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Evaluation of Water Quality for some Drains in Dakahlia Governorate, Egypt

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ABSTRACT

Fresh water resources are limited to meet annual needs of irrigation water for agricultural production in Egypt. So drains water can be used to recover this gab and quality of this water should be studied before using it. Dakahlia Governorate is located in the northeastern of the Nile Delta. It is located near the ends of canals and agricultural drains. These agricultural drains carrying sewage and industrial waste waters (treated and untreated) .The drains water normally used to irrigate some lands near the ends of the irrigation canals. In this study, three agricultural drains were selected taking in consideration its water are used to irrigate farm land. The selected drains are drain No.1, drain No.2 and EL- Mansoura Al- Mustajad drain. Water quality of these drains were studied during winter and summer seasons of 2014. 14 water samples were taken during this period in order to evaluate water quality for irrigation. The obtained results indicated that pH values were within the permissible limits for irrigation even they were higher in winter than in summer season. While EC and , SAR values were slight to moderate. NO3–N values were slight to moderate in all water samples except for water samples (No. 6 and 7) in EL- Mansoura Al- Mustajad drain. NH4–N values for all samples were in the accepted range according to FAO (1985) except for sample No. 7 at the end of EL- Mansoura Al-Mustajad drain which were sever according to FAO (Food and Agriculture Organization) standards. The results indicated also that COD (Chemical Oxygen Demand) and BOD (Biological Oxygen Demand) levels were within the maximum limits for water irrigation except COD values of water samples No. 1 in summer and No. 3 in winter and summer. The BOD values were in the same trend for water irrigation according to Egyptian and U.S.EPA (2004) (United States Environmental Protection Agency) standards. In general, the values were higher in winter than in summer season. The heavy metals values in summer season were higher than in winter one. Mostly , the heavy metals content of the drains was arranged in the following descending order: Ni> Pb> Cd according to NAS/NAE, (1972) (National Academy of Sciences / National Academy of Engineering) and FAO (1985). The results indicated that heavy metals contents were within the permissible limits for irrigation in most sites for lead (Pb) except for water samples No. 7, they were in the maximum limits (more than 5 ppm), While cadmium and nickel values were within the maximum limits for irrigation in water samples except water samples (No. 1 and 3 in winter and summer and No. 5 in winter). The obtained data showed that Ni values were within the maximum limits for irrigation except water samples (No. 1 , 3 and 5 in winter and summer) . In general, the EC ,SAR, NO3 –N , NH4-N , COD , BOD , heavy metals (Pb, Ni and Cd) values at the beginning of the drains were lower than at the end of the drains in the studied area in the three drains . The evaluation of drains are ranged from slightly to moderately suitable for all studied parameters except the two heavy metals (Ni and Cd). So, to use this water for irrigation, good management for salinity control and suitable species of plants must be considered.

Keywords: Water quality, drains, irrigation and heavy metals

INTRODUCTION

The volume of water that returns to drains from irrigated lands is relatively high (about 25 to 30%). The total amount of reused water is estimated to be 13 BCM (billion cubic meters) in 2013 (MIWR., 2014). Domestic wastewater is large portion of this amount discharges into sanitation networks and the remaining into agricultural drains then into the canals, lakes or into the sea. Agricultural drains are exposed to pollution as a result of receiving direct discharge of incompatible industrial wastewater or receiving primary treated / or untreated domestic wastewater, domestic effluents, industrial and agricultural effluents leading to deteriorate water quality (Raschid-Sally and Jayakody, 2008) and (EEAA, 2008)

Aquatic environment exposed to different types of pollutants which may affect water suitability and quality for irrigation. So, to estimate suitability for irrigation, different criteria have been suggested by National Academy of Science (NAS) and the National Academy of Engineering (NAE) as presented by NAS/NAE (1972); FAO (1985) and U.S.EPA (2004). Some of these parameters are: potential of hydrogen (pH) salinity (EC) , sodium adsorption ratio (SAR), nitrate (NO_3^-) concentration , Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Heavy metals contents, if the above characteristics are not in the appropriate concentration or in the suitable limits, this may lead to a negative impact on public health and biodiversity (Maitera *et al.,* 2010 , Kanu and Achi, 2011; Osibanjo *et al.,* 2011;).

