Study the Impact of The Change of Water Quality in El Mahmoudia Canal on The Chemical Properties of The Agricultural Environment

Saad A. E. Abdelrazek[1] and khaled Abdallah El Naka[2]

ABSTRACT

Egypt is facing increasing in water needs because of increasing population therefore, keeping the suitable quality of fresh water streams, it is necessary for safe life and sustainability of all productivity sectors in Egypt. Degradation of water quality observed in the Mahmoudia Canal well water in both each its two sides. Therefore, this study aims to investigate the assessments of Micronutrients concentrations and chemical properties in soils, plant and wells in cultivated farms located in both sides of El Mahmoudia irrigation canal compared control area (uncultivated). The results showed that the all chemical parameters for both ground water (well water) and Mahmoudia water (surface water) were within recommended range of the standards (WHO and FAO) for agricultural use except Mn. Micronutrients levels in soil and plants samples were lower than the safe limits for human consumption. This high Mn levels in El Mahmoudia irrigation canal, Egypt may attribute to more Mining and Brick, fertilizers factories excess fertilization and pesticides, chemicals companies. Micronutrients concentrations in soil samples were all significantly different (P<0.05) compared to control (uncultivated) area. This shows that anthropogenic activities are the main cause of metal emission. The concentration of macronutrients for soils and plants analyzed in all parts are within the range set up by the standard.

Key words: Nutrients, chemical parameters, El Mahmoudia **canal, ground water, soil, plant**

INTRODUCTION

Egypt is facing increasing in water needs, due to the rapid population growth, increased urbanization, and higher standards of living and by an agricultural policy that emphasizes expanding production in order to provide food productivity to suffice population growth. Egypt is passing through a rapid population growth stage toward the stationary population growth stage and urban growth leads to additional demand on Egypt's water resources (Abou Rayan & Djebedjian, 2004; Attia, 2004).

Agriculture sector is the old and permanent main source of Egypt economy and industrial sector started since about fifty years ago for contributing economic development in country (Ehab, 2014). The rapid development of industry sector and continuous irrigation led to a lot of waste going into drains, accumulation salinity and Micronutrients (Zn, Fe, Cu and Mn) will pollutants agricultural soils and are proved detrimental effect beyond a certain limit (Wagdy, 2008 ; Abu Zeid, 2011). Like organic contaminants, Micronutrients cannot be degraded and they have toxic effects at low concentrations (Bader, 2014).

The metals accumulate in the salt marshes near Lake Mariout beside El Mahmoudia irrigation canal; suffer multiple pollution causes, polluted air via rain near roads via splash water or by irrigation with drain water and fertilization with animal waste. After a long time these sources enrich Micronutrients in soil. Pollution of agricultural soils by Micronutrients may lead to reduced yields and elevated levels of these elements in agricultural products and thus provide their entrance into food chain and endangering public health and living environment (Ahmad et al., 2007). Soil salinity is a major environmental factor causes reduction in plant growth and productivity in arid and semiarid areas of as reported by Munns (2016) approximately 1/2 of the world irrigated lands are reported to be seriously affected by salinity and water logging. Consequently, a rapid reduction happens in growth rate, productivity and many metabolic changes due to hormonal signal generated by the roots (Munns, 2010).

People who regularly are collecting clay for construction they wounded in foot (Hanna and Osman, 1995). This may be due to contamination of the water by different chemicals leading to contamination of soil of the farms irrigated with Mahmoudia canal water or well water nearby. This study aims to investigate the assessments of Micronutrients concentrations and salinity of soils in farms located around El Mahmoudia irrigation canal, Egypt.

