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STATUS OF TOTAL AND AVAILABLE CONTENTS OF NITROGEN, PHOSPHORUS AND POTASSIUM IN SOME SOILS OF SOUTH NILE VALLEY, EGYPT.

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ABSTRACT: ***The aim of the present study is to investigate the status of total and available contents of nitrogen, phosphorus and potassium in some soils of South Nile Valley. This study also includes the effect of some soil properties on the levels of nitrogen, phosphorus and potassium. Forty nine soil samples represent seventeen soil profiles were taken for this study. The present data indicate that the total N varies from 190.0 to 1035.0 ppm, while the available N differs from 97.5 to 441.0 ppm. The study indicates that the values of total N are affected by the clay and sand fractions, while the available N values are influenced by the organic matter and calcium carbonate contents.***

The present data indicate that the total phosphorus values are relatively high and range from 258.0 to 9116.0 ppm. This may be due to the geological nature of the sedimentary source rocks which have considerable amounts of phosphate minerals. The available P is affected by clay and calcium carbonate contents in the studied soil profiles and it was found also, that 53.06, 16.34, 22.44, and 8.16 % of the studied soil samples contain very high, high, medium and low amounts of available P, respectively, according to the critical levels of P.

The results show that the values of total and available K vary from 869.0 to 9405.0 and the studied soil reveal higher K contents than both N and P. The available K ranged from 28.61 to 650.6 ppm and it was found that 8.16, 22.44, 69.4 of the studied samples are belonging to low, medium and high levels of available K respectively, according to the critical levels of K. Data also reveal that these soils contain amounts of total nitrogen less than that of total phosphorus and total potassium. However the available nitrogen and potassium are more than the available phosphorus. There are positive relationships between the available NPK and the clay contents of the studied soils; however, there are negative relationships between the available NPK and calcium carbonate contents of soils.

Key word: ***Total and available NPK; South Nile Valley Soils, and Soil properties.***

INTRODUCTION

The challenge for agriculture over the coming decades will be to meet the world's increasing demand for food in a sustainable way. Declining soil fertility and mismanagement of plant nutrients have made this task more difficult. Plant growth is the result of a complex process whereby the plant synthesizes solar energy, carbon dioxide, water, and nutrients from the soil. In all, between 21 and 24 elements are necessary for plant growth. The primary nutrients for plant growth are nitrogen, phosphorus, and potassium (known collectively as NPK). When insufficient, these primary nutrients are most often responsible for limiting crop growth.

Nitrogen, the most intensively used element, is available in virtually unlimited quantities in the atmosphere and is continually recycled among plants, soil, water, and air. However, it is often unavailable in the correct form for proper absorption and synthesis by the plant. Nitrogen is one of the basic plant nutrients and is essential for all life processes in plants; lack of N often limits plant growth in nature and in agriculture (Mortor-Gaudry, 1997). The principle forms of N in soils are (NH_4^+), nitrate (NO_3^-) and organic substances. Most soil N is contained in organic matter; this is slowly converted by microbes to (NH_3), then other microbes converted (NH_4^+), rapidly to (NO_3^-), which is the main mineral N form in most soils (Laegried *et al.*, 1999).

Phosphorus in nature exists mainly as phosphate. Phosphorus deficiencies retard plant growth and tillering and reduce product quality and storage properties. Animal manures and mineral fertilizers are applied to ensure an adequate and sustained supply of P to crops (Laegried *et al.*, 1999). Effective management of P fertilizers is not only critical to economics of crops production, but also to reduce the risk of eutrophication of surface waters (Sims *et al.*, 1998 and Ziardi *et al.*, 2001). Phosphorous extracted by different methods is significantly correlated to plant growth and P uptake under controlled conditions (Simard *et al.*, 1991 and Tran *et al.*, 1992). Organic junction matter groups dissolved in the soil solution competes with phosphate for binding sites on clay, counteracting the P adsorption and increasing the list availability (Mengel, 1997). Rahman *et al.*, (1994) indicated that the stability of phosphorus-organic matter is complexation at high pH.

