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Yield And Growth Of Sweetcorn (*zea mays I. Saccharata*) As Infulenced By Plant Geometry And Inm Practices

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Abstract:
An investigation was carried out to examine the effect of plant densities and Integrated Nutrient Management (INM) on growth and productivity of sweet corn during Winter season of 2016-17. The treatment consisting of three plant densities levels *viz.,* C_1 - 60 cm x 20 cm (83,333 Plants ha^{-1}), C_2 - 45 cm x 20 cm (1, 11,111 Plants ha-^{1}), C_3 - 45 cm X 30 cm (74,074 Plants ha^{-1}) and seven levels of INM practices *viz.,* T_1-100% RDF (120N, 60 P_2O, 60K_2O)- Control, T_2- 50% RDF NPK + Vermicompost, T_3-75% RDF NPK + Vermicompost, T_4- 50% RDF NPK +FYM, T_5-75% RDF NPK + FYM, T_6-50% RDF NPK + Azospirillum 5kg ha^{-1} and T_7-75% RDF NPK + Azospirillum 7.5kg ha^{-1}. The results indicated that plant densities of 45 cm x 30 cm exerted significantly higher growth and number of green cobs per hectare over rest of plant densities levels. Among the INM level 75% RDF+ Vermicompost recorded significantly higher growth and yield attributes, that resulted into higher number of green cobs per hectare.

Key words: Plant densities, INM, Sweet corn, Green Cob

Introduction:

Maize (*Zea mays* L.) is one of the largest producing cereal crops in the world grown in more than 150 countries having 600 million ha area with 600 million ton of production. The major maize producing countries are USA, China, Brazil, Mexico, France and India. USA has the largest area and production in the world. Italy having highest productivity in the world 9600 kg ha^{-1} followed by France with 8800 kg ha^{-1}. In India, it is cultivated on an area of 9.0 million ha with a production of 26.0 million tonnes of grain and productivity of 2710 kg ha^{-1} (Anon., 2017). Sweet corn is very common vegetable crop in North America. It is an exhaustive crop and it is harvested at milky stage and requires fertile soils for optimum production. As the corn is considered as an exhaustive crop, requires more nutrient, organic nutrient management practices play an important role in sustaining productivity of sweet corn. Fertilizer is by and large the most important resource affecting the production and productivity at all planting densities. Keeping this in view the present study was undertaken with an objective to evaluate the performance of sweet maize under

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the combined use of organic and inorganic fertilizers at different plant densities.

Materials and Methods:

The field experiment was undertaken at Experimental Research Farm, during Rabi season of 2016 and 2017. The soil of the experimental area was sandy loam with moderately alkaline pH (7.3) low in organic carbon (0.43%) and available N (191 kg ha^{-1}), available P (26.30 kg ha^{-1}) and available K (295.00 kg ha^{-1}). The experiment was laid out in Randomized Block Design (RBD) and replicated thrice. The sweet corn variety Sugar-75 was used as test crop. Fertilizers were applied as side placement, for which 4-5 cm deep furrows were made along the seed rows with a hand hoe. The 21 treatment combinations consisting three plant densities levels viz., C_1 - 60 cm x 20 cm (83,333 Plants ha^{-1}), C_2 - 45 cm x 20 cm (1, 11,111 Plants ha^{-1}), C_3 - 45 cm X 30 cm (74,074 Plants ha^{-1}) and seven levels of INM practices *viz.,* T_1-100% RDF (120N, 60 P_2O, 60K_2O)-Control, T_2- 50% RDF NPK + Vermicompost, T_3-75% RDF NPK + Vermicompost, T_4- 50% RDF NPK +FYM, T_5-75% RDF NPK + FYM, T_6-50% RDF NPK + Azospirillum 5kg ha^{-1} and T_7-75% RDF NPK + Azospirillum 7.5kg ha^{-1}

All the agronomic practices were conducted uniformly for raising the crop. To examine various yield parameters on sweet corn a sample consisting of five plants was selected at random. The randomly five plants were selected for recording the average value of the number of cobs per plant. The length and girth of five randomly selected cobs (with husk) from each plot was measured and the average was worked out to get cob length and cob girth. The selected cobs were weighed (with husk) and the mean values of the weight of cob were recorded. The total number of cobs obtained from individual plant per square meter was weighed and the mean values were recorded for yield estimation. The cobs were picked up treatment wise and the harvested cobs were weighted after which the total number of cobs obtained from individual plants per square meter recorded and converted into number of cobs per ha. Green fodder was collected plot wise before dry plants were cut from ground level after picking of the cobs. It was weighted and the value attained was converted into tonnes per ha.

Results and Discussion

Effect of crop geometry and INM on crop yield

Cob length (cm)

The data with respect to cob length according to the levels of planting densities and integrated nutrient management is presented non significant

Longest cob length (18.75 cm) was observed in the planting density level of 45 cm × 30 cm while minimum cob length (17.26cm) was observed in spacing of 60 cm × 20 cm which is followed by (17.95 cm) in 45cm ×20 cm spacing.

The effect of different INM levels on cob length of sweet corn plant-1 and per hectare was found significant . Application of 75% RDF NPK +vermicompost recorded significantly highest cob length (18.66 cm) which is at par with the application of 75% RDF NPK + FYM recorded cob length (18.35 cm)while lowest cob length (15.45 cm) in the application of 50% RDF NPK + Azospirillum 5 kg $ha^{-1.}$ The results corroborated with those reported by Massey and Gaur *et al.* (2006).

