

Multi-ratooning in sugarcane

—Future prospects and strategies

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The production of sugarcane ratoon crop can be increased only if all the items of improvement are adopted in a wider scale and this can only be achieved by instituting package of practices of ratooning. Adoption of Best management practices (BMP) and mechanization in sugarcane ratooning will ensure the productivity and sustainability of crop in present scenario.

Keywords: ICAR-IISR, Multi-ratooning, Sugarcane

RATOONING is the cultural custom of cutting crops close to their crown after crop harvest. This allows crops to grow back for subsequent harvest such as sugarcane, sorghum, pearl millet, and pigeon pea. Ratooning ability is an important habit of growth in sugar cane which positively affects economic viability. The crop's economic yield can also be enhanced by harnessing the crop's ratooning capability. It is an established practice in sugarcane agriculture, contributing significantly to the over-all profitability. Ratoon keeping is 25–30% economical than the main crop and it gets ready for harvest before planted crop with supplementary advantage of better quality of juice and sugar contains. Ratoon is cheaper to grow since no cost is involved on fresh seed material and land preparation, besides saving in irrigation and crop maintenance through reduced crop duration. Similarly, spring harvested crop proves to be better ratoon than autumn because of moderate temperature conducive for stubble sprouting.

The major cane growing Country usually take two or more sugarcane ratoons. Varying response of ratooning of different sugarcane genotypes for sprouting, millable

cane and commercial cane sugar. The proper development of ratoon crop depends upon sprouting of underground buds that stay behind after harvesting of the plant crop. Varietal differences in ratooning potential have been observed; so also, varietal differences for sustaining productivity over several ratoons. Earlier studies showed that sugarcane cultivars with good ratooning potential has the characteristics like rapid canopy development, early development of adequate number of stalks for more light interception at early growth stage and stability in cane weight at harvesting to maintain yield in ratoons. Thus, selection of good ratoons and their efficient utilization along with good ratoon management practices will enhance the overall productivity of sugarcane farming. However, yield decline in successive ratoons may create serious problem and it may be due to a variety of factors *viz.*, different ratooning potential of cultivars and suboptimal crop management, low nitrogen availability, shallow soil depth coupled with the addition of root stubbles from previous crops, lack of mechanization, injudicious use of water and fertilizers and insect pest disease infestations. All these factors adversely affect bud germination, root

health, and tillering at early growth stages and also lead to temporary immobilization of mineralized nitrogen. Despite the constraints, optimal varietal selection and Best management practices (BMP) could offer viable options for sustained production in sugarcane multi-ratooning system.

Management of sugarcane ratoon crop

Best management practices of sugarcane ratoon comprises as selection of suitable sugarcane varieties with good ratoonability, stubble shaving, deep tilling, off-barring, placing manure and fertilizer (Integrated nutrient management), use of bio-agents, chemicals in liquid form and earthing-up operations, etc.

Selection of suitable sugarcane varieties with good ratoonability

It is observed that certain sugarcane varieties perform better in ratoon crop or at least on par with plant crop. Varieties like Co 8013, Co 6907, Co 8014, 85A261, 87A298, 90A272, 92A123, 81V48, 91V83, 93V297, 97V60 and 83R23 in early category and 83V18, 89V74, 93A145, 94A109, Co 7219, Co 7805, Co 7706 and Co 86032 in mid-late category are to be selected for cultivation.

Table 1. Effect of different management practices on yield and quality under multi-ratooning system at Lucknow

Treatments	Ratoon yield (t/ha)				Average ratoon yield
	I	II	III	IV	
T ₁ - Control (no cultural practices)	55.1	49.3	42.6	33.3	45.0
T ₂ - Trash mulching in alternate rows	66.6	60.3	53.0	43.6	55.6
T ₃ - Trash burning	63.7	52.8	48.0	39.0	50.8
T ₄ - Stubble shaving + Trash mulching in alternate rows	67.0	60.0	53.0	43.0	55.7
T ₅ - Phorate insecticide (15 kg/ha)	68.2	61.0	52.0	44.0	56.3
T ₆ - Trash burning + Stubble shaving	65.4	55.0	49.0	39.2	52.1
T ₇ - Stubble shaving + Trash mulching in alternate rows + gap filling	71.0	66.3	59.0	57.6	63.4
T ₈ - Phorate insecticide (15 kg/ha) + gap filling	71.0	65.6	60.1	58.6	63.8
T ₉ - Phorate insecticide (15 kg/ha) + gap filling + 20% more seed rate	73.5	68.0	61.0	59.0	65.0
CD (0.05)	3.80	6.25	4.38	3.30	-

Cultivation practices

At the time of harvest of plant crop, sharp knives for cutting the clump to the ground level is needed. Cleaning of field and removal of dead canes, trash etc., wherever they are in the field. Breaking the clods by inter-cultivation between the furrows with the plough.

Stubble shaving

Stubble shaving has to be done with sharp knives to the ground level. The advantage of stubble shaving includes the removal of generated old buds and rejuvenation of new buds. Care should be taken not to disturb the clump while stubble shaving that the stubble remains intact while practicing stubble shaving operation mainly in shallow planting otherwise plant population may reduce.

