VI. SUMMARY AND CONCLUSION

In India the sugarcane productivity is stagnating, demand is increasing at the same time scope for extending the area is very much limited. Under these circumstances, the emphasis must be on increasing sugarcane productivity. The critical steps to achieve this process are planting good quality seed material for establishing healthy and good crop stand in the field and good agronomic and crop management practices for higher yields. Keeping this in view, field experiments were conducted simultaneously at two locations, one was at the Experimental farm, Department of Agronomy, Faculty of Agriculture, Annamalai University, Annamalai Nagar and another was in Farmers’ field, M.Kuchipalayam, Vikravandi taluk, Villupuram district, Tamil Nadu during 2011–13 to study effect of plant population with suitable nursery production practice for productivity enhancement of plant and ratoon sugarcane under SSI method.

The experiment consists of two phases, Phase-I nursery studies, was laid out in randomized block design with three replications. The treatment viz., T\textsubscript{1} – Chip bud alone (No Treatment), T\textsubscript{2} – Chip bud–pro tray medium with humic acid (85% WSG) @ 2 g kg\textsuperscript{-1} of coco pith, T\textsubscript{3} – Chip bud–pro tray medium with acetobacter @ 600 g ha\textsuperscript{-1}, T\textsubscript{4} – Chip bud–pro tray medium with humic acid (85% WSG) @ 2 g kg\textsuperscript{-1} of coco pith + acetobacter @ 600 g ha\textsuperscript{-1}, T\textsubscript{5} – Ring bud alone (No treatment), T\textsubscript{6} – Ring bud–pro tray medium with humic acid (85% WSG) @ 2 g kg\textsuperscript{-1} of coco pith, T\textsubscript{7} – Ring bud–pro tray medium with acetobacter @ 600 g ha\textsuperscript{-1} and T\textsubscript{8} – Ring bud – pro tray medium with humic acid (85% WSG) @ 2 g kg\textsuperscript{-1} of coco pith + acetobacter @...
600 g ha\(^{-1}\). From the above study, the best performed nursery treatment was taken for mass multiplication and transplanting into the main field as a nursery settling for SSI method of planting. For Phase - II, main field studies was laid out in randomized block design with seven treatments replicated thrice viz., \(T_1\) – Normal row planting of two budded setts with 90 cm \(\times\) end to end spacing (conventional method – farmers’ practice as control), \(T_2\) – Wider row planting of ring bud settling with 180 \(\times\) 30 cm spacing (SSI method), \(T_3\) – Wider row planting of ring bud settling with 180 \(\times\) 45 cm spacing (SSI method), \(T_4\) – Wider row planting of ring bud settling with 180 \(\times\) 60 cm spacing (SSI method), \(T_5\) – Wider row planting of ring bud setting with 180 \(\times\) 75 cm spacing (SSI method), \(T_6\) – Wider row planting of two budded setts with 180 cm \(\times\) end to end spacing (conventional method) and \(T_7\) – Wider row planting of single bud setts with 180 cm \(\times\) end to end spacing (conventional method). The trend of results obtained and conclusions arrived are summarized below.

6.1. Nursery studies

Observations on growth parameters viz., germination percentage, establishment percentage, plant height, number of leaves, root volume, LAI, seedling vigour index and nutrient uptake had been recorded upto 25 DAP in the nursery. Among the treatments, ring bud – pro tray medium along with humic acid (85% WSG) \(\times\) 2 g kg\(^{-1}\) of coco pith + acetobacter \(\times\) 600 g ha\(^{-1}\) (\(T_8\)) recorded the highest growth characters and performed superior than the rest of the treatments in the nursery. The above treatment outstripped all other treatments with a significant increase in plant height, number of leaves, LAI, DMP, root volume, seedling vigour
index and nutrient uptake but non significant in germination and establishment percentage.

6.2. Main field studies

Growth characters such as establishment, ratoon sprout population, tiller production, plant height, DMP and physiological characters such as LAI and CGR and yield characters such as NMC, internode length, cane girth, individual cane weight, cane and sugar yield were recorded. Quality parameters *viz.*, brix, pol, CCS and purity coefficient and nutrient uptake and post harvest soil available nutrient status were estimated and economics of different treatments were also worked out.

Ring bud settling planted in the main field with wider row spacing recorded the maximum establishment percentage of more than 96 in all the treatments. While, the conventional method of planting (T1) recorded 83.65 per cent establishment only. Similarly the wider row spacing crops recorded higher ratoon sprouts.

