

## Quality Seed Cane Production of Sugarcane(*Saccharum spp.* hybrid complex) through Bud Chip Technology for Replacement of Old Varieties in West Bengal.

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Sugarcane(*Saccharum spp.* hybrid complex), a poverty reducing traditional crop having religious values cultivated in West Bengal since long back. It is cultivated in West Bengal in around 17 thousand hectares area with average yield of 76.1 tonne per hectare and total production of 12.94 lakh tonnes during 2017-18. Traditional varieties traditionally cultivated(3-budded setts) mainly due to unavailability of quality seed cane of newly released varieties and transportation cost of huge seed materials required for planting(6 tonne/hectare). Sugarcane Research Station, Bethuadahari, Nadia is the only source of quality seed cane of newly released varieties. The performance of the only one operational sugar mill, Khaitan(India) Ltd. at Plassey, Nadia in West Bengal have very poor recovery record as compared to national average. The main problem for implementation of “Sustainable Dev. of Sugarcane Based Cropping System in West Bengal” is transportation of quality seed cane to different districts. Quality seed cane lifted from the research station from different districts was 454.5 quintal and 174.0 quintal during 2016-17 and 2017-18 respectively, clearly indicate the declining trend of seed cane supply. In this context, sugarcane bud chip technology plays an important role on quality seed production and fast replacement of old varieties. This technology is a low cost technology, high seed multiplication ratio, 6-8 weeks’ time saving and reliable by eliminating about 80-90% seed cane to manageable bud chips and make transport and handling easy.

**Keywords:** Sugarcane; Seed Cane; Bud Chip; Seedling Nursery; Low Cost Technology

### Introduction

Sugarcane, a poverty reducing traditional crop, provides raw materials to sugar and sugarcane based industries and also used for chewing purpose and having religious values.

Bagasses, Molasses and Press mud, which are the main by products in sugar industry, serve as raw material for various purposes essentially for production of alcohol, power/paper and bio-manures respectively. It is cultivated in West Bengal in around 17 thousand hectares area with average yield of 76.1 tonne per hectare and total production of 12.94 lakh tonnes during 2017-18 (SugarIndia, YearBook, 2018). It is grown in almost all districts mainly Murshidabad, Nadia, Birbhum, North 24 Parganas, Paschim Medinipur and Malda except hill areas. Traditional varieties traditionally cultivated(3-budded setts) in this state mainly due to unavailability of quality seed cane of superior varieties at different locations and transportation cost of huge seed materials required for planting(6 tonne/hectare). The performance of the only one operational sugar mill, Khaitan(India) Ltd. at Plassey, Nadia in West Bengal have consistently poor cane crushing and recovery record as compared to national average, for last few years resulting less production of sugar and thus their paying capacity to the farmers is very poor and uncertain(Table 1.). The crushing season(days) of this sugar mill was also negligible as compared to other state during 2015-16 and 2016-17 crop season(Table 2.)

**Table 1. Performance of Sugar Industry(Khaitan India Ltd.) in West Bengal**

Performance	2017-18	2016-17	2015-16	2014-15
Crushing Cap.(MT)	1800	1800	1800	1800
Crushed(Lakh MT)	0.69	0.66	0.75	0.59
Sugar(Lakh Qtl.)	0.36	0.48	0.50	0.49
Recovery(%)	5.21	7.18	6.63	8.36
National Average Recovery(%)	9.30	10.48	10.62	10.37
Molasses(MT)	3800	3700	5200	3200

Source-SugarIndia, YearBook, 2018

**Table 2. State wise duration of crushing season(Days)**

State	2016-17	2015-16	2014-15
West Bengal	19	9	71
Bihar	106	95	100
Orissa	70	97	74
Uttar Pradesh	139	111	125

Haryana	168	136	143
Punjab	133	136	128
Rajasthan	99	91	92
Maharashtra	70	114	145
Goa	43	78	98

Source-SugarIndia, YearBook, 2018

The efficiency of sugar and sugarcane based industries is mainly depended upon the availability of improved sugarcane varieties with better juice quality and tolerance to biotic and abiotic stresses. So, replacing the existing old traditional varieties and promoting promising newly released varieties to different districts is in urgent need. Rapid seed cane multiplication and large quantity of planting material poses a great problem in transport, storage and involves high cost. In this context, quality seed cane production of sugarcane through Bud Chip Technology for replacement of old varieties is one of the most important option in West Bengal.

## 2. Materials and Methods

This study is based on both primary and secondary data. Five promising sugarcane varieties (viz. CoLk 94184, CoSe 01421, Co 0232, CoB 99161 & CoSe 95422) of early maturing group(300 days) were taken for the study. It was planted in Conventional Method i.e 3-budded sett planting and using Bud Chip in Bud Chip Technology Method in seed production programme at Research Farm of Sugarcane Research Station, Bethuadahari, Nadia during 2018-19. For conventional Method, the spacing was 90 cm row to row and 12 buds per meter within the row. In Bud Chip Technology Method, the spacing was 90 cm x 45 cm. The standard package & practices for raising good crops were followed (*Sundara, 1998*). The standard methodologies for preparing bud chips and raising seedling nursery for quality seed cane production were followed as described by the Rajendra Prasad and Sreenivasan, 1996 & 1997.