Potassium is a common element, constituting about 2.3 % of the earth's crust. Clay minerals are the main soil source of K, but much of the soil K is present as a part of insoluble mineral particles and is in accessible to plants, only the slow process of weathering can liberate this K (Laegried *et al.*, 1999). Helal (1988) showed that soil K is generally exists in water soluble, exchangeable, non-exchangeable and mineral phases. The Nile alluvial soils contain sufficient amounts of K; this is due to the fact that Nile deposits and irrigation water are rich with K (Balba, 1979; El-Toukhy, 1987 and Abd Alla, 2004). Plant availability and utilization of K was partly related to clay content, but more closely to contain exchange surfaces associated with both mineral and organic constituents (Singh and Goulding, 1997 and Blake *et al.*, 1999).

The aim of this study is to investigate the status of total and available contents of nitrogen, phosphorous and potassium in some soils of South Nile Valley, Egypt.

MATERIALS AND METHODS

The area of study is chosen to include essentially about half of the available soils of part 2 (branch 2) in Tushka depression. Therefore, forty nine soil samples from seventeen profiles were collected to represent the main geomorphological units in the studied area (Fig.1) as follows:

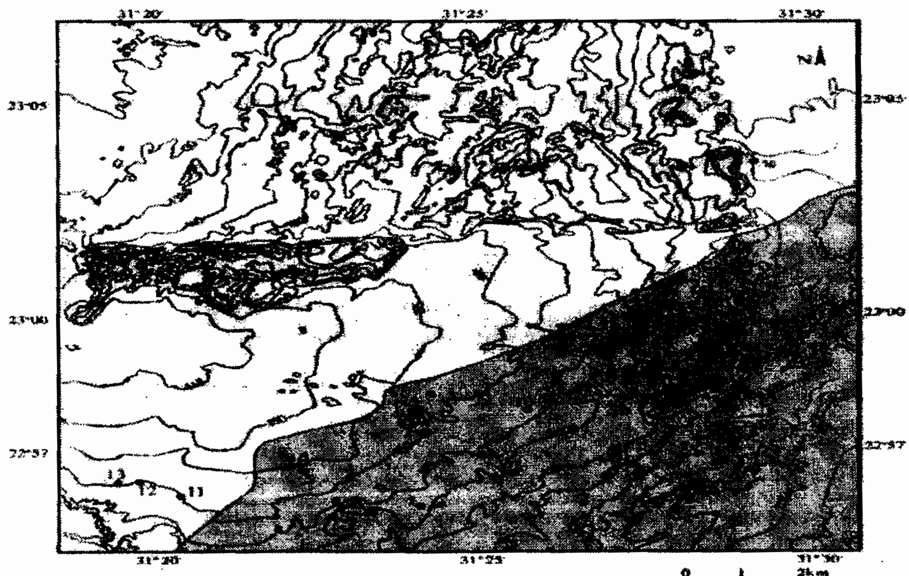


Fig. (1) : Contour, geomorphological and profiles location map of the studied area.

Alluvial deposits over sandstone

Pediplain deposits of sandstone

• Profile Site

(1) Alluvial deposits over sandstone: this unit is represented by ten soil profiles (from 1 to 10). (2) Pediplain of sandstone: this unit is represented by seven soil profiles (from 11 to 17).

Some physical and chemical properties of these soils were determined by Azzam (2004), and shown in Table (1). Particle size distribution, Calcium carbonate content, electrical conductivity (EC) and pH were determined according to Page *et al.*, (1982). Organic matter content (O.M) was determined according to the method given by Walkley and Black (1947).

Table (1): Some physical and chemical properties of the studied soil profiles.

