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EFFECT OF DIFFERENT IRRIGATION LEVELS ON GROWTH AND YIELD PARAMETERS OF SUGARCANE

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ABSTRACT: An experiment was conducted in Bangladesh Sugarcane Research Institute (BSRI) farm at Ishurdi during 2003-04 and 2004-05 cropping seasons to find out the effect of different irrigation levels on growth and yield parameters of six sugarcane varieties (Isd 16, Isd 30, Isd 31, Isd 32, Isd 33 and Isd 34). The experiment was laid up in two factors split-plot design with five irrigation levels in main plots and six varieties in subplots. Irrigations at 21, 28, 35 or 42 days interval in addition to two live irrigations increased sugarcane yield from 15% to 46%. Irrigation at 21 days interval showed higher establishment, tiller, millable cane and yield of cane over irrigation at 28, 35 or 42 days interval. Varieties Isd 34, Isd 31, Isd 32 and Isd 33 showed better performance and produced significantly higher yield among the selected varieties. Hence sugarcane varieties Isd 31, Isd 32, Isd 33 and Isd 34 may be cultivated with potential yield in clay loam soil by providing 4 to 5 irrigations at an interval of 21-42 days in addition to two live irrigations at 0 and 14 days after transplanting when soil bed settlings are used as planting material.

Key Words: Sugarcane; Irrigation; Variety; Performance; Yield Component; Bangladesh.

INTRODUCTION

Water is a scarce and indispensable basic input for sugarcane as it is for other crops. Insufficient or excess water supply is invariably a constraint to growth and yield of sugarcane. For proper growth, sugarcane needs about 1260 mm of rain water or equivalent irrigation per year (Shih et al., 1977). In areas of low or unreliable rainfall or where the rainfall is not even throughout the year the crop is to be irrigated. Sugarcane has a high water use efficiency than other crops. It has been worked out that 200-250 tons of water is required to produce one ton of sugarcane (Anon, 1987).

Sugarcane production in Bangladesh suffers fluctuations because of poor distribution and shortage of rainfall. Annual average rainfall in the sugarcane growing zone ranges between 1200 mm and 2020 mm which is logically satisfactory for growing sugarcane. But the rainfall is not evenly distributed over the year. Yearly rainfall starts from April and continues to October. However, more than 60% of the total rainfall concentrates in June, July and August, causing water stagnation in the field, which creates oxygen stress in the root zone resulting in loss of sugarcane yield and reduction of quality. From November to March, the rainfall is very scanty and erratic. In some of these months no rainfall occurs. But plantation, germination and tiller formation of sugarcane mainly takes place during these dry months. Sugarcane, thus, in these months needs adequate moisture level to promote successful germination, tillering and growth of the crop. It is reported that yearly 2 to 3 irrigations from November to March increased sugarcane yield by 30% or more (Hossain, 1992). The highest yield of sugarcane (107 t ha^{-1}) was obtained from Bangladesh Sugarcane Research Institute's farm by applying three irrigations totaling 30 cm of water which were applied once at 24 hour after plantation and the rest at 30 days and 90 days after plantation (Eusufzai et al., 2000). Mathew and Varughese (2005) also reported

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that irrigation positively influenced all attributes and nutrient uptake and appreciably increased the cane yield. They obtained the highest yield of 107.40 t ha^{-1} with water use efficiency of 1.28 t $ha^{-1}cm^{-1}$ for the variety 'Madhuri' in India.

Again excess water use may induce leaching of valuable nutrients beyond root zone and may also create oxygen stress and therefore may retard normal growth of plant instead of boosting yield. Application of excess water is an economic loss for the sugarcane growers in addition to the yield loss. Sugarcane in general grows well up to soil moisture retention range of 0.2 –2.5 bars in arid climates and about 0.2-1.8 to 2.5 bars in humid climates (Husz, 1972). Generally, the percent aeration porosity even after irrigation should not be below 10% (Husz, 1972 as cited by Srivastava and Singh, 1987)

