

## COMPARATIVE PERFORMANCE OF LOCALLY AVAILABLE SUGARCANE CRUSHERS USED IN KARNATAKA

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Sugarcane is an important industrial crop. About 50 per cent of sugarcane produced in Karnataka is crushed in sugar industries and 40 per cent is crushed for making jaggery and rest 10 per cent for seed as well as local juice consumption. In the present study Two roller power operated sugarcane crusher, three roller traditional sugarcane crusher, three roller heavy duty sugarcane crusher and three roller gear box type sugarcane crushers were used to analyse the different parameters of sugarcane juice extracted from the six varieties Viz., CO419, CO62175, CO7804, B37172, CO8371 and CO86032 which are commonly grown in Karnataka. Using these four sugarcane crushers the Amount of juice extracted (gm/kg) and Baggase weight (gm/kg) were studied and evaluated. It was observed that as the number of crushing cylinders increased, crushing of cane will be more effective leading to increase in percent of juice extraction with reduction in baggase weight. Prevention of contaminations with juice at the time of crushing and maintenance of hygienic conditions in the place of crushing helps in maintaining the Purity of the juice extracted. As the number of cylinders increases, better is the extraction of sugarcane juice.

**Keywords:** Sugarcane Crushers, Cultivars, Amount of juice, purity of juice

### INTRODUCTION

Sugarcane is an important industrial crop of India. The country producing about 300 MT of sugarcane to feed about 450 sugar producing factories with a crushing capacity ranging from 1,250 to 10,000 tones of cane per day and period of crushing ranges from 160 to 180 days with an average recovery of 10%. About 50% of sugarcane produced in Karnataka is crushed in sugar industries and 40% is crushed for making jaggery and rest 10% for seed as well as local juice consumption. The remaining portion of the juice leftover in the baggase is burnt as fuel (Baboo and Soloman, 2000). The sugarcane contains 65% water, 15.5% sugar, 3.5% non sugars and 16% fiber. As per the estimation, on an

average of about 79% of juice is expressed in sugar mills by multistage crushing on the other hand about 65% of juice is expressed in three roller crusher used in jaggery industry. Unviable low crushing capacity with obsolete technology is responsible for getting low yield juice in the cane crushed by jaggery industries. Therefore, processing of sugarcane to extract maximum juice plays an important role in jaggery industries and entire cane crushing system in jaggery industry warrants a complete over hauling and needs an improved method of crushing so that yield of jaggery increases and production cost comes down. The sugarcane crushers used in jaggery industries should meet the requirements like optimum power input, effective juice

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extraction, reasonable maintenance, care in operation and resistance to vibration, wear and tear and investment on the crushers should be within the reach of the investor/farmer. Bhalwar (1976) suggested the replacement of existing crusher with screw press in sugar industry to achieve better performance of juice extraction. Miah *et al.* (1993) made a comparison of draught power source for crushing sugarcane. Baboo and Soloman (2000) stated that 50-55% of juice is extracted using three-roller crushers in the jaggery industry. There is a loss of nearly 25% of the juice in the bagasse due to poor extraction and which will burnt later with bagasse as fuel in jaggery industry itself. Further, they have suggested that there is possibility of improving extraction of juice up to 80% by adopting crushers having more than three rollers/cylinders. According to Singh (2004) horizontal type rollers has better juice extraction than vertical once. Hence, there is a need to incorporate certain modifications to the traditional crushers used in jaggery industries to improve the cane crushing and juice extraction efficiency.

#### MATERIAL AND METHODS

The performance evaluation study was conducted under actual field conditions during sugarcane crushing season in Mandya District of Karnataka. In general there are four types of sugarcane crushers used in jaggery industry in Karnataka depending upon the power source. The power source may be electrical or diesel operated. The existing sugarcane crushers are namely, two roller power operated sugarcane crusher, three roller traditional sugarcane juice extractor, three roller heavy duty sugarcane crusher and three roller gear box type sugarcane crusher. Six varieties of high yielding sugarcane cultivars Viz., CO419, CO62175, CO7804, B37172, CO8371 and CO86032 which are commonly

cultivated in Karnataka were selected for crushing operation. The parameters studies include quantity of juice extracted and weight of baggase obtained in each system of crushing and the varieties crushed were recorded. The analysis of juice was done under laboratory conditions at Agricultural College, V.C. Farm. Mandya. Standard procedures and methods were adopted for conducting evaluation study.

