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# Organic and Inorganic Nutrient Implications on Nutrient Content in Sugarcane Seed Crop

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**ABSTRACT: The seedcane plants should be fertilized in the same way as that of commercial cane fields for maintenance of soil fertility and crop productivity in a sustainable manner which is possible through an appropriate combination of organics, inorganics and bio-fertilizers in an integrated manner to harness their complementary advantage. Considering the role of organic, inorganic and biofertilizers in mineral nutrition of sugarcane seed crop. The experiment was laid out in split-plot design with three main treatments *viz.*, a control and two organic sources-biofertilizer mixture and trash mulching with bio-decomposers and six sub plot treatments where nitrogen and potassium applied in different doses and timings and replicated thrice. The results showed that combined application of biofertilizers or trash mulching along with 125% Soil Test Based Nitrogen and Potassium (STBNK)applied at 30 days interval + additional 25% RDK one month before harvesting recorded higher N, P and K of whole cane plant and was at par with 100% STBNK applied at 30 days interval + additional 25% RDK one month before harvesting.**

**Keywords:** Biofertilizer mixture, nutrient content, soil test based nitrogen and potassium, sugarcane seed crop and trash mulching.

## INTRODUCTION

Sugarcane (*Saccharum officinarum* L.) is an important commercial crop both globally and nationally. It supports livelihood of majority of rural population of India as it is labor intensive crop. Brazil holds the first position in sugarcane production followed by India. In India, Uttar Pradesh ranks first for sugarcane production. In 2020-21, India produced 370.50 Mt of sugarcane under the area 4.60 million hectares with the average productivity of 80.49 tons per hectare (DAC, 2020-21). Sugarcane is a long duration exhaustive crop requires high quantity of nutrient while continuous planting in same field depletes the soil nutrient heavily (Ghaffar, 2009). Sugarcane removes about 205 kg N, 55 kg $P_2O_5$ and 275 kg $K_2O$ from the soil for cane yield of 100 t/ha (Singh & Srivastava, 2011). In general, farmers use matured cane, cut into two or three budded setts and used as seed material which results in reduced germination percentage and low crop stand establishment leads to less yields. Well treated and nourished seedcanes have been found to have good germination capacity and vigour of the subsequent crop (Bikila *et al.*, 2014). Therefore, quality seed production is the essential requisite of sugarcane farmer for elevating cane yield for that seedcane plants are fertilized in the same way as the commercial cane plants despite the difference in purpose of production. Mostly the source of nutrients added to sugarcane cropping is inorganic fertilizers and continuous addition of inorganic fertilizers may lead to environmental problems due to the leaching of soluble nutrients into deeper soil layers (Stamford *et al.*, 2014). Integration of organic sources with fertilizers has also been found to enhance the nutrient use efficiency of the crop as the efficiency of sugarcane to utilize applied N ranges from 16 to 45% owing to leaching of a large quantity of applied N (Yadav and Prasad, 1992). Increasing and extending the role of inoculation with microorganisms (biofertilizers) may reduce the need for chemical fertilizers and thereby decrease adverse environmental effects (Govindarajan *et al.*, 2008). However, most of the research was conducted by using single bacteria which has role to increase the availability of a certain nutrient. Mixed inoculants of $N_2$-Fixing, P and K Solubilizing bacteria was able to improve available soil N, P, and K and kiwi fruit growth (Shen *et al.*, 2016). To get better benefit from biofertilizer application, it is essential that the bacterial culture be used in combination with suitable level of fertilizer (Hari and Srinivasan, 2005). N, P and K are major essential macronutrients for plant growth and development and hence they are commonly added as fertilizer to optimize yield (Chelvi, 2017). Insufficient or un-timely supply of N fertilizer applied to sugarcane would result in poor growth, thin stems and short nodes (Bell *et al*., 2014). So, it is necessary to recommend optimum rate and time of N & K application. Surface organic mulch such as sugarcane trash is used to conserve soil moisture, moderating soil temperature extremes, checking weed growth and adding organic matter to soils and thereby create better physical, chemical and biological environment of soils and in turn, improves crop productivity (Kumar *et al.,* 2015). Hence, the objective of the research was to investigate the effect of NPK fertilizer added with biofertilizer mixture and trash mulch on nutrient content of sugarcane seed crop.

