

Determination of Grain Yield of Different Wheat Varieties as Influenced by Planting Dates in Agro-Ecological Conditions of Vehari

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Abstract

The investigations pertaining to the effect of planting dates commencing from November 1 to December 30 at an interval of 10 days on the yield of three wheat varieties Punjab-96, Uqaab-2000 and Iqbal-2000 were carried out at Adaptive Research Farm, Vehari on loam soil during 2001-03. The two years average results revealed that significantly highest grain yield of 3801 kg/ha was obtained in planting wheat on November 10, which was statistically at par with November 20 and November 1. Each successive delay in planting beyond November 20 progressively depressed the grain yield. Yield was reduced by 34 percent in planting wheat on December 30 as compared to November 10. The impact of varieties were also significant and by producing 3538 kg and 3311 kg as against 3116 kg respectively and Uqaab-2000 showed significantly greater yield potential than Punjab-96. From the results it may be concluded that November 1 to November 20 appeared to be the more desirable planting time to harvest maximum yield potential in all the tested varieties, however, early planting in the season favours for the variety Punjab-96, whereas, Uqaab-2000 gave better performance throughout the planting period, while in contrast Iqbal-2000 proved better for late planting. The meteorological data during the growth period of the crop was also recorded.

Key words: *Triticum aestivum*, Varieties, Dates of planting, Yield, Pakistan.

Introduction:

Wheat (*Triticum aestivum* L.) and cotton (*Gossypium hirsutum* L.) is the predominant cropping system in cotton growing areas of Punjab. Wheat crop is the main source of food for the people and the animals of the region, whereas, cotton is Pakistan's internationally traded crop. About 70 percent of the total foreign exchange is provided to the national budget. Its significance is substantial.

In cotton wheat cropping pattern growers often have difficulty in maintaining good yield of wheat due to late planting. It has been investigated that early stand establishment is an important factor for increasing grain yield (Lindstorm *et al.*, 1976). Appropriate planting time can increase yield with out involving any extra cost. While studying the effect of varying degree of late sowing at an interval of 10 days on the yield of three wheat varieties, Byrlee *et al.* (1984) observed that late planting reduced the tillering period and increased the risk of hot weather in critical period of grain filling which ultimately reduced the grain yield. Khan and Salim (1986) reported that early seeded crop resulted in higher yields as compared with late seeding.

Studies conducted by Razzaq *et al.* (1986) showed that November planting produced higher wheat grain yield. Ansari *et al.* (1989) reported that wheat crop sown from November 1 to December 1 gave significantly higher yield; further delay in sowing suppressed the yield. Khan *et al.* (1989) observed that crop planted from November 10 to December 10 gave significant higher yield than late sowing. Majid and Razzaq (1999) from a six year study concluded that best time of planting wheat with the present cultivars is early November. A yield reduction of 27 and 52 percent were noted by Iqbal *et al.* (2001) by sowing wheat crop on December 15 and 31 respectively compared to December 1 sowing. Ansari (2002) while studying the influence of seeding time on grain yield of wheat varieties observed that wheat planted on November 10, displayed more grain yield than November 1 and November 20. He further concluded that each successive delay in sowing beyond November 10 significantly reduced grain yield.

Crop varieties within a species may show marked differences for various morpho-physiological characters. Black and Siddoway (1977) noted that different wheat cultivars responded differently to seeding dates, resulting in significant decrease in grain yield with delay in planting. Suhail *et al.* (2002) concluded that early sowing favours for two varieties while in contrast Inqbal-91 might be better for late sowing.

No doubt appropriate sowing time of different wheat varieties evolved so far have been determined through experiments and some recently evolved new wheat varieties still need to be tested for exploiting

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their full potential under cotton wheat cropping pattern. Their adjustment for optional production will have a good impact on the farmers economic conditions. With this objective in view the present study was conducted to assess the influence of dates of planting on yield performance of two new wheat varieties Uqaab-2000 and Iqbal-2000 with a standard variety Punjab-96 in cotton wheat cropping pattern.

Materials and Methods

Adaptive Research is meant to develop the site specific technologies for a specific agro-ecological conditions, therefore, to ascertain the appropriate date of sowing of different wheat cultivations the investigations pertaining to the effect of planting dates commencing from November 1 to December 30 at an interval of 10 days on the yield of three wheat varieties Punjab-96, Uqaab-2000 and Iqbal-2000 were carried out at Adaptive Research Farm, Vehari on loam soil during 2001-03. The meteorological data for the growth period of the crop was also recorded and given in Table 1. The crop followed summer fallowing. The experiment was replicated thrice using split plot design with sowing dates and the varieties in the main and sub plot, respectively.