Geomorphic unit	Prof. No.	Depth (cm)	Particle size distribution			pH	ECe ds/m	Organic matter %	$CaCO_3$ %
			sand	silt	clay				
Alluvial deposits over sandstone	1	0-25	69.42	4.55	26.03	7.80	7.21	0.07	10.30
		25-50	66.35	2.60	31.05	7.76	25.63	0.03	8.71
		50-100	57.37	2.13	40.50	7.80	25.89	0.07	4.36
	2	0-25	68.65	1.42	20.93	7.81	7.81	0.03	10.30
		25-55	88.25	3.95	7.80	7.30	42.54	0.16	7.92
		55-110	73.64	1.03	25.33	7.20	46.10	0.20	6.73
	3	0-25	75.29	2.23	22.48	7.81	13.53	0.01	7.92
		25-55	75.62	1.05	23.33	7.51	10.78	0.03	7.13
		55-120	75.74	1.38	22.88	7.71	3.85	0.07	5.94
	4	0-25	88.52	1.23	10.25	7.73	5.68	0.01	11.09
		25-70	74.48	3.09	22.43	7.74	15.57	0.07	5.54
		70-150	67.07	3.25	29.68	7.91	22.69	0.01	4.75
	5	0-20	79.35	0.70	19.95	7.81	14.77	0.07	7.92
		20-50	97.10	1.47	12.43	7.58	15.66	0.03	7.92
		50-120	78.28	1.12	20.60	7.62	12.37	0.03	6.36
	6	0-25	85.05	1.42	13.53	7.76	6.53	0.01	8.71
		25-55	60.57	4.08	35.35	7.58	20.29	0.10	7.52
		55-130	47.35	11.45	41.20	7.62	20.74	0.13	6.34
	7	0-20	87.63	1.37	11.00	8.03	1.88	0.10	9.11
		20-55	57.15	2.35	40.50	8.05	8.29	0.02	3.96
		55-120	49.70	9.77	40.53	7.68	17.69	0.11	1.58
	8	0-25	62.97	3.60	33.43	7.89	11.22	0.05	7.13
		25-65	57.12	10.30	32.58	7.64	25.62	0.17	5.54
		65-130	52.82	10.05	37.13	7.48	26.84	0.23	5.15
	9	0-30	66.25	1.65	32.10	7.91	8.42	0.05	7.52
		30-100	38.09	1.78	60.13	7.15	45.14	0.23	0.79
	10	0-10	63.14	5.33	31.53	7.83	8.29	0.08	8.71
		10-50	56.57	11.15	32.28	7.55	20.74	0.14	4.75
		50-120	56.82	10.83	32.35	7.59	36.60	0.23	3.56
Pediplain deposits of sandstone	11	0-40	69.30	3.25	27.45	7.92	14.85	0.07	7.13
		40-100	62.10	7.20	30.70	8.06	54.65	0.10	3.56
		100-150	9.05	8.42	82.53	7.60	33.02	0.07	1.56
	12	0-35	60.92	11.48	27.60	7.61	18.87	0.03	6.34
		35-100	57.24	3.08	39.68	7.85	21.01	0.07	5.54
	13	0-45	66.40	2.77	30.83	7.71	9.35	0.01	4.75
		45-95	63.07	10.20	26.73	7.93	21.09	0.07	3.96
		95-150	54.85	6.32	38.83	7.67	22.96	0.10	1.98
	14	0-20	75.70	3.75	20.55	7.75	3.66	0.03	7.92
		20-70	76.32	3.93	19.75	8.09	5.00	0.03	5.54
		70-110	58.55	4.55	36.90	7.61	91.66	0.67	1.19
	15	0-20	67.82	3.65	28.53	7.87	18.91	0.05	11.09
		20-50	56.23	8.22	35.55	7.39	18.91	0.08	8.32
		50-120	51.97	11.13	36.90	7.63	11.35	0.11	8.71
	16	0-20	69.85	4.25	25.90	8.01	11.10	0.03	8.32
		20-50	58.18	2.67	39.15	7.91	11.22	0.03	4.75
		50-120	54.78	5.82	39.40	7.66	9.88	0.08	7.92
	17	0-20	71.56	2.24	26.20	7.95	10.00	0.03	7.92
		20-45	59.02	3.95	37.03	7.86	12.32	0.08	3.17
		45-100	52.02	4.98	43.00	7.88	5.49	0.09	1.58

Total and available N in the studied soil samples were determined by Semimicro-Kjeldahl procedures (Bremner, 1965). Total phosphorus was determined according to the fusion method described by Harwood *et al.*, (1969), while determination of total potassium was carried out using the method described by Jackson (1958). Available phosphorus and potassium were extracted according to Soltanpour and Schwab (1977) and P was determined by using a spectrophotometric method described by Watanabe and Olson (1965), while K was measured by flame photometer (Page *et al.*, 1982).