MATERIALS AND METHODS

Environmental description of the studied area

The Mahmoudia Canal is located near the northern edge of the west Nile delta in the El- Behaira governorate. The canal runs for a distance of 77.170 km from the Rosetta branch of the Nile down to the

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[1] Soil Salinity Department, Alexandria Soil, Water and Environment Research Institute, Agriculture Research Center (ARC), Giza, Egypt
* Kuwait National Guard
saadabdelsamad1@gmail.com - Gmail

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Mediterranean Sea at Alexandria. It serves a total command area of about 130,200 hectares through 70 distributed canals. Mahmoudia canal supply the most of drinking water treatment plants (WTPs) in the Alexandria and El - Behaira governorates. The sources of drainage water suppling El Mahmoudia Canal are 1- El- Atf pumping station to the Rosetta branch. Annual discharge of drainage water from El- Atf pumping station to Mahmoudia Canal is about 2.813 billion m^3) 2- Edku pumping station lift drainage water from Zarkon drain into the canal at km 8.850 plus excess flow from the ElKhandak El-Sharki Canal at km 15.270. Annual discharge of drainage water from ElKhandak El-Sharki Canal to Mahmoudia Canal is about 548 million m^3). The Etay El-Barud pump station mixes drainage water with the ElKhandak El-Sharki Canal and leads to poor its water quality. Hence, degradation of water quality observed in the Mahmoudia Canal. Therefore, increasing attention from both the public and the Egyptian government has been tacking. As well as, Mahmoudia Canal is the main source of water supply for municipal, industrial and agriculture, fisheries, hydroelectric power and recreation sectors in Alexandria governorate and western delta region. Moreover, the major drinking water treatment plants (WTPs) in the Alexandria and Behaira governorates receive fresh water from the Mahmoudia canal.

Soil Sampling and Preparation

Four sites selected along the Mahmoudia canal. Soil samples (0-20 cm, depth) collected shiftily, from left and right sides of the canal by using auger. Five sub-samples, from each site, gathered from 10 m apart. Each sample took using zigzag method with 1m apart. Samples transferred by a plastic spade into transparent plastic bags, kept inside icebox and transported to the laboratory. The samples airily dried, grounded, then sieved through a 2 mm sieve and kept in refrigerator for required soil analysis.

Soil analysis

pH was determined in 1:5 soil/water ratio. The suspension was stirred by using the shaker and left 30 minutes, and the pH was determined by inserting the electrode into a supernatant solution (using pH-meter (model, 181, serial No.0708149, UK)) according to Ahmed et al. (2016). EC of 1:5 soil/water ratio measured by using a calibrated conductivity meter connected to an EC electrode. EC readings by Sigma probe were stored electronically and the average of three readings per sample recorded according to Ahmed et al. (2016). Total micronutrients concentrations (Mn, Zn, and Fe) were determined by using atomic absorption spectrophotometer (pg instrument ASS500F, S/N 20-0930-21-0020) according to Alex (2012).

Plants Sampling and Preparation

Plant samples collected from the same sites of soil samples. Plant samples washed several times with tap water and distilled water to remove any dust materials and clean it. Plant samples sliced into small pieces and air-dried then oven dried at 65ºC. The oven-dried samples grounded in a mortar and pestle, stored in polyethylene bags and kept in refrigerator for required plant analysis.

Plant analysis

Micronutrients analysis procedures done as mentioned by Singh et al. (2010). Then the total Micronutrients concentrations (Fe, Zn, and Mn) in digestive dry ash were determined using atomic absorption. Iron analyzed at wavelength of 357.87nm, Zinc at 228.80nm, and Manganese at 283.31 nm (Alex, 2012).

Water Sampling, Handling and Analysis

Twelve samples from Mahmoudia water and twelve samples from ground water (wells water) collected from four locations (Abou Hommos, Kafr El-Dawar, Al-Sayouif and Al-Mamoura areas) with three replications. About 2 ml of 10 percent HNO_3 acid added to each 500 mL plastic bottle to avoid microbial activity before adding lake water. Surface composite samples of water collected from the Mahmoudia canal diverted to farms. All water samples labeled, stored in plastic bottles, transported to the laboratory and kept in a refrigerator at 4ºC before analysis. Chemical parameters such temperature, pH and EC were measured at the site of collection. The pH was measured using pH meter. Na, Ca and K analyzed by Flame Photometry (FP902, Model 1382, S/N 1208037). Calcium was analyzed at a wavelength of (622nm), Potassium at (766 nm) and Sodium at (589 nm) (Gupta, 2007).

