



New Research on Sugarcane Production through Single Eye Bud Culture

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ABSTRACT:-

An experiment was conducted for two consecutive years at Main Sugarcane Research Station, IIMT University, Meerut, India during 2019-20 to 2020-21 to study effect of inter and intra row spacing on growth, yield and quality of sugarcane by using single eye bud sets. It comprised total sixteen treatments of four inter row spacing viz., planting of single eye bud sets at 100 cm row spacing (R1), planting of single eye bud sets at 115 cm row spacing (R2), planting of single eye bud sets at 130 cm row spacing (R3) and planting of single eye bud sets at 155 cm row spacing (R4), planting of single eye bud sets at 50 cm (S1), planting of single eye bud sets at 65 cm intra row spacing (S2), planting of single eye bud sets at 80 cm intra row spacing (S3) and planting of single eye bud sets at 90 cm intra row spacing (S4) were evaluated in SPD with three replication. On the basis of pooled analysis, the growth attributes such as number of tillers at 90, 115, 185 days after planting and number of shoots at 245 days after planting and yield attributes such as millable cane height, cane girth, number of inter nodes per cane, average cane weight and number of millable canes were improved. The planting of single eye bud sets at 60 cm gave significantly superior cane yield at harvest than rest of treatments. On the basis of pooled results, it is concluded from the study that for getting higher yield of sugarcane crop can be achieved with 125 cm x 60 cm (R2S2) inter and intra row spacing, respectively through single eye bud sets under west uttarpradesh condition.



I. INTRODUCTION:-

Good quality planting materials of Sugarcane through Single Bud raised seedling is gaining popularity and is the major answer to increase yield and reduce the cost of cultivation little portion of stem with one Eye-bud are used to raise nursery. The principle advantage of Single Eye Bud plant is substantial saving in seed material and free from diseases Seed requirement is reduced to less than one ton per ha.

Why we should use single eye bud in sugarcane cultivation:-

- The seedlings are free from diseases at the time of supply.
- Less cost in farming practices as planting of established seedling in the field.
- Helpful to increase sugarcane yield and sugarcane recovery.

Cultivation of Sugarcane with Single Eye Bud Culture:-

Type of soil: Well drained alluvial and medium black cotton soil with pH (6.5-7.0) and optimum depth (>65 cm) are good for sugarcane growth.

Climate condition: Sugarcane is grown under wide range of climate, ranging from sub-tropical to tropical.

Variety: Co-15023, Co-13235, Co-14201 varieties etc.

Seed Material: Healthy seed material, free from insects and diseases and having high viability is essential for establishing the crop in the first instance. 10000-20000 plants per acre required for sugarcane SBSS.

Planting season: October (autumn), February-March (spring) and July (Adsali),

Planting: For planting put whole plant with net pot in the pit then over pit with soil

Spacing: 1m x 1m for Sugarcane SBSS.

Harvesting: Sugarcane SBSS Varieties of **Co-13235, Co – 15023 and Co-14201** harvested after 8 months of planting and can be used for commercial seed.

Yield: Yield varies and mainly depends on varieties, states, soil condition etc. In tropical and states of high productivity the yield varies between 80 tones to 100 tones. In sub-tropical region it varies between 50 tones to 70 tons per hectare.



II. METHODOLOGY:-

Selection of Single Bud Sets:-

- Firstly select healthy canes of 8 to 9 months old which have good inter node length (8-9 inches).
- Remove canes with disease infestation like fungus growth, spots etc.
- Remove buds from the selected canes using a tool called Bud cutter.

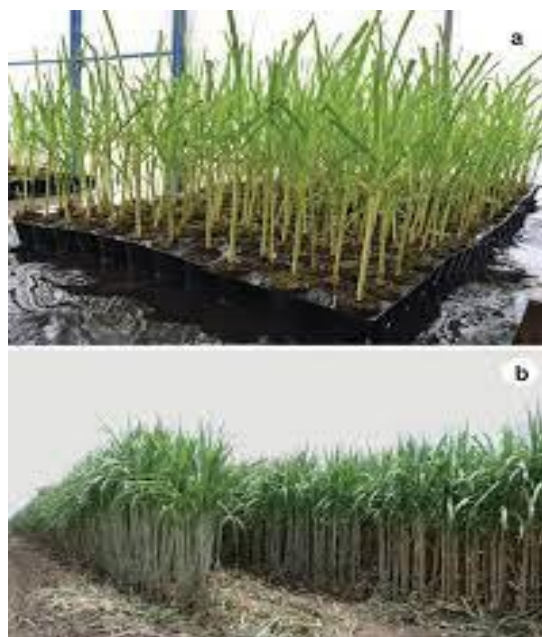
Bud Treatment

The buds can be treated with 1 Kg urea, 60g Carbendazim and 250 ml malathion dissolved in 100 litres of water and soaked for 10 - 15 minutes and shade dried for 10 minutes to induce quick germination of buds. The buds can also be treated by biological method by dissolving 1.5 kg of Trico derma Viridi in 100 liters of water and soaked for 15 minutes and shade dried for 15 minutes. After f treatment, the buds can be treated with 1 per cent lime solution and placed air trig in a gunny bag for 4-5 days.



