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Growth and Yield of Sweet Corn as Influenced by Phosphorus Levels to Preceeding Green Manure and Nitrogen Levels to Sweet Corn

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ABSTRACT

A field experiment was conducted at the Agricultural College Farm, Bapatla, during *kharif* 2017 to study the effect of five phosphorus levels to sunhemp as preceding green manure crop and nitrogen levels to the following sweet corn. Twenty treatment combinations, comprising five phosphorus levels to preceeding green manure crop and four nitrogen levels to sweet corn were tested. The results revealed that application of 40 kg P_2O_5 ha^{-1} to preceeding sunhemp green manure crop significantly recorded highest growth and yield of succeeding sweet corn *viz.,* plant height, drymatter accumulation, less number of days to 50% tasseling, silking, green cob yield with husk, green cob yield without husk, green fodder yield at harvest. Among the nitrogen levels tested to sweet corn maximum growth and yield attributes were recorded at 120 kg N ha^{-1}.

Key words : *Fertility levels, Green manure, Sweet corn.*

The farmer do not get sufficient time gap to grow green manures crops. Farmers are not ready to sacrifice the main crop for the sake of growing green manure crop and incorporate it. However, if a green manure crop is grown with the early showers and incorporated before sowing of *kharif* crop, it will add considerable quantity of biomass to the soil. Leguminous green manure crop responds well to phosphorus fertilization because nodulation and nitrogen fixation require high phosphorus status in host plant which can be facilitated by mycorrhizal symbiont. Sweet corn production requires soil nitrogen in high quantities to meet its growth and yield. This crop partitions more nitrogen to the grain than any other nutrient derived from the soil. Supply of nitrogen through fertilizers alone is costly. Hence incorporation of green manure to the soil preceeding to sweet corn enhances the nitrogen availability to sweet corn.

MATERIAL AND METHODS

The field experiment entitled "Growth and yield of sweet corn as influenced by phosphorus levels to preceeding green manure and nitrogen levels to sweet corn" was conducted at the Agricultural College Farm, Bapatla during *kharif,* 2017. The soil was sandy clay loam in texture, slightly saline in reaction (0.5 EC), Neutral (7.3 pH), low in organic carbon (0.3 %), low in available nitrogen (188.8 kg ha^{-1}), medium in available phosphorus (30.7 kg ha^{-1}) and high in potassium (282.2 kg ha^{-1}). Twenty treatment combinations comprising five phosphorus levels to preceeding green manure crop P_0 - Control P_1 - 10 kg P_2O_5 ha^{-1}, P_2 - 20 kg P_2O_5 ha^{-1}, P_3 - 30 kg P_2O_5 ha^{-1}, P_4 - 40 kg P_2O_5 ha^{-1} as main plots and four nitrogen levels to sweet corn N_1 - 60 kg N ha^{-1}, N_2 - 80 kg N ha^{-1}, N_3 - 100 kg N ha^{-1}, N_4 - 120 kg N ha^{-1} as Sub plots were tested in split plot design with four replications. The recommended dose of 60 kg P_2O_5 and 60 kg K_2O were applied through SSP and MOP as a basal application. Nitrogen was applied through urea in two splits as per the treatments. Sowing of the green manure was done on 23.07.2017. Tractor drawn rotovator was used for incorporation of green manure on 23.09.2017. Bold and healthy seeds of popular hybrid Golden cob of sweet corn were hand dibbled into the soil @ one seed per hill at a depth of 5 cm on 13.10.17 at a spacing of 60 cm × 20 cm.

The weather conditions during the crop growth period was normal. The mean maximum and minimum temperature recorded during crop period were 32.0^{0}C and 22.9^0 C respectively. The mean maximum and minimum relative humidity 82.1 and 69.6 respectively. The crop was planted with a spacing of 60 × 20 cm. The plot size was 6.4 m × 6 m and 5.2 m ×3.6 m respectively. Weeding and plant protection measures were followed as and when needed. Observations regarding the periodical growth and yield attributing characters, cob and fodder yield were recorded. The data were analysed statistically by adopting the standard procedures described by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Growth attributes

In the present study, it was observed that all the growth parameters (Table 1) *viz.,* Plant height, drymatter accumulation, days to 50% tasseling and silking were increased upto harvest with increase in

Table 1. Plant height (cm) drymatter accumulation (kg ha^{-1}) days to 50% tasseling and days to 50% silking at harvest of sweet corn as influenced by phosphorus levels to preceding green manure crop and nitrogen levels to sweet corn

