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Negative Effect Of Ponds Water On Environment

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A B S T R A C T

This study assesses the rainwater ponds with comparison of water samples were taken back from the rainwater right after it fell. In addition, it will investigate the effect of negative effect of ponds rain water. After rainwater falling to the ground and being exposed to natural or industrial activities. This work examined this water Chemical, Physical and Biological properties. Field experiment was conducted in Misurata region in central Libya. The ponds rain water physicochemical parameters such as, acidic number (PH), Total dissolved salts (TDS), Electrical conductivity (E.C), Sulphates (So4-2), Nitrates (No3), Ca, Mn and Fe also determined. Fungal colonies were isolated and counted. The results reveal that sampling sites were affected by different activities waste. Total soluble salts of ponds rain water and control ranged from 24.6 to 524 ppm and the pH ranged from 7.1 to 8.4. and showed appreciable differences within localities. Electrical conductivity presented 39.0 to 819 ppm. Whereas the Sulphates, Nitrates showed 0 to 30 ppm,0 to 30.5 ppm respectively. The all tested metals increased from all locations. Isolated microbial flora consists of 4 fungal genera belonging to, Aspergillus, Penicillium, Rizopus and Fusarium. Most of them may consider the resistance fungi to industrial waste water due to its large colonies numbers isolated from unclean rainwater ponds water and contaminated metals area. In conclusion the human activities had a significant effect on all the parameters examined even microbial flora.

التأثير السلبي لبرك المياه علي البيئة

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الملخص

تقيم هذه الدراسة برك مياه الأمطار مع مقارنة عينات المياه المأخوذة بعد سقوطها مباشرة. بالإضافة إلى ذلك ،تم دراسة التأثير السلبي لمياه الأمطار في هذه البرك. بعد سقوط مياه الأمطار على الأرض وتعرضها لأنشطة طبيعية أو صناعية. تم فحص الخواص الكيميائية والفيزيائية والبيولوجية للماء في هذا العمل. أجريت تجربة ميدانية بمنطقة مصراتة وسط ليبيا. تم تحديد الخواص الفيزيائية والكيميائية لمياه الأمطار في البرك مثل الرقم الحمضي (PH) ، إجمالي الأملاح الذائبة (TDS) ، التوصيل الكهربائي (E.C) ، الكبريتات (So4-2) ، النترات (No3) ، الكالسيوم ، المنغنيز والحديد. تم عزل وحساب المستعمرات الفطرية. أظهرت النتائج أن مواقع أخذ العينات تأثرت بنشاطات مختلفة. وتراوحت الاملاح الذائبة الكلية لمياه امطار الاحواض والسيطرة عليها من 24.6 الى 524 جزء فى المليون ودرجة الحموضة من 7.1 الى 8.4. وأظهرت اختلافات ملحوظة داخل مياه البرك. قدمت الموصلية الكهربائية 39.0 إلى 819 جزء في المليون. بينما أظهرت الكبريتات ، النترات 0-30 جزء في المليون ، 0 إلى 30.5 جزء في المليون على التوالي. زادت قيمة جميع المعادن المختبرة من جميع المواقع. تتكون الفطريات المعزولة من 4 أجناس فطرية تنتمي إلى الاسبرجلس والبنسيليوم والريزوبوس والفيوزاريوم. وقد يعتبر معظمهم مقاومة للملوثات الصناعية بسبب أعداد مستعمراتها الكبيرة

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المعزولة عن مياه برك مياه الأمطار غير النظيفة ومنطقة المعادن الملوثة. خلصت هذه الدراسة الى انه كان

للأنشطة البشرية تأثير كبير على جميع العوامل التي تم فحصها حتى الكائنات الميكروبية.

Introduction

The pollution phenomenon for all water in the nature is evaluates to its contents of suspended dissolved solid matter in different quantities. That pollutant water in every types whether ; domestic, industrial, agricultural and others are contains the pollutant materials. In addition, these wastes and byproducts produces by human activities causes in water the pollution. This pollution depended on degree of pollutant concentration , types of wastes and to the conditions of hydrological, physical and climatic of water sources and the kind of the garbage which throws in water sources. Groundwater is considered to be of great importance as an appropriate source of consumption human beings are water, and as civilization continues to develop and the population grows, human water needs increase at the same time, water pollution is increasing due to agricultural and economic activities such as depletion. Acute and resulting in seawater interference in coastal areas, and the arrival of chemical elements from coastal areas Factories, sewage to the water table [1]. Rain, forms the most important natural source of water . Rainwater has a complex chemical composition that varies from place to place, as well as from shower to shower and season to season in the same place [2]. Rain that falls on the earth's surface may evaporate quickly and may seep into the soil, or run, as surface runoff . If the water evaporates, it is lost into the atmosphere (though it may fall again somewhere else as rain). If the water seeps in, it may stay in the soil where plant roots can reach it. Or it may filter further down in to the ground to recharge ground water. Microorganisms and human being received pollutants which is toxic when any kind of pollution come in and accumulating into the soil . On the other hand, Sometimes this Rainwater does not have any previews ways but there's water in ponds and it's stagnant for a while (Photos 1). Given the lack of a sewage system for rainwater, rainwater harvesting is a problem several different regions for long periods causing many problems in traffic and various environmental diseases. The result of insects, frogs, etc., gathering in these pools, not to mention polluting these pools at multiple intervals Car exhaust, natural dust, alkali and waste collection. Large volumes of rainwater collected from roads are contaminated and Many diseases have been caused.

