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Effect of Application Time of Last Irrigation on Wheat (*Triticum aestivum* L.) Yield

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Abstract

Effect of application time of last irrigation on wheat yield was investigated at Adaptive Research Farm Sargodha during 2001-2002, 2002-2003 and at farmers field in Faisalabad district during winter 2002-2003. The treatments were last irrigation on 10th March, 15th March, 20th March, 25th March and 30th March. The yield components like number of tillers and number of grains per spike did not show significant response to time of last irrigation, however, 1000-grain weight and grain yield was affected significantly. The last irrigation applied on 20th March gave significantly maximum grain yield as compared to the last irrigation applied on 10th, 15th, 25th and 30th March.

Key words: Wheat, last irrigation, Tillers, Grains/spike, Grain weight, Grain yield

Introduction

Wheat is the principal staple food crop of Pakistan. Among the factors responsible for good production time of last irrigation occupies the pivital position in wheat production. The basic purpose of time of last irrigation is to supply plants with water as needed to obtain optimum yield of good quality. The right time of watering plays a vital role in increasing wheat yield but most of our farmers are unaware of proper time of application of last irrigation to wheat crop. Hence a huge quantity of valuable water is wasted by mismanagement and untimely applications. Some irrigation studies on wheat have revealed that the same yield can be obtained with one third to half of the water currently being used with good management and timely application of water (Chandra and Kumar, 1999). Water is essential from seed germination to plant maturity for obtaining high yield, but it's efficient, economical and purposeful utilization at critical stage of crop growth deserves special attention. Thus the present study was designed to evaluate the effect of application time of last irrigation on wheat yield under climatic conditions of Sargodha and Faisalabad.

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Materials and Methods

The trials were conducted at Adaptive Research Farm Sargodha during 2001-2002, 2002-2003 and at farmers field in Faisalabad to evaluate the effect of application time of last irrigation on wheat yield during the year 2002-2003. The experiment was laid out in randomized complete block design (RCBD) by keeping a net plot size of 20 x 6m with three replications. The experiment comprised of the following treatments.

Last irrigation on 10th March (115 DAS)
Last irrigation on 15th March (120 DAS)
Last irrigation on 20th March (125 DAS)
Last irrigation on 25th March (130 DAS)
Last irrigation on 30th March (135 DAS)

The wheat variety Uqab-2000 was sown on 15th November each year with single row hand drill in row spaced 25cm apart using the recommended seed @ 125 kg ha^{-1}. The crop was fertilized according to the standard agronomic recommendations of the crop. Before last irrigation the crop was irrigated at different wheat development stages viz. crown-root initiation, tillering and booting. Crop was kept free of weeds by spraying recommended narrow and broad leaves weedicides. The crop was harvested manually at the ground level using a sickle and tied into bundles. These bundles were kept in the field for about a week for sun drying. The sun dried crop was threshed for separating grains.

Total number of spike bearing and non-spike bearing tillers at harvest was counted in one meter square in each plot and means were computed. Grains per spike were counted and averaged from twenty five spikes taken at random from each plot. Three samples of 1000 grains were taken at random from the seed lot and weighed on an electric balance and then averaged. Grain yield was recorded on plot basis and then converted to kg ha^{-1}.

Data were collected, analysed statistically and the treatment's means were compared by using Duncan's New Multiple range test at 5% probability (Steel and Torrie, 1984).

Results and Discussion

Adaptive Research Farm, Sargodha

During both the seasons the results (Table 1) regarding effect of time of application of last irrigation on number of fertile tillers per unit area of wheat showed non-significant differences. It revealed that tillering is

mainly controlled genetically and least affected by the environment. These results are supported by the findings of Pandey and Yadav (1999).

Data corresponding to the grain number per spike was not influenced significantly by the last irrigation to wheat during both the years. However, from the pooled data it was noted that the maximum number of grains per spike (41) were recorded in the treatment where the last irrigation was applied on 20th March and the minimum (39) in treatments where last irrigation was applied on 10th and 15th March. Similar results had also been reported by Naser *et al.* (1999).

1000-grain weight has a direct influence on economic yield. The results concerning 1000-grain weight of wheat as influenced by the time of last irrigation are presented in Table 1. Time of last irrigation had a significant effect on 1000-grain weight during the year 2001-2002 but a non-significant effect was observed in 2002-2003. However, pooled data reflects that significantly maximum 1000-grain weight (38.70gm) was in treatment where last irrigation was applied on 20th March which was, however, statistically at par with treatment where last irrigation was applied on 25th March. The minimum 1000-grain weight (34.98g) was recorded in treatment where last irrigation was applied on 10th March which was at par with treatments where last irrigation was applied on 15th and 30th March. These results are similar to the findings of Pandey and Yadav (1999).