RESULTS AND DISSCUSSION

Physical and chemical properties:

Data in Table (1) showed that the soil texture of the Alluvial deposits over sandstone unit varies widely between loamy sand and heavy clay, where the dominant textural class in these soils is sandy clay. Soil texture of the Pediplain deposits of sandstone unit varies from sandy clay loam to heavy clay indicating that these soils are rich in clay content than the former soils.

Soil reaction attains neutral to slightly alkaline where the pH values range from 7.15 to 8.05 in soils of the Alluvial deposits. Soils of the Pediplain deposits have pH values fluctuated between 7.39 and 8.09 representing mildly to moderately alkaline (Table 1).

Soil salinity differs widely between 1.88 and 46.10 ds/m at 25 °C in the soils of the Alluvial deposits exhibiting non-saline to very high saline soils. In the same respect, ECe values of the soils of the Pediplain deposits differs widely from 1.88 to 91.66 ds/m at 25 °C representing also non-saline to very high saline soils. The high salinity in most of the studied soil profiles may be attributed to the depositional conditions as well as the arid climate which the area being subjected (Khalifa, 2001).

Calcium carbonate content ($CaCO_3$ %) differs widely between 0.79 and 11.09 % in soil of the Alluvial deposits, while it ranges from 1.19 to 11.09 % in soil of the Pediplain deposits (Table 1).The data revealed that $CaCO_3$ content generally decreases with depth in the studied soil profiles and this may be attributed to the movement of solutions enriched with Ca-bicarbonate upward under capillary and evapo-pumping actions. Then the $CaCO_3$ was deposited near the surface affected by arid climate. The wide range of $CaCO_3$ content in these soils may be attributed to the heterogeneity of the parent rocks from which the soils had been formed. On the other hand, some soils of high $CaCO_3$ content may be affected by the neighboring region of the Eocene limestone plateau (Azzam, 2004).

Organic matter content (O.M %) is very poor or absent due to the arid climate prevailing the area and the scarce of vegetation. Generally, the organic matter contents are relatively increased with depth in most of the studied profiles. This may be due to the action of salts of the soil on the organic remains (Plyasinin, 1967), where the organic matter contents are mostly proportional with the salt content (ECe) of the studied soils (Table 1).

Total and available NPK:

The values of total and available NPK in the studied soil profiles are shown in Table (2). These values can be discussed hereafter as follows:

1-Total and available nitrogen:

The prevailing climate of the studied area is characterized by a long, hot summer and low precipitation. Soils under such climatic conditions contain a low organic fraction. The studied soils contain as little as 0.01-0.67% organic matter; therefore, their total organic N content is also low.

The results indicate that the values of total N vary from 190.0 to 1035.0 ppm. The lowest value of N is detected in profile No.2 (25-55 cm, depth) which may be attributed to the low percent of clay content (7.8 %) and high contents of sand fractions. The highest value of total N is found in profile No. 11 with depth (100-150 cm). This may be due to the high amount of clay content (82.53%) and small amounts of sand content (Table 1). These results are similar to those obtained by El-Toukhy (1987) and Abd Alla (1999).

Table (2) shows that available nitrogen in the studied soil profiles differ from 97.5 to 441.0 ppm. These values are detected in profile No.15 (depth 0-20 cm) and profile No.14 (depth 70-110 cm), respectively. The lowest value of available nitrogen may be attributed to the high amount of calcium carbonate (11.09 %), where $CaCO_3$ causes retention of nitrogen. The highest value of available N is due to the relatively high content of organic matter (0.67%) and low content of $CaCO_3$ percent (1.19%);Table 1.

2-Total and available phosphorus:

Data in Table (2) show that the values of total phosphorous are relatively high and range from 258.0 to 9176.0 ppm. This may be due to the geological nature of the sedimentary source rocks which have considerable amounts of phosphate minerals according to Azzam (2004).

The available phosphorus in the studied soil profiles vary from 2.16 to 44.41 ppm (Table2). The highest value is detected in profile No.11 (100-150 cm depth), while the lowest one is found in profile No.1 (50-100 cm, depth). These results show that the values available P is affected by clay and calcium carbonate contents in the studied soil profiles. According to critical levels ($P > 11$ ppm very high; 8-11 high; 4-7 medium and 0-3 low) stated by Soltanpour and Schawb (1977), 53.06, 16.34, 22.44, and 8.16 % of the studied soil samples contain very high, high, medium and low amounts of available p, respectively.

