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# Studies on leaf nitrogen % and CCS content in selected sugarcane varieties

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**Abstract**
In a field experiment conducted during spring planting 2016-2017 at Agriculture farm, G.F. College, Shahjahanpur on four selected (Co 0238, CoS 08272, Co 05011, and CoS 08279) varieties in which effect of pre-sowing soaking of setts ($T_1$) Untreated (control) unsoaked; ($T_2$) Potassium Nitrate for one hour; ($T_3$) $GA_3$ 50ppm; (one hour) ($T_4$) Metrivuzin 100ppm; (one hour) ($T_5$) Ethrel 100ppm; (one hour) ($T_6$) 2,4 D 100ppm; (one hour) ($T_7$) Coconut water (50% aqueous solution); ($T_8$) Kinetin (100ppm) (one hour) on leaf Nitrogen (at 90,120,150,180 days) and CCS(t/ha) content at harvest was studied. It was observed that at harvest CCS(t/ha) content was highest in $GA_3$ ($T_3$)treated setts 18.8% more that untreated control ($T_1$) which was directly associated with higher leaf nitrogen(%) noted during all growth stages studied. The lowest CCS (t/ha) value was recorded into 2, 4 D sett soakings. Co 5011 recorded highest CCS (t/ha) content at harvest while CoS 08272 responded least for this parameter.

**Keywords:** sugarcane, CCS (t/ha), leaf nitrogen content, pre-sowing sett soakings

## 1. Introduction
It is well known that genotypes respond in differential manner to the changing environmental conditions which could be attributed to their differences in the genetic makeup. In sugarcane spring planting results in considerable shortened early crop growth period leading to lowered tillering and poor cane development (Verma, 2016) [9] with significant losses in cane yield and quality. A large number of workers Iqbal and Asharf 2005, Beckers and Conarth (2007), Karthikeyan and Shanmugam, (2017) [7], Junxian *et al*. (2017) [6]. have made concerted efforts to significantly overcome such hindrances and obtained improved cane yield and quality using pre-sowing soakings of setts in different substances. Hence the present authors also decided to test the effect of some inorganic and organic chemicals soaked before sowing to observe leaf nitrogen content at certain growth stages and CCS (t/ha) content at harvest for improved sustained productivity of sugarcane crop.

## Material and Method
The field experiment entitled, Studies on Leaf Nitrogen % and CCS (t/ha) Content in Selected Sugarcane Varieties, was conducted during spring season of 2016 at Agriculture farm, G.F. College, Shahjahanpur located at latitude 27°-53' N, longitude 79°- 4' E, and at altitude 154.53 meter. It has a semi-arid and subtropical climate of tarai region with hot dry summers and cold winters. The average precipitation in the years 2016-17 was 560 mm. The temperature touched 39.1ºC during the crop growth period and fell to as low as 6.7 ºC. The soil was sandy loam with low carbon (0.25%).
The aim of the experiment was to find out the impact of pre-sowing one hour soaking of setts by certain phytohormones/growth regulators ($T_1$) Untreated (control) unsoaked; ($T_2$) Potassium Nitrate for (one hour) ($T_3$) $GA_3$ 50ppm; (one hour) ($T_4$) $_7$Metrivuzin 100ppm; (one hour) ($T_5$) Ethrel 100ppm; (one hour) ($T_6$) 2,4 D 100ppm; (one hour) ($T_7$) Coconut water (50% aqueous solution); ($T_8$) Kinetin (100ppm) (one hour) aqueous solutions of each replicated thrice was tested for leaf nitrogen % contents at 90, 120, 150 and 180 days after sowing). At harvest, CCS (t/ha) content was noted in the selected sugarcane varieties (early maturing CoS 08272, Co 0238 and Late maturing varieties CoS 08279, Co 05011).
At the time of sowing basal doses of NPK (150:60:80) was given. 1/3 doses Nitrogen was given and rest 2/3 were given equally in two part before monsoon as top dressing. Single super phosphate, Urea and murate of potash were used as perspectives sources of NPK. The setts were dipped in 1% solution of propiconazole and then were soaked in each treatment for the impact respectively.
Samplings for leaf nitrogen assessment was done at selected stages and third leaf was selected for biochemical leaf nitrogen % estimations randomly at 90, 120, 150 and 180 days after sowing of the crop. The seed rate was (90 x 45) row to plant spacing. Weeds were removed manually.
The general agronomic practices for the sugarcane crop were employed. Planting was done on 20/02/2016 and harvested on 22/01/2017 (early varieties) and 02/03/2017 (late varieties).