Tiller production was significantly influenced by plant population. Normal row spacing treatments recorded higher tiller production compared to wider row spacing in main and ratoon crops (2,46,680 and 2,39,180 tillers at location - I and 2,48,150 and 2,41,860 tillers at location - II of main and ratoon crops, respectively) where as, tiller mortality was less in wider row spacing treatments on main and ratoon crops at both the locations. When compared to normal row spacing (conventional method), wider row spacing treatment, T5 recorded 93.50 and 87.40 per cent lesser tiller mortality in main and ratoon crops on location - I. The similar trend was also observed in location - II.
Plant height was markedly increased at wider row planting of ring bud settling with $180 \times 60$ cm spacing under SSI method ($T_4$) which recorded maximum plant height at all the stages of plant growth in the main and ratoon crops at both the locations. The conventional method of planting (control) treatment ($T_1$) recorded lesser plant height.

The DMP, LAI and CGR were higher in wider row (180 cm) spacing with ring bud of 60 cm inter settling planting under SSI method ($T_4$) treatment at 180, 270 DAP and harvest stages (except in initial stage of plant growth) in the main and ratoon crops at both the locations.

All the yield parameters were higher in wider row spacing compared to normal row spacing except NMC. On the contrary, though millable cane per hectare was less in wider row spacing ($T_4$), this treatment produced significantly higher internode length, cane girth and highest individual cane weight, in the main and ratoon crops at both the locations.

Among the treatments, wider row planting of ring bud settling with $180 \times 60$ cm spacing under SSI method ($T_4$) recorded the highest cane yield in main and ratoon crops with an increase of 74.45 and 73.80 per cent at location - I and 72.61 and 73.43 per cent at location – II, respectively over normal row planting of two budded setts with $90 \times \text{end to end}$ spacing under conventional method – farmers’ practice as control ($T_1$). In the case of sugar yield, performance of the treatments was similar to that observed in respect of cane yield.
Wider row planting of ring bud settling with 180 × 60 cm spacing under SSI method (T₄) showed highest sugar yield in the main and ratoon crops at both the locations.

Quality parameters *viz.* brix, pol, purity coefficient and CCS were not significantly influenced by plant population. Nutrient uptake and post harvest soil available nutrients were higher in wider row (180 cm) spacing with ring bud of 60 cm inter settling planting under SSI method. Conventional method of planting (control) treatment (T₁) resulted in least uptake of nutrients and post harvest soil available nutrients in the main and ratoon crops at both the locations.

In respect of economics of sugarcane cultivation, wider row (180 cm) spacing with ring bud of 60 cm inter settling planting under SSI method (T₄) registered highest gross return, net return and B:C ratio in the main and ratoon crops at both the locations.

**6.3. Conclusion**

Based on the results of the present investigation the following conclusions are drawn:

- The ring bud source of planting material is one of the most viable and economically feasible alternative method in sustainable sugarcane initiative (SSI) nursery production technology.

- Ring bud settling enhances higher root emergence, better establishment and plant vigour in the main field was found due to planting material treated with humic acid and acetobacter.
Wider row spaced cane cultivation has its own advantages over narrow spacing. It provides improved resilience against cane productivity, increase the scope for mechanization in sugarcane cultivation.

By adopting above practices in SSI, the cane productivity could be enhanced to a greater extent with higher economic returns.

6.4. Recommendation

The ring bud planting material treated with humic acid (85% WSG) @ 2 g kg⁻¹ of coco pith and acetobacter @ 600 g ha⁻¹ planted along with pro tray medium is the best suited nursery production practice combined with wider row planting of ring bud settling at 180 × 60 cm spacing under SSI method holds promise as a better practice than the conventional practices as now practiced by farmers from the standpoint of soil health and realization of higher crop yield, more amenable for adoption with a greater degree of agronomic sustainability and economic viability.

6.5. Futurology

- Effect of chip buds and ring buds on optimum age of transplanting is to be assessed.
- Effect of drip irrigation with wider row spacing may be studied.
- Studies on the effect of wider row space with successive inter cropping system on sustaining soil health is to be assessed.
- Efforts on developing suitable integrated nutrient management (INM) approach is adopted under SSI method in the main and succeeding ratoon crop of sugarcane needs to be explored.
- Standardization of tiller productions in SSI has to be assessed with different spacing levels.