Hasan (2006) found that the pH , EC and NO_3^- -N values for drainage water samples, were high near the factory (Talkha fertilizers factory, Dakahlia Governorate, Egypt) and after it ,while the lowest values were observed in sites before the factory. There is no contamination with cadmium (Cd) was found before the factory, whereas the highest Cd contamination (concentration) was noticed near the factory . Also. Tantawy *et al.,* (2014) studied nitrate pollution and its content in drainage water in the same site (Talkha area) which lead to drain 1 . They found that the pH , EC and NO_3^- -N values for drainage water near and distance from Talkha fertilizers factory by 1500 m. were (7.75 – 7.78) , (1.98 – 1.05 $dS.m^{-1}$) and (130.20 - 64.40 mg/L) , respectively , which declare that NO_3^--N and EC values were decreased by increasing the distance from the factory

El-Agrodi *et al.,* (1997) studied nitrates content in 15 drainage water samples of the main drain from El-Mansoura till Aga district in Dakahlia Governorate and found that the NO_3-N concentration ranged between 18.20 and 125.32 ppm. In another study, Khafagy (1998) studied drainage water in EL-Mansoura Al- Mustajad drain and Nizam Drain , he found that heave meals content in water samples were less than the critical limits as mentioned by FAO (1985). Hagras *et al.,* (2017) studied the seasonal variation of some heavy metals in El-Mansoura El-Mostagad drain, it is characterized by industrial wastewater and agricultural drainage water .The highest values of Pb was 1.27 ppm in Autumn ,Ni (1.587 ppm) and Cd (0.13 ppm) in summer .

El-Sawy *et al.,*(2015) studied the chemical properties of Bahr Hadus Drain water to evaluate the water quality. The pH ,EC ,SAR , Cd ,Ni and Pb values were (7.92), (1.59 $dS.m^{-1}$), (5.45 $mg.L^{-1}$) ,(0.012 $mg.L^{-1}$) , (0.037 $mg.L^{-1}$) and (0.616 $mg.L^{-1}$), respectively , whereas, Shaban (2017) found that BOD values were (106 $mg.L^{-1}$) on Bahr Hadus drain within the maximum limits for water irrigation according to Egyptian Law No.48 (1982)

El-Samet (2013) carried out a study on Meraga drain located in EL-Gamalia district, Dakahlia Governorate to evaluate drainage water quality. Water samples were seasonally collected from 6 sites along this drain. The range of pH, EC ,SAR , NO3 and Pb values were between (7.48 to 8.67); (1.50 to 3.41 $dS.m^{-1}$); (6.10 to 9.50); (24.6 to 41.3 ppm) and (0.063-0.865 ppm) in all studied locations on this drain.

The present work was carried out to evaluate drainage water quality of some drains in Dakahlia Governorate to be used for irrigation, which may affected by different sources of pollution in this area.

MATERIALS AND METHODS

In this study, three agricultural drains were selected in Dakahlia Governorate , which receive sewage and industrial wastewaters as follow:

1-Drain No. 1 received wastewaters from Talkha Sewage Station (Talkha S), Delta Company for Fertilizers and Chemical Industries (Talkha F) and Batrah Sewage Station (Batrah S).

2-Drain No. 2 received waste waters from Belkas Sewage Station (Belkas S).

3- EL-Mansoura Al-Mustajad drain received waste waters from Aga Sewage Station (Aga S) , EL-Mansoura Sewage Station (Mansoura S) , Misr Company for Oil and Soap (Sandoub F), Tilbanah Sewage Station (Tilbanah S) and Mit luzah Sewage Station (Mit luzah S). The study was conducted during winter (January) and summer (July) seasons 2014 . 7 water samples were taken in winter from the three tested drains as follow: (W1 and W2) from drain No.1, (W3 and W4) from drain No.2 and (W5,W6 and W7) from EL-Mansoura Al-Mustajad drain as described on the map (1).

The 7 samples were taken also from the same sites in summer season:

W1: taken from drain No. 1 before Talkha S by 0.5 km

W2: taken from drain No. 1 after (Batrah S) with (by) 3 km.

W3: taken from drain No. 2 before Belkas S by 0.5 km.

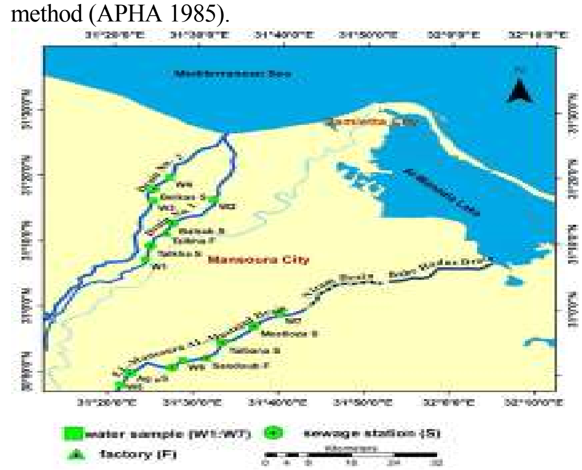
W4: taken from drain No. 2 after Belkas S with (by) 3 km.