### 2.1 Methodology for preparing bud chips for quality seed cane production.

- Selected healthy cane, free from attack by insects and diseases.
- Canes of 6-8 month age were preferred. In case of aged cane, avoid taking bud chips from bottom 1 meter portion.
- Taken bud chips manually using Chipping Machine/bud cutter.

- Dried the chips in shade for 2-4 hrs.
- Prepared a solution consisting of Malathion 50EC 0.1%(2 ml per litre of water) and Carbendazim 0.1% (1gm per litre of water).
- Dipped the bud chips in pesticide solution for 10 min. After removing dried them in shade for 2 hrs.
- If meant for transport, bud chips could be kept in perforated polybags before packing in corrugated paper box.

## 2.2 Methodology for raising seedling nursery

- Prepared a homogenous mixture with equal quantity of soil, sand and vermi compost and filled in seedling trays (portrays).
- Dipped the bud chips in 0.1% Carbendazim solution for 10 min.
- Planted the bud chips with bud facing upward in seedling trays. Covered them with soil mixture lightly.
- The seedling trays were covered with polythene sheet for 5-7 days to make the buds germinate faster.
- Regular watering with rose can were done.
- Sprayed 1% urea solution on 15<sup>th</sup> and 25<sup>th</sup> day after planting.
- After 6 weeks transferred the seedlings together with the mass of medium to the field and transplanted it in small pits with required spacing.

## 2.3 Conventional Method of Planting(Pic-1 & Pic-2.)



## 2.4 Bud Chip Technology Method (Pic-3, Pic-4, Pic-5 & Pic-6)



The secondary data were collected from various reports published by the ICAR-Sugarcane Breeding Institute, Coimbatore, Tamil Nadu, Indian Sugar Mills Association, Sugar India Year Book 2018, Sugarcane Research Station, Bethuadahari, Department of Agriculture, Govt. of West Bengal, etc.

### 3. Results and Discussion

Seed Production Programme has played an important role in fast replacement of old varieties by high yielding newly released varieties (Kumar et al. 2014). The various advantages of quality seed cane production through bud chip technology method over conventional are presented below (Table 3).

**Table 3: Comparative study on Bud Chip Technology and Conventional Method of sugarcane cultivation at Sugarcane Research Station, Bethuadahari, Nadia**

Parameters	Conventional Method	Bud Chip Technology	Advantages of Bud Chip Technology over conventional
Seed cane requirement	60-80 quintal/ha	7.5-10 quintal/ha (25000 bud chip/ha)	Nearly 80-90% (by weight) of the planting material can be reduced
Bud germination	30-35 %	Around 90%	Assured crop stand in the field

Seed Multiplication Ratio	1:10	1:100	Faster multiplication of new released varieties is possible in bud chip technique
Cane yield	650-750 quintal/ha	750-1000 quintal	Higher cane yield
Chances of Varietal admixture during transport	High	Nil	Controlled
Sett transmitted diseases and pests	Maximum	Very less	Minimum
Transportation cost of Seed material	Very high	Very low	Low cost technology

Low Seed cane requirement and high cane yield is found in bud chip technology method as compared to conventional method of planting. Seed multiplication ratio, the most important parameter for rapid seed cane replacement of newly released varieties, is ten times higher in bud chip technology over conventional method. The main hindrance for successful implementation of Sustainable Development of Sugarcane Based Cropping System in West Bengal, the only operative scheme exclusively for sugarcane in this state, is lifting quality seed cane from sugarcane research station, Bethuadahari, Nadia to different growing districts. The declining trend of lifting quality seed cane is presented in table 4.

**Table 4: Quality seed cane of sugarcane lifted from sugarcane Research Station, Bethuadahari, Nadia to different districts of West Bengal**

Year	Quantity
2016-17	454.5 Quintal
2017-18	174.0 Quintal
2018-19	93 Quintal

Source: Annual Report of SRS, Bethuadahari, Nadia during 2018-19.

### Conclusion

Sugarcane bud chip technology is relatively less expensive, labour & 6-8 weeks' time saving and reliable method for seed cane multiplication in west Bengal as compared to



conventional planting through 3-budded setts. Bulks of seed cane are reduced to manageable bud chips and make transport and handling easy and cheaper. The cane after taking bud chips can be well utilized for preparing juice or jaggery(gur). Replacement of old varieties of sugarcane cultivated in different district of west bengal can easily be achieved by using this technology and can save the Govt. money allotted for carrying cost of seed material for implementation of different components of the “Sustainable Dev. of Sugarcane Based Cropping System in West Bengal” scheme.

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