Fertilty status of some soils in south sinai

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This investigation aiming at (i) studying the availability status of some nutrients, for instance, n, p, k, fe, zn, mn and cu in some soils of south sinai area, (ii) defining the order of n, p and k requirements for wheat plants using the diagnosis and recommendation integrated system (dris) and (iii) suggesting the best combination between nutrient and assessing the nutritional balance in wheat plant, experimental work : soil sampling : to achieve the first objective, fifty-eight soil samples from the surface layer (0-30 cm) were collected from different eight regions. soil samples were air-dried, crushed, sieved through a 2-mm stainless steel sieve, mixed thoroughly and stored in plastic jars for the characterization of physical and chemical properties, the availability of some soil nutrients; i.e. n, p, k, fe, zn, mn, and cu was determined. the fertility status of these nutrients were assessed to fulfill the second and the third objectives, two sets of greenhouse experiments were executed using sandy and loamy sand soils that are dominating in south sinai area, the first set of greenhouse experiments : a 33 factorial experiment was conducted on a sandy soil using wheat plant (sakha 8) as a test plant to stu • y the response to n, p and k using one grade of irrigation ater from four different grades were used to irrigate plan procedure : pots of 2 kg each were filled with sandy soil d arranged in a randomized complete block design (' b) with three replicates. ten wheat seeds were sown in ach pot, then thinned after germination to eight seedlings pot : plants were irrigated with fresh water up to 81 % of the water field capacity throughout the growth perio fertilizer treatments were applied as follows : n was applied at rates of 0, 60 and 120 kg n fed as nh4no3 in four doses: the first before sowing, the s and after germination, the third after the second by 10 da s and the fourth at 8 days before the harvest. p was applies at rates of 0, 6.65 and 13.1 kg p/fed as osp in two doses: th first before sowing and the second after germination by 1 u days. k was applied at rates of 0, 10 and 20 kg k/fed as 42504, in two doses: the first before sowing and the second aft germination by 10 days ants were harvested after 42 days, dried at 70°c, and the yield of dry matter was weighed and nutrient contents were determined, such experiment was repeated using the same soil with each of the following irrigation water quality:the first grade (g1) 2.52dsm-i and 5.62 sar the second grade (g2) 5.25 dsm-i and 11.65 sar. the third grade (g3) 8.82 dsm' and 18.58 sar. analog series of experiments were carried out on a loamy sand soil using the same fertilizer treatments and water grades. the second set of greenhouse experiments : series of experiments were conducted using the same treatments of nutrients and water grades on both sandy and loamy sand soils in a similar way like that of the first set of experiments except wheat seedlings were thinned to 3 plants/pot and the plants were grown until the maturity (6 months) and grain yield was determined, the obtained results could be summarized as follows : 1-availability status of the tested nutrients in soils : soil (n): the highest value of available n was found in el-tor area (63.0 mg/kg) followed by ei-gebeel area (53.20 mg/kg), while the lowest value was found in katrean area (21.70 mg/kg). the relatively highest value of soil vailable p was found in katrean area (15.52 mg/kg), follow d by el-qaa plain (15.35 mg/kg), while the relatively lo est value was recorded in el-wady area (5.25 mg/kg). soil (k): the highest value in el -ge eel area (177.66 mg/kg), followed by el- qaa plain are (117.66 mg/kg), while katrean area scored lowest valu s (50.50 mg/kg)., soil iron (fe): the relatively high co tent of available fe were found in el-gbeel area (2.15 mg/kg), followed by el- tor area (1.47 mg/kg), while blah em area had the lowest value (0.58 mg/kg), soil zinc (zn): the highest value was fou d in el -wady area (1.24 mg/kg) followed by el- gebeel a ea (1.11 mg/kg), while the lowest value was found in kat can area (0.4 mg/kg), soil manganese (mn): the relatively highest value was found in el tor

area (5.04 mg/kg), follow :d by el gebeel area (3.99 mg/kg), while the lowest value as found in balaheem area (0.19 mg/kg), soil copper (cu):katrean area had the high st value in available cu (3.03 mg/kg), followed by el tor a ea (0.58 mg/kg) ,while balaheem area had the lowest value (0.4 mg/kg), greenhouse experiments : the first set : (a) sandy soil: soil showed a deficiency of k nutrient followed by n and p nutrients. under the relatively low salinity water (fresh), the possible best combination was (2-1-1) which has: 120,6.65 and 10 mg/kg of n, p and k, espectively and the order of nutrient requirements was k> p>n. under 01 and g2 water qualities, the possible best combination was (1-0-1) in which 60-0-and 10 mg/kg from n, p and k, respectively were added, and the order of required nutrients was k> p>n, while under grade 3 (g3) of water, the possible best combination was 2-2-0, it means 120,13.1 and 0.0 mg/kg for n, p and k, respectively and the order of limitation was k> p>n. (b) loamy sand soil. phosphorus was the most limiting nutrient in soil-received water of a good quality. under the relatively low salinity water (fresh), the possible best combination was (2-1-1), which means 120, 6.65 and 10 mg/kg, for n, p and k, respectively and the order of nutrient requirements was p> n>k. by using gi water quality the possible best combination was (2-2-1) such combination has 120-13.1and 10 mg/kg, for n, p and k, respectively and the order of limiting nutrients was k> p>n, while by using g3 of water quality the possible best nation became (2-2-2), it means 120-13.1 and 20 mg/kg, for n, p and k, respectively. by using g3 of water quality the possible best combination was (2-0-), which had a 120,0 and 0 mg/kg of n, p and k, respect vely and the order of limitation was n>p>k, c) physiological diagnosis chart (p d chart) : the pd chart was applied to the selected i ata from those of the first set of experiments and the resul can be summarized in the following: -in the case of sandy soil irrigated with fresh water, there was a response to nitrogen application. p and k were the most imbalanced nutrients in plants, phosphorus treatment did not satisfy p deficie y. this may be attributed to the less availability of p in t e tested soil as it may be reacted with one or mor of soil constituents. -the failure of each nutrient to satisfy its deficienc may be attributed to the occurrence of another uncontrolle limiting factors such as salinity, in the case of using the first grade water, k was e most limiting nutrient (14). with the second grade water (g2), nitrog n status in plant fluctuated between deficiencies and ten ed to be deficient. while p showed a balanced conc nitration, however, k was highly deficient and the diagnosis is n ply p, with the third grade water (g3), the same trend obtained with the previous grade water was obtained, except k deficiency or imbalance was severe, loamy sand soil irrigated with fresh water : nitrogen and k status in plant tissue revealed a normal concentration (balanced). however, phosphorus was imbalanced and showed a tremendous need, the diagnosis which extracted from the pd chart is n p i 4„- 134114, with the first grade water, phosphorus still the most limiting nutrient. with the second grade of water (g2), the three nutrients showed different stages of balanced or slightly imbalanced conditions, using the third grade of water (g3) reveals that n was more balanced as compared to p and k, resttits of the second set of greenhouse experiments : the best treatments which were identified through the discussion of dris were checked again with the obtained grain yield, in the case of sandy soil irrigated with fresh water, dris method revealed that the best combination was 2-1-1, and the superiority of this treatment was indicat d as it showed the highest grain yield, in a similar way, the best treatment under the first grade of water was 1-0-1; it had the highest grain yi id. the same trend was achieved with the second grade e f water. with the third grade of water, the best treatment was ? -2-0.in case of loamy sand soil, there was a mplete correspondence between the proposed treatments usi g dris and the obtained grain yield, except with the third de of water the correspondence between the grain yield d thediagnosis using dris method indicated the reliabili of this method.