## MATERIAL AND METHODS

The Field research was conducted at the Regional Agricultural Research Station, Anakapalle, Andhra Pradesh for two consecutive years during 2019-20 and 2020-21. The experimental soil was sandy clay in texture, neutral in reaction and medium in organic carbon, low in available nitrogen, high in available phosphorus and medium in available potassium. The experiment was laid out in split-plot design with three main treatments *viz.,* $M_1$-control, $M_2$-biofertilizer mixture (*Azospirillum*, Phosphorus Solubilizing Bacteria, Potassium Releasing Bacteria each @ 1250 ml $ha^{-1}$ and VAM @ 12.5 kg $ha^{-1}$) and $M_3$ -trash mulching with bio-decomposers and six sub plot treatments *viz.,* $S_1$-75% STBNK at planting, 30, 60, 90, 120 DAP + additional dose of 25% recommended K one month before harvesting, $S_2$-75% STBNK at planting, 45, 90, 135 and 180 DAP, $S_3$-100% STBNK at planting, 30, 60, 90, 120 DAP + additional dose of 25% recommended K one month before harvesting, $S_4$-100% STBNK at planting, 45, 90, 135 and 180 DAP, $S_5$-125% STBNK at planting, 30, 60, 90, 120 DAP + additional dose of 25% recommended K one month before harvesting, $S_6$-125% STBNK at planting, 45, 90, 135 and 180 DAP, replicated thrice. Nitrogen, phosphorus and potassium were applied in the form of neem coated urea, SSP and MOP, respectively. Irrigations were provided as and when required. Earthing up was done manually at 120 days age of the crop. Trash twist propping was done at $5^{th}$ month age by "trash twist" method. Whole cane plant samples were collected at 60, 120, 180 DAP and at harvest, cut into pieces and fresh weight was taken then oven dried, powdered, dry weight was determined and analysed for nutrient contents of N,P and K using standard methods (Bremner, 1965, Koeing and Johnson, 1942 and Jackson, 1973, respectively). The data were analysed as per the standard analysis of variance procedure for split plot design by Rangaswamy (2013).

## RESULTS AND DISCUSSION

**Nitrogen Content (%).** Nitrogen content in seedcane whole plant was not influenced by organic sources at 60 and 120 DAP during both the years of study and in pooled data. While, at 180 DAP, nitrogen content was significantly influenced by organic sources (Table 1). Higher nitrogen content was observed with application of *Azospirillum*, PSB, KRB each @ 1250 ml $ha^{-1}$ and VAM @ 12.5 kg $ha^{-1}$ ($M_2$) and trash mulching ($M_3$) and both were superior to control ($M_1$) during first year of the study. An identical trend was exhibited at harvest during both the years of experimentation and in pooled data as well.

**Table 1: Nitrogen content (%) in whole plant at different growth stages of sugarcane seed crop as influenced by biological nutrient management during 2019-20, 2020-21 and pooled data.**