Gap filling

Normally more gaps are found in the ratoon crop while harvesting the plant crop because of labour movement. Therefore, filling the gaps is very necessary in order to have more milliable canes in ratoon crop as well. Researchers/ farmers should do so in the following ways:

- With setts: Placement of either single/two/three budded setts in the gaps.
- Pre-germinated seedlings raised through "Polybag system".
- Taking the clumps from thickly populated area and filling the gaps.
- Poly bag seed nursery:

Single budded sets shall be carefully cut. It should be taken proper care to keep the bud in the upward direction while planting in the bag. The setts should have a thin

layer of soil medium on the bud. Poly bags are to be placed in rows. For every six rows path with rose cans should be left for easy sprinkling of water. Number of sprinklings depends on prevailing environmental conditions. Poly bags should be kept under shade preferably. The buds start sprouting from 10th to 12th day onwards. Normally the seedlings aged between 35-40 days are to be used for planting. While planting, care is to be taken not to disturb the soil of the poly bag. With a blade, give a smooth cut along the length on one side of the bag, carefully remove the bag and place the setting in the main field furrows and press gently. The experiments was carried out at ICAR-Indian Institute of Sugarcane Research, Lucknow on multiple ratooning showing that the greatest yield of ratoon was achieved when stubble shaving coupled with gap filling operations were employed (Table 1).

Use of ratoon management device

All ratoon management operations are a tedious job and very difficult to do with time due to labour and resources being unavailable. To alleviate the issue of labour drudgery, ratoon management tools may be a viable alternative to do most of the ratoon management activities such as off-baring, stubble rashing, manure placement, fertilizer/bio-agents; liquid chemicals and earthing operations, etc., in one go. Ratoon management device is developed at ICAR-IISR, Lucknow.

Trash mulching

This should be done by applying 3 tonnes of trash per hectare and

spreading between the furrows on the field. *Trichoderma* spp for decomposition of waste could be beneficial and crop residues would supply organic matter and around 30 kg N, 9 kg P₂O₅ and 24 kg K₂O per hectare after decomposition. The key benefits of trash mulching are to avoid soil moisture evaporation by retaining the residue in the field and it also helps to keep the root zone moist results in raising more tillers and less early shoot borer (ESB) attack. Mulching the waste under several ratooning systems is more efficient than burning the waste.

Conjunctive application of organic and inorganic fertilizers

To achieve sustainable production of sugarcane, the introduction of chemical fertilizers, organic manures and biofertilizers into the nutrient management system is necessary. Application of farm yard manure, cane trash, pressmud, vermicompost and bio-compost in combination with inorganic fertilizers have recorded increased cane yield over inorganic fertilizer alone, besides improving soil productivity and profitability of sugarcane. Intercropping and incorporation of green manures such as sesbania, sunnhemp, cowpea and pulses like greengram, blackgram, lentil and French bean have beneficial effects of improving nitrogen use efficiency, cane yield and also improves soil physical, chemical and biological properties of soil. For ratoon crop, 3 bags of urea, 5 bags of super phosphate, and 1.50 bags of potash muriate are to be used. The second dose of 3 bags of urea should be given at 45th day after ratooning

along with the application of 2 bags of bio-compost, 4 kg of azospirillum and 4 kg of phosphobactor per acre is recommended for getting higher yields and better sugar recovery.

Weed management practices in ratoon crop

Three hoeing at 1, 4, and 7 weeks after ratoon initiation should be adopted for effective control of weeds in sugarcane ratoon crop. However, under limitations of manpower-availability, cost etc., pre emergence application of either of atrazine @ 2.0 kg a.i. per ha or metribuzin @ 1.0 kg a.i./ha (800- 1000 litres water/ha) followed by either of 2,4-D Na salt @ 1.0 kg/ ha a.i. (in 600-800 litres water/ha) or hoeing at 45 days after ratooning can be successfully practiced. Further, trash mulching in alternate rows and hoeing in unmulched furrow at 1 and 6 weeks after ratoon initiation is also a good option.

Water management

Ratoon crops normally require 8-10 irrigations in their life span. Drip irrigation is also recommended in the places of water scarcity. In certain cases, alternate furrow method is recommended. However, wherever there is plenty of water, normal

irrigations at regular intervals are recommended to get higher yields.

Intercropping with other crops

Growing of intercrops such as cereals, pulses, oilseeds, spices and condiments in between the rows of main crop and ratoon crop can provide good opportunity to achieve significantly higher cane yield. Many experiments has been conducted at different locations to understand the effect of intercrops on component crop (main crop as well as ratoon crop) which proved that sugarcane with intercrops gives maximum yield over the sole crop. An experiment was conducted at Pusa farm to assess the yield of sugarcane + French bean-ratoon + French bean cropping system indicated that the yield of ratoon crop intercropped with French bean was significantly superior over main crop.

Harvesting of ratoon crop

It is an established fact that ratoons mature early (at least by one month) when compared to plant crop. Hence, all the care should be taken to get the cutting orders by respective sugar factories well in advance so that the cane may be used as an open mill cane at the time of starting of the crushing season.

SUMMARY

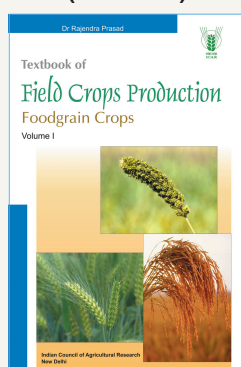
Sugarcane occupies major agriculture land and cultivated almost by all categories of farmers as cash crop in India. However, with the increasing cost of input resources for field preparation operations, the small and marginal farmers are forced to alter their existing cropping system. Under such scenario, sugarcane ratooning could be best possible alternative to restrained farmers to change cropping system, so that the intended sugar demand of different sectors can be met. Sugarcane ratooning offers several tangible and intangible benefits to maintain a sustainable crop production system. Some researchers have exploited scope of sugarcane ratooning along with intercropping and have reported better production and profit compared to sole planting sugarcane farming. So, sugarcane ratooning with intercrops is the scope of future of sugarcane farmers and this system could be helpful in increasing farmer's income by two folds in future.

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TECHNICAL SPECIFICATIONS

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