#### RESULTS AND DISCUSSION

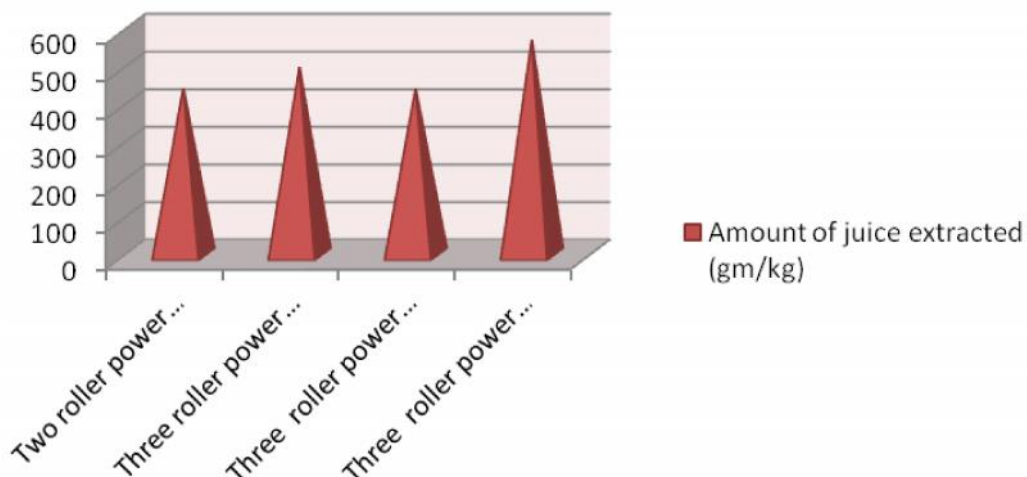
**Amount of Juice Extracted (gm/kg):** The quantity of juice extracted from each system of crushing and variety of sugarcane crushed are recorded and presented in Table 1. It is observed that the amount of juice extracted vary from cultivar to cultivar in each system of crushing. This may be due to the characteristics of cultivars and method of juice extraction. From the data it could be observed that the power driven three roller gear box type sugarcane crusher proved better in extracting juice from the varieties of sugarcane crushed (547 to 588 gm/kg of cane crushed) followed by three roller traditional sugarcane crusher (477 to 515 gm/kg) and three roller heavy duty sugarcane crusher (444 to 525 gm/kg) used in jaggery industries. The juice extracted by power driven two roller sugarcane crusher used by venders is comparatively less than that of other three crushers. The variation in juice extracted from the systems of crushing may be due to their design parameters such as clearance between rollers, serrations made on the periphery of the roller, speed of roller and quantity of cane fed per unit time.

**Weight of Baggase (gm/kg):** The weight baggase available after extraction of juice vary from variety to variety of cane crushed depending upon the fiber content in the cane and the percent of juice extracted. It is clear from the

**Table 1: Amount of Sugarcane Juice Extracted from Different Types of Crushers**

Type of Crusher	Sugarcane Varieties					
	CO419	CO62175	CO7804	B37172	CO8371	CO86032
Two roller Power operated sugarcane crusher	452	412	442	458	435	460
Three roller traditional sugarcane juice extractor	477	508	505	480	512	515
Three roller heavy duty sugarcane crusher	522	444	480	478	502	525
Three roller gear box type sugarcane crusher	547	583	578	568	570	588

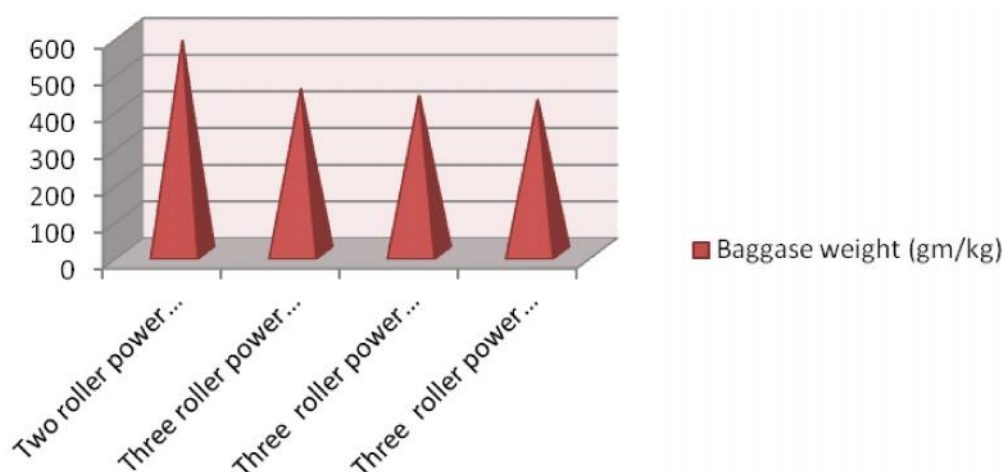
**Figure 1: Amount of Juice Extracted (gm/kg)**



**Table 2: Baggase Weight Obtained from Different Type of Crushers**

Type of Crusher	CO419	CO62175	CO7804	B37172	CO8371	CO86032
Two roller Hand operated sugarcane crusher	574	629	584	565	564	560
3 roller traditional sugarcane juice extractor	504	428	432	502	424	420
3 roller heavy duty sugarcane crusher	387	489	470	474	392	385
3 roller gear box type sugarcane crusher	453	424	426	415	412	402

**Figure 2: Baggase Weight (gm/kg)**



data presented in Table 2 that the weight of bagasse recorded after extracting juice using three roller gear box type sugarcane crusher is comparatively less (402 to 453 gm/kg of cane crushed) followed by cane crushed using three roller traditional sugarcane crusher (420 to 504 gm/kg), three roller heavy duty sugarcane crusher (385 to 470 gm/kg), and power driven two roller sugarcane crusher (560 to 629 gm/kg). It could be seen from the Table 1 that the percent of juice extracted using three roller gear box type sugarcane crusher is high (547 to 588 gm/kg of cane crushed), hence recorded less weight of bagasse available after juice extraction as compared to other methods of cane crushing where the extraction of juice is less leading higher weight of bagasse due to presence of juice in the bagasse.

#### CONCLUSION

From the study it could be concluded that as the number of crushing cylinders increased, crushing of cane will be more effective leading to increase in percent of juice extraction with reduction in bagasse weight. Prevention of contaminations with juice at the time of crushing and

maintenance of hygienic conditions in the place of crushing helps in maintaining the Purity of the juice extracted.

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