| Treatments | 2019-20 | | | | 2020-21 | | | | Pooled data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 60 DAP | 120 DAP | 180 DAP | At harvest | 60 DAP | 120 DAP | 180 DAP | At harvest | 60 DAP | 120 DAP | 180 DAP | At harvest |
| **Organic sources** | | | | | | | | | | | | |
| $M_1$ | 1.21 | 0.88 | 0.56 | 0.55 | 1.17 | 0.85 | 0.57 | 0.52 | 1.19 | 0.87 | 0.57 | 0.53 |
| $M_2$ | 1.29 | 0.93 | 0.65 | 0.61 | 1.23 | 0.89 | 0.63 | 0.56 | 1.26 | 0.91 | 0.64 | 0.58 |
| $M_3$ | 1.29 | 0.92 | 0.65 | 0.61 | 1.22 | 0.88 | 0.62 | 0.56 | 1.25 | 0.90 | 0.63 | 0.58 |
| SEm± | 0.044 | 0.029 | 0.019 | 0.012 | 0.041 | 0.024 | 0.010 | 0.007 | 0.040 | 0.029 | 0.014 | 0.009 |
| CD ( p = 0.05) | NS | NS | 0.07 | 0.05 | NS | NS | 0.04 | 0.03 | NS | NS | 0.05 | 0.04 |
| CV (%) | 14.8 | 13.7 | 12.7 | 8.8 | 14.6 | 11.4 | 7.3 | 5.2 | 13.9 | 13.9 | 9.6 | 7.0 |
| **Time and dose of N & K application** | | | | | | | | | | | | |
| $S_1$ | 1.17 | 0.85 | 0.56 | 0.55 | 1.12 | 0.81 | 0.57 | 0.51 | 1.15 | 0.83 | 0.56 | 0.53 |
| $S_2$ | 1.12 | 0.81 | 0.54 | 0.54 | 1.10 | 0.81 | 0.54 | 0.49 | 1.11 | 0.81 | 0.54 | 0.51 |
| $S_3$ | 1.34 | 0.95 | 0.66 | 0.61 | 1.25 | 0.91 | 0.63 | 0.56 | 1.29 | 0.93 | 0.64 | 0.59 |
| $S_4$ | 1.27 | 0.92 | 0.62 | 0.58 | 1.21 | 0.90 | 0.60 | 0.54 | 1.24 | 0.91 | 0.61 | 0.56 |
| $S_5$ | 1.36 | 0.99 | 0.68 | 0.62 | 1.29 | 0.92 | 0.64 | 0.59 | 1.32 | 0.96 | 0.66 | 0.61 |
| $S_6$ | 1.33 | 0.94 | 0.67 | 0.62 | 1.26 | 0.91 | 0.65 | 0.58 | 1.30 | 0.93 | 0.66 | 0.60 |
| SEm± | 0.057 | 0.037 | 0.015 | 0.022 | 0.050 | 0.032 | 0.016 | 0.016 | 0.046 | 0.030 | 0.019 | 0.017 |
| CD ( p = 0.05) | 0.16 | 0.11 | 0.04 | 0.06 | 0.15 | 0.09 | 0.05 | 0.05 | 0.13 | 0.09 | 0.06 | 0.05 |
| CV (%) | 13.5 | 12.3 | 7.2 | 11.1 | 12.5 | 11.1 | 8.1 | 8.8 | 11.3 | 10.2 | 9.5 | 9.0 |
| Interaction | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

In the second year of experimentation and in pooled data, higher nitrogen content was registered with $M_2$ and found statistically comparable with $M_3$ and both exhibited significant superiority over control. These results were in accordance with that of Rawat (2021); Babu (2009b). The buildup of nitrogen content in plants might be due to greater multiplication of microbes owing to trash application which lead to more N mineralization in soil resulting in higher N availability apart from that of inoculated *Azospirillum* fixing atmospheric nitrogen in soil which inturn was taken up by plants.

Application of nitrogen and potassium at different time and levels had significant effect on nitrogen content at all the growth stages. At 60 DAP, application of 125% STBNK at 30 days interval + additional 25% recommended dose of K one month before harvesting ($S_5$) had perceptibly increased the nitrogen content. However, 125% STBNK applied at 45 days interval ($S_6$), 100% STBNK at 30 days interval + additional dose of 25% recommended K one month before harvesting ($S_3$) and 100% STBNK applied at 45 days interval ($S_4$) were comparable. The significantly lower nitrogen content was observed with 75% STBNK alone applied at 45 days interval ($S_2$) followed by 75% STBNK applied at 30 days interval + additional 25% recommended dose of K one month before harvesting ($S_1$) over 125% STBNK applied plots. Similar trend was observed at 120 DAP and at harvest during both the years of study and also with pooled data.

Whereas at 180 DAP, higher nitrogen content was associated with $S_5$ treatment which maintains parity with $S_6$ and $S_3$ treatments and differed significantly with $S_1$, $S_2$ and $S_4$ treatments during 2019-20. In the second year of experimentation and in pooled data, $S_5$ maintained parity with $S_4$ treatment in addition to $S_6$ and $S_3$ treatments. The increase in nitrogen content in response to higher fertilizer levels were in conformity with the present findings of Shankaraiah and Hunsigi (2000); Rawat (2021). With increase in N supply, availability, acquisition, mobilization and influx into the plant tissues increased with balanced N supply might be the possible reason for more N content in plants.

**Phosphorus Content (%).** Phosphorus content at 180 DAP and at harvest was significantly affected by organic sources whereas, at 60 and 120 DAP it was found to be non significant (Table 2). Application of *Azospirillum*, PSB, KRB each @ 1250 ml $ha^{-1}$ and VAM @ 12.5 kg $ha^{-1}$and trash mulching with bio-decomposers recorded higher phosphorus content and both exhibited superiority over control at 180 DAP during both the years and in pooled data.

