A survey of potency of washing polluted soil of petroleum residues by water with detergents and its effect on some field descriptions of wheat and barely.

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Abstract
The survey indicates that the pollution of agricultural soil by petroleum residues has negative effects on some field description of different categories of wheat and malt crops where the level of the fallen pollution (1000 ppm) has significant increasing in plants length , dry weight of crops categories through survey , where the high levels (2000 & 4000 ppm) have significant decreasing in the two characteristic , the characters and the crops where effected differently , on the other hand , washing soil (silt and sandy) by water and in some time water with some detergent on other times causes significant elimination of petroleum residues which cause soil pollution during the survey , the ratio of elimination in sandy soil was more than that in silt soil , and also washing process with detergent eliminates petroleum residues more than washing by water alone , the survey also includes the effects of frequent washing of water and water with detergents which lead to celerity and seed germination of wheat crops seeds and the results indicates that elimination process increases with frequent washing which increase the two characters where the increasing of sandy soil was more than that of silt and the detergents of washing water increase the two characters and the two textures .

Introduction
The soil are the external layer for the earth shell which precipitate at the biosphere, the soil were formed during along time by many factors which act to crumbing the rocks (1) the soil pollution were happened as a result of human activities from the refuses which producing from chemical products, dyes, factors, metals fusion, electric power stations, organic refuses especially healthy centers, and petroleum refineries (2) all these pollutants will arriving to the soil which considering as a one of ecosystem components which representative the media that all plants growing in it in direct and indirect ways (3) the soil contents from these pollutants will differ from site to other as a result of the distant from the pollution sources (4), at 1991 year and as a result of second golf war, very large amount from poisoning pollutants leaked to Iraqi environmental which involved twenty for million liters from heavy fuel, sixty five million liters from other different fuels (5) and sixty million barrels from crude oil were leaked to the desert to be made (346) oily lack and polluted more than (1500 km) from gulf shore (6), the soil chemical and physical specification will be change as a result of the petroleum pollution, many changes in chemicals and physical soil specification will be happened as a result of petroleum pollution and these changes will effect on the growth of the plants, the polluted soil may be activation or inhibition the growth of the plants roots and that is depending on the change which is happening on the soil specifications and there are many factors have a great effect such as the type of the soil texture, environmental circumstances and the plant species (7, 8,9)

The temperature of the soil which is covered by oily layer are more effect than that uncovered which losing the water from the upper layer of the soil (upper four centimeters) while the covered soil loosed the water from only upper one centimeter and that have positive effects on the germination of the seeds and the growth of the seedlings (10). (9) noted that the contamination of the plants by the petroleum residues will cause many physiological and morphological changes and the damages will become bigger when the contaminated by the petroleum residues on the leafs of the plant than the soil on the other hand (12) showed that the seeds product and dry weight of the plants which growing at polluted soil with petroleum residues and reduced and the absorption of the water by wheat plant from the polluted layer or the layers under the polluted layer will be reduced also, (13) given the reason of the reduction in the growth of the plants which growing in the soil which polluted by petroleum residues to the poisoning effect of the petrol on the plants. (14) also given a reason to the reduction in seeds germination while (7) said that the reduction in the growth of the plants caused as a result of a bad circumstances of the soil, the pollution of the soil by the oil have destroying effects on the simple ecosystem especially at the herbaceous species than the perennial species and caused reduction on the production of dry weight of the plants, the dry weight production of the plants that growing at polluted soil by oil resides about (128 gr/m2) while the production of the plant at unpolluted soil amount (495 gr/m2) (15) showed that the contamination of the soil by the oil residues are active the growth of the plants especially the growth of the roots because of the increasing of the available nitrogen and phosphors in the soil as a result of the microbial action which result from the contamination of the soil and that cause accumulation some metal ions such as (Na, K, Ca, Mg, V) in plant tissues. The oil with low viscosity because the low viscosity oil will distribute in the soil and penetrate the roots more than the high viscosity oil (16). Many researches showed that the presence of the oil resides in the soil occur a reduction in the yield production.

Because these resides will effect on the metabolism and protein synthesis (17) on the other hand (18) showed that the contamination of the soil by the oil resides will impairment the photosynthesis and reducing the chlorophyll level and the high concentration will inhibit the growth of the plant and roots elongation while (19) showed that the high concentration of hydrocarbons effected on the activation of the photosynthesis and the regulation of stomata's.