This exposes them to the reception of many pollutants, both natural and industrial [3] . And so after the ponds water seeps to soil after a while, it can damage the soil and its components, including ground water. Nearly 90% of Cd, Ni, and Pb accumulated in the 10–15 cm soil depth when this soil irrigated with unclean water [4]. Although many of elements including heavy metals are required by living organisms for their normal function [5] , these elements considered one of the most harmful industrial pollutants in the environment also at high concentrations, they become toxic. Its known that in environment, metals including heavy metals can be present as either dissolved elements or as suspended elements. These heavy metals can affect soil and its content including micoorganismes particularly fungi. Although, some fungi mentioned as heavy metals tolerant [5] . Several investigations have been carried out to study the effect of treated wastewater on soil chemical and physical properties [6] . Monitoring the contamination of soil by different kinds of pollutants is of great importance because of their potential effects on arable land and groundwater [3] . In study on air pollution and rainwater characteristics by researchers [7] , results showed sulfate and nitrate accumulations between (1.65 15.1 mL/L) and (0.83 8.29 mL) respectively. And in a study on the impact of air pollutants on rainwater properties in southern Mosul, researchers conducted by [8], by studying the characteristics of rainwater, including hydrogen, electrical conductivity, calcium and sulfate and nitrate, where the results showed that the pH value of the rain water falling on the study area ranged from (8.63 6.57), electrical conductivity values ranged from (50.33 829.6 Ms/cm) The calcium value in this region was between 6.41 and 128.25 mL/L. Both sulfate and nitrate values were recorded between (3.80 59.92 mL/L) and (0.01 5.86 mL).

Researchers [9] performed samples of groundwater and sewage wells Some of the chemical and biological characteristics of these waters have been estimated and the results obtained have been shown in that study, hydrogen values ranging from (7.00 to 7.90).

An example of such a pollutant is factories dust, which can affect the chemical properties of soil. The physico-chemical properties of soil contaminated by metals were changed which made the soil unsuitable for plant growth. Clay minerals, organic matter, pH, temperature, redox potential and interrelationships between heavy metals themselves are the physicochemical factors which can affect the interactions between soil microorganisms and heavy metals. In addition, wastewater possesses different biological, physical and chemical effects on the environment. The relationships among soil properties, fungi, and Pond water from rain leaks into the soil through unclean water as a pollutant have been explored in relatively few studies. Those studies did not focus on the effects of pond water on environment but study water in harvesting tanks in or within wells, in which case they would be protected from some kind of pollution [10] . Cropping patterns in the area follows rainfall, as cropping is totally depend on rainfall [11].

Photos 1: Rainwater in ponds and it's stagnant for a while (photographed by the writer).

Aims:

No published reports have examined negative effect of ponds water on the environment from rain in Libya. To our knowledge, no previous studies have investigated fungal flora and physicochemical parameters with Pond water from rain. Therefore, this paper aims to investigate the effect on Pond water from rain in Libya. Genera of fungi which are present in Pond water from rain were investigated, as well as the present study was carried out to determine the Pond water from rain content of metals, pH and total soluble salts in Misurata stations, comparing the findings with those for samples were taken back from the rainwater right after it fell.

MATERIALS AND METHODS:

The field research area lies near the coast of Libya at latitude 32.65 N (north) and longitude 14.26 E (east). The station is located about 100 km east of Tripoli (Libya's capital city). In the summer, the main direction of the wind is from the desert (south) to the sea (North). However, in the winter the wind blows from west to east. Generally speaking, the climate of the area in the summer is hot and dry. The temperature rapidly increases in this season, reaching 48°C. In the winter it is warm and rainy but rainfall is scanty. In Libya, more than 50% probability of occurrence of 10 mm rainfall amounts can be noted in sixteen meteorological stations including the Misurata study area and rainfall of 25 to 50 mm can occur. 26 millimetres is the average annual rainfall for the country. The highest annual rainfall levels in the country occur in only two areas and the study area does not include these areas. laboratory tests were carried out for the samples which took from different ponds water in some zones n Misurata. The water samples were taken from Qasr Ahmed and Abad, Elgoshi, Ekzir and Elrwasat by three replicates and for