W5: taken from EL- Mansoura Al-Mustajad drain before Aga S by 0.5 km.

W6: taken from EL- Mansoura Al-Mustajad drain after Elmansoura S by 0.5 km.

W7: taken from EL-Mansoura Al-Mustajad drain after Mit luzah S by 1.5 km.

Water samples were taken from the middle of the drains then moved to the laboratory to be analyzed. pH was determined according to Klute (1986). EC according to Jackson (1973). Sodium adsorption ratio (SAR) was calculated using Richards's equation (1954). Split samples were taken for nitrate and ammonium determination , they were put in the deep freezing under -5 ºC till nitrate and ammonium were determined calorimetrically using spectrophotometer (APHA 1985) Chemical oxygen demand (COD) was measured by potassium dichromate method (APHA 1985).



Map 1. Locations of water samples in Dakahlia Governorate during winter and summer seasons of 2014

Biological oxygen demand (BOD) was determined by using dilution and seedling method (APHA 1985). Heavy metals content (Cd, Ni and Pb): For determination of total metals, water samples were digested using nitric acid as described in standard methods APHA (1985).The concentration of (Cd, Ni and Pd) were measured using Analytik Jena atomic absorption spectrometer (Page *et al.,* 1982). Analysis of water was carried out to evaluate the quality of water with respect to irrigation according to guideline of FAO (1985) which gives 3 (degree) categories concerning (pH; EC; SAR; NH_4-N and NO_3-N) whereas concerning other parameters such as COD and BOD levels, The Egyptian Law No.48 (1982) and its amendment (2013) and U.S.EPA (2004) we used for evaluation. Finally, Heavy metals hazards were evaluated according to NAS/NAE (1972) and FAO (1985) as mentioned in Table 1

Table 1 .Guidelines of water quality for irrigation

Water parameter	Units	Degree of Restriction on Use			according to
		None	Slight to Moderate	Severe	
EC	$dS.m^{-1}$	< 0.7	0.7 – 3.0	> 3.0	FAO (1985)
SAR		<3	3-9	>9	FAO (1985)
NO_3 – N	$mg.L^{-1}$	< 5	5-30	>30	FAO (1985)
NH_4-N	$mg.L^{-1}$	range in irrigation water 0 – 5			FAO (1985)
pH		Normal Range 6.5-8.4			FAO (1985)
COD	$mg.L^{-1}$	must not exceed than 50			Egyptian Law No.48 (1982) and its amendment 2013
BOD	$mg.L^{-1}$	Do not add 30			U.S.EPA (2004) , Egyptian Law No.48 (1982) and its amendment 2013
Cd	$mg.L^{-1}$	0.01			NAS/NAE (1972) and FAO (1985)
Ni	$mg.L^{-1}$	0.20			
Pb	$mg.L^{-1}$	5.00			

RESULTS AND DISCUSSION

Water samples in the three studied drains were evaluated according to different laws and catogeries to clarfiy the quality of these waters to reirrigate once more for farm land around these drains.

Table 2 and Fig. 1 show the pH values in the water samples of the drains . pH values in the summer season were lower than winter. The pH values recorded in winter ranged between (7.28 and 8.05) while in summer ranged between (7.11 and 7.91). The highest pH value recorded was 8.05 for the sample (W1) in winter while the lowest one was 7.11 for the sample (W7) in summer. The results were within the limits of the validity of irrigation water according to FAO (1985) in all locations. The pH values at the beginning of the drains were higher than the samples at the end of the drains for the three drains. This may be due to the quality and components of the wastewater, which have low pH values and this may be due to organic acids or to the increase in CO_2 production , which may reduce pH values in water. These results are in agreement with those obtained by Ezekiel *et al.*,(2011) ; Ghazi (2012); Al-Mayah (2013); El-Samet (2013) and Mahmoud and Ghoneim (2016).