On the other hand, all varieties of sugarcane do not response to water deficit/ stress similarly. Some varieties can withstand more water stress than others, thus producing better yield in even drought condition. In contrast, some varieties can produce better yield in water stagnation condition. Therefore, determination of performance of different sugarcane varieties at different soil moisture levels is an important aspect to optimise economic yield of sugarcane at different locations of the country. Research work on this aspect has not been yet undertaken in Bangladesh although research works on other aspects of irrigation for sugarcane have been done by many researchers (Eusufzai et al., 2000; Siddique et al., 2001). Hence, the present experiment was conducted during 2003-04 and 2004-05 cropping seasons to find out the effect of different irrigation levels on growth and yield parameters of some selected varieties of sugarcane.

MATERIALS AND METHODS

The study was carried out in Bangladesh Sugarcane Research Institute (BSRI) farm at Ishurdi with six sugarcane varieties namely, Isd 16, Isd 30, Isd 31, Isd 32, Isd 33 and Isd 34. Settlings were raised from budchips of these varieties in soil bed. At the age of 60-69 days the settlings were transplanted in the main field. The experiment was laid in split-plot design with five irrigation levels in the main plots and six sugarcane varieties in the sub-plot (Table 1) and was replicated thrice. The budchip settlings were transplanted @ 25000 settlings per hectare. The soil of the experimental field was loamy to clay loam with pH value ranged from 7.57 to 7.70. (Table 2).

Chemical fertilizers were applied as per BARC recommendation (BARC, 1989) and intercultural operations were done as per BSRI recommendation (Rahman et al.,1998). Number of tillers produced by different varieties in different irrigation treatments were counted during May, 2004 after 6 months of transplantation. Number of millable canes were counted just one week before harvesting at the age of 13 months. Chemical analyses of canes were done during premature stage in October and mature stage in December to find the pol percentage of the cane (pol % cane). Pol

Table 1. Main plot and sub-plot treatments of the experiment laid in split-plot design

Main-plot treatment (Irrigation)	Sub-plot treatment (Variety)
I_1 = Live irrigation at 0 and 15 days after plantation	V_1 = Variety Isd 16
I_2 = I_1+ irrigation at 21 days interval	V_2 = Variety Isd 30
I_3 = I_1+ irrigation at 28 days interval	V_3 = Variety Isd 31
I_4 = I_1+ irrigation at 35 days interval	V_4 = Variety Isd 32
I_5 = I_1+ irrigation at 42 days interval	V_5 = Variety Isd 33
	V_6 = Variety Isd 34

Table 2. Physisochemical properties of the experimental field

Depth (cm)	Texture	pH	Organic matter (%)	N (%)	P (ppm)	K (meq/ 100g soil^{-1})	S (ppm)
0-15	Loam	7.57	1.30	0.042	10.0	0.22	27.0
16.50	Loam	7.62	0.87	0.020	5.5	0.22	25.0
51.75	Clay loam	7.70	0.62	0.019	3.0	0.23	18.0

% cane determined at matured stage has been included in this paper for discussion.

Number of Irrigation Applied

Only two live irrigations at 0 and 14 days after plantation (DAP) were applied in treatment I_1. During 2003-04, irrigation treatment I_1, I_2, I_3, I_4 and I_5 received 2, 7, 5, 5 and 4 irrigations, respectively (Table 3). However, during 2004-05, these treatments received 2, 7, 6, 5, and 5 irrigations, respectively (Table 4). During 2004-05 treatment I_3 and I_5 received one more irrigation over that they received during 2003-04. It is because rainfall started little later during 2004-05. The higher number of irrigations applied during both 2003-04 and 2004-05 was 7 and was applied to treatment I_2 where irrigation was applied at 21 days interval. During first two live irrigations, water was applied at a depth of 6 cm each. However, the latter irrigations water was applied at a depth of 10 cm each.