The crop was sown on a well prepared soil on 22.5 cm apart rows with the help of single row hand drill using a seed rate of 125 kg/ha Fertilizer @150-100-50 kg NPK per hectare was applied. All P and K along with 1/3 N was applied at sowing and remaining 2/3 N at first irrigation and booting stage in two equal splits as recommended for normal sowing i.e. up to December 1. While all NPK fertilizer dose to the late dates of planting was applied at the time of sowing. Irrigations were applied at critical growth stages (crown root development, booting, milking and grain formation). The crop was harvested during third week of April. The grain yield was recorded and analysed statistically by using analysis of variance method and Duncan's multiple range test at 5% probability was employed to test the significance of the treatment means.

Results and Discussions

The data regarding grain yield of three wheat varieties for 2001-03 have been presented in Table-2. The yield results during 2001-02 along with statistical analysis show that the differences due to dates of planting as well as varieties were highly significant. Grain yield was not significantly affected by planting wheat from November 1 to November 20. However, maximum yield was recorded from the crop planted on November 10 (4098kg/ha) which was statistically at par with planting dates of November 20 and November 1 with 4050 and 4015 kg/ha respectively. This demonstrated that each successive delay in sowing beyond November 20 significantly

reduced grain yield. This may be due to slight changes in mean temperature during November and then between March to April, Byerlee *et al.* (1984). Significant yield reduction in crop planted on December 1 to December 30 were recorded. These results are in agreement with those reported by Razzaq *et al.* (1986) and Ansari *et al.* (1989). Varieties showed significant differences among them for grain yield. The variety Uqaab-2000 produced the highest grain yield of 3680 kg/ha and was comparable with Iqbal-2000. The lowest grain yield was observed in Punjab-96.

The data regarding grain yield per hectare during 2002-03 envisaged that yield affected significantly by different planting dates. Wheat planted on November 10, produced maximum grain yield of 3504 kg/ha which was statistically at par with planting on November 20 and November 1 with 3447 and 3444 kg/ha respectively. However, wheat planted on December 30 produced lowest grain yield of 2337 kg/ha. These results are in conformity to those of Ali *et al.* (1982), Khan and Salim (1986) and Ansari (2000). Over all performance of varieties Uqaab-2000 and Iqbal-2000 was significantly better than Punjab-96. The highest yield of 3177 kg/ha was obtained in variety Uqaab-2000 and was statistically at par with Iqbal-2000. The lowest yield of 3043 kg/ha was observed in Punjab-96. The results reported by Ali *et al.* (1982) are not in agreement with these findings who obtained similar yield potential from all the varieties. This contradiction in results may be due to the selection of different varieties than those under study.

From the two years average (pooled) data it was concluded that early planting wheat resulted in higher yields as compared with late planting in cotton-wheat cropping pattern. Critical examination of data indicated that there were no significant yield differences of planting wheat from November 1 to November 20. Further delay in planting beyond this progressively suppressed the grain yield. The significantly lowest yield of 2514 kg/ha was found under late planting on December 30. Hence November 1 to November 20 appeared to be the more desirable planting time to harvest maximum yield potential in all the tested varieties in the study. These findings are quite in agreement with those of Razzaq *et al.* (1986), Ansari *et al.* (1989) and Majid and Razzaq (1999) who concluded that best time of planting wheat with the present cultivars is early November. The varieties Uqaab-2000 and Iqbal-2000 yielded significantly better than Punjab-96. The results are supported by the findings of Black and Siddoway (1977) who noted that different wheat cultivars responded differently to seeding dates, resulting in significant decrease in grain yield with delay in planting.