Table 2. Chemical analysis of water of drains during winter and summer seasons

drains	Location	pH		EC $dS.m^{-1}$		SAR	
		Winter	Summer	Winter	Summer	Winter	Summer
Drain No. 1	W1	8.05	7.90	0.77	0.73	3.24	2.87
	W2	7.79	7.35	1.95	1.36	5.20	4.40
Drain No. 2	W3	8.02	7.30	0.88	0.76	3.51	3.33
	W4	7.94	7.52	1.85	1.72	5.03	4.91
EL-Mansoura Al-Mustajad Drain	W5	8.01	7.91	0.85	0.75	3.40	3.60
	W6	7.62	7.46	1.25	1.12	4.86	4.33
	W7	7.28	7.11	2.37	2.22	6.85	6.75

Table 2 and Fig. 2 show EC values of water samples for the three drains . The EC values ranged between 0.77 and 2.37 $dS.m^{-1}$ in the winter , while in the summer they fluctuated between 0.73 and 2.22 $dS.m^{-1}$. The highest EC value recorded was 2.37 $dS.m^{-1}$ for sample (W7) in winter while the lowest one was 0.73 for sample (W1) in summer. The evaluation of the EC values were slight to moderate for irrigation water according to FAO (1985), as shown in Table 1.

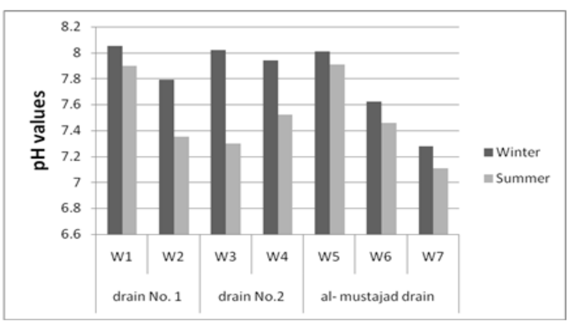


Fig .1. pH values in winter and summer season for water samples of drains

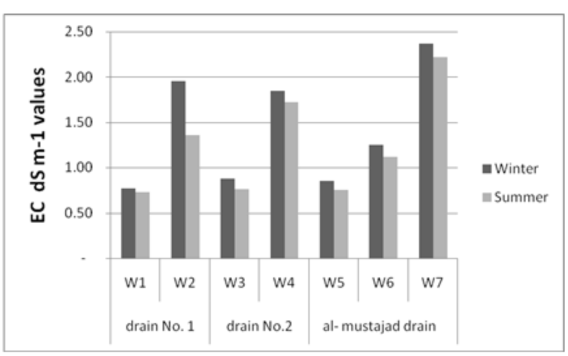


Fig .2. EC values in winter and summer season for water samples of drains

In general, the EC values in water samples at the beginning of the drains were lower than those at the end of the drains. The results show that the water sample (W7) of in EL-Mansoura Al-Mustajad drain was the highest value, possibly due to the presence of sewage stations and the oil & soap factory around this drain, which continuously discharges wastewater into the drain.

Mostly, EC values in winter were higher than summer. This may be due to the presence of the winter closure period (winter solstice). Whereas , in the summer large amounts of water are flooded to the drains which make a dilution in the concentration of the water contents. Also ,this difference in EC values may be due to the difference in the quantity and quality of the wastewater (for wastewater and factories) that are disposed to the drains.

Also, Table 2 and Fig. 3 show the SAR values in water samples of the three drains. SAR values ranged between 3.24 and 6.85 in winter. SAR values in the summer varied between 2.87 and 6.75. The highest SAR value recorded was 6.85 for the sample (W7) in winter while the lowest value was 2.87 for the sample (W1) in the summer. SAR values in the water samples at the beginning of the drains were lower than those at the end of the drains. The evaluation of the SAR values were slight to moderate grade for irrigation water except water sample (W1), which was less than so, lay in grade without problems according to FAO (1985).

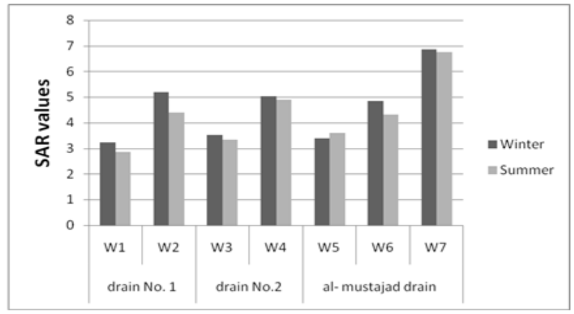


Fig .3. SAR values in winter and summer season for water samples of drains

So according to evaluation of parameters for these water as shown in Table 2, to use this water for irrigation, an appropriate drainage system and good management of salinity control are needed, and plants with moderate to high salt tolerance should be selected

Data in Table 3 and illustrated in Fig.4 show the NO_3-N values in the water samples of the three drains. The NO_3-N values recorded in the winter ranged between 9.20 and 36.65 mg.L^{-1}, while the NO_3-N values recorded in the summer lie between 8.65 and 34.48 mg.L^{-1}. The highest NO_3-N recorded was 36.65 mg.L^{-1} for sample (W7) in winter while the lowest value of NO_3-N was 8.65 mg.L^{-1} for sample (W1) was in summer. The values of NO_3-N in winter were higher than in summer.