comparison, other samples were taken back from the rainwater right after it fell. From these characteristics which testes in laboratory analysis: acidic number (PH), Total dissolved salts (TDS), Electrical conductivity (E.C) determined by [12], Whereas, Sulphates (So4-2), Nitrates (No3) by [13]. Ca, Mn and Fe also determined by [14]. Fungal colonies were isolated and counted using the dilution plate method, Sabouraud medium by method described by [15]. Results were processed and analyzed using SPSS statistical analysis package for Windows. Data is reported as mean ± standard error of the mean (SEM) unless otherwise stated. A p-value of < 0.05 was considered significant. Two-way analysis of variance was performed (ANOVA) on the pairs of variables likely to exhibit correlation.

Statistical Analysis:
Results were processed and analyzed using SPSS statistical analysis package for Windows. Data is reported as mean ± standard error of the mean (SEM) unless otherwise stated. A p-value of < 0.05 was considered significant. Numbers with the same letter are not significantly different at $p = 0.05$ according to duncan's test.

RESULTS AND DISCUSSION:
Some physicochemical characteristics of Pond water from rain (Misurata- Libya) have indicated a strong influence by this kind of water that have settled in the soil. It can be concluded that the effect of different environment activities on Pond water from rain metals content, and pH of this kind of water doesn't depend on how long the water stays in the ponds, but also on the different natural and

industrial activities that might affect them . Results of water analysis are shown in Table I. PH values of the water samples revealed significant differences between some localities and the control samples, it ranged from 7.1 to 8.4. Higher pH values were recorded in the areas of Qasr Ahmed and Abad, two areas where there was no a sewage system. These values are higher than control and almost above the Libyan drinking water standard values (6.5 to 8.5) [16]. The reason for the rise of the pH sample (Qasr Ahmed) may be the various pollutants that entered the ponds. Considering this area is rural and adjacent to the city's iron and steel factory. The physicochemical which affects gases and organisms activities, due to the reduction in CO_2 while Photosynthesis and Respiration [17]. Total dissolved salts (TDS) and Electrical conductivity (E.C) in this work showed higher values comparing with water samples were taken back from the rainwater right after it fell (control). These results at the same way of rain water in study of [16]. It has been observed from the results obtained that the highest value is for total melting salts and electrical conductivity recorded at Qasr Ahmed .This could be due to continues water salty problem and industrial contamination of these Pond water [18] or iron and steel plant which located in that area. And the recorded electrical conductivity values for this research higher than previously recorded value, which is probably due to the difference in industrial activity between the two studies [19]. Significantly, pH, TDS and E.C showed a large different between all values.

Table I : Electrical conductivity, Total dissolved salts and pH in pond rainwater at different sites. numbers with the same letter are not significantly different at $p = 0.05$ according to duncan's test.

Electrical conductivity (E.C) Ms/cm	Total dissolved salts (TDS) ppm	(PH)	Sites
819 a	524a	8.4 a	Qasr Ahmed
142.6 b	91.1 b	7.9 a	Abad
466 c	298.3 c	7.2 a	Elgoshi
400.6 c	256.3 c	7.8 a	Elrwasat
530.3 d	339 d	7.8 a	Ekzir
39 e	24.6 e	7.1 b	Control

While, the range of sulfate Table II showed values between 0 to 30 ppm . The results showed that the highest value of sulfate was in the Elrwasat site. It's probably because the place where the sample was taken was next to the soap factory and may be due to car exhaust, because this area is a busy due to university colleges region and industrial zone.

On the other hand, the results of Nitrates presented from 0 to 30 ppm and the highest concentration noted at Abad region. This may attributed to Nitrate sources in the soil which are known to be different and diverse, these are sewage waste and black wells thrown into the soil and may be from the degradation of nitrogen substances by microbes for human and animal waste as well as plant remains, agricultural fertilizers [20]. Other reason for increasing nitrate concentration is the reaction of NOx with rain droplets with the help of several special agents in winter [21]. Statistically there were significant differences in water sulfate and nitrates content between Pond water and control samples also ($P < 0.001$).

Table II: Sulphates (So$_4$) and Nitrates (No$_3$) in pond rainwater at different sites. numbers with the same letter are not significantly different at $p = 0.05$ according to duncan's test.