The ending of petroleum resides in the plant and soil:

The petroleum resides found only in the upper layers of the soil because these compound can not pass through the soil layers (20, 21 & 22) the resides in the contaminated soil are suffering from biodegradation process and this process depending upon the number of bacteria population in the soil. On the other hand the soil humidity are playing important role in completion of the process and optimum relative humidity (14-15%) that the low relative humidity inhibition the biotic processes and the high humidity are limiting the gases diffusion (23). The absorb competence depending upon the pollutant physical and chemical characters while the respiratory ratio considering the change key which limiting the absorption of the chemical materials that this process change will increase with increasing of respiratory ratio which depending upon the plant species, leaf area, nutrient type, soil humidity, the soil temperature, wind circumstances. Within this operation the ending of the oily pollutants in side the plants as follow (24).

Washing of the oily soil

Soil washing has been suggested as a high technical to treatment the soil which contaminated by crude oil hydrocarbons and other organic compounds especially those compound which hydrophilic (25, 26, 27 & 28), at this process the polluted soil were separated to many parts by dependence on the granules size, all the soil granules which at the sand granules or more will give a good results by using the water and will cause a reduction in pollutants size more than (60%) (29), on the other hand (30, 31 & 32) were showed that the pollutants detaining on the rocky substances and coars after the washing process will effected by many factors such as the dislike of the pollutant to the water, the wash media attributes, and the soil granules attribute also the pollutants which dislike the water especially the poly nuclear aromatic hydrocarbons which consist from (4-5) aromatic cycles and high molecular weight alkynes which considering from oil ingredients may be not easily separate from soil surfaces to the washing liquids, also the using of some of these additives to the washing liquid will increase the washing process, some of these additives, suspension substances and extraction substance which may be giving a best results to removing the pollutants and buffering solution to correct the (pH) of the soil, (33 &34) were showed they the adding of some additives will be forming a new compounds which more complex than the washing liquids and become very difficult to treated it,

Materials and methods

At this experiment we used species from the wheat (Triticum aestivum L)

And tow species from barley (Horeum sativum L) the seeds brought from (EBA center for agriculture research)

Soil preparation

The soil samples were be collected from agriculture site, these samples were be taken from (15-30 cm) depth an November 2005.

The soil analysis

The soil analysis were be done in engineering collage laboratories Tikrit University.

To estimate some chemical and physical properties the soil texture were be estimated according to (35).

The experiment of oil washing

The different texture soil samples (sandy and silt) were polluted by Crude oil of kirkuk fields, the contamination concentration are (12000 ppm), the contamination were done by added (13.729 ml) from crude oil to every one Kg soil because the specific gravity of Kirkuk crude oil at March 2002 are (0.874), the crude oil were mixed well by electric blender, (12Kg) from each samples were polluted and divided at six pots (2Kg soil) at each , the total pots are (12), the first half were washed by raw water and other half washed by raw water with some detergent and the washing process were done three times ,the resides concentration from crude oil were determined after every washing process by using (tetra carbon chloride), the experiment were executed by using heated (65C) raw water and heated raw water with some detergent which using in the first experiment to study the importance of the temperature degree on the removal of the crude oil from the soil, after the treated soil samples were dried , (10 seeds) from wheat yield were planted at each pot to study some vegetative adjective such as :-

1. Germination ratio (%).
2. Germination celerity (days).

Results &discussion

The Results at table (1) showed that the contamination of the soil by petroleum resides caused different effects on the length of plants, (1000ppm) contaminated soil caused a significant increasing in the length of wheat yield especially (Iraqi) species and barely yield especially (tmouz-2) species, while the other two concentration (2000 ppm & 4000 ppm) caused a significant decreasing in the length of the two yields , the reason of the increasing in the length of the plants which growing in (1000ppm) polluted soil may be belong to increasing in available nitrogen (11) said that the polluted soil with petroleum resides will be increasing the growth of the root groups , as a general the wheat yield are more effect than the barley.