Table (2): Total and available N, P and K (ppm) in the studied soil profiles:

Geomorphic unit	Prof. No.	Depth (cm)	N		P		K	
			Total	Available	Total	Available	Total	Available
Alluvial deposits over sandstone	1	0-25	195.0	110.6	4339.0	8.32	1350.0	68.9
		25-50	631.0	184.0	2628.0	2.42	5320.0	160.9
		50-100	980.0	220.8	2298.0	2.16	4885.0	150.6
	2	0-25	490.0	184.0	2504.0	8.6	1360.0	72.6
		25-55	190.0	105.0	2389.0	8.2	1250.0	60.8
		55-110	980.0	184.0	1988.0	4.8	3039.0	105.5
	3	0-25	735.0	128.8	4846.0	13.71	4342.0	280.6
		25-55	735.0	110.4	4406.0	13.58	5428.0	56.0
		55-120	795.0	128.0	3680.0	13.14	6514.0	70.8
	4	0-25	245.0	110.0	3871.0	11.69	1320.0	69.4
		25-70	345.0	184.0	2590.0	9.33	3909.0	290.9
		70-150	490.0	128.8	1455.0	4.51	5320.0	127.7
	5	0-20	735.0	184.0	2494.0	13.1	4451.0	440.1
		20-50	490.0	184.0	1969.0	12.83	3149.0	118.5
		50-120	735.0	165.6	1194.0	7.28	2497.0	100.0
	6	0-25	735.0	147.2	5324.0	7.63	869.0	260.0
		25-55	490.0	165.6	3450.0	6.59	4560.0	240.7
		55-130	490.0	220.8	3335.0	5.81	4668.0	106.8
	7	0-20	245.0	108.0	2446.0	3.61	1411.0	96.4
		20-55	490.0	184.0	3746.0	4.16	4234.0	390.0
		55-120	980.0	147.2	5305.0	5.20	6731.0	360.0
	8	0-25	735.0	184.0	4473.0	9.71	5536.0	280.6
		25-65	980.0	202.0	4005.0	8.80	5754.0	420.9
		65-130	980.0	220.0	3823.0	2.77	5320.0	310.2
	9	0-30	735.0	184.0	3613.0	12.83	1474.0	99.5
		30-100	1000.0	225.0	4358.0	15.0	6549.0	620.0
	10	0-10	735.0	184.0	4511.0	8.32	5536.0	560.0
		10-50	735.0	147.0	3689.0	12.77	4669.0	460.9
		50-120	735.0	165.0	3842.0	13.04	4994.0	320.5
Pediplain deposits of sandstone	11	0-40	490.0	220.0	860.0	7.35	3040.0	160.9
		40-100	490.0	184.0	1385.0	40.94	4560.0	280.6
		100-150	1035.0	228.0	1844.0	44.41	6580.0	650.6
	12	0-35	245.0	110.4	4358.0	23.5	6297.0	270.0
		35-100	490.0	184.0	2561.0	19.7	3583.0	130.0
	13	0-45	490.0	165.6	3320.0	15.61	2497.0	270.3
		45-95	735.0	147.0	3230.0	14.89	3366.0	280.6
		95-15 0	490.0	165.6	2351.0	10.75	3665.0	310.0
	14	0-20	735.0	184.0	9176.0	22.2	4017.0	100.0
		20-70	490.0	128.0	516.0	18.75	5536.0	420.9
		70-110	490.0	441.0	469.0	17.69	5537.0	390.0
	15	0-20	200.0	97.5	258.0	7.35	1150.0	59.5
		20-50	490.0	194.4	2953.0	18.0	6405.0	360.4
		50-120	490.0	139.2	1663.0	15.96	5970.0	320.5
	16	0-20	735.0	184.0	2427.0	20.82	5103.0	540.7
		20-50	735.0	165.6	1147.0	13.18	4342.0	310.2
		50-120	490.0	346.6	793.0	12.65	9405.0	330.8
	17	0-20	735.0	276.0	1663.0	14.57	5211.0	290.9
		20-45	735.0	294.0	1400.0	14.51	4125.0	280.6
		45-100	490.0	147.0	1395.0	10.75	4559.0	28.67