Sulphates (So$_4$) ppm	Nitrates (No$_3$) ppm	Sites
0.0 a	0.0 a	Qasr Ahmed
8.0 b	30.5 b	Abad
0.0 a	8.8 c	Elgoshi
30.0 c	5.9 d	Elrwasat
11.0 d	5.03 d	Ekzir
19.0 e	4.6 e	Control

As shown in Table III, the concentrations of detected metals (Ca, Fe, and Mg), showed variable values depending upon the sampling site. The increment of water metals in the same area may be a result of precipitation of metals and other heavy metals over the time. The Ca, Mg and Fe concentrations showed Eighteen, six and sixteen times

higher than the control respectively. These results are different from results of rain water in study of [16]. Ekzir and Elrwasat sites water samples analysis showed highest value of Ca. The differences within localities may attribute to the changing of different unclean water sources [6] . Fe concentration at Elgoshi and Abad showed higher than recommended maximum levels by [22] 2 mg/l and this attributed to the water is unsuitable to drink. Occurrence of manganese and iron in ground water can threat human health and even lead to chronic diseases [23]. Significant differences in water metals content between Pond water and control samples ($P < 0.001$).

Generally, nitrate, sulfate and some of the elements in this water are increased, this may be due to a number of gale storms as well as the emission of oxides. Sulfur, Nitrogen from different factories [16] .

Table III: Metals content in pond rainwater at different sites. numbers with the same letter are not significantly different at $p = 0.05$ according to duncan's test.

ppm Fe	Ca ppm	Mg ppm	Sites
0.76 a	2.4 a	1.2 a	Qasr Ahmed
1.68 b	3.2 b	16.8 b	Abad
2.21 c	4.8 c	8.7 c	Elgoshi
0.53 a	5.5 d	0.00 d	Elrwasat
0.3 d	5.5 d	0.00 d	Ekzir
0.3 d	0.25 e	0.40 e	Control

The number of fungal colonies is shown in Table IV. Different localities have showed different colonies numbers. And from this study, the most common fungi are *Aspergillus niger , Fusarium oxyspurium , Penicillium chrysogenum*. The initial scan of fungi in studied water samples and control was about 384 colonies. It note that Elgoshi samples recorded the highest number of species and colonies at about 109. The Abad sample recorded the lowest number of species and colonies (23) compared to other locations. The increased microbial population at polluted sites by this kind of water may be attributed to different metals which may feed some of these

microorganisms [5]. This may be due to a decrease in pH value to this site, as fungi grow in the equator medium. Given the results, showed that the lowest number of species and colonies is recorded in the Abad region. This may be due to the high value of pH in the sample and possibly to the high concentration of nitrate compared to studied areas.

The absence of certain fungi in Pond water probably due to the relatively different metals concentrations high salts, pH and pb, resulting from accumulation of some pollution metals [24].Consequently, this may leads to low abundance or an absence of

fungi in the soil [25] , or can reduce microbial growth [26]. In the same way [27] reported that an increase in heavy metals in the environment affects qualitative and quantitative fungal composition. The effect of organic matter, total soluble salts, pH value, and metals on soil microbial flora are severally different from place to another, and this may take place at water as well. The rest of the region has a large number of fungi, despite the high value of pH and high salinity. And even though sulfate and nitrate are reduced comparing to control. This may be due to the resistance of these species to several pollutants, where race resistance has been recorded by [27;28].

Table IV: Fungal content in pond rainwater at different sites.

Fungal	Qasr Ahmed	Abad	Elgoshi	Elrwasat	Ekzir	control
Aspergillus niger	7	-	20	4	4	6
Aspergillus flaves	7	-	2	-	-	2
Aspergillus sp	-	-	-	2	2	-
Aspergillus sp	-	-	-	5	5	-
Aspergillus sp	-	-	5	-	-	-
Aspergillus sp	-	-	20	-	-	-
Aspergillus sp	4	-	2	-	-	3
Penicillium chrysogenum	21	-	50	19	19	2
Penicillium sp	-	-	3	-	-	-
Penicillium sp	-	3	3	-	-	-
Penicillium sp	2	-	-	-	-	-
Fusarium oxyspurium	21	20	4	17	17	16
Fusarium sp	13	-	-	-	-	-
Fusarium sp	-	-	-	2	2	-
Rhizopium sp	-	-	-	25	25	-
Total genes	3	2	3	3	3	3
Total spices	7	2	9	7	7	5
Total colonies	75	23	109	74	74	29

CONCLUSION:

The influence of environment in the area of Misurata on the presence of fungal species was investigating by studying the numbers of colonies of various fungi. Conclusively, It has been observed that human activity has a negative influence on the quality of water in Misurata (city in Libya). The low fungal load, as well as high densities of total soluble salts, Electrical conductivity, Sulphates , Nitrates, PH, Ca, Mg and Fe suggests that pollution of water by this kind of parameters has occurred. This work can conclude that the results obtained for the examined physiochemical characteristics of Pond water in the area studied prove that the different natural and industrial activities has had a significant impact on the these pond waters. The increment of water parameters may be reflected to the soil and its ground water. So far, the results throw some light on the intensity of the effect impact of a particular water on soil. Several experiments suggested to undertaken to address How far these activities can affect the soil content .

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