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Influence of Integrated use of Organic and Inorganic sources of nutrients on quality parameters of Sweet Corn

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ABSTRACT

A field experiment entitled "*Sustaining soil health and productivity of sweet corn through nutrient management*" was conducted at Agricultural College Farm, Bapatla using sweet corn hybrid maize Mahy-301 as a test crop. The experiment comprising of 10 treatments was laid out in completely randomized block design and were replicated thrice. The biochemical composition of sweet corn kernel was significantly influenced by the different nutrient management practices. The maximum protein content (10.56%) was observed in T_2 (100 per cent RDF) whereas the highest starch content (54.33 %) and sucrose content (8.57 %) was observed in treatment which received 50 per cent RDF with FYM @ 5 t ha^{-1} .

Key words: *Quality parameters, Liquid biofertilizers, Protein content, Starch and sucrose content, Sweet corn*

Introduction

Corn has a high diversity of types and races, therefore is one of the species with the greatest genetic variability among the cultivated plants, allowing innumerable direct uses, such as animal feed and human food. Among the various types of corn, sweet corn also known as specialty corn having highest edible quality in milk stage. The net income from sweet corn is quite higher as compared to grain maize Due to its increasing demand, there is an increasing tendency for commercial production of sweet corn, hence it became one of the alternative crop. In sweet corn, the green cobs are being consumed as roasted or boiled. Starch is the most predominant carbohydrates component of sweet corn.

The microorganisms which are present in the soil are responsible for increasing the fertility of the soil and the productivity of the crops. In order to increase the microorganisms in the soil beejamrutham and Jeevamrutham is used. Jeevamrit enhances microbial activity in soil and helps in improvement of soil fertility. Application of chemical fertilizers along with organic sources of nutrients *viz.*, liquid biofertilizers and FYM provides better physiological and biochemical activity of sweet corn under adequate and balanced nutrient supply there by improves the quality parameters of sweet corn.

Materials and Methods

A field experiment entitled "Sustaining soil health and productivity of sweet corn through nutrient

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management" was conducted at Agricultural College Farm, Bapatla using sweet corn hybrid maize Mahy-301 as a test crop. The experiment comprising of 10 treatments *viz*., T_1 : Absolute Control, T_2 : 100% RDF, T_3 : FYM @ 5 t ha^{-1} + LBF @ 1.5 L ha^{-1}, T_4 : Beejamrutham + Jeevamrutham, T_5: 50% RDF + FYM @ 5 t ha^{-1}, T_6 : 50% RDF + LBF @ 1.5 L ha^{-1}, T_7 : 50 % RDF + T_4, T_8 : 25% RDF + T_4, T_9 : 25% RDF + FYM @ 5 t ha^{-1} + T_4, T_{10} : 25% RDF +LBF @ 1.5 L ha^{-1} + T_4 laid out in randomized complete block design with three replications.

Results and Discussion

The results pertaining to biochemical composition of sweet corn by integrated nutrient management practices were presented in Table 1 and Fig. 1.

Protein content

The highest protein content (10.56 %) was observed in T_2 where 100 per cent N, P and K were supplied through inorganic fertilizers. This might be due to inorganic fertilization of crop was associated with higher N availability in soil from the fertilizer and thereby greater N uptake by crop. Nitrogen, being the principle constituent of protein might have substantially increased the protein content of kernel due to increased uptake of nitrogen under higher nutrients. Similar results were reported by Singh *et al.* (2016) and Subbaiah *et al.* (2012). The lowest values of protein content were observed in absolute control (T_1)

Among the treatments receiving integrated sources of nutrients, the treatments T_5, T_6 and T_7 which received combination of 50 per cent RDF with FYM, liquid biofertilizers, beejamrutham and jeevamrutham recorded statistical superiority when compared to the treatments which received integration of 25 per cent RDF with organic sources of nutrients (T_8 to T_{10}). This might be due to increased availability of nitrogen through inorganic sources and it could also be attributed to fixation of nitrogen through biological nitrogen fixation by *Azospirillum* culture when integrated with FYM and liquid biofertilizer. Thus, better physiological and biochemical activity of sweet corn under adequate and balanced nutrient supply might have enhanced the protein content of kernel and it was also confirmed by Kalibhavi *et al.* (2001), Kar *et al.* (2006) and Sunitha and Maheswara Reddy (2012).