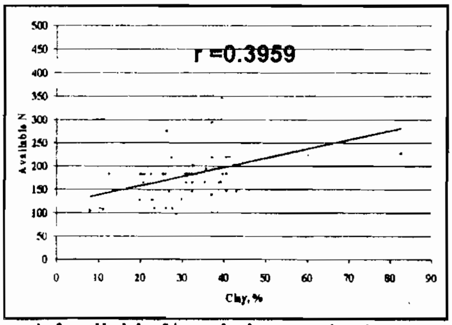
3-Total and available potassium:

Data represented in Table (2) show that the values of total K in the studied soil profiles vary from 869.0 to 9405.0 ppm, the studied soil reveal higher K contents than both N and P. The highest value of total K is detected in profile No.16 (50-120 cm depth), while the lowest value of total K is found in profile No.6 (0-25 cm depth).

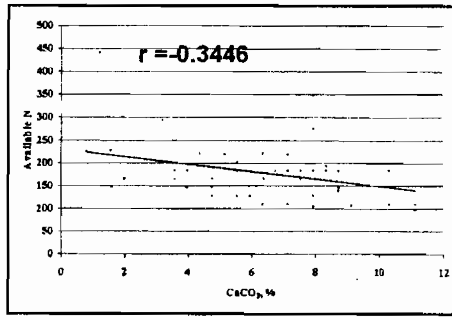
The available K vary widely from 28.67(Profile No. 17; 45-100 cm depth) to 650.6 ppm (Profile No.11; 100-150 cm depth). The highest value of available K is accompanied by high amount of clay content (Table 1). According to Soltanpour and Schawb (1977), the index values of available K in soils are as follow: low, 0-60 ppm; medium, 61-120 ppm; high > 120 ppm. Comparing these levels with the values of available K, it was found that 8.16, 22.44, 69.4 of the studied samples are belonging to low, medium and high levels of available K respectively.

4- Comparison among nitrogen, phosphorus and potassium:

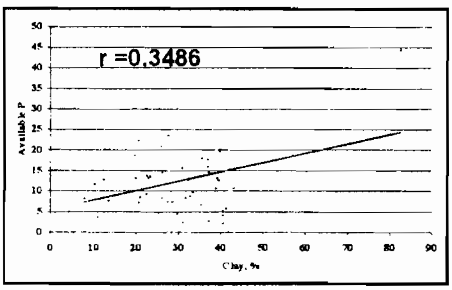
The present data of the studied soil profiles indicate that these soils contain amounts of total nitrogen less than that of total phosphorus and total potassium. However the available nitrogen and potassium are more than the available phosphorus. There are positive relationships between the available NPK and the clay contents of the studied soils (r = 0.3959, 0.3486 and 0.5236 respectively); however, there are negative relationships between the available NPK and calcium carbonate contents of soils (r = -0.3446, -0.2660 and -0.4076 respectively; Fig. 2).



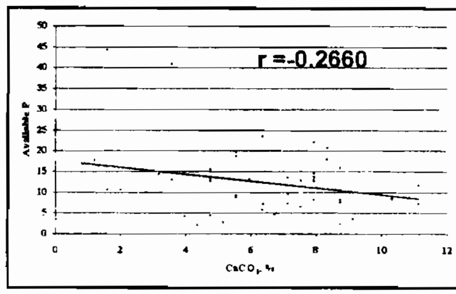
a) Available N and clay content.



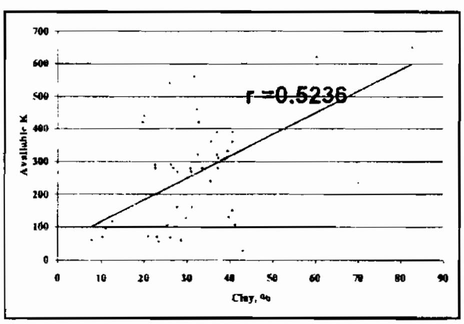
b) Available N and $CaCO_3$ content.



