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EFFICACY OF SPLIT FERTILIZATION FOR RATOON SUGARCANE AT TWO IRRIGATION LEVELS

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ABSTRACT

An experiment was conducted at the farm of Regional Sugarcane Research Station (RSRS), Madargonj, Thakurgaon in 2006-2007 crop year to find out the efficacy of split fertilization at two irrigation levels on ratoon sugarcane. Top dressing fertilizers (i.e N&K) were applied in two, three and four splits. Approximately equal amount of water in total was applied in both the levels of irrigation. In level A_1 six (60-75 mm each) and in A_2 five (75-90 mm each) irrigations were applied. Application of urea and potash (N-K fertilizers) in two splits (B_1) produced highest number of tiller, millable cane and also highest yield in both levels of irrigation. The difference was not significant over B_2 & B_3. Irrigation level A_1 had higher average yield but not had significant difference over A_2. Highest number of tiller (125.1×10^3 ha^{-1}), millable cane ($92.89\times10^3 ha^{-1}$) and cane yield ($80.85\times10^3 ha^{-1}$) were produced by the treatment B_1 under A_1 level of irrigation. Hence application of N-K fertilizers with two equal splits appliced as basal dose (during stubble shaving) and at 120 days after stubble shaving and also light irrigation 6 to 7 number with total amount of 460 to 500 mm including effective rainfall may be preferred for loamy and sandy loam soils of Old Himalayan Piedmont Plain.

Key words: *Split fertilization, ratoon cane, irrigation level, number of irrigation, amount of water*

INTRODUCTION

Sugarcane like other perennial grass is able to regenerate shoots from stubbles producing successive crops known as ratoon crops. Ratooning has been progressively used in many sugarcane growing countries of the world as a device to cut down cost of production (Humbert, 1968). To grow plant crop followed by some ratoon crops minimize the cost of seeds, land preparation and planting of sugarcane (king *et. al*., 1965).

Ratooning ability is one of the most important characteristics of sugarcane which influence a particular variety (Miah *et. al.,* 1987). The number of ratoon crops that can profitably be grown varies depending on local environmental conditions and practices. At present taking of two or even more ratoons from the same plantation is a normal practice almost in all the countries where sugarcane is a major crop. In Hawaii, Mauritius, Philippines and Cuba, 4 to 6 ratoons are quite common (Majid and Alam, 1998). Ratoon crops have often failed to produce satisfactory growth and yield. Matin et. al. (1989) got the yield of first ratoon less than 50% of that of plant cane both in rainfed condition. They also found 50% to 65% mortality of tiller in ratoon cane in Bangladesh. That is why only 15-20% of sugarcane area is under ratoon cane in Bangladesh. The percent area is far below that in other advanced cane growing countries of the world. Majid and Alam (1998) pointed out several reasons for lower yields of ratoon than that of plant crop. Among them lack of moisture and nutrient are most

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important. Declining of soil fertility under continuous cropping might soil fertility, specially low nitrogen, phosphorus and poor irrigation practice were the main causes of steadily be responsible for low ratoon yield in our country. Earlier work in India and elsewhere proved that declining ratoon yield (Majid and Alam, 1998). On the other hand following all normal practices of ratooning specially timely harvesting and stubble shaving, gap filling, fertilization, irrigation, adopting pest control measures, solving drainage problems etc. increased the yield even higher than plant cane (BSRI, 1995). On an average, first ratoon crop is harvested in Bangladesh especially in high and medium high lands where plant cane is not affected by pest and diseases considerably. Second and third ratoon is harvested in rare cases in Bangladesh.

Sugarcane being a long duration and high yielding crop removes large quantity of nutrients from soil. Parthasarathy (1972) reported that a 46 ton crop of sugarcane removes 164 Ibs nitrogen and 398 Ibs potash from soil. Timely fertilization is the key factor to get maximum benefit from the added fertilizers. Bhoj *et.al.* (1974) reported that the best practice would be to apply the fertilizer in two instalments i.e. half at the time of planting and the rest half at tillering. In calcareaus silty clay loam soil highest cane yield was found with 480 mm pre monsoon total irrigation water including 65 mm effective rainfall and number of irrigation was seven (Siddique *et al.*, 2005). For this experiment premonsoon irrigation water range 420-525 mm (average 473 mm) and 450-540 mm (average 495 mm) by seven and six irrigation respectively (including effective rainfall) were budgeted. The range was thought for giving relaxation to the farmers who are not habituated to measure or estimate the amount of irrigation water which they apply in the field. Hence the experiment was conducted to find out the effect of split application of N-K fertilizers with the variation of irrigation number but with equivalent amount of water on the first ratoon of sugarcane.

MATERIALS AND METHODS

The experimeat was conducted in the farm of Regional Sugarcane Research Station (RSRS), Madargonj, Thakurgaon in 2007-2008 crop year to see the effect of split application of fertilizers (N-K) on ratoon sugarcane at two irrigation levels. Experimental works started through stubble shaving the left over stalk of previous planted cane by spade on the Ist week of December, 2007 just immediately after harvest. The plant cane was planted by STP method with pre-raised soil bed settlings. The experiment was set up under split plot design with two factors [A (2)×B(3)] having three replications. Factor-A Consisted two irrigation level and Factor-B Consisted three different levels of split application of top dressing fertilizers. The treatments are as follows-

Factor	A	:	Irrigation
Level	A_1	:	Seven light irrigation (60-75mm) at 0-2, 20, 55, 80, 110,140 and 175 days after stubble shaving (DASS)
Level	A_2	:	Six comparatively deeper irrigation (75-90 mm) at 0-2, 25, 65, 110, 140 and 175 DASS, respectively.
Factor	B	:	Split application of top dressing fertilizers (N and k).
Level	B_1	:	50% N and K-fertilizers as basal +50% N and K fertilizers at 115 DASS
Level	B_2	:	30% N and K fertilizers as basal + 35% N and K fertilizers at 115 DASS +35% N and K fertilizers as 145 DASS.
Level	B_3	:	25% N and K fertilizers as basal +25% N and K fertilizers at 115 DASS +25% N and K fertilizers at 145 DASS. +25% N and K fertilizers at 180 DASS.