Quality assurance

Quality assurance achieved by spiking the digested samples with Micronutrients standard solution. For this purpose 1000µg/g stock solution used to prepare several 60µg/g standard solutions of Micronutrients. The spiked samples then digested following the same procedures that used for soil and plant samples. Appropriate procedures for the quality assurance and precautions followed to ensure the reliability of the results in all soil, water and plant sample tests. Samples carefully, handled to avoid contamination and all glassware socked in acids and rinsed with distilled water. Throughout the analysis analytical grade, reagents applied and reagent blank determination done to correct the instrument readings.

Statistical Analysis

ANOVA selected to determine the statistical differences between more groups of samples, analysis of variance. The Fisher's least significant difference (LSD) test was used at $P < 0.05$ significance level. For water, analysis to compare the statistical differences between two groups of samples unpaired t-test was used (Kothari, 2004).

RESULTS and DISCUSSION

Chemical Properties of Soil

The chemical properties of soils from all sites depicted in Table 1. The mean observed values of temperature for Abou Hommos, Kafr El-Dawar, Al-Sayouif, Al-Mamoura and Control areas were 23.18, 24.88, 26.58, 24.54 and 25.58, respectively, which are in between the recommended range by FAO/WHO (2011).

The results showed that pH of media affects mineral nutrient, soil quality and much microorganism activity. From the evidence available, neither a high pH (above 8.4) nor low pH (below 5.0) is favorable for maximum yield of plant. The higher soil pH is not favorable for the transference of Micronutrients from soil to plants (Tabi et al., 2012). In The pH values of the soil recorded were 7.٧4, 7.89, 7.73 and 8.12 for Kafr El-Dawar, Al Sayouif, Al-Mamoura and Abou Hommos, respectively. The average electric conductivity of soil recorded as 806, 532.77, 724.33, 937.67and 236.67µs/cm, for Abou Hommos, Kafr El-Dawar, Al-Sayouif, Al Mamoura and control, respectively; and TDS for respective site recorded as 516.41, 346.54, 462, 22, 605.2 and 236.67.

Concentrations of micronutrients in Soils and Plants (Spinach)

The results of Micronutrients content in soils and plants indicated in table 1 and 2, if soils pH is near neutral region the plants cultivated on it will not consume micronutrients through their roots, so, the concentration of micronutrients will become high on soils (Atefeh, 2013). Except Fe for Abou Hommos, low concentrations of Micronutrients recorded in plants than soils, this is the same with result obtained by (Epstein and Bloom, 2005). In all samples, except Al-Sayouif in soil, the concentrations of Mn in both plants and soils recorded above the permissible limit of (FAO/WHO, 2003) see Table 1. These high levels of Mn may be due to the presence of vehicle exhaust fumes (Mengel, 2015). In all plant samples, the concentrations of Zn are below permissible limits. As reported by Ellert et al. (2014), if the pH values of the soil are not acidic, due to mobile behavior of Zn, it easily absorbed by roots and distributed in side of plants. In all areas, the concentrations of Fe were above permissible limits (WHO, FAO, 2003). Similar levels of elevation reported for iron on studies conducted in Nile delta soils. However, the concentration of Fe in all soils was bellow permissible limits. The concentration of all Micronutrient in soil samples significantly higher than the control area concentrations (Tble1). This indicates Micronutrient contamination in the agricultural soils of El Mahmoudia Canal is due to long-term agricultural activities.