## Results
Leaf nitrogen content at 120,150 and 180 days after sowing was significantly affected due to impact of pre-sowing setts soaking in different inorganic and organic chemicals (Tables 1 to 4). It was observed that sett soaking in $GA_3$ ($T_3$) recorded maximum value almost at all growth stages followed by potassium nitrate ($T_2$) and ethrel ($T_5$) which was directly and positively correlated with CCS (t/ha) content at harvest (Table 5). There was significantly 18.8% more CCS (t/ha) content by $GA_3$ ($T_3$)treatment statistically equal to ethrel ($T_5$) followed by kinetin(T8) and poorest in 2, 4 D ($T_6$). The association of higher leaf nitrogen content (%) studied at different growth stages linked with significantly high CCS (t/ha) content at harvest is not surprising as this element(N) is known to be an integral part of various biomolecules such as enzymes, proteins, nucleic

acids, hormones etc. directly and indirectly linked not only with metabolic fluxes but it also plays important role in various physiological labyrinths (Devlin, 1966, Curtis and Clark, 1950). Among the varieties Co 05011 recorded highest CCS (t/ha) content statistically equal to CoS 08279. The poorest performance was shown by CoS 08272 (Table 5). It was interesting to note that high yielder varieties were also showing peaks in leaf nitrogen content at almost all growth stages (Table 1-4). It is quite under standable as species of a genus, and even varieties of a species, differ under the same environmental condition, in their utilization of inputs (Millikan, 1961, Evans and Sorger, 1966) [8, 4].

**Table 1:** Effect of some inorganic and organic chemicals sett soakings on leaf nitrogen ( % ) at 90 days in Sugarcane varieties

| Varieties | | Treatments | | | | | | | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Water | Hot water | Bavistin | Dormex | Neem leaf extract | Lantana leaf extract | Lime | Azotobacter | |
| | | $T_1$ | $T_2$ | $T_3$ | $T_4$ | $T_5$ | $T_6$ | $T_7$ | $T_8$ | |
| CoS 08272 | | 1.30 | 1.32 | 1.34 | 1.38 | 1.32 | 1.33 | 1.38 | 1.36 | 1.34 |
| Co 0238 | | 1.32 | 1.36 | 1.36 | 1.40 | 1.35 | 1.40 | 1.38 | 1.36 | 1.37 |
| CoS 08279 | | 1.38 | 1.42 | 1.44 | 1.46 | 1.40 | 1.41 | 1.42 | 1.42 | 1.42 |
| Co 05011 | | 1.40 | 1.44 | 1.46 | 1.48 | 1.42 | 1.42 | 1.45 | 1.44 | 1.44 |
| Mean | | 1.35 | 1.39 | 1.40 | 1.43 | 1.37 | 1.39 | 1.41 | 1.40 | |
| | | C.D. at 5% | | | | | | | | |
| Treatment | = | NS | | | | | | | | |
| Varieties | = | 0.04 | ** | | | | | | | |
| Treatment X Varieties | = | NS | | | | | | | | |

**Table 2:** Effect of some inorganic and organic chemicals sett soakings on leaf nitrogen ( % ) at 120 days in Sugarcane varieties.

| Varieties | | Treatments | | | | | | | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Water | Hot water | Bavistin | Dormex | Neem leaf extract | Lantana leaf extract | Lime | Azotobacter | |
| | | $T_1$ | $T_2$ | $T_3$ | $T_4$ | $T_5$ | $T_6$ | $T_7$ | $T_8$ | |
| CoS 08272 | | 1.32 | 1.36 | 1.38 | 1.44 | 1.34 | 1.35 | 1.36 | 1.38 | 1.37 |
| Co 0238 | | 1.35 | 1.39 | 1.39 | 1.46 | 1.36 | 1.39 | 1.41 | 1.43 | 1.40 |
| CoS 08279 | | 1.40 | 1.44 | 1.45 | 1.49 | 1.44 | 1.46 | 1.44 | 1.50 | 1.45 |
| Co 05011 | | 1.42 | 1.46 | 1.45 | 1.53 | 1.46 | 1.46 | 1.48 | 1.52 | 1.47 |
| Mean | | 1.37 | 1.41 | 1.42 | 1.48 | 1.40 | 1.42 | 1.42 | 1.46 | |
| | | C.D. at 5% | | | | | | | | |
| Treatment | = | 0.04 | ** | | | | | | | |
| Varieties | = | 0.03 | ** | | | | | | | |
| Treatment X Varieties | = | NS | | | | | | | | |