RESULTS AND DISCUSSION

Establishment of Settling

From the previous practice and experience it was essentially important to apply at least two irrigations at 0 and 14 days after transplantation for soil bed settlings (Hossain, 2005). However, some plant died after 14 days of transplantation due to pest infestation, diseases and high water stress. The results showed that the establishment of settlings was significantly higher (Table 5). The statistically significant highest establishment was found in the treatment I_3(23.39 x 10^3ha^{-1}) followed by treatment I_2(23.17 x 10^3ha^{-1}) and I_5 (23.26 x 10^3ha^{-1}) during 2003-04. The lowest establishment was found in the treatment I_1 (20.02 x 10^3ha^{-1}) where no irrigation was applied except two live irrigations.

However, during 2004-05, highest establishment was found in I_2 (22.42 x 10^3ha^{-1}) which was statistically similar with the treatment I_3 (22.39 x 10^3 ha^{-1}) and I_4(22.35 x 10^3ha^{-1}). The lowest establishment of settlings was found in I_1 (20.94 x10^3ha^{-1}).

On the other hand, significantly higher establishment of settlings was found in the varieties V_4, V_5, V_6 and V_3 over varieties V_1 and V_2 during 2003-04 (Table 5). The highest establishment was found in the variety V_4 (23.44 x 10^3ha^{-1}) and the lowest establishment was found in the variety V_2(19.73 x10^3ha^{-1}). During 2004-05, sig-

Table 3. Number and day of irrigation application for different treatments during 2003-04 (planted on December 6, 2003)

	Treatment				
Treatment	I_1 (2 live irrigations)	I_2 (21 days interval)	I_3 (28 days interval)	I_4 (35 days interval)	I_5 (42 days interval)
No. of Irrigation	2	2+5=7	2+3=5	2+3=5	2+2=4
Irrigation applied after plantation (DAP)	0, 14	0, 14 35, 56, 77, 98, 119	0, 14 42, 70, 98	0, 14 49, 84, 119	0, 14 56, 98

Table 4. Number and day of irrigation application for different treatments during 2004-05 (planted on December 5, 2004)

Treatment	Treatment				
	I_1 (2 live irrigations)	I_2 (21 days interval)	I_3 (28 days Interval)	I_4 (35 days interval)	I_5 (42 days interval)
No. of Irrigation	2	2+5=7	2+4=6	2+3=5	2+3=5
Irrigation applied after plantation (DAP)	0,14	0,14 35,56,77,98,119	0,14 42,70,98,126	0,14 49,84,119	0,14 56,98,140

nificantly higher establishments were also shown by V_4 (24.00 x 10^3ha^{-1}) and V_5 (23.59 x 10^3ha^{-1}) over others (Table 6). The lowest establishment was shown by variety V_2 (17.41 x 10^3ha^{-1}) during 2004-05. On the basis of the establishment potential the varieties can be ranked as: Isd 32 > Isd 33 > Isd 34 > Isd 31 > Isd 16 >Isd 30.

Number of Tillers

It is evident that during 2003-04, the number of tillers produced in irrigation treatment I_2, I_3, I_4 and I_5 where 5, 3, 3 and 2 extra irrigations applied, were significantly higher than the control treatment I_1 where only two live irrigations were applied (Table 5). Similar effects of irrigation treatments on tiller production were also observed during 2004-05. In both cropping seasons the highest number of tillers was produced in the treatment I_2 (138.11 x 10^3ha^{-1} and 115.771 x 10^3 ha^{-1} respectively) followed by treatment I_3 (135.20 x 10^3ha^{-1} and 105.740 x10^3ha^{-1} respectively) although the differences were not statistically significant. The lowest number of tillers were produced in the treatment I_1 (104.8 x 10^3 ha^{-1}) during 2003-04 and in I_5 (98.41 x 10^3ha^{-1}) during 2004-05. These evidences reestablished the fact that irrigation significantly increases the number of tillers.