Table 1. Nutrients and Chemical properties of studied soil samples

Parameters	Abou Hommos	Kafr El-Dawar	Al-Sayouif	Al-Mamoura	control	Std
Temp (ºC)	23.18±0.603	24.88±0.568^{a}	26.58±0.063^{b}	24.54±0.063^{b}	25.58±0.123^{b}	---
pH	8.12 ±0.040^{b}	7.74 ±0.07a	7.89 ±0.041a	7.73 ±0.068^{b}	7.32±0.107^{b}	5.8-8.3
EC(µs/cm)	806±11.78^{b}	532.77±8.020b	724.33±7.023b	937.67±6.658^{b}	365.54±3.512^{b}	10-30
TDS(µg/g)	516.41±6.506^{b}	346.54±7.937b	462.22±4.163b	605±2.646^{b}	236.67±3.605^{b}	<1
Na^{+}(µg/g)	63 ±1.527^{b}	23 ±0.577a	27 ±1.000a	49±1.527^{b}	26±0.5735^{b}	--
K+(µg/g)	113±3.605^{b}	131 ±1.527^{a}	132±2.081^{a}	126 ±3.511^{b}	83±3.055^{b}	--
Ca^{+2}(µg/g)	52 ±2.000^{a}	40 ± 1.527^{b}	45 ±1.1547^{b}	51±3.2145a	21±2.080^{b}	--
Mn	202.5±1.609^{b}	113.6 ±0.2081^{b}	164.2 ±0.300^{b}	132.5±0.100^{b}	1.3±0.050^{b}	100
Zn	0.231 ± 0.001^{b}	0.006 ± 0.0001^{a}	0.0054 ± 0.00015a	0.010± 0.0025 b	n.d	3
Fe	0.079 ± 0.0002^{b}	0.127 ± 0.0036^{b}	0.098 ± 0.0035^{b}	0.308± 0.0015 b	n.d	100
Cu	n.d	n.d	n.d	n.d	n.d	--

The average values in the same rows between letter bb and ab are significantly different and between letter aa are not significantly different.

Table 2. Chemical properties and Nutrients in extractions of plant

Parameters	plants				
	Abou Hommos	Kafr El-Dawar	Al-Sayouif	Al-Mamoura	Std
pH	4.7 ±0.097b	3.85 ±0.1228a	3.86 ±0.1069[a]	4.3 ±0.1286[b]	----
EC (µs/cm)	446 ±3.785b	421 ±3.511b	385 ±4.582[b]	543 ±1.527 [b]	----
TDS(µg/g	285 ±2.516b	270 ±2.309b	247 ±3.055[b]	348 ±2.646[b]	----
Na+(µg/g	3.79 ±0.030b	2.26 ±.0208b	3.12 ±0.020[b]	3.43 ±0.030 [b]	----
K+(µg/g	45.1 ±0.707b	33.8 ±0.458b	43.5 ±0.945[b]	39.6 ±0.723 [b]	----
Ca+2(µg/g)	6.11 ±0.070b	5.32 ±0.020b	5.62 ±0.036[b]	3.22 ±0.030 [b]	----
*Mn, mg/L	0.732 ±0.0035b	0.367 ±0.0036b	0.234 ±0.0015[b]	0.331 ±0.004[b]	0.3
*Zn, mg/L	0.0055 ±0.0003a	0.0023± 0.002b	n.d	0.006 ± 0.0004a	0.2
*Fe, mg/L	0.003 ± 0.0006	0.100 ± 0.0036b	0.077 ± 0.0016[b]	0.630 ± 0.085[b]	0.05
Cu, mg/L	n.d	n.d	n.d	n.d	--

The average values in the same rows between letter bb and ab are significantly different and between letter aa are not significantly different. Total concentrations of micronutrients.

