fertility status of some soils in tushka and its effect on the productivity of some crops

Mohamed Fathy Amin Hussien

Four field experiments were conducted on the effect of mineral N, P, and K fertilization on some soils of Tushka and its effect on productivity of some crops. The experiments were done in two locations: Location 1 (winter season 1 2004/2005) was in the Pilot Farm irrigated by well water; it belongs to the South Valley Company (a State-owned company). Location 2 (winter season 2 2005/2006) was in a land irrigated by Branch No. 2 of El-Sheikh Zayed Canal, (Nile water). N, P and K were originally obtained from different three sources, i.e., fertilizers were ammonium sulphate (20.5% N) as N-source, Calcium superphosphate (6.8% P, i.e. 15.5% P205) as P-source, and Potassium sulphate (41.5% K, i.e. 50% K20) as K- source. Various NPK combinations were evaluated. Also a fertilizer NPK combination used by the South Valley Company, a company which is investing in and operating Branch No. 2 of Tushka (about 120 thousand feddans), was compared.The experiments were conducted in a randomized complete block factorial, involving 3 factors of N: 3 rates, P: 2 rates and K: 2 rates; an extra treatment representing CT was also conducted. All treatments were in 3 replicates. All treatments for all experiments received compost before planting at a rate of 4 Mg/fed. (Mg: megagrams = 106 g). Also, a dose of 50 kg/fed. of elemental sulpher mixed with 25kg magnesium sulphate (9.63% Mg) along with the compost.At the end of the experiments yield of tomato, melon and green beans (fruits or pods) were measured. Some harvest parameters of fruit or pod quality and N, P, and K in plant were determined. Some chemical properties of the soil were determined compared with Company treatment (CT).The first season, winter 2004/05.Two field experiments were carried out during the winter season 1 of 2004/2005 on a sandy loam soil of Tushka area at the Pilot Farm on two crops used for export, tomato hybrid (Lycopersicon esculentum Mill, cv. F1 1077) and melon ”cantaloupe” (Cucumis melo L. cv. Fado).The Tomato experiment.This experiment was conducted under the following treatments:1-N rates: N1, N2, and N3 rates of 62 kg, 82 kg and 164 kg N/fed applied in two equal splits, (at soil preparation and at pre-flowering stage).2-P rates: P1 and P2 rates of 21 kg and 27 kg P/fed. applied in one dose at soil preparation.3-K rates: K1 and K2 rates of 83 kg and 104 kg K/fed. applied in two equal splits along with N.The CT treatment (South Valley Company) was 82 kg N + 13 kg P + 62 kg K/fed.The results show the followings:1-The N2P1K2 and N3P2K1 gave highest for marketable and unmarketable yields surpassed CT by 23.5% and 11.5% respectively.2-The NPK combinations gave higher marketable and total yields than those given by CT Increases showed the following ranges: increase over CT were 3.7% (N1P1K2) to 25% (N2P1K2) for marketable yield; and 2.4% (N1P1K1) to 20.2% (N2P2K2).3-Highest N combined with the high. P2 reduced fruit quality.4-N2P1K, treatment increased fruit firmness (hardness), but N2P2K2 treatment gave the highest total soluble solids TSS.5-Increasing NPK fertilizers increased the uptake of N, P, and K and highest uptake of any nutrient of them was generally associated with addition of its highest rates. Highest uptake was by N2P2K2 treatment.6-Increased NPK lowered soil EC, pH, at the end of the season particularly with the highest NPK. The topsoil (0- 30cm) generally showed higher values for EC than the subsoil (30-60cm).7-The different NPK combinations show that N3P1K2 treatment gave the lowest value for pH as compared to other treatments in the topsoil. In the subsoil it was any of the N1P2K2 or N2P2K2 or N3P2K2 which showed lowest pH.8-The NPK increased available amount of N, P, and K in soil after harvest.9-High NPK fertilizers gave greater value for extractable

