involved 'ON-OFF' operations for every 10 minutes. RCFW recorded higher labour due to roughness. These findings fall in line with the findings of Dhanapal (1996) in his studies with surge irrigation in maize.

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EFFECT OF INOCULATION OF *Acetobacter diazotrophicus* (ACN) WITH DIFFERENT LEVELS OF NITROGEN ON IT'S POPULATION ON VARIOUS PARTS OF SUGARCANE VARIETY - CoC 92061.

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ABSTRACT

Acetobacter diazotrophicus was multiplied in semi solid LGI medium and mixed with lignite. Then it was inoculated with setts and planted with different levels of inorganic fertilizer nitrogen. The population of *A. diazotrophicus* reached maximum in the treatment where 50 percent N with *A. diazotrophicus* inoculation was given.

KEY WORDS : *Acetobacter diazotrophicus*, Endorhizosphere, Caulosphere, Phyllosphere, Variety CoC 92061, LGI semi solid medium.

Sugarcane is one of the important commercial crops and is the main raw material for producing sweetening agent. Sugarcane responds well to nitrogen in terms of cane and sugar yields. Nitrogen is added to the sugarcane fields through inorganic, organic and biological sources. The use of the potential biological processes in the soil become inexpensive and improves the long term soil fertility in sustainable agricultural farming (Dobereiner and Urquiage, 1992). The new potential nitrogen fixing organism, *Acetobacter diazotrophicus*, has been found to occur in the roots, stems, leaves (Gills *et al.*, 1989, James *et al.*, 1994), rhizosphere soil and cane juice (Muthukumarasamy *et al.*,1994). A study was conducted to enumerate *A. diazotrophicus* in different parts of the sugarcane plants and rhizosphere.

MATERIALS AND METHODS

Acetobacter diazotrophicus was multiplied in LGI semisolid medium (crystallized cane sugar - *100 g*, K_2HPO_4 - 0.2 g, KH_2PO_4 - 0.6 g, $MgSO_4 5H_2O$ - 0.2 g, $CaCl_2$ - 0.02 g, $NaMoO_4$ - 0.002 g, Ferric Chloride - 0.01 g, 0.2 N KOH solution of Bromothymol Blue 5 per cent - 5.0 ml, Agar - 1.8 g, distilled water - 1000 ml, pH-5.5) over the shaker at 120 rpm at room temperature for five days to attain 10^9 cells/ml. Then it was mixed with the powdered lignite and after curing for three days, inoculated with setts and planted with different levels of 'N' fertiliser at Annamalai University experimental plots between March '95 and December '95.

The samples viz., rhizosphere soil, endorhizosphere, caulosphere and phyllosphere

Table 1. Effect of inoculation of *A. diazotrophicus* with different levels of nitrogen on the population of *A. diazotrophicus* in Endorhizosphere, Caulosphere, Phyllosphere and Rhizosphere of sugarcane variety CoC-92061

Treatments	Number of cells g^{-1} dry tissues (x 10^5)								Number of cells g^{-1} dry weight (x 10^5)							
	Endorhizosphere				Caulosphere				Phyllosphere				Rhizosphere			
	60	120	180	240	60	120	180	240	60	120	180	240	60	120	180	240
T_2	14.2	21.3	22.0	22.3	10.2	17.4	19.1	20.3	3.5	6.6	7.3	7.2	13.2	14.1	16.5	17.10
T_3	16.1	23.5	23.3	24.6	11.2	19.2	23.3	21.0	3.9	8.2	7.6	9.1	14.3	16.3	18.2	18.20
T_4	21.4	27.3	31.6	34.0	13.2	22.1	25.1	25.0	4.4	9.3	10.2	9.4	16.2	20.3	23.7	23.50
T_5	21.5	24.4	23.6	24.3	13.3	19.3	20.4	21.0	4.7	8.2	8.6	7.5	15.3	20.4	21.4	21.20
T_6	22.3	25.2	24.6	23.0	15.5	20.4	21.3	22.0	5.0	8.2	8.9	7.6	15.1	21.1	22.7	21.70
C.D. (P=0.05)	0.005	0.301	2.08	1.58	0.309	0.390	0.219	0.005	0.454	0.233	0.324	0.005	0.083	0.416	0.084	0.295

were collected at 60 days interval till 240 DAP (Days After Planting). A series of ten fold dilutions of each sample upto 10^{-6} were made for enumerating the *A. diazotrophicus*. The LGI semisolid medium was used for the enumeration of *A. diazotrophicus*. A liquots of 1 ml, 0.1 ml and 0.01 ml from the 10^{-6} dilution for each sample were pipetted out into three sets of each of the five tubes and all the tubes were incubated for three days. The positive tubes showing yellow subsurface pellicle were counted and the population was enumerated by referring to MPN table. The cane yield and brix percentage were recorded at maturity.

