Studies on fertility evaluation of kalubia soils using diagnosis and recommendation integrated system

Abd El-Hady Abd El-Hady Mohamed Ahmed

The objectives of the current investigation were to: (i) develop database for DRIS norms and indices of wheat grown in Kalubia Governorate, Egypt, (ii) compare the locally derived norms with the existing non local norms, and (iii) identify the order of the most limiting nutrient (or nutrients) among the tested N, P, and K nutrients and the order in which other elements would likely become limiting.To achieve these objectives 1000 plant samples were collected at shooting stage from wheat Fields distributed in seven counties of Kalubia Governorate, i.e., Toukh, Shebien El-Kanater, Kaluob, El-Kanater El-Khairia, El-Khanka, Benha and Kafer Shoukr. The samples were collected in season 2001/2002. The collected fresh wheat samples were weighed and small portions were taken and oven-dried at 70°C for 72 h, weighed and ground to pass a 0.5 mm — screen. Portions of 0.5 g each were digested using a mixture of sulfuric and perchloric acids,diluted and their contents of N, P and K were determined .Corresponding Wheat plants of 1m2 area were harvested at maturing stage from each field and yields of grains were weighed.The 1000 observations were divided into high yielding populations > 2.4 ton (grains) / fed. DR1S norms were calculated for the high yield populations because the high yield usually results from a balanced nutrients in plant.The DRIS reference norms were established using the criterion of significant variance at ratio test between desirable(high yielding) and undesirable (low yielding) subpopulations. The high yielding subpopulations comprised 59.1% of the total number of observations (591 observations) while, the low yielding subpopulations comprised 40.9% of the total number of observations (409 observations). The N/P., N/K and K/P forms of expression are interrelated in a three coordinate DRIS chart . Modified DRIS (M-DRIS) norms were also calculated. The obtained results could be summarized as follows: Wheat varieties:A survey study was performed on wheat ’varieties which were cultivated in Kalubia 2001/2002 season and its results indicate that almost 40.000 fed were sown with wheat in 2001/2002 season. The bigest area was shown in Benha county (10830 fed) followed by Toukh (9009 fed), while the smallest area was found in El-Khanka county. Of 40.000 fed, 4000 fed were planted with unknown wheat varieties of low yielding.In case of Shibin El-Kanater county, 150 samples were collected, 80% of these samples were among the high-yielding population (Grain yield > 2.4 Mg/fed) and low-yielding samples comprised 20%.In case of Toukh, 200 samples were collected to represent 9009 fed. the high-yielding population samples comprised 70%, while the low-yielding ones constituted 30%.In case of Banha, the high-yielding population showed the lowest proportion and comprised 43.5%, while the low-yielding population showed the highest proportion (56.5%) of the tested samples. Kaluob was one of the most productivecounties as the total wheat cultivated area was 3720 fed, which were represented by 150 samples. The high-yielding populations were 75% and the low-yielding populations were 25%.The degree of nutrient imbalance in the plant was expressed in forms of a DRIS index, which measures the extent to which a particular nutrient deviated from the established norms.Different expressions of nutrient ratios were calculated, i.e., n/p, n/k, p/n, p/k, kin, np, nk and kp for low- and high-yielding populations.The variance ratio of all calculated expressions were significant at probability level of 0.01 except the multiplication of N by (np) and K by P (kp). The variance ratios of the expression

derived from dividing nutrient by the other are significant.Low-yielding population showed high values of standard deviation, coefficient of variation as compared with high-yielding population.DRIS norms for the high-yielding populations (591 observations) were as follows: 13.93, 1.40 and 10.25 for n/p, n/k and k/p, respectively. Corresponding DRIS norms reported by Sumner (1981) for wheat plants derived from 1500 observations of high-yielding populations were 12.74, 1.54 and 8.08 for n/p, n/k and k/p, respectively.The calculated norms in the current study can be used with reasonable confidence because the data base from whichthey were derived are taken from large number (591) of samples.The DRIS norms calculated in the current study are different from those developed by Sumner (1981), mainly in K and P levels. This situation suggests that some regionality may exist for DRIS norms dependent on soil properties at least with wheat plants.