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## Performance of Three Cotton Genotypes in Five Irrigation Regimes Under Ghotki Conditions

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**Abstract:** A field experiment was designed to assess the yield performance of three cotton cultivars under five irrigation regimes during 1992 and 1993 crop seasons. On an average, highest seedcotton yield of 2455 kg ha<sup>-1</sup> was obtained when the crop received 5 post planting irrigations followed by 6 and 7 post planting irrigations where seedcotton yield of 2256 and 2169 kg ha<sup>-1</sup> was obtained respectively. The lowest yield of 1785 kg ha<sup>-1</sup> was produced when 8 post planting irrigations were applied. The highest yielding variety was GH-3 that produced 2313 kg ha<sup>-1</sup> followed by Shaheen with 2125 kg ha<sup>-1</sup> seedcotton yield.

**Key words:** Cotton, post-plant irrigations, seedcotton yield and varietal response

### Introduction

The genetic yield potential of today's cotton plant is at least 5 and probably close to 10 times the average yields we attain each year. The primary cause of potential yield reductions is an unfavorable physical environment, including radiation, temperature and water supply. Water stress from lack of water is rarely a problem in seedling emergence and stand establishment. Water stress from excess water is a great problem to stand establishment and seedling survival than is limited water supplies. Cotton crop is very sensitive to the environmental conditions and is grown in the wide range of ecological zones. It does well when appropriate agronomic practices are adopted. It has been observed that majority of cotton growers irrigate their crop indiscriminately without keeping in view the need and planting time of the crop.

Depending on climate and length of growing season, cotton crop transpires about 2570 to 3085 m<sup>3</sup> (25 to 30 acre inches) of water per acre during the season. In early vegetative period, crop water requirements are low or some 10 percent of total. They are high (50 – 60% of total) during flowering and yield formation phase. Later in the growing period, the requirements decline because of leaf shedding, salinity and cooler season. The peak water use occurs during the months of August and September hence water stress should be avoided during this period (Khan and Malik, 1996).

Nadi (1975) in Sudan investigated the effects of three irrigations on growth, yield and quality of cotton and found that light irrigation at 75 mm per irrigation every 10 days are economically better than traditionally accepted practice of irrigation every 14 days. Mustafa and Siddiqui (1978) reported that the optimum interval of subsequent irrigations was 15 days and yield of seedcotton decreased with increase in interval of subsequent irrigations.

The seedcotton yield of CIM-240 varieties was compared in three post-planting irrigation regimes (5, 6 and 8 irrigations) at CCRI, Multan. Accordingly 8 post-planting irrigations gave 404 and 100 kilograms more seedcotton than 5 and 6 post planting irrigations respectively (Anonymous, 1993).

Godoy *et al.* (1994) indicated that the highest values in lint yield were found when initial irrigation was applied 60 or 70 days after planting and then irrigated each 28 days. Khan and Malik (1996) were of the view that first post planting irrigation may be applied at 50 – 60% depletion of available moisture. Further depletion of available water may restrict vegetative growth but when followed by ample supply of water, vegetative growth will be somewhat excessive, which may cause late flowering and reduced yield.

Present study therefore, was conducted to determine the number of post planting irrigations excluding two pre-planting soaking doses in Ghotki area of upper Sindh and also to assess the high yielding variety under varying irrigation regimes.

### Materials and Methods

Seedcotton yield response of two advance strains (GH-1 and GH-3) and one commercial variety, Shaheen developed at CRS, Ghotki under five irrigation regimes (I<sub>1</sub>=8, I<sub>2</sub>=7, I<sub>3</sub>=6, I<sub>4</sub>=5 and I<sub>5</sub>=4 post planting irrigations excluding 2 pre-planting soaking doses) during 1992 and 1993 crop seasons. The sowing of the experiment was done in split plot design replicated four times. The irrigation treatments were kept as main plots while varieties were kept as sub-plots. All the required agronomical practices were carried out when needed. Crop was protected thrice during 1992 and twice during 1993 against sucking as well as bollworm complex. The seedcotton was harvested plot-wise and finally calculated as kilograms per hectare basis. DMR Test (Duncan, 1970) was applied to bring out the differences between the treatments.

