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Research Notes

Response of hybrid maize *(Zea mays* L.) to soil and foliar application of nutrients

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Maize has higher production potential in Tamil Nadu, especially under irrigated conditions. Development of hybrid maize has broken the yield barrier to a greater extent. It is well known that maize, that too hybrid maize is heavy feeder on nutrients. Bedsides soil application of nutrients, it is important to feed the hybrid maize through foliar application of nutrients and micronutrients. Zinc and sulphur were found to be the yield limiting nutrients in many of the long-term fertilizer experiments (Nambiar, 1994). Studies on the nutrient requirement of hybrid maize with various integrating factors such as inorganics, organics and foliar feeding of DAP, MOP and micronutrients are scanty. Hence, the present study was proposed to study the effect of above factors on hybrid maize at North Western agro climatic zone of Tamil Nadu.

Field experiments were conducted during *rabi* season of 2001 and 2002 at Tamil Nadu Agricultural University, Regional Research Station, Paiyur Farm, in randomized block design with four replications. The treatments included were T_1 - 100% recommended inorganic fertilizer (135:62.5:50 NPK kg/ha); T_2 - 100% recommended inorganic fertilizer + FYM 12.5 t/ha; T_3 -125% recommended inorganic fertilizer (170:78:62.5 NPK kg/ha); T_4 - 100% recommended inorganic fertilizer + 1% DAP and 1% MOP spray twice at knee high and tasseling stages; T_5 - 100% recommended inorganic fertilizer + 1% DAP and 1% MOP + 0.5% Zn So4 and 0.2% B spray twice; T6 - 100% recommended inorganic fertilizer + 1% DAP and 1% MOP + 0.5% Zn So4 and 0.2% B spray twice + 1% $FeSo_4$ spray twice. Full dose of recommended P and K fertilizers were applied at the time of sowing. Half of the N was applied at the time of sowing and the remaining quantity was applied in two equal splits *viz*., knee high and tasseling stages. The soil was sandy clay loam (Typic ustorthent) having pH 8.2, EC 0.14 ds/m, organic carbon 0.35%, available N, P_2O_5 and K_2O of 185, 11.8 and 246 kg/ha respectively. Seeds of COH 3 hybrid maize (15 kg/ha) were sown at 60 cm x 20 cm spacing (80,600 plants/ha) on 5th December and 8th December in 2001 and 2002, respectively. The crops were harvested on 26th March and 1st April during the respective crop seasons of 2001 and 2002. Over night soaked 2% DAP spray was given as per treatment schedule and the foliar nutrient sprays such as muriate of potash (MOP) 1 %, Zinc sulphate ($ZnSO_4$) 0.5%, Boron (B) 0.2% and ferrous sulphate ($FeSO_4$) 1% were prepared from the commercial grade materials and were sprayed according to the treatment schedule. The data on plant height, cob length, cob girth, cob weight, total dry matter production (TDMP), 100 grain weight, grain yield and stover yield of maize was recorded at the time of harvest.

Table 1. Growth, yield attributes and yield of hybrid maize as influenced by the treatments (mean of two years)

Treatment	Plant height (cm)	Total DMP (g)	Cob length (cm)	Cob girth (cm)	Cob weight (g)	100-grain weight (g)	Grain yield (kg/ha)	Stover yield (t/ha)
T_1 - 100%NPK	225.0	90.9	9.5	10.3	33.5	22.7	2833	5.2
T_2 - T_1+FYM 12.5 t/ha	238.5	106.4	10.4	11.6	39.8	23.7	3190	6.3
T_3 - 125%NPK	246.2	117.5	10.7	11.9	40.7	24.4	3280	6.6
T_4 - T_1+1% DAP+1% MOP	230.1	100.2	10.3	10.9	38.7	23.4	2995	5.8
T_5 - T_4+ 0.5% Zn SO_4 + 0.2%B	234.6	101.3	10.2	11.6	38.5	23.6	3058	5.9
T_6 - T_5+ 1% $FeSO_4$	250.9	125.6	11.0	12.2	43.9	25.2	3443	6.8
CD (P=0.05)	14.1	13.4	0.6	0.5	3.7	1.3	317	0.6