RESULTS AND DISCUSSION

Yield and yield attributes of ratoon cane at two levels of irrigation and split application of N-K fertilizers for the crop of 2006-07 are presented under the following sub-headings.

Number of Tiller:
No significant difference was observed in tiller production among the treatments at A_1 and A_2 levels of irrigation (Table 1). Highest tiller population of 125.10 × 10^3 ha^{-1} was produced from B_1 under A_1 followed by B_1 treatment under A_2 irrigation level. Lowest tiller of 99.58× 10^3 ha^{-1} was recorded from B_3 under A_1 irrigation level.

Millable Cane:
No significant difference was observed in millable cane production among the treatments (Table 1). The maximum millable cane was found (92.87 ×10^3 ha^{-1}) from B_1 treatment under A_1 level of irrigation and did not differ with other treatments in both irrigation levels. Chowdhury *et. al* (1982) found similar result (83.03×$10^3$$ha^{-1}$) in similar soil of Setabgonj Sugarmills area at two splits applied at 0 and 120 days after plantation respectively. The yield differed insignificantly with other treatments.

Brix%:
The data presented in the Table 1 reveals that the different time of fertilizer applications and level of irrigation did not affect brix%.

Yield of ratoon Cane:
Non-significant difference was observed in cane yield among the treatments. From Table 1 treatment B_1 showed the highest yield of 80.85 t ha^{-1} under A_1followed by 79.95 t ha^{-1} from B_1 under A_2 irrigation levels. Lowest yield (75.73 t ha^{-1}) was found from B_3 treatment under A_2 level of irrigation. Similar results were found by chowdhury *et. al* (1982). They found highest yield 58.37 t. ha-1 for two splits applied at 0 and 120 days after plantation respectively. The yield differed insignificantly with other treatments.

Table 1. Impact of split fertilization and level of irrigation on tiller, millable cane and yield of ratoon cane in 2007-2008 crop year.

Irrigation Level	Split application of (N-K)	Number of Tiller (x 10^3 ha^{-1})	Number of Millable cane (x 10^3 ha^{-1})	Brix (%)	Yield of ratoon cane ($t.ha^{-1}$)
A_1					
Irrigation Number	B_1=2 splits	125.10	92.87	19.15	80.85
assigned -7	B_2=3 splits	106.84	87.69	18.95	79.20
applied-6	B_3=4 splits	99.58	76.66	19.05	76.44
A_2					
Irrigation number	B_1=2 splits	119.58	88.47	18.90	79.95
assigned-6	B_2=3 splits	116.60	87.84	19.30	78.15
applied-5	B_3=4 splits	105.34	86.27	19.10	75.73

In the present experiment, split application of N and K fertilizers into two equal halves i.e. ½ N + ½ K after stubble shaving and the rest ½ N + ½ K at 120 DASS (B_1) under A_1 level of irrigation was found superior to other treatments. This is evident from the results of the experiment that B_1 level of N-K fertilizers (2 splits) with A_1 level of irrigation (6 light irrigations with 75 mm effective rainfall) is superior in respect of cane yield improvement in sandy loam to loamy soil. As the difference between

B_1 and B_2 is insignificant, we may assume that in case of heavy irrigation and heavy rainfall just after irrigation or fertilizer (N-K) application, three splits or additional split with additional dose of fertilizer to recover leaching loss of N and K elements may give higher yield. In that situation, three splits or an additional split with additional dose of N-K fertilizer or with only N-fertilizer may be recommended (hypothesis). Further investigation needed.

REFERENCES

Bhoj, R.L.P.K. Singh, and Kirtikar, 1974. Appropriate time of application of Ammonium Sulphate to sugarcane crop. 5th all Indian Cong. Sug. Res. & Dev. Workers.pp. 172-176.

BSRI, 1995, Annual Report, 1995, Bangladesh Sugarcane Research Institute, Ishurdi, pabna, P.111-114.

Chowdhury, M.K.A., Rahman, M.H. and Hossain, A.H.M.D, 1982. The Effect of Split application of Nitrogen and Potash Fertilization Sugarcane, Bangladesh J. Sugarcane, 4:46-50.

Humbert, R.P. 1968. The growing of sugarcane. Elsevier Publishing Company, New York.779.p.

King, N.H.; Mungomery, R.W. and Hughes, C.G.1965. Manual of sugarcane growing. Elsevier Publishing Company, New York. 375.p.

Majid, M.A. and Alam, F. 1998. Fertilizer management for sugarcane ratooning Bangladesh J. Sugarcane. 18-20:75.79.

Parthasarathy, S.V. 1972. Sugarcane in India Published by the K.C.P. Lte. Madras-6. pp.321-463.

Siddique, M.A.B., Hossain S.M.I., Eusufzai S.U.K.and Alam K.S. 2005. Scheduling Irrigation for Sugarcane with Potato as Intercrop in the Ganges River Plain soils. Bangladesh J. Sugarcane, 24-27: 157-160.