

## ARTICLE

# Response of Stubble Shaving Times on Ratoon Yield of Different Sugarcane Genotypes

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### ABSTRACT

Ratooning is common practice done in sugarcane with purpose of reducing the total cost of cultivation and early cane maturity. More than 35% of sugarcane productivity is lost due to improper attention of the farmers towards ratoons. Majority of farmers reported that the ratoonability wasn't good when harvested in December-January. This experiment was carried out to find the appropriate ratoon shaving time with response to different varieties in sugarcane ratoon crop in the year 2018/19 at national sugarcane research project, Jitpur, Bara. The experiment was conducted in split plot design with four levels of cane genotypes as Co – 0238, CoLk – 94184, Co – 0233 and CoS – 07250 as the main plot factor while four harvesting dates as sub plot factor with three replications. Observations of a number of millable canes, single cane weight, plant height and single cane diameter were recorded, tabulated and analyzed in R-studio. Ratoon stubble shaving in the month of November had the highest number of millable canes (88079/ha) which wasn't significantly different from the stubble shaving in the month of December, January. Likewise, highest cane yield (60.04 mt/ha), single cane weight (0.757 kg), cane diameter (2.11 cm), plant height (1.82 m) were found in early stubble shaving dates. Cane Yield and various yield parameter shows better performance in early ratoon shaving periods i.e. from November to January than late ratoon shaving dates.

## 1. Introduction

Sugarcane is a major commercial cash crop grown in Nepal with annual production of 1.95 million tons sharing 34<sup>th</sup> rank in total yield globally [4]. The national productivity of sugarcane is limited to only 45.12 t/ha which is less in comparison to global average 56.29 ton/ha [7]. Ratooning is common practice in sugarcane for cultivation cost reduction and early crop maturity. Moreover, ratoons have supplementary advantage of better juice quality and sugar

recovery as compared to plant crop of same variety [14]. Low yield of ratoons compared to main crop is mainly due to differential potential of cultivars, poor sprouting of stubbles and higher mortality of tillers [12]. Moreover, more than 35% of its productivity is lost due to improper attention of the farmers towards ratoons [6]. Late maturing cultivars having good yield are suitable for growing ratoon but early maturing cultivars are poor ratooners.

Stubble shaving is an important operation by which the portion of cane sticking out of the collar region above the

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ground is removed to encourage proper germination and tillering<sup>[1]</sup>. Crops harvested in the spring give better ratoon than autumn harvested due to moderate temperature which is more conducive for ratoon sprouting<sup>[9]</sup>. Stubble shaving is usually recommended within a week of harvest of sugarcane because mortality of facultative tillers usually occurs from left over canes<sup>[2, 10]</sup> noticed different response of different genotypes for sprouting, millable canes and commercial cane sugar for ratooning.<sup>[13]</sup> found superior response in late harvested canes in first week of November. Majority of farmers keep ratoon crops after harvesting crop without considering the environmental factors and basic agronomic practices like stubble shaving. Keeping all this in view, the present research was carried out to find the appropriate ratoon shaving time with response to different varieties.

## 2. Materials and Methods

Field experiments were conducted in sugarcane ratoon crop from November 2018 to February 2019 at National sugarcane research project, jitpur, Bara (27° 6'48.31''N , 84° 57'15.8''E and 85 masl). The experiment was conducted in split plot design with four level of cane genotypes as Co – 0238, CoLk – 94184, Co – 0233 and CoS – 07250 as main plot factor while four ratoon stubble shaving dates i.e. November, December, January and February were set in sub plot factor with three replications. Canes were planted in each plant size of 5m row length with 90 cm spaced 5 rows. NPK were applied in the field in the recommended dose of fertilizers 150:60:40 kg/ha NPK. Other crop management practices and plant protection measures were applied uniformly and when required. Observations of a number of millable canes, single cane weight, plant height and single cane diameter were recorded. Data were tabulated and analyzed in R-studio.

## 3. Results and Discussion

### 3.1 Number of Millable Canes

Different cane genotypes and stubble shaving dates had a significant difference in number of millable canes. The result revealed that ratoon stubble shaving in the month of November had the highest number of millable canes (88079/ha) which wasn't significantly different from the stubble shaving in the month of December, January. But there was less number of millable canes per hectare (53472 canes/ha) in the late stubble shaving date i.e. in the month of February. Sugarcane genotype CoLk- 94184 had the highest number of millable canes which wasn't significantly different from CoS 07250. There was no any significant different in

interaction between ratoon shaving time and genotypes. The highest number of millable canes in the early shaving date is due to the higher number of sprouts due to environmental factors such as high temperature in November than further coming months. Similar findings are also found by<sup>[9]</sup> and<sup>[5]</sup>.