Beside irrigation, number of tiller also depends on the variety as it is the inherent characteristics of each variety. Under the same input and environmental condition all the varieties do not usually produce

Table 5. Contribution of irrigation to yield and other parameters of sugarcane during 2003-04 and 2004-05

Treatment	Establishment of settings (x 10^3 ha^{-1})	Tiller (x 10^3 ha^{-1})	Millable cane (x 10^3 ha^{-1})	Yield (t ha^{-1})	Pol % cane	Total sugar content (t ha^{-1})
2003-2004						
I_1	20.02 c	104.80 b	95.22 c	68.70 c	12.749	8.759
I_2	23.17 ab	138.11 a	128.24 a	99.97 a	12.520	12.516
I_3	23.39 a	135.20 a	125.85 ab	97.95 ab	12.639	12.380
I_4	21.89 b	126.17 a	107.87 c	79.33 bc	12.427	9.858
I_5	23.26 ab	134.93 a	109.76 bc	86.98 abc	12.926	11.243
LSD at 5%	1.473	19.89 a	17.74	19.03	ns	-
2004-2005						
I_1	20.94 c	99.259	74.938	55.37 b	12.468	6.903
I_2	22.42 a	115.771	93.472	81.56 a	13.146	10.722
I_3	22.39 a	105.740	85.185	79.64 a	12.656	10.079
I_4	22.35 ab	101.968	86.497	80.84 a	12.599	10.185
I_5	21.64 bc	98.412	82.454	76.16 a	12.029	9.161
LSD at 5%	0.7397	ns	ns	14.33	ns	-

same number of tillers. It is evident that variety V_6, V_5 and V_3 produced significantly higher number of tiller (147.71 x $10^3 ha^{-1}$, 146.36 x $10^3 ha^{-1}$ and 144.53 x $10^3 ha^{-1}$ respectively) over variety V_1, V_2 and V_4 during 2003-04. Similarly the highest number of tillers was also produced by the variety V_6 (134.50 x $10^3 ha^{-1}$) during 2004-05. The lowest number of tillers was produced by the variety V_2 during both 2003-04 and 2004-05 cropping seasons. On the basis of the tiller production potentials, the varieties can be ranked as: Isd 34 > Isd 33 > Isd 31 > Isd 32 > Isd 16 > Isd 30.

Millable Cane

Millable cane is the number of canes that are used for milling/crushing. It is the number of tiller that can survive and become matured in competition with others. From the data of 2003-04 (Table 5), the highest number of millable cane was obtained from the treatment I_2 (128.24 x $10^3 ha^{-1}$) where irrigation was applied at 21 days interval in addition to two live irrigations at 0 and 14 DAP. The lowest millable canes were obtained from treatment I_1 (95.22 x $10^3 ha^{-1}$) where only two live irrigations were applied. Table 5 shows a general trend that the shorter the irrigation interval, the higher the number of millable cane.

Similar contribution of irrigation was also observed during 2004-05. The highest number of millable canes was also produced in the treatment I_2 (93.472 x $10^3 ha^{-1}$) and the lowest number of millable canes was produced in the treatment I_1 (74.938 x $10^3 ha^{-1}$) (Table 5). Therefore, it is revealed that irrigation increased the number of millable cane as it increased the number of tillers.

In variety, the highest number of millable cane was produced by the variety V_6 (133.53 x $10^3 ha^{-1}$) and the lowest by the variety V_2 during 2003-04 (Table 6). However, varieties V_3, V_5 and V_6 produced significantly higher number of millable cane over varieties V_4, V_1 and V_2. It is also evident that variety that produced higher number of tiller, also produced higher number of millable cane.

Similar results were also observed during 2004-05. The highest number of millable cane was also produced by the variety V_6 (112.70 x $10^3 ha^{-1}$) during 2004-05. Therefore, it is evident that during both cropping seasons the variety V_6 produced the highest number of millable cane followed by the varieties V_3 and V_5 (Table 6). Thus on the basis of the millable cane production potential the varieties can be ranked as: Isd 34 > Isd 33 > Isd 31 > Isd 32 > Isd 16>Isd 30.

Cane Yield

Yield of sugarcane is the final output from the field for the farmers. It is evident that irrigation has a positive impact to increase the yield of sugarcane (Table 5). During 2003-04, the highest yield of sugarcane (99.97 t ha^{-1}) was produced in the treatment I_2 where irrigation was applied at 21 days interval. However, yield difference among the treatments I_2, I_3, and I_5 are statistically insignificant. Treatment I_4 produced significantly lower yield than treatment I_3 due to lower establishment of settlings, which caused lower number of millable cane causing lower yield. Moreover, yield difference between treatment I_4 and I_5 was statistically insignificant.