Table 3.Chemical and biological analysis of water of drains during winter and summer seasons

drains	Location	NO_3- mg L^{-1}		NH_4 mg L^{-1}		COD mg L^{-1}		BOD mg L^{-1}	
		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
Drain No. 1	W1	9.20	8.65	1.39	1.26	60	42	28	19
	W2	27.14	26.29	2.66	2.50	230	211	117	106
Drain No. 2	W3	9.80	9.18	1.44	1.33	48	41	24	17
	W4	26.45	23.28	2.70	2.43	223	210	111	103
EL- Mansoura Al-Mustajad Drain	W5	14.84	14.18	1.42	1.16	112	82	58	38
	W6	31.13	30.21	2.81	2.77	313	300	173	150
	W7	36.65	34.48	5.75	5.57	341	309	200	165

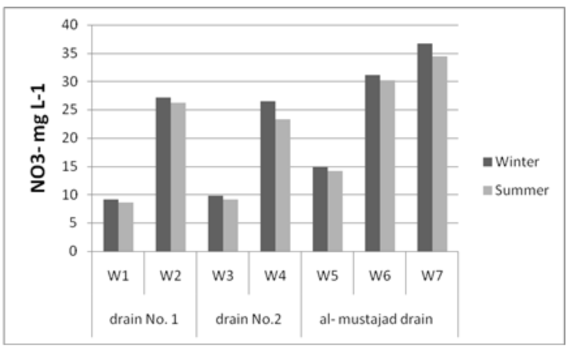


Fig .4. NO_3 values in winter and summer season for water samples of drains

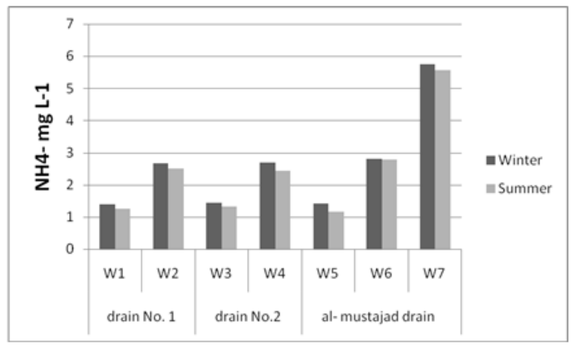


Fig .5. NH4 values in winter and summer season for water samples of drains

Data in Table 3 and Fig. 5 show the values of NH_4-N in water samples of drains, it is obvious that NH_4-N values recorded in the winter ranged between 1.39 and 5.75 mg L^{-1} while the NH_4-N values recorded in summer ranged between 1.16 and 5.57 mg L^{-1} . The highest NH_4-N value was 5.75 mg L^{-1} for the sample (W7) in winter, while the lowest values was 1.16 mg L^{-1} for the sample (W5), which was in summer. NH_4-N values in winter were higher than in summer.

The NO_3-N and NH_4-N values in water samples at the beginning of the drains were lower than at the end of the drains in the three drains . According to FAO (1985) as shown in Table 1, NO_3-N values for water samples (W1, W3) are problem-free (None) and samples (W2, W4, W5) are slight to moderate, whereas (W6, W7) are severe in both seasons for the three drains . Concerning NH_4-N values for all samples are in the accepted range (limits) according to FAO (1985) except for sample No 7 at the end of EL-Mansoura Al-Mustajad drain which exceeded the NH_4-N limits for irrigation water (5 mg L^{-1}). It is worthy to note that EL-Mansoura Al-Mustajad drain had the highest values of NO_3-N and NH_4-N, especially the sample (W7). This may be due to the presence of sewage stations (Talbana, Met Luza) and Sandoub factory, which discharge wastewater continuously in this drain.

The increase in the content of nitrates and ammonia in water samples in drains may be due to the impact of wastewater and industrial effluent . As well as high levels of nitrate and ammonia in the drains during the winter due to precipitation (rainfall) and discharge of fertilizers as mentioned by Allen, (2011); Salman and Hussein, (2012) and Elmorsi *et al.,* (2017) found in the eastern sites of Lake Manzala and agricultural effluents of Bahr Hadus drains .

Data in Table 3 and Fig. 6 show the COD values for water samples in diffferent drains . The values of COD in winter varied between 48 to 341 mg.L^{-1}, while in summer between it varied 41 to 309 mg.L^{-1}.The highest COD values was 341 mg.L^{-1} in water sample (W7) in winter , while the lowest value was 41 mg.L^{-1} in (W3) during summer season.