**Table 1.** Effect of ratoon shaving date in number of millable cane (NMC) of different sugarcane genotypes in 2019

Date	Genotypes				NMC/ha
	Co- 0238	CoLk 94184	Co - 0233	CoS 07250	
Nov	69907	109259	56481	116667	88079a
Dec.	68056	97222	44444	85648	73843a
Jan.	62500	76852	75463	78704	73380a
Feb.	46296	60185	46759	60648	53472b
NMC/ha	61690b	85880a	55787b	85417a	
Cv	23%				
Mean	72193				
LSD (d)	17674				
LSd(v)	12939				
LSD (dv)	Ns				

### 3.2 Plant Height

Plant height was found significantly different to different stubble shaving dates. Tallest canes (1.82 m) were found in early ratoon shaving date i.e. in the month of November followed by December (1.77 m), January (1.72 m) and February (1.68 m). However, there were no any significant differences in plant height among tested genotypes and their interaction effects. Smallest plant height among all shaving dates was found in late shaving date in February which might be due to shortest growing period and less absorption of nutrients for ratoon growth which is at par with the<sup>[3]</sup>.

**Table 2.** Effect of ratoon shaving date in Plant height (PH) of different sugarcane genotypes

Date	Genotypes				Mean
	Co- 0238	CoLk 94184	Co - 0233	CoS 07250	
Nov	1.78	1.85	1.83	1.81	1.82a
Dec.	1.75	1.72	1.81	1.79	1.77ab
Jan.	1.73	1.70	1.75	1.68	1.72bc
Feb.	1.67	1.69	1.69	1.68	1.68c
Mean	1.73	1.74	1.77	1.74	
Cv	4.5				
Mean	1.75				
LSD (d)	0.06				
LSd(v)	Ns				
LSD (dv)	Ns				

### 3.3 Cane Diameter

The result revealed that the thickest cane diameter (2.11 cm) was found in early ratoon shaving date i.e. in the month of November which wasn't significantly different from stubble shaving date December.

The cane diameter decreased in further stubble shaving date in January and February. Likewise, Genotypes Co 0238 had recorded thickest cane diameter of 2.2 cm followed by genotype Co 0233 and CoS 07250. But, there was no interaction effect between genotypes and ratoon shaving times.

**Table 3.** Effect of ratoon shaving date in cane diameter (CD) of different sugarcane genotypes at NSRP in 2019

Date	Genotypes				CD (cm)
	Co- 0238	CoLk- 94184	Co - 0233	CoS - 07250	
Nov	2.33	1.91	2.1	2.1	2.11a
Dec.	2.31	1.88	2.12	2.07	2.09a
Jan.	2.2	1.82	1.95	1.91	1.97b
Feb.	1.97	1.77	1.93	1.82	1.87c
CD (cm)	2.2a	1.85c	2.03b	1.98b	
Cv	4.5				
Mean	2.01				
LSD (d)	0.06				
LSd(v)	0.09				
LSD (dv)	Ns				

### 3.4 Single Cane Weight

The maximum single cane weight (0.757 kg) was recorded in early ratoon shaving date i.e. in the month of December which wasn't significantly different with the ratoon shaving date of 0.743 and 0.757 kg. Likewise, genotype Co 0238 had highest single cane weight among tested genotypes of 0.822 kg followed by Co 0233 of 0.769 kg. There were no interaction effects between tested two factors. High cane weight is attributed to high cane diameter and plant height due to long growing time which is at par with <sup>[11]</sup>.

**Table 4.** Effect of ratoon shaving date in single cane weight (SCW) of different sugarcane genotypes

Date	Genotypes				SCW (kg)
	Co- 0238	CoLk 94184	Co- 0233	CoS 07250	
Nov	0.857	0.607	0.83	0.677	0.743a
Dec.	0.867	0.633	0.84	0.687	0.757a
Jan.	0.787	0.603	0.713	0.63	0.683b
Feb.	0.777	0.603	0.693	0.63	0.676b
SCW (kg)	0.822a	0.612d	0.769b	0.656c	
Cv	4.2				
Mean	0.715				
LSD (d)	0.02				
LSd(v)	0.04				
LSD (dv)	Ns				

### 3.5 Cane Yield

The result revealed that highest cane yield (60.04 mt/ha) was found in early stubble shaving date i.e. in the month of November which wasn't significantly different further two stubble shaving date i.e. in the month of December (54.71 mt/ha) and January (51.74 mt/ha) followed by late ratoon shaving date i.e. in the month of February (37.54 mt/ha).

As yield attributing parameter supports the yield performance, the highest cane yield was found after early stubble shaving in the ratoon. But cane yield was not significantly different among genotypes and their interaction with shaving dates. Higher cane yield is attributed to higher number of millable canes, cane height, weight and cane diameter which is at par with the findings by <sup>[8]</sup>.

**Table 5.** Effect of ratoon shaving date in cane yield of different sugarcane genotypes

Date	Genotypes				Mean
	Co 0238	CoLk 94184	Co 0233	CoS 07250	
Nov	61.1	61.1	61.1	61.1	62.04a
Dec.	59.3	59.3	59.3	59.3	54.75a
Jan.	51.4	51.4	51.4	51.4	51.74a
Feb.	38.9	38.9	38.9	38.9	37.5b
Mean	52.66	52.2	44.21	56.94	
Cv	23				
Mean	51.5				
LSD (d)	12.07				
LSd(v)	Ns				
LSD (dv)	Ns				

## 4. Conclusions

From above discussion, yield parameter like of millable canes, plant height, cane diameter, single cane weight and cane yield shows better performance in early ratoon shaving periods i.e. from November to January than late ratoon shaving dates. Ratoon performance in high when stubble shaving is done in the start of spring season by considering environmental factors like temperature and soil.

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