Similar contribution of irrigation to increase yield was also found during 2004-05. The highest yield of sugarcane was also produced in treatment I_2 (81.56 t ha^{-1}) while the lowest was in the treatment I_1 (55.37 t ha^{-1}). However, the differences in yield among treatments I_2, I_3, I_4 and I_5 were statistically insignificant. It is important to mention that the average yield in all treatments during 2004-05 were lower than that of 2003-04. It was because of heavy weed infestation in the field during February and March 2004-05. It is apparent that additional irrigations over two live irrigations increased the yield of sugarcane up to 46% over control (Table 5).

Considering varietal aspect, it is evident (Table 6) that during 2003-04, variety V_3 produced the highest yield of 103.96 t

ha^{-1}, which was statistically similar with the variety V_5 (102.59 t ha^{-1}) and V_6 (100.55 t ha^{-1}). The lowest yield was produced by the variety V_2 (48.91 t ha^{-1}). However, during 2004-05, the highest yield was produced by the variety V_6 (93.78 t ha^{-1}). But the highest yield produced by V_6 was statistically similar to yield produced by the varieties V_3 (86.16 t ha^{-1}), V_4 (93.62 t ha^{-1}) and V_5 (82.69 t ha^{-1}). Thus on the basis of yield performance the varieties can be ranked as: Isd34 > Isd 31 > Isd 32 > Isd 33 > Isd 16 > Isd 30.

Pol Percentage of Cane

Irrigation did not have any significant effect on pol percentage of cane. Differences in pol percentage of cane among the treatments are statistically insignificant and ranged from 12.427% to 12.926% and 12.029 to 13.146% during 2003-04 and 2004-05 respectively (Table 5). However pol percentage of cane varied widely from variety to variety and differences were statistically significant (Table 6). The highest pol percentage of cane (above 13 %) was found in the variety V_1 and V_2 during both 2003-04 and 2004-05 cropping seasons although their cane yields were lower. The lowest pol percentage of cane was found in the variety V_4 (11.383% and 11.600% during 2003-04 and 2004-05, respectively. On the basis of pol percentage of cane, varieties can be ranked as: Isd 30 > Isd 16 > Isd 33 > Isd 34 > Isd 31 > Isd 32.

Total Sugar Content

It is the amount of total sugar that is contained with the total produced cane. Considering the irrigation treatments highest amount of total sugar was obtained from treatment I_2 during both 2003-04 and 2004-05 (12.516 and 10.722 tha^{-1} respectively) (Table 5). However, considering varietal performance, it is evident from the Table 6 that the highest total sugar content was obtained from the variety V_5 (13.653 tha^{-1}) during 2003-04 while the highest total sugar content was obtained from the variety V_6 (11.225 tha^{-1}) during 2004-05. During both the seasons the least total sugar content was obtained from variety V_1 and V_2. Thus on the basis of the total sugar content, the varieties can be ranked as: Isd 33 > Isd 34 > Isd 31 > Isd 32 > Isd 16 > Isd 30.

Table 6. Contribution of variety to yield and other parameters of sugarcane during 2003-04 and 2004-05

