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