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## Response of Sugar Cane Varieties to Different Irrigation Intensities

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**Abstract:** Cane yield and Recovery Percentage of sugar cane varieties were affected due to various irrigation frequencies. Variety COL-75 showed outstanding performance for cane yield under normal weekly irrigation in plant/ratoon stages, followed by Bannu-1 and Naurang-98 under same irrigation regime. The highest recovery percentage was noted for varieties Naurang-98 and Bannu-1 under weekly irrigation. Hence COL-75 was found with higher cane yield potential followed by Bannu-1 and Naurang-98 for cane yield and recovery percentage under normal weekly irrigation and different irrigation intervals in Bannu Division.

**Key words:** Sugar cane, varieties, irrigation, recovery, yield

### Introduction

In Bannu Division, sugar cane has occupied the place of major cash crop due to establishment of Sugar Mills in the area. It is grown on about 7.18 percent area of the irrigated zone in Bannu with average yield of 40.37 t ha<sup>-1</sup>. During 1998-99 its total production in the area was 68260 tones while the total requirement of Bannu Sugar Mills was 294578 tones (Anonymous, 1999). The average yield of sugar cane is 65.8 t ha in India, 46.30 t ha<sup>-1</sup> in Pakistan and 76.30 t ha<sup>-1</sup> in Indonesia (Sundera, 1998). Pakistan ranks fourth in area and production among the leading sugar cane producing countries of the world (Anonymous, 1992). The production is lower in this zone due to several limiting factors. Major restrictions are lack of irrigation water and production technologies in this part of NWFP. The successful cultivation of sugar cane depends upon the availability of adequate irrigation water and management practices (Nazir, 1994). To solve this problem, necessary recommendations for optimum irrigation levels and drought tolerant varieties are the major requirements and needs emphasis for timely improvement in sugar cane production in the area.

### Materials and Methods

The study was undertaken at the Agricultural Research Station Serai Naurang, Bannu to see the response of four high yielding sugar cane varieties viz; Bannu-1, Naurang-98, COL-75 and PAS-132 to three irrigation intensities. The experiment was laid out in RCBD (factorial) with three replications. Irrigation schedule was commenced from the month of April with the following details:

- T1 = Irrigation after 7 days interval
- T2 = Irrigation after 14 days interval
- T3 = Irrigation after 21 days interval

All the recommended cultural and management practices were adopted uniformly at appropriate stages in all treatments. A basal dose of NP was applied at 150-56 kg/ha. Phosphorous was applied at 1st hoeing in the month of March. Nitrogen was applied in two equal splits in April and May to plant and ratoon crops. Insecticide "Furadon" was applied at 20 kg/ha to all treatments for the control of borers attack. Weedicide "Gesapex Combi" was applied in all treatments in February. Hoeing and earthing up operations were performed and completed at the end of May. Data/observations were collected/compiled on various aspects at different stages. Data pertaining to recovery percentage and cane yield were analyzed statistically with the help of computer package MSTATC.

### Results and Discussion

It is evident from Table 1 and 2 that the various irrigation intervals significantly affected recovery percentage of different varieties. The interaction between varieties × irrigation treatments also showed significant variations at 0.05 level of probability. Variety Naurang-

Table 1: Recovery (%) of sugar cane varieties as affected by different irrigation intensities in plant crop during 1995-96

Varieties	Irrigation (After 7 days)	Irrigation (After 14 days)	Irrigation (After 21 days)	Mean
Bannu-1	8.91 a	7.33 bcd	5.45 f	7.23 NS
COL-75	7.86 bc	6.57 de	6.50 de	6.98
Naurang-98	8.33 ab	6.90 cde	7.37 bcd	7.53
PAS-132	7.15 cde	6.32 ef	7.15 cde	6.87
Mean	8.06 a	6.78 b	6.62 b	
<b>Recovery (%) in ratoon crop during 1996-97</b>				
Bannu-1	9.17 ab	8.35 bc	8.18 bcd	8.57 ab
COL-75	8.09 bcd	7.67 cd	7.47 cd	7.75 b
Naurang-98	10.23 a	9.15 ab	9.49 a	9.62 a
PAS-132	8.19 bcd	7.09 d	7.23 cd	7.52 b
Mean	8.92 NS	8.07	8.10	

Means having different letters are significant at 5% level of probability using DMR test. NS = Non-Significant

Table 2: Recovery (%) of sugar cane varieties as affected by different irrigation intensities in plant crop during 1996-97

Varieties	Irrigation (After 7 days)	Irrigation (After 14 days)	Irrigation (After 21 days)	Mean
Bannu-1	8.66 ab	8.47 a-d	8.17 a-e	
COL-75	7.56 b-e	7.44 cde	7.35 de	7.45
Naurang-98	8.91 a	8.52 abc	7.89 a-e	8.44
PAS-132	7.42 cde	7.22 e	7.15 e	7.27
Mean	8.14NS	7.91	7.64	
<b>Recovery (%) in ratoon crop during 1997-98</b>				
Bannu-1	9.70 a	8.68 bc	8.43 cd	8.94 a
COL-75	7.68 de	7.49 e	8.37 cd	7.85 be
Naurang-98	9.30 ab	7.80 de	8.75 be	8.62 ab
PAS-132	7.26 e	7.21 e	7.87 de	7.45c
Mean	8.49 a	7.80 b	8.35 ab	