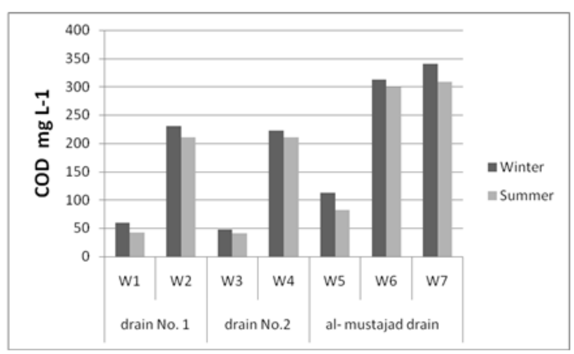


Fig .6. COD values in winter and summer season for water samples of drains

Data in Table 3 and Fig. 7 illustrate BOD values for water samples for all drain during winter and summer seasons 2014. The values of BOD recorded in winter ranged between (24 and 200 mgL^{-1}) , while in summer they ranged between (17 and 165mgL^{-1}). The highest BOD value was 200 mg L^{-1} (W7) in winter, while the lowest values was 17 mg L^{-1} at (W3) in summer season. The obtained data indicated that COD and BOD values were within the maximum limits as shown in Table 1 in all sites ,except COD values (W1 in summer ,W3 in winter and summer), the BOD values gave the same trend for water irrigation evaluation according to Egyptian Law No.48 (1982) and U.S.EPA (2004).

In general, the COD and BOD values at the beginning of the drains were lowest than at the end of the three drains. it was noticed that EL-Mansoura Al-Mustajad drain had the highest COD and BOD values which may be due to sewage plants and the oil & soap factory, which discharge its waste water to this drain. Chemical Oxygen Demand (COD) is an important water quality parameter because, similar to BOD, it provides an index to assess the effect of discharged waste water on the environment. More the organic matter more the demand of oxygen by microbes to degrade it. Higher COD levels mean a greater amount of oxidizable organic material in the sample, which will reduce dissolved oxygen (DO) levels. A reduction in DO can lead to anaerobic conditions, which is deleterious to higher aquatic life forms. Generally, BOD and COD values were higher in winter than in summer and mostly, gave the maximum limits for water irrigation. This result may be due to inefficient treatment of domestic sewage and industrial wastewater discharged to drains. In addition to the biodegradation of organic materials exerts oxygen tension in the water and increases the biochemical oxygen demand according to ElBourie *et al*., (2011) and Shivayogimath *et al.*,(2012).

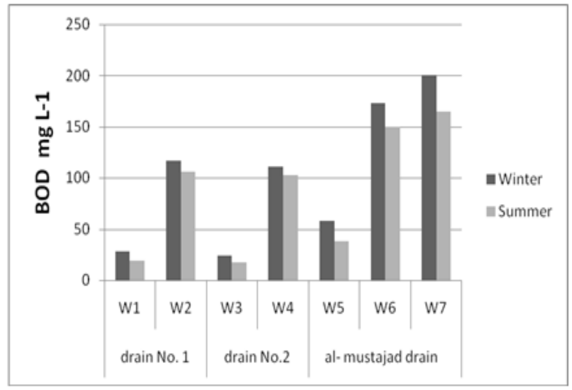


Fig 7. BOD values in winter and summer season for water samples of drains

Data in Table 4 and Fig. 8 show Cd values for drains water samples. The values of Cd in winter record between (0.0 and 0.024 mg.L^{-1}), while it record in summer between (0.0 and 0.03 mg.L^{-1}). The highest Cd value recorded was 0.03 mg.L^{-1} in (W6) in summer and the lowest value recorded was 0.0 mg.L^{-1} in (W1 and W3) in winter and summer and (W5 in winter).

Data in Table 4 and Fig. 9show Ni values for drains water samples. The values of Ni in winter were (0.02 to 0.75 mg.L^{-1}), while in summer were between (0.03 to 0.88 mg.L^{-1}).The highest Ni value was obtained in sample No. W6 (0.88 mg.L^{-1}) during summer season while the lowest value was 0.02 mg.L^{-1} which obtained in sample No. (W1) in winter season.