Treatment	Establishment of settings (x 10^3 ha^{-1})	Tiller (x 10^3 ha^{-1})	Millable cane (x 10^3 ha^{-1})	Yield (t ha^{-1})	Pol% cane	Total sugar content (t ha^{-1})
2003-2004						
V_1	21.89 b	109.76 bc	98.11 c	71.71 c	13.300 a	9.537
V_2	19.73 c	102.42 c	81.87 c	48.91 d	13.881 a	6.789
V_3	23.05 ab	144.53 a	128.09 a	103.96 a	11.647 bc	12.108
V_4	23.44 a	116.27 b	107.33 b	91.77 b	11.383 c	10.446
V_5	23.29 a	146.36 a	131.40 a	102.59 a	13.309 a	13.653
V_6	22.67 ab	147.71 a	133.53 a	100.55 a	12.393 b	12.461
LSD at 5%	1.261	9.438 a	9.852	8.315	0.8064	-
2004-2005						
V_1	21.76 c	81.80 c	63.15	54.03 b	13.82 a	7.467
V_2	17.41 d	61.93 d	53.02 c	37.98 c	13.61 a	5.169
V_3	22.02 c	120.00 ab	92.43 b	86.16 a	12.33 b	10.623
V_4	24.00 a	109.00 b	87.61 b	93.62 a	11.60 c	10.860
V_5	23.59 a	117.60 ab	98.19 b	82.69 a	12.16 bc	10.055
V_6	22.91 b	134.50 a	112.7 a	93.78 a	11.97 bc	11.225
LSD at 5%	0.4667	17.17	13.13	11.88	0.6511	-

DIFFERENT IRRIGATION LEVELS ON SUGARCANE

Table 7. Interaction effect of irrigation and variety on yield and other parameters of sugarcane during 2003-04 and 2004-05

S. No.	Treatment combination (irrigation + variety)	Establishment of setting ($x 10^3$ ha^{-1})	Tiller ($x10^3 ha^{-1}$)	Millable cane ($x 10^3$ ha^{-1})	Yield (t ha^{-1})	Pol % cane
2003-04						
1	I_1V_1	19.67	85.00	81.00	56.90	14.303
2	I_1V_2	15.33	87.56	68.22	41.77	14.447
3	I_1V_3	21.22	123.56	117.11	77.00	11.623
4	I_1V_4	22.89	103.33	93.67	77.20	10.937
5	I_1V_5	21.33	111.45	103.22	89.57	12.917
6	I_1V_6	19.67	117.89	108.11	69.77	12.270
7	I_2V_1	21.89	117.78	106.78	87.57	12.533
8	I_2V_2	22.33	113.22	101.67	56.13	13.817
9	I_2V_3	23.11	144.33	143.22	114.00	11.660
10	I_2V_4	23.55	123.11	125.22	104.43	10.957
11	I_2V_5	24.33	158.89	148.67	119.67	13.223
12	I_2V_6	23.78	153.89	143.89	105.90	12.930
13	I_3V_1	23.99	124.55	117.33	86.43	13.790
14	I_3V_2	21.00	99.22	80.22	52.77	13.393
15	I_3V_3	24.11	157.11	143.78	117.37	11.613
16	I_3V_4	23.44	124.00	116.56	105.67	11.283
17	I_3V_5	24.33	165.89	150.56	118.00	13.730
18	I_3V_6	23.44	157.89	146.67	119.57	12.023
19	I_4V_1	20.23	108.78	91.56	61.43	12.040
20	I_4V_2	19.89	101.67	76.67	44.47	13.867
21	I_4V_3	23.22	135.44	115.00	89.33	11.680
22	I_4V_4	22.78	111.33	96.78	87.90	11.857
23	I_4V_5	22.56	144.22	130.44	87.87	14.123
24	I_4V_6	22.67	155.56	136.78	105.00	10.997
25	I_5V_1	23.66	112.67	93.89	66.23	13.833
26	I_5V_2	20.11	110.44	82.55	49.43	13.880
27	I_5V_3	23.56	162.22	121.33	122.13	11.660
28	I_5V_4	24.56	119.55	104.44	83.67	11.880
29	I_5V_5	23.89	151.33	124.11	97.87	12.553
30	I_5V_6	23.78	153.33	132.22	102.53	13.747
Interaction effect		ns	ns	ns	ns	ns
2004-05						
1	I_1V_1	20.09 c	63.33	40.93	33.52	13.78
2	I_1V_2	16.67 e	74.81	65.65	37.67	12.84
3	I_1V_3	18.89 d	135.10	70.74	54.20	12.60
4	I_1V_4	24.17 a	101.30	87.41	73.64	11.67
5	I_1V_5	23.52 a	94.17	71.85	53.78	12.75
6	I_1V_6	22.31 b	126.85	113.06	79.40	11.17
7	I_2V_1	22.22 b	94.81	76.02	59.96	14.67
8	I_2V_2	18.15 c	62.04	52.50	32.42	14.79
9	I_2V_3	21.76 b	126.48	102.96	79.11	12.22
10	I_2V_4	24.72 a	136.57	95.56	121.14	11.57
11	I_2V_5	23.89 a	134.44	117.69	96.70	13.17
12	I_2V_6	23.80 a	140.28	116.11	88.51	12.46
13	I_3V_1	22.31 c	88.05	66.02	61.67	14.01
14	I_3V_2	17.87 d	51.76	40.00	36.05	13.58
15	I_3V_3	23.42 ab	123.70	95.28	97.39	12.72
16	I_3V_4	24.17 a	111.57	91.39	93.86	11.93
17	I_3V_5	23.61 ab	119.81	104.54	91.65	11.87
18	I_3V_6	22.96 bc	139.54	113.89	104.42	11.82
19	I_4V_1	23.15 a	84.26	72.78	59.68	13.56
20	I_4V_2	17.41 b	62.50	47.04	40.97	14.24
21	I_4V_3	23.15 a	92.97	98.61	88.64	11.93
22	I_4V_4	23.70 a	98.52	77.96	97.82	11.29
23	I_4V_5	23.71 a	119.17	100.28	92.20	12.04
24	I_4V_6	22.96 a	152.78	122.32	110.04	12.55
25	I_5V_1	21.02 b	78.52	60.00	55.34	13.09
26	I_5V_2	16.94 c	58.52	59.91	42.81	12.59
27	I_5V_3	22.87 a	121.95	94.54	111.48	12.17
28	I_5V_4	23.24 a	97.87	85.74	81.65	11.55
29	I_5V_5	23.24 a	120.46	96.57	79.13	10.95
30	I_5V_6	22.50 a	130.15	97.96	86.55	11.83
Interaction effect		1.044	ns	ns	ns	ns