Grain yield or economic yield is the final product, which is governed by the inherent potential and environmental factors. The data regarding the effect of time of last irrigation on grain yield of wheat is given in Table 1. Analysis of variance revealed significant differences among treatment means. The individual comparison of treatment means of pooled data showed that statistically higher grain yield (3746 kg ha^{-1}) was obtained when the last irrigation to wheat was given on 20th March. It was followed by the treatment where last irrigation was applied on 25th March. However, minimum grain yield (3281 kg ha^{-1}) was recorded in treatment where last irrigation was applied on 10th March which was statistically at par with treatments where last irrigation was applied on 15th and 30th March. These results are in line with those of Maliwai *et al.* (2000).

Adaptive Research Station, Faisalabad

A perusal of the data given in Table 2 showed that last irrigation on different dates did not affect the number of fertile tillers of wheat. The figures in the table indicate no appreciable differences in fertile tillers per unit area. However, the treatment where last irrigation was given on 20th March gave maximum fertile tillers per unit area (352) as compared to the treatment where last irrigation was applied on 30th March (309). These findings are also supported by the results reported by Pandey and Yadav (1999).

Data regarding number of grains per spike as influenced by different dates of last irrigation is tabulated in Table 2. It is evident from the data that statistically non-significant effects existed from time of last irrigation. These results are in accordance with that of Naser *et al.* (1999).

Table 1: Effect of application time of last irrigation on number of fertile tillers (m^{-2}), number of grains $spike^{-1}$, 1000-grain weight (g) and grain yield (kg ha^{-1}) of wheat crop at Adaptive Research Farm, Sargodha (2001-2002 and 2002-2003

Treatments		Last irrigation on 10th March (115 DAS)	Last irrigation on 15th March (120 DAS)	Last irrigation on 20th March (125 DAS)	Last irrigation on 25th March (130 DAS)	Last irrigation on 30th March (135 DAS)
No. of fertile tillers m^{-2}	2001-02	293^{NS}	287	314	309	309
	2002-03	356^{NS}	335	329	328	350
	Mean	325^{NS}	311	322	319	330
No. of grains $spike^{-1}$	2001-02	37^{NS}	37	40	40	39
	2002-03	41^{NS}	40	42	40	41
	Mean	39^{NS}	39	41	40	40
1000 grain weight (g)	2001-02	31.56d	32.28cd	37.81a	37.06ab	33.31c
	2002-03	38.40^{NS}	37.69	39.58	39.24	38.52
	Mean	34.98b	34.99b	38.70a	38.15a	35.92b
Grain yield (Kg ha^{-1})	2001-02	2960d	3100c	3660a	3460b	3130c
	2002-03	3601b	3620b	3832a	3669b	3620b
	Mean	281c	360c	746a	565b	375c

NS : Non-significant; DAS: Days after sowing; any two means not sharing a letter in common differ significantly at 5% probability level

Table 2: Effect of application time of last irrigation on number of fertile tillers (m^{-2}), number of grains $spike^{-1}$, 1000-grain weight (g) and grain yield (kg ha^{-1}) of wheat crop at Adaptive Research Station, Faisalabad (2002-2003)

Treatments	No. of fertile tillers m^{-2}	No. of grains $spike^{-1}$	1000-grain weight (g)	Grain yield (kg ha^{-1})
Last irrigation on 10th March (115 DAS)	346^{NS}	40^{NS}	39.31d	3499c
Last irrigation on 15th March (120 DAS)	325	40	41.56c	3799b
Last irrigation on 20th March (125 DAS)	352	40	44.35a	4100a
Last irrigation on 25th March (130 DAS)	348	39	43.63b	3898b
Last irrigation on 30th March (135 DAS)	340	39	39.32d	3560c

NS : Non-significant; DAS: Days after sowing; any two means not sharing a letter in common differ significantly at 5% probability level

Grain weight contributes considerably to final grain yield, any change in grain weight is bound to effect the grain yield. The perusal of data in Table 2 indicates significant affect on 1000-grain weight. Treatment where last irrigation was given on 20th March produced significantly maximum 1000-grain weight (44.35g). The minimum 1000-grain weight (39.31g) was recorded in treatment where last irrigation was applied on 10th March, which was, however, at par with treatment where last irrigation was applied on 30th March. These results are in conformity with the findings of Pandey and Yadav (1999).

Grain yield per unit area is the product of the individual yield components. Any variation in individual yield components will tend to influence the final yield. The data regarding the effect of time of last irrigation on grain yield of wheat reflects that the significantly maximum grain yield (4100 kg ha^{-1}) was recorded when the last irrigation to wheat was given on 20th March. It was followed by the treatment where the last irrigation was given in 25th March, which was statistically at par with the treatment where last irrigation was applied on 15th March. The minimum yield (3499 kg ha^{-1}) was obtained in treatment where last irrigation was applied on 10th March, which was, however, statistically at par with the treatment where last irrigation was given on 30th March. These results were similar with that of Maliwai *et al.* (2000).

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