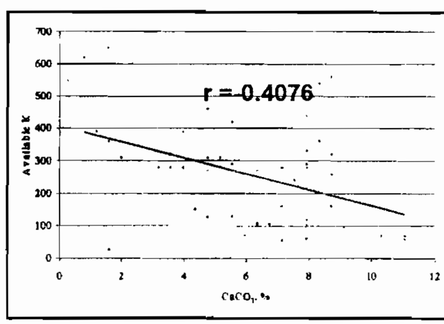
c) Available P and clay content.



d) Available P and $CaCO_3$ content.



e) Available K and clay content.



f) Available K and $CaCO_3$ content.

Fig (2): The relationship between available NPK and both of clay and CaCO3 contents in the study soils.

REFERENCES

Abd Alla, A. M. (1999). Studies on the chemical analysis of phosphorus in soils.Ph.D.Thesis, Fac., Sci., Monofia Univ., Egypt.

Abd Alla, A.M. (2004). Status of the content of some macronutrients in some soils and plants of El-Fayoum Governorate. Egypt.J.Appl.Sci; 19 (5): 357-367.

Azzam, M. A. (2004). Mineralogical, Geochemical and Geotechnical studies on some Quaternary sediments in South Nile Valley, Egypt. Ph.D thesis, Fac. Of Science, Helwan Univ., Egypt.

Balba, A. M. (1979). Evaluation of changes in the Nile water composition resulting from the Aswan Dam. J.Env. Qual; 8: 153-156.

Blake, L., S. Mercik, M. Koerschens, K. W. T. Goulding, A.Stempen, P. R. Weigel and D. S. Powlson (1999). Potassium content in soil, uptake in plants and the potassium balance in three European long-term field experiments. Plant and Soil; 216: 1-14.

Bremner, J. M. (1965). Methods of soil analysis. In C.A. Black (ed.), Part 2. Agronomy.

El-Toukhy, M. M. (1987). Studies on the status of some nutrient elements in the soil adjacent to IDKO lake-Beheria Gov. M.Sc., Thesis, Fac.Agric., Cairo.Univ.

Harwood, J. E., R. A. Van Steenderen and A. L. Kuhn (1969). A rapid method for orthophosphate analysis at high concentrations in water. Water Res. 3: 417-423.

Helal, M. I. D. (1988). Status of potassium in the soils of Egypt. Ph.D. Thesis, Fac.Agric., Cairo Univ., Egypt.

Jackson, M. L. (1958). Soils Chemical Analysis. Prentice-Hall, Inc., Englewood, N. J., USA.

Khalifa, A. (2001). Chemical and mineralogical properties of some Toshka soils. M.Sc. Thesis, Inst.of African Res. and studies, Cairo Univ. Egypt.

Laegreid, M., O. C. Bockman and O. Kaarstad (1999). Agriculture, Fertilizers and the Environment. CABI Publishing, Norsk Hydro ASA, Norway.

Mengel, K. (1997). Agronomic measures for better utilization of soil and fertilizer phosphate. European J.of Agronomy; 7: 221-233.

Mortor-Gaudry, J. F. (1997). Aspects physiologique, biochemique et molecularie. National Institute de la Recherche, Paris. (C.F. Leagreid et al. 1999, Norsk Hydro ASA, CABI Publishing, Norway).

Page, A. L., R. H. Miller and D. R. Keeney (1982). Methods of Soil Analysis, Part 2. 2nd ed. Agronomy 9: 403-430. Am.Soc. of Agron., Inc., Madison, Wis. USA.

Plyasisin, A. A. (1967). Reclamative Soil Science. Foreign Languages publishing House, Moscow.

Rahman, M. M., M. Jahiruddin, M. I. Ali, M. S. Hooue and M. Q. Haque (1994). Effect of soil properties on the extraction of phosphorus and its critical limit for rice. J.Indian Soc.; 43 (1): 67-71.

Simard, R. R., T. S. Tran and J. Ziza (1991). Strontium chloride-Citric acid extraction evaluated as soil testing procedure for P.Soil Sci.Soc. Am.J.; 55: 414-421.

Sims, J. T., R. R. Simard and B. C. Joern (1998). Phosphorus loss in agriculture drainage. J.Env.Qual.; 27: 277-293.