Chemical Properties of Water

Table 3 shows the physicochemical properties of water. The temperature values for SW and GW was 25.43 & 27.78ºC and pH values was 7.8 & 7.63, respectively, which is in between the range recommended by FAO/WHO (2011) for irrigation water. The average values of electrical conductivity for surface water is 668 µs/cm and average value for ground water is 1432 µs/cm. EC for surface water was considered slightly normal and little to moderate salinity problems for ground water(Allam and Allam, 2007). Therefore, the EC of ground water according to this limit can caused moderate salinity problem. Indeed to combat this salinity it is possible to apply normal water to remove the salts from the root zone by leaching (Plaut et al., 2013). The concentration of TDS in this study is 428 and 917 for SW and GW, respectively. When the values of TDS obtained for GW compared with the values obtained for SW it is slightly saline for irrigation purpose, but the value for both of them is lower than FAO standard according to which maximum permissible limit (2000 mg/L) for irrigation water.

Table 3. Chemical properties and Nutrients concentrations of water

Parameters	Water sources		
	Surface water	Ground water	Std CAPMAS (2012)
Temp.(oC)	25.43±0.100 b	27.78±0.351	--
pH	7.84 ±0.0208 [b]	7.66 ±0.042 [b]	6.5-8.4
EC (µs/cm)	668 ± 4.358 [b]	1430 ±6.557 [b]	0-3000
TDS(µg/g	428 ±2.516 [b]	917 ± 3.785 [b]	0-2000
Na+(µg/g	236 ±3.605 [b]	77 ±0.2645 [b]	900
K+(µg/g	11.6 ±0.305 [b]	23.9 ±0.435 [b]	0.2
Ca+2(µg/g)	9.6 ±0.0611 [b]	24.7 ±0.435 [b]	400
Mn mg/L	0.333 ±0.003 [b]	0.286 ±0.001	5
Zn mg/L	0.005 ±0.0002 [b]	0.087 ±0.003 [b]	0.01
Fe mg/L	0.002±0.0012 [b]	0.027 ±0.003 [b]	0.1
Cu mg/L	n.d*	n.d*	--

* Not detected

Micronutrients Analysis for Water

The mean Micronutrients concentrations of water from the two water irrigation sources given in Table 3. The average value of Mn content of ground water and lake water was 0.333 and 0.286 mg/L, respectively. The standard for irrigation water approved by FAO/WHO for Mn is 5 mg/L. These results shows that Mn content of lake water as well as ground water were found in safe range and can be used for irrigation without any hazards. The concentration of Cu in Ground water and Mahmoudia water not detected. The concentration of Fe in Ground water and Mahmoudia water ranged between 0.002 and 0.027mg/L, respectively. The standard for irrigation water approved by WHO, FAO (2003) for Fe is 0.1 mg/L. For neutral to alkaline soil, the results show that Fe content of Ground water and lake water were found in safe range. The average value of Zn content of ground water and lake water was 0.005and 0.087 mg/L, respectively. The standard for irrigation water approved by FAO/WHO for Zn was 0.01 mg/L. These results shows that Zn content of lake water were found in safe range and can be used for irrigation without any hazards. But, for ground water, the value is higher than the permissible limit.

Macronutrients Analyses by Flame Photometry

The concentration of cations in water used for irrigation was highest for Na, followed by K and Ca for lake water and Na, followed by Ca and K for ground water (Table 3). The concentration of cations in plants was highest for K, followed by Ca and Na and for soil same trends were observed like plant except Na in Abou Hommos site which shows some increments than plants. Except K, the concentration of Na^+ and Ca^{+2} for both ground and lake water was below the acceptable range (FAO/WHO) recommended for irrigation (Pescod, 1992).

Conclusion and Recommendations

The concentration of Micronutrients in ground water is relatively larger than surface water (Mahmoudia water) except Mn. Micronutrients concentration in soils and plants are within permissible limits (FAO/WHO). Therefore, from this it is possible to conclude that, except Mn, for today El Mahmoudia soil and water is well suited for plant irrigation without any hazardous effect on people. But if attention is not given or continuous long-term agricultural activities as well as more vehicle exhaust fumes and ceramic and plastic factories, the concentration of these Micronutrients may reached to toxicity levels and it may causes diseases . Therefore, some safe ways should applied for the disposal of these wastes.

