A study on mineral and organic fertilization of maize in newly reclaimed area

Fatma Abd Elhamid Nofal

Two field experiments' were conducted at Nubaria Research Station,Agricultural Research Center, Egypt, during 1995 and 1996 seasons tostudy the effects offour N levels (0, 35, 90 and 135 kg/fed), two P levels (0and 30 kg P20s/fed) and three FYM levels (0, 20 and 40 ton/fed)on thegrowth, grain yield and its components, and chemical contents of leaves andkernels of S.c. 122.The soil type was calcareous and sandy clay loam in texture with aCaC03 of about 23%.A spilt-split plot design with four replications was used, the main plotswere devoted for FYM levels, the sub-plot for P levels and the sub-subplotsfor the N levels. Sub-sub-plot area was 21 m2 (11300 fed). Plantingwas done on 19 and 21 June in 1995 and 1996, respectively. The precedingcrop was wheat in both seasons. Harvest was undertaken on 20 October inboth seasons. The results of the experiments could be summarized asfollows:I. Effect of N levels1. The increase ill N level from zero to 45, 90 and 135 kg/fedsignificantly increased plant height, ear height, area of the topmostear leaf, number of ears/plant, ear length, ear diameter, ear weight,number of rows/ear (in the first season), number of kernels/row,weight of 100 kernels, shelling percentage and grain yield/fed. Thehighest value of these traits were generally recorded at the highest Nlevel., 2. The increase in N level significantlyreduced number of days to 50%tasseling and silking in both seasons. The earliest flowering wasreached at the highest N level.3. The increase in grain yield due to the increase in N level was anindication for the vital role of this nutrient. Maize grain yield was1.79, 3.38, 3.73 and 4.40 ton/fed in 1995 season at zero, 45, 90 and135 kg N/fed, respectively. The corresponding values of grain yieldin 1996 season were: 1.51,2.87,4.19 and 4.54 ton/fed, respectively.The highest N level induced an increase in grain yield of 145 and200% in the first and second season, respectively compared with thecheck treatment.4. The increase in N level significantly increased N, P and K percentagesin leaves at 90 days from planting in 1995 season, while the effect ofN level on these contents was not significant in 1996 season.5. The increase in N level significantly affectedN% and protein contentin grain in both seasons. The highest N and protein %were recordedat the highest N level. The crude protein % increased from 9.06 atthe control level to 9.22, 9.87 and 10.37% with the increase in Nlevel to 45, 90 and 135kg/fed, respectively on the average of bothseasons.6. Increasing N level significantly increased P and K percentages inkernels in 1995.7. N. uptake increased markedly with the increase in N level. On theaverage of both season,N uptake was 17.15,34.49,51.37 and 65.42kg/fed at the N level of zero, 45, 90 and 135 kg/fed, respectively .8. Nitrogen sue efficiency has been reduced with the increase in N levelon the average of both seasons.N use efficiency valued 29.70,23.58and 20.75 kg grain/kg N at the N level of 45,90 and 135 kg/fed,respectively. This result indicates the efficiency of the highest Nlevel in calcareous soil to produce high grain yield.9. N recovery has been slightly reduced as the N level increased. On theaverage of both season, applying 45, 90 and 135 kg N/fed recordedapparent N recovery of39.20, 37.97 and 35.76%, respectively.II. Effect of P levels1. Applying P at 30 kg P20y'fed significantly increased plant height (in1996), ear height, leaf area of topmost ear, number of ears/plant, earweight (in 1995), shelling percentage (in 1995) and grain yield/fed.2. P application did not significantly affect ear length, ear diameter,number of rows/ear, number of kernels/row and 100-kernel weight inboth seasons.3. Applying P at 30 kg P20s/fed significantly increased maize grainyield/fed by 26.68, 10.43 and 18.31% in 1995, 1996 and thecombined average, compared with

the control, respectively.4. Applying P at 30 kg P20s/fed significantly increased N content inleaves (in 1995) and N content in grain (in 1995).5. P application did not significantly affect P and K contents in leavesas well as in kernels in both seasons.6. Applying P at 30 kg PzOs/fedmarkedly increased N uptake in grainwhere an increase of 19.46% in N uptake was recorded on theaverage of the four N levels.7. N use-efficiency increased as a result of P application. On theaverage of both seasons, P at 30 kg P20s/fed increased N useefficiency by 10.00, 4.65 and 4.79% at the N level of 45, 90 and 135kg/fed, respectively.III. Effect of FYM1. Application of FYM significantly increased plant height, ear length(in 1995), area of the topmost ear leaf (in 1996), number ofears/plant, ear diameter (in 1995), ear weight, 100-kernel weight (in1995), shelling percentage and grain yield/fed.2. FYM did not significantly affect tasseling and silking dates, earlength, number of rows/ear, and number of kernels/row.3. Applying 20 ton FYMlfed significantly increased grain yield by 9.88,23.44 and 32.79”10 in 1995, 1996 and the combined average,respectively.4. FYM application significantly increasedN% in leaves (in 1995),N%in grain (in 1995),P% in grain (in 1996) and protein content in grain(in 1995).5. The application of FYM did not significantly affect P and K contentsin leaves and K% in grain.127IV. Interaction effects1. The results indicated that N x P had a significant effect on:• Tasseling date (in 1996).• Silking date (in 1996).• Ear length (in 1996).• Ear weight (in the combined average).• Shelling percentage (in 1995, 1996 and the combined average).• Grain yield/fed (in 1995).The highest values were generally recorded by combining the highestlevels ofN and P.2. Significant effects of N x FYM were recorded on the followingcharacters:• Plant height (in the combined average).• Leaf area of topmost ear (in 1996).• Ear length (in 1996).• Ear diameter (in 1996).• Ear weight (in 1996).• Shelling percentage (in 1995 and the combined average).• Grain yield/fed (in 1996 and the combined average).The highest values of these traits were recorded by combining 135 kgN/fed and 40 ton FYMlfed. Generally, the response of most of thestudied characters to FYM was quite evident where no N wasapplied, while at the higher N levels, the effect of FYM was greatlyreduced.3. Significant interaction effect between P x FYM were observed on:• Ear length (in 1996).• Grain yield/fed (in 1995 and the combined average).The highest values were generally recorded by combining the highestlevels ofP and FYM.4. Significant interactions ofN x P x FYM were recorded on:• Leaf area of the topmost ear leaf (in 1996).• Ear length (in 1996 and the combined average).• Ear diameter (in the combined average).• Number of kernels/row (in 1996 and the combined average).In general, the highest values were generally recorded by combiningthe highest levels of three factors.In conclusion, the results indicated clearly that the highest grain yieldwas obtained by applying 135 kg N + 30 kg P20S + 40 ton FYM, beingabout five tons per feddan in both seasons.