Means having different letters are significant at 5% level of probability using DMR test. NS = Non-Significant

98 implies significantly the highest recovery in ratoon stage after 7 days irrigation interval during 1996-97. Next higher recovery was given by Bannu-1 under the same interval in plant stage during 1997-98. As regards fortnightly irrigation interval, Naurang-98 responded with higher recovery in ratoon stage during 1996-97, followed by Bannu-1 in ratoon stage during 1997-98. Considering the response for recovery percentage in treatments with 21 days irrigation interval, it was 9.49 and 8.75 percent for variety Naurang-98 in ratoon stage during 1996-97 and 1997-98 respectively. Mongelard (1969) observed different responses in drought susceptible/resistant varieties. He emphasized on plant water potential and its effect on growth for transport and storage of sugar synthesis in sugar cane.

Table 3: Cane yield (t ha<sup>-1</sup>) of sugar cane varieties as affected by different irrigation intensities in plant crop during 1995-96

Varieties	Irrigation (After 7 days)	Irrigation (After 14 days)	Irrigation (After 21 days)	Mean
Bannu-1	71.01 a	48.93 abc	34.31 bcd	51.42 a
COL-75	72.71 a	53.31 ab	37.37 bcd	54.46 a
Naurang-98	50.96 ab	34.66 bcd	20.39 cd	35.34 b
PAS-132	59.12 ab	39.01 bcd	17.67 d	38.60 b
Mean	63.45 NS	43.98	27.44	
<b>Cane yield (t ha<sup>-1</sup>) in ratoon crop during 1996-97</b>				
Bannu-1	43.83 NS	39.07 NS	20.32 NS	34.41 b
COL-75	62.85	45.06	34.20	47.37 a
Naurang-98	46.27	31.57	21.74	33.19 b
PAS-132	39.41	33.97	27.31	33.57 b
Mean	47.94 a	37.42 b	25.90 c	

Means having different letters are significant at 5% level of probability using DMR test. NS = Non-Significant

Table 4: Cane yield (t ha<sup>-1</sup>) of sugar cane varieties as affected by different irrigation intensities in plant crop during 1996-97

Varieties	Irrigation (After 7 days)	Irrigation (After 14 days)	Irrigation (After 21 days)	Mean
Bannu-1	71.40 NS	63.42 NS	46.03 NS	60.28 b
COL-75	96.04	68.13	60.16	74.78 a
Naurang-98	79.37	54.36	46.03	59.92 b
PAS-132	77.55	60.92	38.41	58.96 b
Mean	81.09 a	61.71 b	47.66 c	
<b>Cane yield (t ha<sup>-1</sup>) in ratoon crop during 1997-98</b>				
Bannu-1	58.70 a	52.23 ab	21.74 cd	44.22 a
COL-75	61.96 a	52.54 ab	31.16c	48.55a
Naurang-98	67.03 a	53.26 ab	30.07 c	50.12 a
PAS-132	36.70 be	23.23 cd	11.26 d	23.73 b
Mean	56.09 a	45.31 b	23.54 c	

Means having different letters are significant at 5% level of probability using DMR test. NS = Non-Significant

Data presented in Table 3 and 4 revealed that irrigation intensities significantly affected cane yield. The interaction of irrigation × varieties was also significant except for the trial conducted during 1996-97 (plant/ratoon crop). Weekly irrigation showed the highest cane yield in all varieties during the entire period of research. While the lowest cane yield was noted in various treatments irrigated after 21 days interval. Significantly highest cane yields of 96.04, 79.37 t ha<sup>-1</sup> were recorded for varieties COL-75 and Naurang-98 under weekly irrigation schedule in plant stage during 1996-97. Varieties COL-75 and Bannu-1 produced higher cane yields in treatments, irrigated after 21 days interval in plant stage during 1996-97. Gupta (1983), Misra and Ahmad (1987) described critical growth stages of sugar cane (Seedling emergence, tillering and cane elongation stages) with respect to water requirements. They recommended 1200-1500 mm of water for higher yields in sugar cane. Anonymous (1985) reported that the morphological characteristics in sugar cane were mainly affected by the environment because of high co-efficient of variations associated with these characteristics. These findings are also in accordance with those obtained by Singh and Singh (1996) who reported sugar cane varieties COS 770 with better performance under drought stress as compared to variety CO 1148 under normal conditions. Sundera (1998) observed sugar cane varieties COSI 86071, CO 8208, CO 8601 and CO 85007 as drought tolerant.

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