REFERENCE

Abd El Hadi, A.H., M.S. Khadr and M.A.M. Hassan. 1990. Effect of fertilization on the productivity of major crops under intensive cropping system in Egypt. 3rd Int. congr. prgm. Soil Sci. Soc. Pak. 20-22.

Abd El-Naim, E.M., M.S. Omran, T.M. Waly and B.M.B. El - Nashar. 1987. Effect of prolonged sewage irrigation on some physical properties of sandy soil. Biol. Wastes 22: 269-274.

Abdelrazek, S.A. E., A.E.M. Shouman, M.H. El-Deep and Abou Rayan, M. and B. Djebedjian. 2004. "Egypt's Water Demand, Supply and Management Policies", International Water Demand Management Conference, Dead Sea, Jordon, 30 May–3 June

Abu Zeid M. 2011. "Major Policies and Programs for Irrigation Drainage and Water Resources Development in Egypt", Egyptian Agriculture Profile, Centre International de Hautes Etudes Agronomiques Méditerranéennes, Montpellier, France.

Ahmed, A., Y. Tahei, B. Charles, C. Peter.2016. Soil Salinity Assessment by Some Destructive and Non Destructive Methods in Calcareous Soils, Journal of physical society of japan N., 104, pp.27-40

Ahmad, S. A., M. Hussain, R. Saddiq, A.K. Alvi, Mungbean. 2007. A nickel indicator, accumulator or excluder? Bulletin of Environmental Contamination and Toxicology, 78(5), pp. 319-2452

Alex, V.H. 2012. Physicochemical Parameters in Soil and Vegetable Samples from Gongulon Agricultural Site, Maiduguri, Borno State, Nigeria, International Journal of Chemistry, 01, pp. 2306-6415.

Allam M. N., and G. I. Allam.2007. "Water Resources in Egypt: Future Challenges and Opportunities", International Water Resources Association, Water International, Vol. 32, No. 2, PP. 205-218.

Atefeh, R. B. 2013. Influence of soil amendments and soil properties on macro– and micronutrient availability to microorganisms and plants. Doctoral thesis Swedish University of Agricultural Sciences, 63p.

Attia B. B. 2004. "Water as a Basic Human Right in Egypt", Global Issue Papers, No. 11, Supplement 1: The Understanding of Water in the Arab Countries of the Middle East – A Four Country Analysis, September

Bader E. 2014. "Mathematical Programming Models for Optimizing Irrigation Water Management in Egypt", Ph. D. Thesis, Kiel University, Germany, November.

Ehab A. E. 2014. Using QUAL2K Model and river pollution index for water quality management in Mahmoudia Canal, Egypt. Journal of Natural Resources and Development; 04: 54 – 63

Ellert, B. H., M. J. Clapperton and D. W.Anderson. 2014.An ecosystem perspective of soil quality. In G. Gregorich and M. R. Carter (eds.) Soil quality for crop production and ecosystem health. Elsevier, Amsterdam. p. 115–141

Epstein, E. and A. J. Bloom. 2005. Mineral Nutrition of Plants: Principles and Perspectives. Second Edition. Sinauer Associates. Sunderland, MA.

FAO/WHO. 2011. Codex Alimantarius Commission, Food additives and contamination, Joint FAO/WHO Food standard program, pp. 1-289

FAO/WHO, CODEX ALIMENTARIUS.2003. International Food Standards CODEX STAN-179. Codex Alimantarius commission, WHO/FAO

Gupta, P. K. 2007. Soil, Plant, Water and Fertilizer analysis. 2nd Ed. Agrobios, (India)

Hanna F., and M. A. Osman.1995. "Agricultural Land Resources and the Future of Land Reclamation and Development in Egypt", Egyptian Agriculture Profile, Centre International de Hautes Etudes Agronomiques Méditerranéennes, Montpellier, France

Kothari, C.R. 2004. Research methodology, method and techniques. 2nd Edition, new age international (P) Ltd. India

Mengel, D. B. 2015. Role of Micronutrients in Efficient Crop Production. Purdue University Cooperative Extension Service. Bulletin AY-239

Munns, R. M. 2010. Comparative physiology of salt and water stress, Plant cell environment journal, 25(2), pp. 2239-250

Munns, R. M. 2016. Tester, Mechanisms of salinity tolerance, Annual Review of Plant Biology, 59, pp. 651-81, 2008.