Table (1) the effect of polluted soil by petroleum residues on the length of two yields (wheat and barely)

The yield	The class	The concentrations(ppm)				The class Mean	The yield mean
		control	1000	2000	4000		
Wheat	Iraq	56.42 bc	58.66 a	55.30 c	51.00 e	55.34 b	54.37 B
	Tmouz-2	54.11d	56.68 b	53.41de	49.44 f	53.41 c	
Barley	Aamal	59.32 a	57.46 b	54.12 d	54.12 d	56.25 a	55.21 A
	Barakah	54.56 cd	55.08 c	54.48cd	46.72 g	55.21 b	

Table (2) the effect of polluted soil by petroleum residues on the dry weight of vegetative groups of two yield (wheat and barely)

The yield	The class	The concentration (ppm)				The class mean	The yield mean
		control	1000	2000	4000		
wheat	Iraq	4.68 e	5.18 d	3.88 f	3.32 g	4.26 c	3.99 B
	Tmouz-2	4.34 ef	3.98 f	3.51 fg	3.11 g	3.73 d	
Barely	Aamal	6.56 b	7.21 a	5.88 c	5.21 d	6.26 a	5.79 A
	Barakah	5.24 d	6.44 bc	4.89 de	4.56 e	5.33 b	

At table (2) the polluted soil by petroleum residues had shown a different effects on the dry weight of vegetative groups, polluted soil by (1000 ppm)caused a significant increasing in this feature at barely especially (Aamal species) while the other two concentrations (2000 ppm & 4000 ppm) caused a significant decreasing in this feature , as a general the wheat are more effected than the barely.

Table (3) the effect of the washing by raw water with some detergent on removal of crude oil from contaminated soil which polluted at (12000ppm)

Washing liquid	Washing time	Soil texture					
		Sandy soil			Silt soil		
		R1	R2	R3	R1	R2	R3
Raw water	The first	10700d	9600g	9840f	11412a	11060bc	11210ab
	The second	8650 i	7942 k	7410 l	10764d	10855cd	10815d
	The third	6400 n	4744pq	5610qr	8748 i	8862 i	9282 h
The average		8583 B	7428 E	7620 DE	10308 A	10259 A	10435 A
Raw water with detergent	The first	9210 h	8400 j	7740 l	10452e	9614 g	9886 f
	The second	6008 o	5818 p	6554 n	8440 j	7982 k	8412 j
	The third	4242 s	3512 t	4006 s	6964m	5481 r	5660qr
The average		6486 G	5910 F	6100 H	8618 B	7692 D	7986 C

The results at table (3) were showed to significant decreasing in the concentration of the crude oil in the soil which washed by the raw water with some detergents more than the soil which washed by the raw water alone and the reduction in sandy soil are more than the silt soil , the repetition of the washing process have a significant effects that the third washing process were removed the crude oil from contaminated soil more than the first or second washing process , the third washing by raw water with some detergent caused significant decreasing at sandy soil which reached to (70,73%) in comparison (60,46%)by raw water only while the more reduction in silt soil were reached to (54,32%) by using raw water with some detergent.

Table (4) the effect of the washing by heated water with some detergent on removal of crude oil from contaminated soil which polluted at (1200ppm

Washing liquid	Washing times	Soil texture					
		Sandy soil			Silt soil		
		R1	R2	R3	R1	R2	R3
Heated raw water	The first	9846 b	9654bc	9312e	10488a	10648a	9855 b
	The second	6812 k	6576 l	5866n	9640 c	8922 f	9001 f
	The third	4312 q	4660 p	4688p	7946hi	6821 k	6811 k
The average		6990 E	6963 E	6622 F	8753 AB	8797 A	8555 B
Heated raw water with detergent	The first	7488 j	7816 i	7342j	9554cd	9681b	9412de
	The second	5844 n	6120m	5377o	8114 h	8632g	8022h
	The third	3866 r	3232s	2856t	6232m	5834n	5312 o
The average		5732 G	5722 G	5191 H	7966 C	8049 C	7582 D

At table (4) we studied the effect of heated raw water and heated raw water by using some detergent to cleaning the contaminated soil with crude oil, generally the washing liquids caused a redaction in the Concentration of the pollutants ,the reduction which happened at sandy soil are more than the silt soil , the effect of heated raw water with some detergents are more significantly from which happened by raw water alone, the repetition of washing process have a significantly effects that the third washing process were caused a reduction reached to (76.2%) while the second washing process caused a reduction reached to (64.0%), the more reduction which happened at silt soil were reached to (55.7%) by using a heated water with some detergent .

The results at table (5) showed that the cleaning of contaminated soil which polluted by crude oil hydrocarbons increased the germination of seeds which planted at polluted soil , the repetition of washing process caused a significant effect that the third washing process were increased the seeds germination ratio to reached to (93%) by comparison with (36.6%) at unwashed soil that is at sandy soil while at silt soil the seeds germination ratio reached to (56.6%) on the other hand the using of some detergent were increased the germination ratio to reached to (100%) at sandy soil and (70%) at silt soil these results agree with the result of (36) which showed that the used of some additives will giving a best results to remove the pollutants and correct the soil PH).