Table 4. Heavy metals concentrations of drains water during winter and summer seasons.

drains	Location	Cd mg L^{-1}		Ni mg L^{-1}		Pb mg L^{-1}	
		Winter	Summer	Winter	Summer	Winter	Summer
Drain No. 1	W1	0	0	0.02	0.03	0.025	0.03
	W2	0.013	0.017	0.544	0.65	0. 143	0. 175
Drain No. 2	W3	0	0	0.055	0.06	0.013	0.018
	W4	0.013	0.018	0.41	0.53	0.164	0.18
EL-Mansoura Al-Mustajad Drain	W5	0	0.01	0.037	0.05	0.011	0.01
	W6	0.024	0.03	0.75	0.88	0.036	0.03
	W7	0.022	0.025	0.59	0.77	5.066	5.11

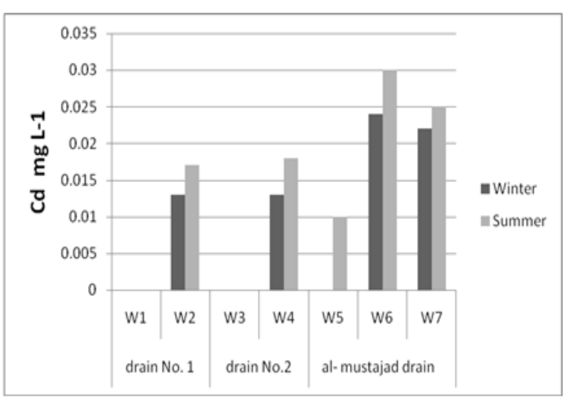


Fig .8. Cd values in winter and summer season for water samples of drains

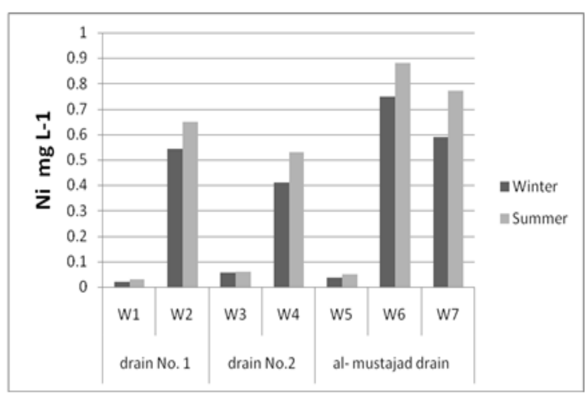


Fig .9. Ni values in winter and summer season for water samples of drains

Data in Table 4 and Fig. 10 illustrated Pb values for water samples on all drains . The values of Pb in winter were between (0.011 to 5.066 $mg.L^{-1}$) , while it recorded in summer between (0.01 and 5.11 mgL^{-1}).The highest Pb value was 5.11 $mg.L^{-1}$ which obtained in sample No W7 in summer, while the lowest value was 0.01 $mg.L^{-1}$ in W5 during summer season.

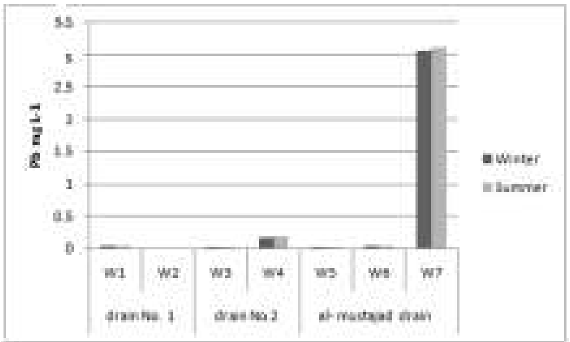


Fig .10. pb values in winter and summer season for water samples of drains

According to NAS/NAE (1972) and FAO (1985) the results indicated that heavy metals contents were within the permissible limits for irrigation in all sites for (Pb) except (W7) in winter and summer season ,While (Cd) values were within the maximum limits for irrigation except water samples (W1, W3 in winter and summer and W5 in winter) concerning Ni values, the obtained data were within the maximum limits for irrigation except water samples (W1, W3 and W5 in both winter and summer season).

In general, the heavy metals concentrations in water samples at the beginning of the drains were lower than at the end of the drains in the studied area. Also, the heavy metals values in summer season were lower than in winter season. Mostly the heavy metals content of the drains was arranged in the following descending order: Ni> Pb> Cd. The Increase of heavy metals values may be due to sewage and industrial wastewaters flooded in the drains which contain heavy metals in its components as well as fertilizers through the use of phosphate fertilizers. These results are in agreement with those obtained by Ibrahim(2010); Anter *et aL,* (2012) ; Atwa *et al*.,(2013); Al-Mayah (2013) and El-Feky *et al.,* (2015)..

It worthely to mention that heavy metal pollution loads are high in the EL-Mansoura Al-Mustajad drain due to a lot of sewage plants and the oil & soap factory along El-Mansoura El-Mostagad drain in the studied area, all of which discharge wastewaters which receive inefficient treatment or untreated, as mentioned by Hagras *et al.,* (2017).