Nursery:-

The gunny bags can be opened on the 5th day and healthy sprouted buds can be selected for raising nursery. Fill half of each cone in the tray with coco-pith and place the buds flat. Do not press or push it hard and ensure that the bud side faces up. Cover the bud sets in trays completely with coco-pith.



Transplanting of seedling and cultural operations:-

- Transplant seedlings of 30-35 days old in the main field.
- Watering can be stopped one day before transplanting.
- Maintain optimum plant spacing of 5 x 2.5 ft.
- To moisten the soil, irrigate the field one day before transplanting.
- After the establishment of 1 or 2 tillers, the mother shoot may be removed just one inch above the ground to facilitate more number of tillers.
- Wider spacing under SBSS provides scope for intercropping with vegetables, pulses and green manure crops.
- Earthing up has to be done on 50th and 95th day after planting for enhancing aeration and root growth.
- For effective photosynthesis, only the top 9-10 leaves are sufficient. Therefore it is important to remove the lower dry and green leaves during 5th and 6th month, and applied as much in the interspaces.



Drip Irrigation and fertilizer Application:-

The productivity of cane under SBSS can be enhanced by practicing drip irrigation with fertilizer application. Fertigation can be done at twelve days interval. The water use efficiency is higher in drip irrigation and can save irrigation water to the tune of 60 per cent. Nutrient management in sugarcane cultivation is very essential for better crop growth. NPK can be applied at the rate of 265 kg, 60 kg and 110 kg per hectare, respectively through inorganic or organic sources.



Drip Irrigation With Fertilizer Application



III. MODELING AND ANALYSIS:-

Wide row planting Transplanting sets in wide row spacing provides more space and sunlight for long duration which increases cane productivity and decreases insect and disease incidence. Wide row spacing (≥ 5 feet) facilitates intercropping and use of machineries for inter-cultural operations and harvesting. The plant to plant spacing in a row may be kept at 5 feet for sets and tissue culture plantlets. In places where there are chances of lodging due to heavy winds and mechanical harvesting is not possible, a paired row system of planting can be followed. In case of paired rows, distances of 1.5' to 2.0' between rows and $>5'$ between two such pairs are maintained. The plants in paired rows can be tied with each other (propping) in order to avoid lodging. For mechanical harvesting single row planting is ideal. Sub-surface drip lateral lines to be laid from 4" to 6" away from the sugarcane row in case of single row planting and between the rows of a pair in case of paired row planting. The yield and additional returns from intercrops grown under wide row planting will also be more compared to intercrops grown in close spaced sugarcane.





Intercropping:-

Adoption of wide rows would permit taking inter-crops during the initial stages of sugarcane growth. This intern will generate intermittent income to the sugarcane farmers. When sugarcane is grown adopting closer row spacing of 90 cm, it takes about three months for closing of the canopy while it takes longer time under wide row planting. Under wide rows, as the availability of growth resources like solar radiation and space is more, medium canopied high yielding varieties of crops can be grown as intercrops. Growing of legumes as intercrops can also result in improvement of soil fertility. Legumes could fix atmospheric nitrogen under favorable conditions which will be available to associated sugarcane crop. There are many reports of reduction in incidence of insect-insects in sugarcane crop if onion, coriander and garlic are grown as intercrops. Generally, short duration crops which can be harvested before the final earthing up are found suitable hence recommended. Green gram, black gram, soybean, coriander, potato, onion, garlic, mustard, marigold etc. Net additional income of ` 50,570, ` 30,516, ` 10,500 and ` 5,874 per hectare were recorded in sugarcane intercropped with black gram, green gram, coriander and soybean, respectively.



Sugarcane intercropped with green gram, black gram, coriander and soybean



Sugarcane intercropped with mustard /yellow mustard



Sugarcane intercropped with marigold



Trash mulching:-

Sugarcane, on an average produces 30-35 leaves under good growing conditions. The dried leaves along with leaf sheath are called trash. Sugarcane produces about 10 to 15 tons of trashes per hectare per crop. The operation of removing loosely adhering dried and drying cane leaves from the stalk is known as de-trashing. De-trashing provides easy movement of air within the crop canopy, an ideal micro-climate condition for the growth of cane and also reduces the problem of insect like stalk borer, internodes borer and mealy bugs. There is an improvement in the water holding capacity, better soil aggregation and thereby improves porosity in the soil. Therefore, sugarcane trash incorporation in the soil influences physical, chemical and biological properties of the soil. Besides conserving soil moisture by reducing evaporation from soil surface, mulching also moderates soil temperature which helps in improving germination. Trash mulching immediately after ratooning results in conservation of soil moisture and better development. Under trash mulching, there could be termite problem, which may be overcome by taking appropriate control measures.