of N and K than lower dose.The melon ”A” experiment.This experiment was conducted under the following treatments:1-N rates: N1, N2, and N3 rates of 32 kg, 41kg and 84 kg N/fed respectively applied at two equal splits, (at soil preparation and at pre-flowering stage).2-P rates: P1 and P2 rates of 21 kg and 27 kg P/fed respectively applied in one dose at soil preparation.3-K rates: K1 and K2 rates of 83 kg and 104 kg K/fed respectively applied at two equal splits along with N. The CT treatment (South Valley Company) was 41 kgN + 13 kg P + 62 kg K/fed (same rates for P and K givento tomato, but half the rate of N for tomato).The results show the followings:1-Increased NPK increased yield of melon and improved yield quality of fruits. N1P2K1 and N2P2K2 treatments gave highest marketable and total yields surpassing CT by 24.8 % and 24.4% respectively. N31311(2 gave highest unmarketable yield surpassing CT by 52.2%.2-Increasing N high rate of P and K fertilizers decreased fruit yield.3-Highest weight/fruit was associated with N2P2K2 treatment. The N2PIK2 treatment gave the highest fruit firmness (hardness), sucrose and TSS contents.4-High NPK did not affect sucrose % of melon fruits.5-Increasing NPK increased the uptake of N, P, and K varying from one nutrient to another.6-The highest values was associated with highest rates of NPK and differed according to the added rates of mineral fertilizer combinations.7-High NPK decreased the soil pH and EC at the end of the experiment.8-High NPK increased available N, P, and K at end of the experiment.The second season, winter 2005/06.Two field experiments were carried out at the winter season 2005/2006 on a sandy loam soil of Tushka area (South Valley Company) using Nile water from Branch No.2 of El-Sheikh Zayed Canal. The test crops were melon (Cucumis melo L. cv. Fado) and green beans (Phaseolus vulgaris L. cv. Polesta).The melon ”B” experiment.Design and treatments were similar to the melon ”A” experiment.The results show the followings:1-Increased rates of NPK increased yield and its components. The superiority of the N3P1K2 of the maximum marketable yield over that of the CT was 12.4%. Superiority of N1P2K2 of highest total yield over that of the CT was 11.1%.2-Harvest quality most improved with N1P2K2 which gave the highest weight/fruit; N2P2K2 gave highest fruit hardness; highest sucrose was given by N3P1K2, and highest TSS was given by N2P2KI. Comparing the CT treatment with those of NPK shows that increases of 21.7, 8.7, 33.3, and 37.8% were obtained by the treatments of NPK which gave highest parameters of fruit weight, fruit hardness, sucrose, and TSS in comparison with the CT treatment.3-N1P2K2 treatment gave highest uptake of N, P, and K; giving increases of 16.7%, 29.4%, and 28.3% respectively over those obtained by the CT treatment.4-All NPK gave lower pH, as well as EC in soil as compared with the CT treatment; pH in the subsoil is generally greater than in the topsoil. Such a trend is in line of that of the soil salinity.5-Added mineral fertilizers NPK to the soil, their contents of such elements are all reflected in contents of element in treated soils. Amounts of soil extractable elements in the subsoil depth were lower than found in the topsoil depth.6-The N3P2K2 treatment gave the highest contents for available N, P, and K. The lowest was shown by N1P1K1 in general all of the NPK combinations resulted in higher contents of available N, P, and K in soil, than given by CTThe green beans experiment.It included three factors also as the case with the other experiments.The results show the followings:1-The NPK combinations gave greater yields than the C.T treatment ranging between 8% (due to N1P2K2) and 123% (due to N3P2K1) for marketable yield; 21% (due to N1P2K1) and 58% (due to N3P1K2) for unmarketable yield;11% (due to N1P1K1) and 57% (due to N3P2K1) for total yield2-There were greater values for pod weight/plant over those of the CT treatment ranging between 10% (for N1P1K1)and 63% (for N3P2K1); and lower colour lightness that of the CT3-For percent export: the superiority was particularly considerable when such NP combination was combined with the high K2 rather than the low K1; the averageincrease was 13% in the first case and as high as 50% in the second one.4-Some of the NPK treatments exceeded the CT treatment regarding TSS and they were mostly having the P2 rate.5-The highest N3P2K2 gave highest K uptake and surpassed the CT treatment regarding; but N3P2K1 gave highest N as well as P uptake and also exceeded the CT treatment.6-Percentage increases due to NPK treatments over the CT treatment show the following range:â5.6 (N1P1K1), to 80.6 % (N3P2K1) for N-uptake.â10.9 (N1P1K1), to 89.1% (N3P2K1 for P-uptake).â42.8 (N1P1K1), to 136.3 % (N3P2K2) for K-uptake.7-The CT treatment gave rather lower pH than most of the NPK treatments particularly in the subsoil; but higher EC than most NPK treatments particularly in the topsoil.8-Increased NPK rates were associated with increased contents

of residual, and most available of N, P, and K soil. NPK treatments showed greater values of such nutrients than shown by the C.T treatment.It may be concluded that:•On the basis of applying a suitable rate of organic manure or compost within the range 4 to 6 Mg/fed., combinations of NPK fertilizers are necessary to acquire efficient yields.•Application of different rates of mineral N, P, and K fertilizers pronounced will be applied each year. Its gave productivity of crops safe (existence of fertilizer residues).•Balanced ratios of N, P, and K are important for getting the most profitable reward upon reclamation of desert sandy soils.