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Short Communication

EFFECT OF COMBINED USE OF ORGANIC AND INORGANIC FERTILIZERS ON MAIZE

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Maize (*Zea mays*) is an important cereal crop that provides staple food to large number of human population in the world. Besides being a rich source of starch (80%), maize seed also contains proteins (10%), oil (4.5%), fiber (3.5%) and minerals (2%) (Reddy and Reddy, 2003). Beside the aforesaid advantages the production and productivity of maize in some areas of India is still low mainly due to low soil fertility which is a result of depleting organic matter content in the soil. Application of farmyard manure is considered as a traditional way of returning organic matter to the soil. It is believed that adding considerable quantities of compost to agricultural land will reverse the trend of soil organic matter reduction. Bio waste and FYM application can increase plant available phosphorus, potassium and magnesium levels of soils. Poultry manure has been recognized as a valuable source of plant nutrients for crops and is a potential source of plant nutrients like nitrogen (0.84 to 1.21%) phosphorus (0.91 to 1.07%) and potassium (1.35 to 2.35%). Maize crop can be grown under wide range of conditions and responds well especially to good soil fertility. Hence, the present experiment was undertaken to study the effect of FYM, poultry manure and NPK on the quantitative traits with grain yield as primary concern under the agro climatic conditions of Allahabad and to find out the most optimum dose of fertilizer combination required for cultivation of rabi maize.

A field experiment was conducted at the Field Experimentation Center of Department of Genetics and Plant Breeding, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad during rabi 2012-2013 in 3 X 2 m plots in randomized block design with three replications. Nine **treatments viz:** T_0 (control), T_1(NPK @ 120:60:60 Kg ha^{-1}), T_2(10t FYM ha^{-1}), T_3(25% NPK + 50% FYM), T_4 (50% NPK + 50% FYM), T_5(75% NPK + 25% FYM), T_6(1t poultry manure ha^{-1}), T_7(25% NPK + 75% FYM), T_8(50% NPK + 50% poultry manure) and T_9(75% NPK + 25 % poultry manure) were adopted using maize genotype (SHIATS M2). Five plants from the inner rows of each plot were selected randomly for recording the observations *viz:* days to 50% tasseling, days to 50% silking, Anthesis – silking interval (days), plant height (cm), number of cobs per plant, length of the cob (cm), girth of the cob (cm), number of kernel rows / cob, 100 grain weight (g) and grain yield / plot. The experiment was sown in third week of November and harvested in last week of April. The recommended agronomic practices were followed to harvest maximum yield.

Table 1: Influence of different treatments on growth yield attributes and yield of maize

Treatments	Plant height (cm) at silking	Day to 50% tasseling	Days to 50% silking	Anthesis-silking Interval (days)	Number of cobs/plant	Cob length (cm)	Cob girth (cm)	Rows/ cob	100 grain weight (g)	Grain yield /plot (g)
T_0	182.6	120.0	122.6	2.6	1.1	15.7	15.9	11.5	25.8	1065.0
T_1	183.7	122.0	124.6	2.6	1.2	17.8	16.0	11.5	25.9	1153.3
T_2	196.8	121.0	124.6	3.6	1.6	17.5	16.2	13.5	28.4	1475.0
T_3	189.0	124.6	127.0	2.4	1.6	16.3	16.2	14.9	26.1	1516.6
T_4	203.4	124.6	128.0	3.4	1.6	17.7	16.1	11.7	25.1	1350.0
T_5	206.9	123.3	127.0	3.7	1.5	17.1	16.5	11.7	29.1	1383.3
T_6	204.5	122.6	126.3	3.7	1.5	16.3	16.4	13.5	22.2	1241.6
T_7	200.4	124.3	127.3	3.0	1.3	18.1	16.6	12.8	29.4	1220.0
T_8	193.0	122.6	125.6	3.0	1.4	17.4	16.4	11.7	27.9	1633.3
T_9	201.2	122.3	125.3	3.0	1.5	16.7	16.7	12.6	28.2	1166.6
C.D (0.05)	6.57	2.42	1.069	0.62	0.21	0.59	0.27	1.33	1.53	47.8

T_0: control, T_1: 120:60:60 NPK kg ha^{-1}, T_2: 10t FYM ha^{-1}, T_3: 25% NPK+50% FYM, T_4: 50% NPK+50% FYM, T_5: 75% NPK+25% FYM, T_6: 1t poultry manure ha^{-1}, T_7: 25% NPK+75% FYM, T_8: 50% NPK+50% poultry manure, T_9: 75% NPK+25% poultry manure

Statistical analysis of data on growth parameters indicated significant effect of different treatments on plant height, days to 50% flowering, days to 50% silking and anthesis-silking interval (Table 1). Application of recommended doses of NPK (@120:60:60 kg ha^{-1}) and organic manure (i.e. FYM and poultry manure) alone and in combination resulted delay in appearance of tassel in maize

compared to control. However, mineral N applied maize took longer duration for tasselling (122-124 days) in comparison to FYM and poultry manure applied maize (121-122 days). In addition, days to 50% silking also showed variation with different sources of fertilizers. The maize experienced with combination of NPK and FYM took longer time for silking (127-128 days) compared to others. Similar results were obtained by Gajri *et al.* (1994), who reported that maize phenological parameters were significantly affected by the amount of N fertilization. Our results are also in line with the findings of Lemcoff and Loomis (1994) who investigated that phenological events like tasseling, silking and maturity in maize were significantly delayed by increasing rate of mineral N than the other sources. Delay in silking in FYM treated plots could be attributed to slow and timely release of essential nutrients from FYM throughout the growing season that encourages plant vegetative growth (Ali *et al.*, 2011, and Arif *et al.*, 2012).

The influence of treatments on anthesis-silking interval (days) was highly significant with short interval of 2.4 days in 25 % NPK + 50 % FYM, which is an indication of receipt of viable pollen by all stigma resulting in greater chance of seed-setting, increased kernel numbers and thereby increase in yield. The plant height trait is also influenced by the treatments. Higher plant height was found in the plot which received NPK and organic manure alone and in combination compared to control. However, the taller plants were found in treatment 75% NPK and 25% FYM (206.97cm) and shorter plants in control (182.63cm). The results indicated that increased nitrogen application has pronounced effect in increasing vegetative growth of crop plants. The number of cobs per plant revealed that, all the treatments were significantly superior to control with maximum number of cobs per plant i.e. 1.63 under 10t FYM ha^{-1} and 50 % NPK+ 50% FYM. Length of the cob was found to be significant with the maximum cob length 18.10 cm in 25% NPK + 75% PM. The data on cob girth revealed that, all the treatment combinations except T_9 were significantly superior to the control with the maximum cob girth (16.67) under 25 % NPK + 75% PM. Number of grain rows per cob was found to be significant with the application of 25% NPK + 75 % FYM. Similar results were reported by Singh and Totawat (2002). The influence of treatments was significant on 100 grain weight with the maximum value (29.42 g) under 25 % NPK + 75 % PM. The influence of treatments was significantly positive for grain yield per plot with the maximum (1633.33 g) under NPK 50 % + 50 % PM. Verma *et al* (2006) reported that integrated nutrient management increased the grain yield of maize ranging from 56.71-162.85%.

Thus, it may be concluded from the above results that combined use of organic and inorganic sources of plant nutrients (NPK 50 % + PM 50%) could efficiently enhance the fertility of the soil there by achieving maximum yield.

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