At harvest even though $M_2$ registered higher phosphorus content, found comparable with $M_3$ and both found significantly superior to $M_1$ during 2019-20 and in pooled data whereas during 2020-21, only $M_2$ found superior to $M_1$. More P content in seedcane could be ascribed to reduced phosphorus sorption leading to greater mobilization of phosphorus in soil and also solubilisation of sparingly soluble phosphorus compounds into soluble compounds by the applied PSB thereby augmenting its availability to plants (Babu, 2009; Banerjee *et al*., 2018; Rawat, 2021).

**Table 2: Phosphorus content (%) in whole plant at different growth stages of sugarcane seed crop as influenced by biological nutrient management during 2019-20, 2020-21 and pooled data.**

| Treatments | 2019-20 | | | | 2020-21 | | | | Pooled data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 60 DAP | 120 DAP | 180 DAP | At harvest | 60 DAP | 120 DAP | 180 DAP | At harvest | 60 DAP | 120 DAP | 180 DAP | At harvest |
| **Organic sources** | | | | | | | | | | | | |
| **$M_1$** | 0.20 | 0.19 | 0.16 | 0.14 | 0.19 | 0.18 | 0.15 | 0.14 | 0.20 | 0.18 | 0.16 | 0.14 |
| **$M_2$** | 0.21 | 0.19 | 0.18 | 0.17 | 0.20 | 0.18 | 0.17 | 0.16 | 0.21 | 0.19 | 0.18 | 0.17 |
| **$M_3$** | 0.21 | 0.19 | 0.18 | 0.16 | 0.20 | 0.18 | 0.17 | 0.15 | 0.21 | 0.19 | 0.18 | 0.16 |
| **SEm±** | 0.007 | 0.006 | 0.003 | 0.004 | 0.004 | 0.004 | 0.003 | 0.003 | 0.006 | 0.007 | 0.004 | 0.004 |
| **CD ( p = 0.05)** | NS | NS | 0.01 | 0.01 | NS | NS | 0.01 | 0.01 | NS | NS | 0.01 | 0.01 |
| **CV (%)** | 13.7 | 13.9 | 8.1 | 10.0 | 9.0 | 8.8 | 8.7 | 7.3 | 11.6 | 15.1 | 8.9 | 9.8 |
| **Time and dose of N & K application** | | | | | | | | | | | | |
| **$S_1$** | 0.19 | 0.17 | 0.16 | 0.14 | 0.18 | 0.17 | 0.16 | 0.13 | 0.19 | 0.17 | 0.16 | 0.14 |
| **$S_2$** | 0.19 | 0.17 | 0.16 | 0.14 | 0.18 | 0.17 | 0.15 | 0.13 | 0.19 | 0.17 | 0.16 | 0.14 |
| **$S_3$** | 0.22 | 0.20 | 0.18 | 0.17 | 0.20 | 0.19 | 0.17 | 0.16 | 0.21 | 0.20 | 0.18 | 0.17 |
| **$S_4$** | 0.21 | 0.19 | 0.16 | 0.15 | 0.20 | 0.18 | 0.17 | 0.16 | 0.21 | 0.19 | 0.17 | 0.16 |
| **$S_5$** | 0.22 | 0.20 | 0.18 | 0.17 | 0.20 | 0.19 | 0.18 | 0.16 | 0.22 | 0.20 | 0.18 | 0.17 |
| **$S_6$** | 0.22 | 0.20 | 0.18 | 0.17 | 0.20 | 0.19 | 0.17 | 0.16 | 0.21 | 0.20 | 0.18 | 0.17 |
| **SEm±** | 0.008 | 0.008 | 0.004 | 0.005 | 0.004 | 0.005 | 0.005 | 0.004 | 0.006 | 0.006 | 0.004 | 0.005 |
| **CD ( p = 0.05)** | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.01 | 0.01 |
| **CV (%)** | 11.6 | 13.2 | 6.4 | 9.8 | 6.1 | 7.5 | 8.3 | 7.1 | 8.9 | 9.8 | 7.7 | 8.7 |
| **Interaction** | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

With reference to different doses and time of N and K application, the perceptibly increased phosphorus content in whole plant at 60 DAP was noticed with $S_5$, $S_6$, $S_3$ treatments and maintained parity with 100% STBNK alone applied at 45 days interval during 2019-20. The lower phosphorus content was observed with less fertilizer applied plots of $S_2$ and $S_1$ treatments. Similar trend was invariably observed at 120 DAP during both the years of experimentation and also in pooled data. In the second year of experimentation, at 60 DAP the higher phosphorus content in whole plant was recorded with $S_5$, $S_6$, $S_3$ and $S_4$ treatments and showed significant superiority over $S_1$ and $S_2$ treatments. Whereas in pooled data, treatment $S_5$ registered more phosphorus content in whole plant and it was statistically on par with $S_6$, $S_3$ and $S_4$ treatments.