Cob diameter(cm)

It is revealed from the data that there exhibited differences for cob diameter of sweet corn which are non significantly evaluated.It is observed that significantly maximum cob diameter (14.93 cm) was observed in the planting density level of 45 cm × 30 which is followed by (14.21 cm) in 60 cm ×20 cm spacing. However, minimum cob diameter (13.72 cm) in the spacing level of 45 cm × 20 cm.

The effect of different INM levels on cob diameter of sweet corn plant-1 and per hectare was found significant Application of 75% RDF NPK +vermicompost recorded significantly highest cob length (18.66 cm) which is at par with the application of 75% RDF NPK + FYM recorded cob length (18.35 cm)while lowest cob length (15.45 cm) in the application of 50% RDF NPK + Azospirillum 5 kg $ha^{-1.}$ Similar findings were corroborated with those reported by Massey and Gaur *et al.*(2006).

with those reported by *Massey and Gaur et al. (2006)* , *Keerthi S et al. (2013)*and *R.K.Mathukia(2014)*

Number of cobs Girth

The results with the respect to the number of cobs is presented in Table. It is observed maximum number of cobs (63516.18) was found in the level of planting density of 45 cm × 30 cm which was followed by (61335.29) in the spacing of 60 cm × 20 cm. However, minimum number of cobs (48138.78) was recorded in the level of spacing of 45 cm × 20 cm.

The effect of different INM levels on number of cobs of sweet corn $plant^{-1}$ was found significant . Application of 75% RDF NPK +vermicompost recorded significantly maximum number of cobs (55946.53) which is at par with the application of 75% RDF NPK + FYM recorded number of cobs (54138.74) while minimum number of cobs (51317.83) in the application of 50% RDF NPK + Azospirillum 5 kg $ha^{-1.}$

Similar findings were corroborated with those reported by *Kurne et al., (2003), Massey* and *Gaur et al.(2006), Sepat et al., (2010).*

Number of Green cobs $Plant^{-1}$

It is well evident from the data, that differences were exhibited among the different plant density level and INM levels for the number of green cobs $plant^{-1.}$ It is observed maximum number of green cobs $plant^{-1}$ (1.50) was found in the level of planting density of 45 cm × 30 cm which was followed by (1.48) in the spacing of 60 cm × 20 cm. However, minimum number of green cobs $plant^{-1}$ (1.35) was recorded in the level of spacing of 45 cm × 20 cm.

The effect of different INM levels on number of green cobs of sweet corn $plant^{-1}$ was found significant .

Application of 75% RDF NPK +vermicompost recorded significantly maximum number of green cobs plant^{1} (1.46) which is at par with the application of 75% RDF NPK + FYM recorded cob length (1.42) while minimum number of green cobs plant^{-1} (1.26) in the application of 50% RDF NPK + Azospirillum 5 kg ha$^{-1.}$ Similar findings were corroborated with those reported by Massey and Gaur *et al.*(2006).

Number of Green cobs Plant ha^{-1}

The data regarding to the number of green cobs plant ha^{-1} Effect on the levels of planting density differed significantly maximum number of green cobs plant ha^{-1}(150.00) in the spacing of 45 cm × 20 cm while minimum number of green cobs plant ha^{-1}(111.11) in the spacing of 45 cm × 30 cm.

The effect of different INM levels on number of green cobs of sweet corn plant ha^{-1} was found significant . Application of 75% RDF NPK +vermicompost recorded significantly maximum number of green cobs plant^{1} (130.68) while minimum number of green cobs plant ha^{-1} (110.99) in the application of 50% RDF NPK + Azospirillum 5 kg ha^{-1} which is at par with the application of 75% RDF NPK + Azospirillum 7.5 kg ha^{-1} (112.78)$^{.}$ Similar findings were collaborated with those reported by Massey and Gaur *et al.*(2006).

Table Cob length, cob diameter , No of green cobs No of green cobs per ha and influenced by +Plant densities and INM levels

Treatments	Cob Length (cm)	Cob Diameter (cm)	Number of Green Cobs Plant^{-1}	Number of Green Cobs ha^{-1} (000)
Plant Densities Levels				
C_1- 60 cm x 20 cm (83,333 Plants ha^{-1})	17.95	14.21	1.48	123.33
C2-45 cm x 20 cm (1, 11,111 Plants ha-1)	17.26	13.72	1.35	150.00
C3-45 cm X 30 cm (74,074 Plants ha-1)	18.75	14.93	1.50	111.11
CD at 5%				
INM Levels				
T1-100% RDF(120N, 60 P_2O, 60K_2O) Control	17.85	14.05	1.40	125.31
T2- 50% RDF NPK + Vermicompost	16.55	13.85	1.36	121.73
T3-75% RDF NPK + Vermicompost	18.66	14.35	1.46	130.68
T4- 50% RDF NPK +FYM	16.22	13.72	1.34	119.94
T5-75% RDF NPK + FYM	18.35	14.15	1.42	127.10
T6-50% RDF NPK + Azospirillum 5kg ha^{-1}	15.45	13.67	1.24	110.99
T7-75% RDF NPK + Azospirillum 7.5kg ha^{-1}	15.83	13.70	1.26	112.78
Plant Density x INM Levels	NS	NS	NS	NS

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