ABSTRACT

STUDIES ON INTEGRATED NITROGEN MANAGEMENT FOR SUSTAINING SUGARCANE (Saccharum officinarum L.) PRODUCTIVITY

By

A. UDAYAKUMAR

Decree: Doctor of Philosophy in Agriculture

Supervisor: Dr. T. Selvin Jebaraj Norman, Ph.D.,
Reader in Futurology,
Centre for Futures Studies,
Gandhigram Rural Institute (Deemed University),
Gandhigram 624 302,
Tamilnadu Nadu.

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Field experiments were conducted at farmer's Held of Reddiarchatram block of Dindigul District during the laic season of 1996-97 and 1997-98 to study the effect of organic and inorganic sources of N on growth and yield of sugarcane. The experiments were laid out in split plot design and replicated thrice. The organic sources consisted of farm yard manure (a) 12.5 t ha⁻¹, FYM @ 6.25 t ha⁻¹ + vermicompost (@ 1.5 t ha⁻¹, FYM @ 0.25 t ha⁻¹ + daincha in situ incorporation and FYM @ 0.25 t ha⁻¹ -I- sunnhemp in situ incorporation in main plots and inorganic sources includes 100 per cent recommended nitrogen alone 100, 75 and 50 percent of recommended N with and without Azospinllum.
The results of the experiments revealed that the maximum germination per cent was observed during 1997-98 than the 1996-97. Application of 100 per cent FYM alone registered higher number of tillers in both years whereas inorganic sources, application of 100 per cent N + *Azospirillum* recorded higher tillers. The other growth attributes viz., survival capacity, plant height and dry matter production were higher under application of 50 per cent FYM + sunnhemp incorporation and application of 100 per cent N + *Azospirillum* in both the years.

The growth analysis such as LAI, CGR, RGR and NAR were higher in application of 50 per cent FYM + sunnhemp incorporation (organic sources) and application of 100 per cent N (inorganic sources) + *Azospirillum* than other treatments at 180-270 DAP of both the years.

The yield attributes viz., cane population, length of millable cane, cane weight, number of internodes, length of internode and cane girth were higher under 50 per cent FYM + sunnhemp *in situ* incorporation and 100 per cent N + *Azospirillum* in both the years. The similar trend was also noticed in quality characters such as brix value, sucrose, purity coefficient, commercial cane sugar, juice extraction per cent and reducing sugar per cent.

The cane and sugar yield were higher under application of 50 per cent FYM + sunnhemp *in situ* incorporation and 100 per cent N - *Azospirillum* in both the years.

Among the intercrop, sunnhemp recorded higher green biomass and dry matter production accumulation under 100 per cent N and *Azospirillum* application in both the years of study.
The plant analysis such as sheath moisture per cent, leaf N, sheath P and K were higher at 50 per cent FYM + sunnhemp *in situ* incorporation and 100 per cent N + *Azospirillum* in both the years.

The NPK uptake was maximum under application of 50 per cent FYM + sunnhemp *in situ* incorporation and 100 per cent N + *Azospirillum* in both the years.

The post harvest N availability was higher at application of 50 per cent FYM + sunnhemp *in situ* incorporation and 75 per cent N + *Azospirillum* in both the years whereas the P and K availability was maximum under application of 50 per cent FYM + sunnhemp incorporation and 100 per cent N + *Azospirillum* in both the years of study.

With regard to economics, the maximum gross and net income were recorded under 50 per cent FYM + sunnhemp *in situ* incorporation -i- 100 per cent N i *Azospirillum* treatment combination but the B:C ratio was the highest at 50 per cent FYM + sunnhemp *in situ* incorporation + 75 per cent N + *Azospirillum* in both the years.

To conclude, the application of FYM @ 6.25 t ha\(^{-1}\) as basal, raising sunnhemp as intercrop and *in situ* incorporation at 45 DAP and application of 169 kg N i 7.27 kg ha\(^{-1}\) of *Azospirillum* was found to be the ideal agronomic practice to get higher sugarcane productivity and income.