RESULTS AND DISCUSSION

The results of population studies and yield of sugarcane are given in the table - 1 and table - 2 respectively. The population of *A. diazotrophicus* in endorhizosphere was increasing from 60 DAP upto 240 DAP in all the treatments except the last treatment wherein 100 percent inorganic nitrogen was added. It was maximum in the treatment given with 50 per cent N fertiliser followed by 25 per cent, 75 per cent and 100 per cent. The addition of nitrogen at low levels was supporting the population of *A. diazotrophicus* in endorhizosphere.

Table 2. Effect of inoculation of *A. diazotrophicus* with different levels of nitrogen on the yield and brix percentage of sugarcane variety - CoC 92061

Treat ments	Yield (t/ha)	Percentage increase over control	Brix per centage	Percentage increase over control
T_1	63.33	-	13.6	-
T_2	74.23	17.21	14.30	5.14
T_3	104.20	64.53	15.10	11.02
T_4	128.10	102.27	15.80	16.17
T_5	129.10	103.85	15.80	16.17
T_6	129.50	104.48	16.00	17.64
C.D.	1.510	0.324		

T_1 - No N + No *A. diazotrophicus*
T_2 - No N + *A. diazotrophicus* @ 5 kg / ha
T_3 - 25%N + -do-
T_4 - 50%N + -do
T_5 - 75% N + -do
T_6 - 100%N + -do

This might be due to the root exudates of host plant, which attracted and triggered the activities of the endosymbiont. The effect of this nitrogen fixing population was also reflected on the yield for the same treatment. The population in caulosphere was maximum in the same treatment supported the endorhizosphere population. The rhizosphere population increased with the age of the crop till 180 DAP and attained the maximum of 23.7 x 10^5 per g of soil and decreased towards maturity.

The endorhizosphere of sugarcane would be the main niche for the *A. diazotrophicus* which could contribute 'N' requirement by sugarcane. As the caulosphere also harbours the considerable number of the said bacterium, the total nitrogen fixing potential of the bacterium would be increased.

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PERFORMANCE EVALUATION OF A FOUR ROLLER SUGARCANE CRUSHER

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ABSTRACT

At present juice recovery from sugarcane using conventional power crushers is about 60 percent. Nearly 10-20 per cent of juice goes as waste along with bagasse. For increased juice recovery, an improved four roller crusher has been developed. It consisted of rollers, gear train, feed chute, bagasse carrier, juice collection tray and juice outlet. The performance of this crusher over three roller vertical and horizontal crusherr was evaluated and compared in terms of capacity, energy consumption and juice extraction efficiency. Juice extraction efficiency was found to be 11 and 8 per cent higher than that of the vertical and horizontal type three roller crusher respectively.

KEY WORDS: Juice extraction efficiency, Capacity, Roller clearance.

Sugarcane is one of the important cash crops grown in India. About 60 per cent of the cane produced in the country is used for production of gur, which is obtained by evaporating the juice. The efficiency of vertical and horizontal crushers in the extraction of juice varies. According to Michael and Ojha (1966) the vertical three roller type crushers yielded 50 to 70 per cent extraction efficiency. Singh (1995) reported that the horizontal roller type crushers yielded 2 per cent more juice than vertical roller crushers when the feeding was uniform.

This shows that there is a scope for increasing the juice extraction efficiency through design and development of improved cane crushers. With this objective a four roller horizontal type power operated sugarcane crusher was developed and tested for its performance.

MATERIALS AND METHODS

The four roller crusher developed is shown in Fig.1. The unit consisted mainly of a feed hopper, splitting rollers, crushing rollers, fly wheel, juice outlet, bagasse outlet and a housing frame. The king roller was positioned at the top of the frame and the other three rollers viz., the splitting roller, the pressing roller and the extraction roller were positioned at the bottom and around the periphery of the king roller. The position of the counter shaft was arranged in such a way that the 12-teeth closed type pinion attached to the counter shaft meshed with the 50 teeth gear wheel attached to the counter shaft. A juice collection tray was fixed covering the bottom of the three rollers. The drive wheel of the unit was connected to an electric motor of 5.0 hp capacity by a suitable belt drive.

The king roller along with the crushing rollers formed the spilitting pair and do the job of splitting and crushing the cane that was fed into the gap between them, thus extracting the juice. The crushed cane passed through the gap between the king and the extraction roller and thus the remaining juice was extracted. The splitting roller clearance was kept at 10 mm. The juice and the