**Table 3:** Effect of some inorganic and organic chemicals sett soakings on leaf nitrogen ( % ) at 150 days in Sugarcane varieties

| Varieties | | Treatments | | | | | | | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Water | Hot water | Bavistin | Dormex | Neem leaf extract | Lantana leaf extract | Lime | Azotobacter | |
| | | $T_1$ | $T_2$ | $T_3$ | $T_4$ | $T_5$ | $T_6$ | $T_7$ | $T_8$ | |
| CoS 08272 | | 1.38 | 1.42 | 1.44 | 1.49 | 1.40 | 1.42 | 1.42 | 1.50 | 1.43 |
| Co 0238 | | 1.37 | 1.44 | 1.45 | 1.48 | 1.41 | 1.44 | 1.42 | 1.52 | 1.44 |
| CoS 08279 | | 1.42 | 1.44 | 1.46 | 1.52 | 1.44 | 1.46 | 1.44 | 1.56 | 1.47 |
| Co 05011 | | 1.44 | 1.48 | 1.49 | 1.54 | 1.50 | 1.48 | 1.46 | 1.59 | 1.50 |
| Mean | | 1.40 | 1.45 | 1.46 | 1.51 | 1.44 | 1.45 | 1.44 | 1.54 | |
| | | C.D. at 5% | | | | | | | | |
| Treatment | = | 0.05 | ** | | | | | | | |
| Varieties | = | 0.03 | ** | | | | | | | |
| Treatment X Varieties | = | NS | | | | | | | | |

**Table 4:** Effect of some inorganic and organic chemicals sett soakings on leaf nitrogen ( % ) at 180 days in Sugarcane varieties.

| Varieties | | Treatments | | | | | | | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Water | Hot water | Bavistin | Dormex | Neem leaf extract | Lantana leaf extract | Lime | Azotobacter | |
| | | $T_1$ | $T_2$ | $T_3$ | $T_4$ | $T_5$ | $T_6$ | $T_7$ | $T_8$ | |
| CoS 08272 | | 0.98 | 1.10 | 1.12 | 0.30 | 1.01 | 1.10 | 1.11 | 1.31 | 1.00 |
| Co 0238 | | 1.01 | 1.11 | 1.16 | 1.36 | 1.11 | 1.12 | 1.18 | 1.40 | 1.18 |
| CoS 08279 | | 1.02 | 1.14 | 1.19 | 1.40 | 1.14 | 1.12 | 1.16 | 1.41 | 1.20 |
| Co 05011 | | 1.10 | 1.16 | 1.18 | 1.38 | 1.16 | 1.14 | 1.18 | 1.49 | 1.22 |
| Mean | | 1.03 | 1.13 | 1.16 | 1.11 | 1.11 | 1.12 | 1.16 | 1.40 | |
| | | C.D. at 5% | | | | | | | | |
| Treatment | = | 0.05 | ** | | | | | | | |
| Varieties | = | 0.04 | ** | | | | | | | |
| Treatment X Varieties | = | 0.11 | ** | | | | | | | |

**Table 5:** Effect of some inorganic and organic chemicals sett soakings on CCS (t/ha) at harvest in Sugarcane varieties

| Varieties | Treatments | | | | | | | | Mean |
|---|---|---|---|---|---|---|---|---|---|
| | Untreated | Potassium Nitrate | $GA_3$ | Metrivuzin | Ethrel | 2,4 D | Coconut Water | Kinetin | |
| | $T_1$ | $T_2$ | $T_3$ | $T_4$ | $T_5$ | $T_6$ | $T_7$ | $T_8$ | |
| CoS 08272 | 8.10 | 8.98 | 9.01 | 8.90 | 9.01 | 8.90 | 8.90 | 9.05 | 8.86 |
| Co 0238 | 8.16 | 8.20 | 9.30 | 9.10 | 9.10 | 9.00 | 9.01 | 9.20 | 8.88 |
| CoS 08279 | 8.10 | 9.90 | 10.10 | 9.60 | 9.80 | 9.30 | 9.40 | 9.50 | 9.46 |
| Co 05011 | 8.05 | 9.85 | 10.10 | 9.30 | 9.70 | 9.60 | 9.55 | 9.65 | 9.48 |
| Mean | 8.10 | 9.23 | 9.63 | 9.23 | 9.40 | 9.20 | 9.22 | 9.35 | |
| | C.D. at 5% | | | | | | | | |
| Treatment = | 0.37 | ** | | | | | | | |
| Varieties = | 0.26 | ** | | | | | | | |
| Treatment X Varieties = | NS | | | | | | | | |

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