Trash mulching in sugarcane field



Multiple ratooning:-

Ratoon crops results in reduction in cost of cultivation, cost of seed, planting cost and care of the crop during growth. Ratoons are economical by about 30 – 35 per cent. Ratoons stabilize the cane area of a factory, as each year the factory will have assured cane area to the extent of ratooning, which is around 45-55 per cent in most sugar factories. Therefore, every year efforts for planting is limited to the 55 per cent of the total cane area required. The increased yield of ratoon crop and improved soil quality can be obtained with proper and timely ratoon management practices like stubble shaving, off-baring, gap filling, early manuring, control of chlorosis and management of insects and diseases combined with selection of varieties having multi-ratooning potential. In sets transplanting technology, multiple ratooning is an important aspect owing to its low cost of production when compared with (plant) main crop as it saves the cost of seed-bed preparation, seed material and planting . Ratoon also helps in extending the crushing schedule of sugar factories as they mature earlier than plant crop. **Co- 14201, Co- 13235 and Co- 15023**, the popular varieties of tropical and subtropical region, respectively are excellent ratooners.





IV. RESULTS AND DISCUSSION:-

(1) High yielding and better quality variety: Co - 15023, Co – 13235, Co- 14201.

(2) Sets raising and transplanting: Single bud sets of about 7- 8 month old healthy seed cane were treated with nutrients (0.1% each of urea, FeSO₄ and ZnSO₄) and propiconazole fungicide using mechanized sett treatment device and planted in portrays for sets preparation. Sets were ready for transplanting by 40 days. However, due to delay in field preparation and installation of drip irrigation system 55 days old sets were transplanted in main field. Imidachloprid @ 0.5 ml per liter was applied on sugarcane rows to protect from termite infestation. As intercrop was shown in the inter rows spacing, pre-emergence pendimethalin spray @ 0.75 kg ai/ha was applied on 4th days after transplanting (DAT). The sets establishment was 95%.

(3) Sub-surface drip irrigation: Sub-surface drip system with 16 mm inline laterals having drippers spaced at 50 cm interval was laid out for sugarcane and surface drip system to provide supplemental irrigation water to intercrops. Irrigation through sub-surface drip was based on evaporation demand and crop co-efficient. Nutrient requirement for plant crop for the target cane yield of 250 t/ha is 750:230:625 kg N: P₂O₅:K₂O per hectare. Basal application of farm yard manure @ 10 t/ha and SSP in furrows was carried out before transplanting sets. FeSO₄ and ZnSO₄ @ 100 and 40 kg/ ha was also applied as basal dose in furrows. The nutrient requirement for intercrops was worked out and applied in the interspaces and green gram, soybean and coriander as intercrops were sown in the interspaces. Drip irrigation system was operated on alternate days based on pan evaporation and crop co-efficient. The total quantity of water applied through drip till harvesting 20 was 72.54 lakh liters/ha (725 mm) excluding the effective rainfall (494.3 mm). 30% of N and K requirement was split equally and fertigated on weekly interval from 30 to 90 DAT. The remaining 70% of N and K was split equally and fertigated on weekly interval from 85 to 180 DAT.

V. CONCLUSION:-

In single bud sets of sugarcane cultivation **use of less seeds**, less water and optimum land utilization to get more yields. It is governed by some principles like using single bud sets, raising nursery, wide spacing, sufficient irrigation and intercropping.

REFERENCES

- [1]. Gouri V., Devi, C. T., Bharata Laxmi M., Kumari, M. B. G. S. and Rao, K. P. 2014. Response of bud sets and single bud seedlings of sugarcane to different planting methods and nitrogen levels under drip fertigation. 125-129.
- [2]. Khalid, S., Munsif, F., Ali, A., Ismail, M., Haq, N. and Shahid, M. 2015. Evaluation of sets bud sets of sugarcane for enhancing yield to various row spacing. International Journal of Agricultural and Environmental Research, 1(2): 8-13.
- [3]. Khandagave, R. B. 2011. Wide row spacing in sugarcane a remedy for mechanized harvesting. Proceedings of 41st Annual Convention of The South Indian Sugarcane and Sugar Technologists Association of India: 125-129.
- [4]. Mokashi, D. D. 2005. Climatic changes and its relation on growth, development, yield and quality of suru sugarcane (Co 86032). Ph.D. thesis submitted to Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra.
- [5]. Panse, V. G. and Sukhatme, P.V. 1967. Indian Council of Agricultural Research, New Delhi, India, pp.152- 161.
- [6]. Pawar, M. W., More, D. B., Amodkar, V. T. and Joshi, S. 2005. Effect of intersets spacing on sugarcane yield and quality. Sugar Tech, 7(1): 87–89.
- [7]. Singh, K. and Brar, A.S. 2015. Effect of planting methods and irrigation schedules on cane yield, quality, economics and water productivity of spring sugarcane (*Saccharum officinarum*) in south western Punjab. Indian Journal of Agronomy, 60(4): 601-605.