Starch content

The data presented in Table 1 indicated that there was a significant difference among the treatments in starch content in sweet corn kernel. The highest starch content (54.33 %) was observed in treatment which received 50 per cent RDF with FYM @ 5 t ha^{-1} and it was on a par with treatments T_3 and T_9 whereas the lowest value (44.33%) was observed in absolute control (T_1). This might be due to FYM treated plots tended to favour higher accumulation of starch content of sweet corn which might be the function of greater conversion of CO_2 to organic compounds and CO_2 fixation, subsequently greater CO_2 assimilation. The results obtained were in close agreement with the findings of Singaram and Kamalakumari (1995)

Further it was observed that 50 per cent RDF + LBF @ 1.5L ha^{-1} recorded superiority over the other treatments. This might be due to effective regulation

Table 1. Biochemical composition in kernel of sweet corn as influenced by integrated nutrient management

Treatments	Protein (%)	Starch (%)	Sucrose (%)
T_1 : Absolute Control	7.23	44.33	6.23
T_2 : 100 % RDF	10.56	49.33	7.60
T_3: FYM @ 5t ha^{-1} + LBF @ 1.5L ha^{-1}	8.12	53.37	6.77
T_4 : Beejamrutham + Jeevamrutham	7.76	49.67	6.50
T_5 : 50% RDF + FYM @ 5t ha^{-1}	9.41	54.33	8.57
T_6 : 50% RDF + LBF @ 1.5L ha^{-1}	9.41	49.88	7.60
T_7 : 50 % RDF +T_4	9.37	47.67	7.60
T_8 : 25% RDF +T_4	8.93	48.33	6.90
T_9 : 25% RDF + FYM @ 5t ha^{-1} +T_4	9.13	53.67	7.07
T_{10} : 25% RDF +LBF @ 1.5L ha^{-1} +T_4	9.08	50.03	7.03
SEm±	0.31	1.17	0.25
CD @ 0.05	0.92	3.46	0.74
CV (%)	6.05	4.02	6.03

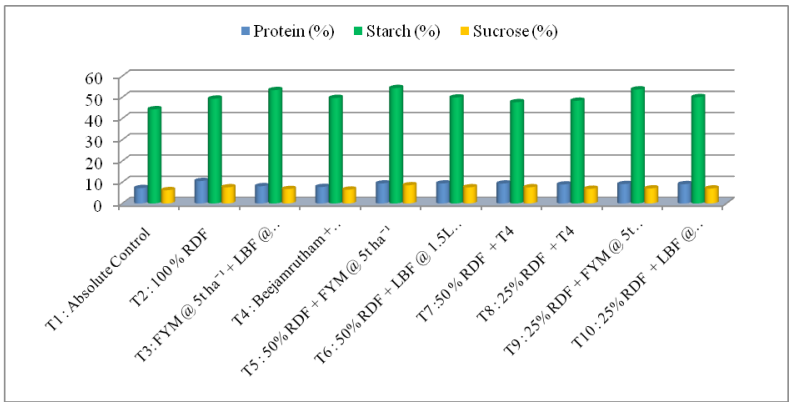

Fig. 1. Influence of integrated nutrient management in sweet corn on biochemical composition of kernel

of the metabolic functions leading to better synthesis of proximate constituents and consequent improvement in the quality of the produce.

Sucrose content

The sucrose content in sweet corn results indicated that there was a significant difference in sucrose content in sweet corn kernel with the application of different sources of nutrients.

Among the treatments, highest sucrose content was observed in the treatment T_5 where 50 per cent RDF was integrated with FYM @ 5 t ha^{-1} and it was on par with the treatments T_2 (100 % RDF), T_6 (50 % RDF + LBF@ 1.5 L ha^{-1}) and T_7(50 % RDF +T_4). This might be due to higher availability of nutrients and their inter conversions in the plant metabolism whereas lowest sucrose content in unfertilized control (T_1) might be due to the non-availability of nutrients. These results were in accordance with the findings of Rasool *et al.* (2016) and Spandana, (2012). The lowest values were recorded in absolute control (T_1). The treatments receiving integration of 25 per cent RDF and organic sources of nutrients were on par with each other and also with T_2.

The treatment which received FYM @ 5 t ha^{-1} and LBF @ 1.5L ha^{-1} recorded superior values over seed treatment with beejamrutham fortnight interval application of liquid jeevamrutham.

Conclusion

The biochemical composition of sweet corn kernel showed significant influence with respect to protein, starch and sucrose contents. Among the treatments highest protein (10.56%) was recorded in 100 per cent RDF followed by the application of 50 per cent RDF with FYM @5 t ha^{-1} whereas starch and sucrose contents were significantly highest in the treatment which received integration of 50 per cent RDF with FYM @ 5 t ha^{-1}.

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