### Results and Discussions

The seedcotton yield data for the year 1992 of three cultivars under varying irrigation regimes are depicted in Table 1 whereas for the year 1993 in Table 2 and average data of two years are given in Table 3. During 1992, significantly highest yield (2812 kg ha<sup>-1</sup>) was obtained when crop received 5 post-planting irrigations followed by 6 and 7 post planting irrigations where the yield of 2636 and 2543 kg ha<sup>-1</sup> was achieved respectively. However, the yield of both irrigation regimes (6 and 7) was of same order according to DMR test. Significantly highest yielding variety was GH-3 that produced 2720 kg ha<sup>-1</sup> seedcotton followed by Shaheen (2543 kg ha<sup>-1</sup>). The lowest yielding variety was GH-1 that produced 2292 kg ha<sup>-1</sup> of seedcotton yield (Table 1).

During 1993 almost same trend of yield performance in respect of post planting irrigations was observed as 5 post planting irrigations recorded highest yield of 2098 kg ha<sup>-1</sup> followed by 6 and 7 irrigations (1876 and 1794 kg/ha). However, statistically these two irrigation regimes were same. This year also GH-3 variety maintained it self as highest yielding with 1906 kg ha<sup>-1</sup> yield, followed by Shaheen (1714 kg ha<sup>-1</sup>).

When the data of two years were averaged (Table 3), significantly 5 post-planting irrigations gave highest seedcotton yield of 2455 kg ha<sup>-1</sup> followed by 6 and 7 post planting irrigations (2256 and 2169 kg ha<sup>-1</sup>). However, statistically

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Table 1: Performance (seedcotton yield kg ha<sup>-1</sup>) of strains under varying irrigation regimes during 1992 cotton season at CRS, Ghotki

Irrigations	GH-1	GH-3	Shaheen	Average
I <sub>1</sub>	1944	2439	2152	2178 c
I <sub>2</sub>	2259	2762	2607	2543 ab
I <sub>3</sub>	2371	2851	2686	2636 ab
I <sub>4</sub>	2582	3016	2837	2812 a
I <sub>5</sub>	2302	2532	2435	2423 bc
Average	2292 c	2720 a	2543 b	-

Means followed by similar letters are not significantly different at 5% level

Table 2: Performance (seedcotton yield kg ha<sup>-1</sup>) of strains under varying irrigation regimes during 1993 cotton season at CRS, Ghotki

Irrigations	GH-1	GH-3	Shaheen	Average
I <sub>1</sub>	1244	1535	1398	1392 d
I <sub>2</sub>	1625	1980	1778	1794 b
I <sub>3</sub>	1748	2051	1829	1976 b
I <sub>4</sub>	1997	2259	2037	2098 a
I <sub>5</sub>	1511	1707	1528	1582 c
Average	1625 b	1906 a	1714 b	-

Means followed by similar letters are not significantly different at 5% level

Table 3: Average performance (seedcotton yield kg ha<sup>-1</sup>) of strains under varying irrigation regimes at CRS, Ghotki

Irrigations	GH-1	GH-3	Shaheen	Average
I <sub>1</sub>	1594	1987	1775	1785 c
I <sub>2</sub>	1942	2371	2193	2169 b
I <sub>3</sub>	2060	2451	2258	2256 b
I <sub>4</sub>	2290	2638	2437	2455 a
I <sub>5</sub>	1907	2120	1982	2003 bc
Average	1959 c	2313 a	2125 b	-

Means followed by similar letters are not significantly different at 5% level

both these irrigations were same. As regards the varietal performance, on an average, GH-3 maintained its superiority over other two genotypes by producing 2313 kg ha<sup>-1</sup> seedcotton and was statistically high yielding variety. Second best was Shaheen with 2125 kg ha<sup>-1</sup> seedcotton.

The results are in accordance with those of Nazirov and Satipov (1979), who got highest yield with 4 and 5 irrigation regimes. The results of this study however, are in contradiction with the results obtained at CCRI, Sakrand and Multan where the highest yield was obtained when the crop was irrigated 8 times after planting (Anonymous, 1993 and 1998). This may be explained as the under ground water table of Ghotki area is in the range of 3 to 8 feet, therefore the crop needed less number of irrigations as compared to Sakrand and Multan, otherwise the climatic conditions of Ghotki area are not far different from these two places as Ghotki is situated almost in the center of Sakrand and Multan. Therefore, keeping in mind the results of this study, the growers of this area are advised not to exceed 5 or 6 post planting irrigations excluding two pre-planting soaking doses for getting high yields from their crops.

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