Treatments	Plant height	Drymatter production	50% tasseling	50% silking
Main plots - Phosphorus levels (kg ha^{-1}) to sunhemp				
Control	241	7279	47	62
10	254	8399	46	61
20	255	8400	46	59
30	257	8786	46	58
40	260	10178	45	57
SEm±	4.2	232.6	0.4	0.5
CD (P=0.05)	13.2	716.7	1.3	1.8
CV (%)	8.7	10.8	3.8	4
Sub- plots – Nitrogen levels (kg ha^{-1}) to sweet corn				
60	248	8192	47	60
80	250	8402	46	60
100	257	8695	46	59
120	258	9145	45	59
SEm±	3.1	234.7	0.3	0.4
CD (P=0.05)	8.9	671	1.1	1.1
CV (%)	8.5	12.1	3.8	3.1
Interaction (P×N)				
SEm±	7	525	0.8	0.4
CD (P=0.05)	NS	NS	NS	NS

Table 2. Yield of sweet corn as influenced by phosphorus levels to preceeding green manure crop and nitrogen levels to sweet corn.

Treatment	Green cob yield with husk	Green cob yield without husk	Green Fodder yield
Main plots - Phosphorus levels (kg ha^{-1}) to sunhemp			
Control	9512	8343	14778
10	11540	9567	15014
20	13836	12288	16887
30	14248	12309	16962
40	15331	13520	18461
SEm±	476.4	239.3	496.9
CD (P=0.05)	1468.1	737.6	1531.3
CV (%)	14.7	8.5	12.1
Sub- plots – Nitrogen levels (kg ha^{-1}) to sweet corn			
60	12543	10734	15235
80	12675	11176	16352
100	12703	10946	16877
120	13653	11966	17218
SEm ±	498.3	218.2	507.6
CD (P=0.05)	1424.3	623.7	1451
CV (%)	17.2	8.7	13.8
Interaction (P×N)			
SEm ±	1114.2	488	1135.2
CD (P=0.05)	NS	NS	NS

application of phosphorus to the preceeding sunhemp green manure crop from control to 40 kg P_2O_5 ha^{-1}. Among the nitrogen levels to sweet corn the tallest plants (258 cm), was recorded with 120 kg N ha^{-1} the shortest plant height (248 cm) with 60 kg N ha^{-1} at harvest. The highest drymatter (9145 kg ha^{-1}) was recorded with 120 kg N ha^{-1} and lowest (8192 kg ha^{-1}) drymatter at harvest respectively was registered in 60 kg ha^{-1}. Less number of days were required to attain 50% tasseling and silking when sweet corn crop received the highest nitrogen level 120 kg N ha^{-1} and was on a par with 100 kg N ha^{-1} and 80 kg N ha^{-1}. While application of the 60 kg N ha^{-1} took the more number of days (60) to attain 50% silking. These findings are in conformity with Meena (2013) Roshan *et al*. (2013) and Shahzad *et al*. (2015).

Yield

The yield (Table 2), increased with increase in P_2O_5 kg ha^{-1} to preceeding green manure crop. Significant improvement in overall growth of the crop by virtue of increased phosphorus doses. This greater availability of photosynthates, metabolites and nutrients to develop reproductive structure seems to have resulted in increased productive plants, with the phosphorus levels to green manure crop.

Whereas, among the nitrogen levels to sweet corn with increase in the level of nitrogen to sweet corn from 60 to 120 kg N ha^{-1}, the green cob (with husk) yield increased significantly. The green cob yield recorded with application of 120 kg N ha^{-1} (13,653 kg ha^{-1}) was significantly higher over 60 kg $ha^{-1}$and was on a par with 100 and 80 kg N ha^{-1} and the lowest green cob yield (12,543 kg ha^{-1}) was observed with application of 60 kg N ha^{-1}. The highest green cob yield (without husk) 11,966 kg ha^{-1} recorded with 120 kg Nha^{-1} applied to sweet corn which was significantly superior over 100, 80 kg N ha^{-1} and 60 kg N ha^{-1}. The lowest green cob yield without husk (10,734 kg ha^{-1}) was recorded with 60 kg N ha^{-1}. Application of 120 kg N ha^{-1} significantly enhanced the green fodder yield (17,218 kg ha^{-1}) which was on par with 100 and 80 kg N ha^{-1}. The positive response to higher level of nitrogen on green cob yield could be ascribed to overall improvement in crop growth that enabled the plant to absorb more nutrients, moisture, higher light interception and increased leaf area which might have enabled the plants to accumulate more quantities of photosynthates in the sink Similar findings was also reported by kar *et al.* (2006) Bhatt *et al.* (2012) Singh *et al.* (2012) Shankar *et al.* (2013) and Eajaz *et al.* (2014).

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