Note: Foliar sprays of DAP, MOP, Zn, Fe and B were given twice at knee high and tasseling stages

Growth parameters such as plant height (cm) and total dry matter production (g) at harvest were influenced by the treatments tried.,The plant height was highest in T_6 (250.9 cm), which was comparable to that recorded in T_3 (246.2 cm), and T_2(238.5 cm).The lowest plant height of 225 cm was recorded T_1. Increased TDMP of 125.6 g/plant was recorded in T_6, which was comparable to the TDMP recorded in the treatment T_3 (117.5 g/plant). The lowest TDMP of 90.9 g/plant was recorded in T_1. Thus, the growth was favourably influenced by the treatments of soil application 100% NPK + DAP 1% spray + MOP 1% spray + $ZnSO_4$ 0.5% spray + B 0.2% spray + $FeSO_4$ 1% spray twice at knee high and tasseling stages of the crop, indicating the favourable influence of foliar spray of nutrients to hybrid maize. Similarly, Abou El - Nour (2002) reported that foliar sprays with EDTA-micro nutrient compound containing Fe, Mn, Zn and N had significant effect on growth and nutrient content of maize.

Significant variations among the treatments were observed with respect to yield attributes. The highest values of cob length (11.0 cm), cob girth (12.2 cm), cob weight (43.9 g) and 100 grain weight (25.2 g) were recorded with T_6 (100% NPK + 1% DAP + 1% MOP + 0.5% $ZnSo_4$ + 0.2% B + 1% FeSo4) which were comparable to those in the next best treatment T_3 (125% NPK). T_1 (100% NPK) registered the lowest values for the above yield attributes 9.5, 10.3, 33.5 and 22.7, respectively. Foliar feeding of Zn and Mn along with enhanced doses of NPK favourably influenced the growth parameters of maize as reported by Mahmoud (2001).

Grain and stover yields of maize (mean of two years) varied significantly among the treatments. The higher grain yield of 3443 kg/ha was recorded with T_6 which was

comparable to that in T_3 and T_2 (3280, 3190 kg/ha respectively)The lowest grain yield of 2833 kg/ha was recorded in T, (100 %NPK), which was 17.7 % lower than that in T_6. The stover yield was high in T_6 treatment (6.8 t/ha), which was comparable to the treatments of T_3 and T_2 registering the yield of 6.6 and 6.3 t/ha respectively. The lowest yield of 5.2 t/ha was recorded in T_1 (100% NPK), which was 23.5% lower than that in T_6. Surendra Singh and Sarkar (2001) also reported a yield increase of 33 %with higher dose of NPK application (210:90:150 NPK kg/ha) over recommended level (100:60:40 NPK kg/ha).

From this experiment, it may be concluded that soil application of 100% NPK coupled with foliar spray of 1% DAP + 1%MOP + 0.5% ZnSOo4 + 0.2% B + 1% $FeSO_4$ twice at knee high and tasseling stages influenced the growth, yield attributes and yield of hybrid maize under irrigated conditions of North Western agro climatic zone of Tamil Nadu.

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Research Notes

Survival of microbial inoculants on seeds in premonsoon sowing

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The premonsoon sowing of millets, pulses and cotton is a practice adopted in most of the rainfed area where the seeds are sown well ahead of monsoon and remain in the soil until receipt of rain. The seeds remain buried in dry soil for 2-3 weeks and germinate after the receipt of the rains if the season is normal and the farmers are lucky. Otherwise they have to take up another sowing particularly when rain is delayed beyond a month. The seeds remain in the soil and subjected to heat stress and information on the survival of biofertilizer organisms inoculated on the seeds is much limited. Therefore the present study