CONCLUSION

Water is fundamental for biological standpoint. In agriculture, it is a key component to produce enough food. Different sources of pollution such as sewage and industrial wastewaters which discharged on drainage drains in the studied area induced bad characteristic and low water quality .To reuse this water for irrigation suitable drainage system and good management for salinity control must be considered. Also, it may require to use salt tolerant plants. Above all the efficiency of sewage and industrial wastewater treatment and permanent control should be improved.

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تقييم جودة المياه لبعض المصارف بمحافظة الدقهلية مصر.

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تعتبر موارد المياه العذبة غير كافية لتلبية الاحتياجات السنوية لمياه الري للإنتاج الزراعي في مصر. لذلك نحن بحاجة إلى استخدام موارد أخرى و لسد هذا النقص يعاد استخدام مياه المصارف ، لذلك نحن بحاجة إلى دراسة جودتها قبل استخدامها. تقع محافظة الدقهلية في شمال شرق دلتا النيل. وهي تقع في نهايات القنوات والمصارف الزراعية. في هذه الدراسة تم اختيار ثلاثة مصارف زراعية تحمل مياه الصرف الصحى و الصناعى (المعالجة و الغير معالجة) و مياه المصارف عادة ما تستعمل فى رى الأراضى القريبة من نهاية تفرعات ترع الري . وهذه المصارف الزراعية فى منطقة الدراسة هي مصرف نمرة 1 ، مصرف نمرة 2 ، و مصرف المنصورة المستجد.و قمنا بدراسة جودة مياه هذه المصارف خلال فصلي الشتاء والصيف 2014. تم أخذ 14 عينة من المياه خلال هذه الفترة وذلك لتقييم جودة المياه للري. أشارت النتائج المتحصل عليها إلى أن قيم pH كانت ضمن الحدود المسموح بها للري وكانت أعلى في فصل الشتاء عنها في فصل الصيف بينما كانت قيم EC و SAR طفيفة إلى معتدلة فى حين كانت قيم NO_3 –N طفيفة إلى معتدلة في جميع عينات الماء باستثناء عينات المياه رقم 6 ورقم 7 فى مصرف المنصورة المستجد و كانت قيم NH_4-N فى الحدود المسموح بها فيما عدا عينة المياه رقم 7 فى نهاية مصرف المنصورة المستجد وذلك طبقا لمعايير منظمة الاغذية و الزراعة . أوضحت النتائج أن (COD) (مستويات الأكسجين الكيميائي المستهلك) و(BOD) (الأكسجين الحيوى المستهلك) كانت ضمن الحدود القصوى لري المياه فيما عدا قيم (COD) لعينة المياه رقم 1 فى الصيف ورقم 3 فى الشتاء والصيف وجاءت قيم (BOD) فى نفس الاتجاه طبقاً للمعايير المصرية ومعايير وكالة حماية البيئة الامريكية ، وبشكل عام كانت القيم أعلى في فصل الشتاء عنها في فصل الصيف. كانت قيم المعادن الثقيلة في فصل الصيف أعلى مما كانت عليه في فصل الشتاء. في الغالب تم ترتيب محتوى المعادن الثقيلة لعينات المياه بالترتيب التنازلي التالي Ni< Pb > Cd طبقا لمنظمة الأغذية و الزراعة والأكاديمية الوطنية للعلوم والأكاديمية الوطنية للهندسة ، أشارت النتائج إلى أن محتوي المياه من المعادن الثقيلة مثل الرصاص كانت ضمن الحدود المسموح بها للري في معظم المواقع باستثناء عينات المياه رقم 7 التي كانت في الحدود القصوى (أكثر من 5 جزء في المليون بالنسبة لعنصر الرصاص) ، في حين كانت قيم الكادميوم والنيكل ضمن الحدود القصوى للري ماعدا عينات المياه رقم 1 و 3 و5 فى الصيف و الشتاء فى الغالب كانت قيم EC و SAR و NO_3 –N وNH_4-N و COD و BOD و العناصر الثقيلة Pb و Ni و Cd فى بداية المصرف اقل من نهاية المصرف تراوحت قيم مياه المصارف من طفيفة إلى معتدلة طبقا لمعايير الاستخدام المياه للرى فى أغلب المواقع فيما عدا النيكل و الكادميوم و لاستخدام هذه المياه نحتاج الى إدارة جيدة للأراضى للتحكم فى الملوحة واختيار النبات المقاوم للملوحة .