At 180 DAP during 2019-20, more phosphorus content in whole plant was recorded with $S_5$, $S_6$ and $S_3$ treatments and showed significant superiority over $S_1$, $S_2$ and $S_4$ treatments. While during 2020-21, treatment $S_5$ registered more phosphorus content in whole plant and it was statistically on par with $S_6$, $S_3$ and $S_4$

treatments. In pooled data, $S_5$, $S_6$ and $S_3$ treatments recorded equal phosphorus content and significantly superior to $S_1$ and $S_2$ treatments.

At harvest $S_5$, $S_6$ and $S_3$ treatments registered higher phosphorus content and exhibited significant superiority over all other treatments during 2019-20 while, during 2020-21 higher phosphorus content was noticed with $S_5$, $S_6$, $S_3$ and $S_4$ treatments. In pooled data, $S_5$, $S_6$ and $S_3$ treatments recorded equal phosphorus content and significantly superior to $S_1$ and $S_2$ treatments. The least phosphorus content was noted with $S_2$ treatment during both the years of study and in pooled data.

Babu (2009) also observed that application of high fertilizer dose *i*.e., 100% resulted in more phosphorus content in cane plants than lower dose *i*.e., 75%.

**Potassium Content (%).** A glance at the data on potassium content indicated that potassium content was uninfluenced by various organic sources used in this study at all growth stages except at harvest (Table 3). At harvest, higher potassium content was documented with $M_2$ treatment and $M_3$ treatments and both the treatments were superior to $M_1$ during 2019-20 and in pooled data. While, during 2020-21 higher potassium content was documented with $M_2$ treatment and it was closely followed by $M_3$ and both were comparable with each other and exhibited significant superiority over control. This may be due to addition of organic manures that facilitates availability of plant nutrients directly to plants through solubilising effect on fixed forms thereby more nutrients available for absorption by plants thus more nutrient content in plants.

Banerjee *et al*. (2018) also reported that higher potassium content in cane plants was observed with application of biofertilizers along with inorganic fertilizers than application of only inorganics.

The data presented in Table 3 revealed that various sub plot treatments had exerted significant effect on potassium content at all the growth stages. At 60 DAP, $S_5$ treatment exerted remarkable influence in increasing potassium content. However, it was statistically on par with $S_6$, $S_3$ and $S_4$. The least potassium content was observed with plots receiving lower dose of fertilizers *i.e*., $S_2$ and $S_1$ during first year of experimentation and in pooled data. Similar trend of treatments performance continued with regard to potassium content at 120 DAP during 2020-21 and in pooled data.

**Table 3: Potassium content (%) in whole plant at different growth stages of sugarcane seed crop as influenced by biological nutrient management during 2019-20, 2020-21 and pooled data.**