Singh, B. and K. W. T. Goulding (1997). Changes with time in K content and phyllosilicates in the soil. Eur.J.Soil Sci.; 48: 651-659.

Soltanpour, P. N. and A. P Schwab (1977). A new soil test for simultaneous extraction of macro-and micro-nutrients in alkaline soils. Commun.Soil Sci. Plant Anal.; 8: 195-207.

Tran, T. S., R. R.Simard and M.Tabi (1992). Evaluation of the electro-ultra filtration to determine available P in neutral and calcareous soils. Sci.Plant anal. 23:2261-2281.

Ziardi, N., R. R. Simard, T. S. Trans and G. Allard (2001). Soil available P as evaluated by description techniques and chemical extractions. Can.J. Soil Sci.; 81: 167-174.

Walkley, A. and Black (1947). A critical examination of a rapid method for determining organic carbon in soils. Soil Sci. 63:251-264.

Watanabe, F. S. and S. R. Olsen (1965). Test of an ascorbic acid method for determining P in water and NaHCO3 extract from soil. Soil Sci.Soc.Am.Proc. 29:677-678.

حالة المحتوى الكلى والميسر من النيتروجين والفوسفور والبوتاسيوم فى بعض أراضى جنوب وادى النيل-مصر.

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الملخص العربى

أجرى هذا البحث لدراسة حالة المحتويات الكليه والميسره من النيتروجين والفوسفور والبوتلسيوم فى بعض أراضى جنوب وادى النيل-مصر(منخفض توشكى جزء ٢) . وقد أوضحت الدراسه أيضا تأثير بعض خواص التربه على قيم النيتروجين والفوسفور والبوتلسيوم. أجريت الدراسه على ٤٩ عينه تمثل ١٧ قطاع تربه تغطى منطقة الدراسه.

وقد أظهرت الدراسه أن قيم النيتروجين الكلى تختلف من ١٩٠ الى ١٠٣٥ جزء فى المليون بينما قيم النيتروجين الميسر تتراوح من ٩٧,٥ الى ٤٤١ جزء فى المليون . وبينت الدراسه أن النيتروجين الكلى تأثر بقيم الطين بينما النيتروجين الميسر تأثر بنسب الماده العضويه وكربونات الكالسيوم.

كما أظهرت الدراسه أن قيم الفوسفور الكلي متزايده نسبيا حيث تتراوح من ٢٥٨ الى٩١٧٦ جزء فى المليون وذلك لأن صخور المصدر الرسوبيه تحتوى على كميات مناسبه من معادن الفوسفات . أما قيم الفوسفور الميسر فهى مرتبطه بنسبة الطين وكربونات الكالسيوم فى القطاعات المدروسه وأن حوالى ٥٣,٠٦، ١٦,٣٤، ٢٢,٤٤، ٨,١٦% من الأراضى المدروسه أحتوت على كميات عاليه جدا، عاليه، متوسطه، منخفضه من الفوسفور الميسر على الترتيب وذلك طبقا للحدود الحرجه للفوسفور.

وكذلك أوضحت الدراسه أن قيم البوتلسيوم الكلي يتراوح بين ٨٦٩ و ٩٤٠٥ جزء فى المليون وأن قيم البوتلسيوم الكلي أعلى من قيم كل من النيتروجين و الفوسفور الكلى. أما قيم البوتلسيوم الميسر فقد تراوحت بين ٢٨,٦٧و٦٥٠,٦ جزء فى المليون ووجد أن ٦٩,٤ من العينات المد١روسه تحتوى على كميات عاليه من البوتلسيوم الميسر وذلك طبقا للحدود الحرجه للبوتاسيوم.

وبينت الدراسه أن النيتروجين الكلى أقل من كلا من الفوسفور والبوتلسيوم الكلى .أما قيم الفوسفورالميسر فكانت أقل من قيم كلا من النيتروجين والبوتلسيوم الميسر . وظهر من خلال الدراسه أن هناك علاقه طرديه بين نسب العناصر الثلاثه الميسره ونسب الطين ، بينما هناك علاقه عكسيه بين نسب هذه العناصر ونسب كربونات الكالسيوم فى القطاعات المدروسه.