Table (5) the effect of soil washing by raw water with some detergent on the seed germination ratio

Soil texture	Washing times	R1	R2	R3	Average
Sandy soil	Before washing	40%	30%	40%	36.66%
	First washing by raw water	50%	40%	40%	43.33%
	First washing by raw water with detergent	70%	60%	60%	63.33%
	Second washing by raw water	70%	60%	70%	66.66%
	Second washing by raw water with detergent	80%	80%	70%	76.66%
	Third washing by raw water	100%	80%	100%	93.33%
	Third washing by raw water with detergent	100%	100%	100%	100%
Silt soil	Before washing	10%	30%	30%	20.00%
	First washing by raw water	40%	60%	60%	43.33%
	First washing by raw water with detergent	50%	60%	60%	50%
	Second washing by raw water	50%	60%	60%	56.66
	Second washing by raw water with detergent	60%	70%	70%	63.33%
	Third washing by raw water	70%	70%	70%	66.66%
	Third washing by raw water with detergent	70%	70%	70%	70.00%

The results at table (6) showed that the removing of the crude oil hydrocarbons from contaminated soil by the washing process will help to increasing the germination celerity , the repetition of this process make increasing in the germination celerity , on the other hand the using of some detergent to washing the soil were increased the germination celerity as a result of removing the.

pollutants from the contaminated soil especially at sandy soil than the silt soil , the washing process by raw water with some detergent were increased the germination time from (18.33day)to(5.33 day) while this process decreased the germination time from (22 day) to (9.33) day at silt soil.

Table (6) the effect of soil washing by raw water with some detergent on germination celerity.

Soil texture	Washing times	R1	R2	R3	Average
Sandy soil	Before washing	16	21	18	18.33
	First washing by raw water	14	11	18	14.33
	First washing by raw water with detergent	12	13	11	12.00
	Second washing by raw water	11	11	12	11.33
	Second washing by raw water with detergent	9	11	8	9.33
	Third washing by raw water	6	8	7	7.66
	Third washing by raw water with detergent	7	5	4	5.33
Silt soil	Before washing	24	21	21	22
	First washing by raw water	21	22	22	21.66
	First washing by raw water with detergent	21	19	21	20.33
	Second washing by raw water	16	20	20	18.66
	Second washing by raw water with detergent	16	21	17	18.00
	Third washing by raw water	14	11	11	12
	Third washing by raw water with detergent	9	11	8	9.33

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دراسة فعالية غسل الترب الملوثة بالمخلفات النفطية بالمياه المضاف إليها بعض المنظفات وتأثيرها على بعض الصفات الحقلية لمحصولي الحنطة والشعير

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الملخص:

أشارت الدراسة إلى إن تلوث الترب الزراعية بالمخلفات النفطية لها تأثيرات سلبية على بعض الصفات الحقلية لأصناف مختلفة من محصولي الحنطة و الشعير إذ سببت مستويات التلوث المنخفضة (١٠٠٠ جزء بالمليون) انخفاضا معنويا في هاتين الصفتين واختلاف الأصناف والمحاصيل في طبيعة التأثير من جانب آخر سبب غسل الترب (الرملية والطينية) بالماء أحيانا والماء المضاف له بعض المنظفات إزالة معنوية للمخلفات النفطية الملوثة للترب قيد الدراسة ، كانت نسبة الإزالة في الترب الرملية أكثر من نسبتها في الترب الطينية كما أحدثت عملية الغسل بوجود بعض المنظفات إزالة اكبر للمخلفات النفطية الملوثة للترب مقارنة بغسلها بالماء فقط كما تضمنت الدراسة تأثير عمليات الغسل المتكرر بالماء تارة والماء المضاف إلية بعض المنظفات على نسبة و سرعة إنبات بذور محصول الحنطة وأظهرت النتائج إن عملية الإزالة تزداد بتكرار عملية الغسل مما أدى إلى إحداث زيادة في هاتين الصفتين وكانت الزيادة في الترب الرملية أكثر منه في الترب الطينية كما سبب وجود المنظفات مع مياه الغسل زيادة في هاتين الصفتين وفي كلا النسختين.