The interaction between planting dates and varieties was significant during both the years of study. During

2001-2002 maximum grain yield was obtained from November 10 planting in variety Uqaab-2000 and was at par with Punjab-96 when planted in November 1, whereas, minimum yield was recorded in Punjab-96 planting on December 30. During 2002-03 maximum grain yield was obtained from Uqaab-2000 planted on November 10 but was comparable with Punjab-96 and Iqbal-2000 planted on November 1 and November 20, respectively. Wheat varieties Uqaab-2000 and Iqbal-2000 planted after December 1 gave significantly higher yields than Punjab-96. The two years average data indicated that varieties Punjab-96 and Uqaab-2000 gave significantly higher yield up to November 10 compared with Iqbal-2000. All the tested varieties in the experiment produced non significant yield differences on November 20 planting. However, variety Iqbal-2000 planted after December 1 produced significantly higher grain yields followed by Uqaab-2000 and Punjab-96. Almost similar results were reported by Suhail *et al.*

(2002) who concluded that some varieties perform better in early sowing while in contrast other might be better for late planting. The graphical presentation of the effect of the three varieties with sowing dates has also given in Table 3.

Average yield differences under different planting dates (Table 2) indicated that November 10 and November 20 planting out yielded November 1 planting by 1.93 and 0.51 percent respectively. Delay in planting from November 20 to December 1 decreased yield by 4.94 percent. The first and second decrease in December 30 planting was 33.86 and 32.92 percent compared with November 10 and November 20 respectively. The decrease could be related to reduced tillering period and exposure to hot weather in critical period of grain filling Byerlee *et al.* (1984). A yield reductions of 27 and 52 percent were also noted by Iqbal *et al.* (2001) with sowing the crop on 15 December and 31 respectively as compared to December 1 planting.

Table 1: Grain yield of wheat as influenced by dates of planting in cotton-wheat cropping pattern during 2001-02 and 2002-03.

Varieties	D1 (Nov.01)	D2 (Nov.10)	D3 (Nov.20)	D4 (Dec.01)	D5 (Dec.10)	D6 (Dec.20)	D7 (Dec. 30)	Means
2001-2002								
Punjab.96	4216ab	4125bc	4018cd	3729fg	3357h	2947j	2534k	3
Uqaab-2000	4120bc	4324a	4083bc	3858ef	3579g	3118i	2677k	3
Iqbal-2000	3709fg	3846ef	4048cd	3913de	3825ef	3377h	2859j	3
Means	4015a	4098a	4050a	3833b	3587c	3147d	2691e	
LSD (P<0.05)	Date of planting=111.0		Variety = 57.5		Date of			
2002-2003								
Punjab-96	3578ab	3535abc	3394bcdef	3176gh	2875i	2560j	2180k	3
Uqaab-2000	3520abc	3686a	3457bcde	3327cdefg	3082h	2797i	2369j	3
Iqbal-2000	3233fgh	3291defg	3491abcd	3374bcdefg	3251efgh	2885i	2462j	3
Means	3444a	3504a	3447a	3292b	3069c	2747d	2337e	
LSD (P<0.05)	Date of planting=118.5		Variety =70.1		Date of			
2001-2003 (Pooled)								
Punjab-96	3897ab	3830bc	3706cde	3452h	3116j	2754l	2358n	3
Uqaab-2000	3820bc	4005a	3770bcd	3593efg	3331i	2957k	2523m	3
Iqbal-2000	3471gh	3569fgd	3769bcd	3643def	3538fgh	3131j	2661l	3
Means	3729a	3801a	3748a	3563b	3328c	2947d	2514e	
LSD (P<0.05)	Date of planting=76.9		Variety = 44.3		Date of			

Table 2: Yield differences (percentage) of wheat varieties as influenced by dates of planting in cotton-wheat cropping pattern during 2001-02 and 2002-03.

Dates of planting	Yield (Kg/ha)	D1 (Nov.01)	D2 (Nov.10)	D3 (Nov.20)	D4 (Dec.01)	D5 (Dec.10)	D6 (Dec.20)	D7 (Dec.30)
		3729	3801	3748	3563	3328	2947	2514
D1(Nov.01)	3729	-	-	-	-	-	-	-
D2(Nov.10)	3801	+1.93	-	-	-	-	-	-
D3(Nov.20)	3748	+0.51	-1.93	-	-	-	-	-
D4(Dec.01)	3563	-4.45	-6.26	-4.94	-	-	-	-
D5(Dec.10)	3328	-10.75	-12.44	-11.28	-6.60	-	-	-
D6(Dec.20)	2947	-20.97	-22.47	-21.37	-17.29	-11.45	-	-
D7(Dec.30)	2514	-32.58	-33.86	-32.92	-29.44	-24.46	-14.69	-

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