| Treatments | 2019-20 | | | | 2020-21 | | | | Pooled data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 60 DAP | 120 DAP | 180 DAP | At harvest | 60 DAP | 120 DAP | 180 DAP | At harvest | 60 DAP | 120 DAP | 180 DAP | At harvest |
| **Organic sources** | | | | | | | | | | | | |
| $M_1$ | 0.90 | 0.84 | 0.67 | 0.62 | 0.88 | 0.78 | 0.67 | 0.61 | 0.89 | 0.81 | 0.67 | 0.62 |
| $M_2$ | 0.94 | 0.88 | 0.76 | 0.69 | 0.92 | 0.85 | 0.75 | 0.69 | 0.94 | 0.87 | 0.76 | 0.69 |
| $M_3$ | 0.94 | 0.88 | 0.75 | 0.69 | 0.92 | 0.83 | 0.73 | 0.68 | 0.93 | 0.86 | 0.74 | 0.69 |
| SEm± | 0.022 | 0.024 | 0.025 | 0.014 | 0.027 | 0.024 | 0.020 | 0.014 | 0.024 | 0.023 | 0.018 | 0.016 |
| CD ( p = 0.05) | NS | NS | NS | 0.06 | NS | NS | NS | 0.06 | NS | NS | NS | 0.06 |
| CV (%) | 10.2 | 11.9 | 14.3 | 9.2 | 12.5 | 12.2 | 11.7 | 9.2 | 10.9 | 11.6 | 10.8 | 10.1 |
| **Time and dose of N & K application** | | | | | | | | | | | | |
| $S_1$ | 0.88 | 0.81 | 0.69 | 0.61 | 0.85 | 0.78 | 0.68 | 0.61 | 0.87 | 0.80 | 0.69 | 0.61 |
| $S_2$ | 0.87 | 0.80 | 0.67 | 0.61 | 0.84 | 0.77 | 0.64 | 0.61 | 0.86 | 0.79 | 0.66 | 0.61 |
| $S_3$ | 0.96 | 0.90 | 0.74 | 0.70 | 0.94 | 0.84 | 0.76 | 0.68 | 0.95 | 0.87 | 0.76 | 0.69 |
| $S_4$ | 0.93 | 0.87 | 0.72 | 0.68 | 0.91 | 0.82 | 0.70 | 0.66 | 0.92 | 0.85 | 0.71 | 0.67 |
| $S_5$ | 0.97 | 0.91 | 0.77 | 0.70 | 0.95 | 0.87 | 0.77 | 0.70 | 0.97 | 0.89 | 0.77 | 0.71 |
| $S_6$ | 0.96 | 0.91 | 0.76 | 0.70 | 0.95 | 0.85 | 0.76 | 0.70 | 0.96 | 0.88 | 0.76 | 0.70 |
| SEm± | 0.026 | 0.030 | 0.024 | 0.027 | 0.030 | 0.021 | 0.027 | 0.019 | 0.026 | 0.027 | 0.017 | 0.019 |
| CD ( p = 0.05) | 0.08 | 0.09 | 0.07 | 0.08 | 0.09 | 0.06 | 0.08 | 0.05 | 0.07 | 0.08 | 0.05 | 0.06 |
| CV (%) | 8.5 | 10.5 | 10.1 | 12.3 | 9.9 | 7.7 | 11.1 | 8.4 | 8.4 | 9.5 | 7.2 | 8.6 |
| Interaction | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

While during 2020-21, the higher potassium content was observed with $S_5$ and $S_6$ treatments and were statistically comparable with $S_3$ and $S_4$ treatments. At 120 DAP during 2019-20 similar trend of treatments performance observed with regard to potassium content.

At 180 DAP, $S_5$ treatment recorded significantly higher potassium content over $S_2$ and $S_1$ treatments and found on par with $S_6$, $S_3$ and $S_4$ during 2019-20 and 2020-21 and with $S_6$ and $S_3$ in pooled data. Conspicuously, lower potassium content was noticed with $S_2$ and $S_1$ treatments which might be due to low availability of K with less fertilizer applied plots. Higher potassium content with the execution of 125% STBNK might be due more available K under these treatments. These results corroborates with the findings of Madhuri *et al*. (2011).

At harvest, the higher potassium content was registered with $S_3$, $S_5$ and $S_6$ treatments and was comparable with $S_4$ treatment during 2019-20. Whereas in the second year of experimentation, higher potassium content was observed with $S_5$ and $S_6$ treatments and was comparable with $S_3$ and $S_4$ treatments. In pooled data, $S_5$ recorded significantly higher potassium content over $S_1$ and $S_2$ treatments and found on par with $S_6$, $S_3$ and $S_4$ treatments. Conspicuously lower potassium content was observed with lower dose of fertilizers *i.e*., $S_2$ and $S_1$

during both the years of experimentation and in pooled data.

N, P and K content of whole cane did not differ significantly due to interaction between organic sources and time and dose of nitrogen and potassium application at all the growth stages during 2019-20, 2020-21 and in pooled data.

## CONCLUSION

Therefore, it may be concluded that supply of nutrients for seedcane crop through integrated use of biofrtilizer mixture, trash mulching along with 125% Soil Test Based Nitrogen and Potassium applied at 30 days interval + additional 25% RDK one month before harvesting brought significant increase in N, P and K content in whole cane plant and it was on par with 100% STBNK applied at 30 days interval + additional 25% RDK one month before harvesting.

## FUTURE SCOPE

Evaluate the residual action of biological nutrient management practices on seed cane for next year or subsequent crops. Study the influence of other organic manures on seed cane at field level crop yield performance. Assessment of foliar sprays influence with bio-fertilizers biological nutrient management on seed cane at field level crop yield performance.

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