Means followed by same letter donot differ significantly

Interaction Effect

The interaction effects of irrigation and variety on establishment of settlings, tiller, millable cane, yield and pol percentage of cane were statistically insignificant during 2003-04 (Table 7). However, during 2004-05 only establishment of settlings showed significant differences in interaction effect (Table 7). Variety V_4 and V_5 showed the highest establishment in all the treatment combinations. Variety V_3 and V_6 also showed significantly higher establishment in some other treatment combinations. An exceptionally highest yield of 122.13 t ha^{-1} was produced by I_5V_3 treatment-combination during 2003-04 while 121.14 t ha^{-1} by I_2V_4 treatment combination during 2004-05. However, comparatively higher yields were produced by I_2V_{1-6} and I_3V_{1-6} treatment-combinations during 2003-04 and I_3V_{1-6} and I_4V_{1-6} treatment-combination during 2004-05.

The study revealed that there was no statistical evidence of interaction effect between irrigation and variety. But both irrigation and variety showed their individual effect on establishment of settlings, tiller and millable cane production, and cane yield. However, irrigation did not have any effect on pol percentage of cane. It is therefore concludeed that irrigation at an interval of 21 days in addition to two live irrigations at 0 and 14 DAP of budchip settlings produced the highest yield over control. However, irrigation at 21 to 42 days interval produced statistically same yield in clay loam soil. Moreover, it showed a trend that the shorter the irrigation interval (i.e. the higher the number of irrigation), the higher the yield. To maximize the cane yield the selection of varieties for cultivation from the studied varieties may be as: Isd 34 > Isd 31 > Isd 32 > Isd 33 > Isd 16 > Isd 30. But, for maximizing total sugar content the varieties may be selected as: Isd 33 > Isd 34 > Isd 31 > Isd 32 > Isd 16 > Isd 30.

Therefore, for cultivation of sugarcane by raising settlings from budchip in soil bed, the variety Isd 31, Isd 32, Isd 33 and Isd 34 may be potentially practiced with 4 to 5 irrigations at an interval of 21 to 42 days in addition to two live irrigations at 0 and 14 DAP.

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