Pescod, M. B. 1992. Wastewater treatment and use in agriculture, Food and Agriculture Organization of the United Nations, Rome, 47, pp. 125

Plaut, Z., M. Edelstein, M. Ben-Hur. 2013. Sodium and potassium intake were estimated using three methods Critical Reviews in Plant Sciences, 32, pp. 250

Singh, A., R.K. Sharma, M. Agrawal, F.M. Marshall. 2010. Risk assessment of heavy Micronutrients through contaminated vegetables from wastewater irrigated areas in Varanasi, India, Journal of tropical ecology, 51(2), pp. 375–387

Tabi, F. O., M. Omoko, A. Boukong, Ze A. D. Mvondo, D. Bitondo and C. FuhChe. 2012.Evaluation of lowland rice (Oryza sativa) production system and management recommendations for Logone and Chari flood plain – Republic of Cameroon. Agricultural Science Research Journals. 2(5): 261-273

Wagdy, A. 2008. "Progress in Water Resources Management: Egypt", Proceedings of the 1st Technical Meeting of Muslim Water Researchers Cooperation, Malaysia, December

WHO, FAO. 2003. Report of the 24th session of the codex committee on nutrition and foods for special dietary uses, joint FAO/who food standards programme codex Alimantarius commission, World Health Organization, Geneva.

الملخص العربي

دراسة تأثير تغير نوعية المياه في ترعة المحمودية على الخواص الكيميائية للبيئة الزراعية

سعد عبد الصمد السيد عبد الرازق و خالد عبد الله الناقة

تواجه مصر زيادة في الاحتياجات المائية بسبب الزيادة السكانية ، وبالتالي ، فإن الحفاظ على الجودة المناسبة لتيارات المياه العذبة ضروري لحياة آمنة واستدامة جميع القطاعات الإنتاجية في مصر. لوحظ تدهور نوعية المياه في ترعة المحمودية والآبار في كلا جانبيها. لذلك ، تهدف هذه الدراسة إلى معرفة تقديرات تركيزات المغذيات الدقيقة والخصائص الكيميائية في التربة والنباتات والآبار في المزارع المزروعة الواقعة على جانبي قناة ري المحمودية مقارنة بالكنترول (منطقة غير مزروعة). أظهرت النتائج أن جميع المعايير الكيميائية لكل من المياه الجوفية (مياه الآبار) ومياه المحمودية (المياه السطحية) كانت ضمن النطاق الموصى به من المعايير الخاصة بمنظمة الصحة العالمية ومنظمة الأغذية والزراعة للاستخدام الزراعي باستثناء **المنجنيز**. كانت مستويات المغذيات الدقيقة في عينات التربة والنباتات أقل من الحدود الآمنة للاستهلاك البشري. كان تركيز الأملاح القابلة للذوبان في التربة والنباتات ضمن النطاق المحدد بالمعيار. هذه المستويات المرتفعة من المنجنيز في قناة المحمودية بمصر قد تعزى إلى زيادة مصانع الطوب ومصانع الأسمدة والتسميد الزائد وشركات المبيدات والكيماويات. اختلفت تركيزات المغذيات الدقيقة في عينات التربة معنويا (P <0.05) مقارنة بمنطقة الكنترول (غير المزروعة). وهذا يدل على أن الأنشطة البشرية هي السبب الرئيسي لتلوث المياه العذبة