Effect of Irrigation by Domestic Wastewater on Final Penetration Rate in Lysimeter Soil

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ABSTRACT
The increase in the population and industrialize live on the one hand and shortage of the drinkable water source and also need to much water and foods on the other hand has interested expert and specialist attentions in using of uncommon waters such as sewage and wastewater for agric water. It is evident that before irrigation carried out to sewages, we should to informed in respect of effects of the these waters on the plants by means of study and research, that we have operated a special management for optimum usage. for doing this, at one comparison design, where average gropes compared to control sample, we have studied effect of the irrigating to the domestic sewage and it is drain in the lies waiter method on final penetration rate in the farmland soil with the intention of this applied 15 numbers of the plastic lies miter to cylindrical shape that in them planted basil, Alfalfa and colza. After a measure final penetration rate in soils irrigated domestic wastewater and first and second rain, we found that average for final penetration in the colza lyesmiter soils irrigated by domestic sewage reduced to about -41%, it did reduce to -18% in the alfalfa limiter soils that were irrigating by first drainage and also it did reduce to -7% in the basil lyesmiter soils that it is irrigated second drain all of these results were as compared with control sample that irrigated by pit water.

Key words: Irrigation, domestic wastewater, final penetration rate.

INTRODUCTION

In spaces that climatically are dry and semidry as they has to reuse of uncommon aqueous sources such as sewage and wastewaters by reason of shortage for water sources , it is necessary that also we have a scientific and researching perspective on the agric water soil. This topic is important when we know after irrigating to sewage, parts of soluble ions in these wastewaters with nutrient and useful material and even unuseful elements enter to soil. Other wise without specific controls for use of wastewater in the agriculture, it can damage to structure and texture of the soil. Soil are consisted of organic and mineral materials , water , air and microorganisms and they always are exposed to physical chemical changes , on the other part domestic sewages has not unuseful and heavy elements such as cadmium, zinc and merry. But, however, human were excreta part of proteins and vitamins and consequently after irrigated by domestic sewage supply parts of nutrient and useful materials in the soil. If he uses of domestic sewage instead pit water for irrigating agricultural crops it improves permeability and porosity. Properties for soil and soil texture become in sponge form [1]. In another's researches, were stated that irrigation of the form lands by urban and domestic wastewater for long time will fall in effect on the hydraulic soil conduction but it will lead to stability for soil particles as passed water flow reduce to soil surface, it is evident that after repeated irrigation by sewage for

long term most take place keeping and with proposing these results and other results, it supposed that irrigation toy uncommon water such as domestic sewages can has useful and destructive effects on the structure and other physical–chemical soil parameters [2], [3] and [4]. On this basis, it is important for study process related to water penetration rate in the soil. Permeability is a parameter that on based it, irrigation method (dropping, superficial, raining) will select. Thus, aim of this research was the study of irrigation effects by domestic wastewater on changes in final penetration rate.

MATERIAL AND METHOD

In order to studying irrigation effect toy refined domestic sewage over changed of final water penetration rate in the soil , applied 15 plastic lies miter (weltered reservoir) in cylindering–shape to lame height and 60cm in diameter that they placed on the metal legs to 40cm height. Lysimeters filled with farms soil (depth 0-45cm). The floor each lysimeter drilled to 5cm in diameter and then on it placed and with capital beds that firm strongly by twist. Then a hose set up as drain pipe and it stopping a leak with aquarium paste until origin doesn't penetrated of drilled walls of the drain to out. Inside each lysimeter filled to farm soil until depth about 80cm. Of course, in order to make a natural case for permeability of the water in to lysimeter, we strew sand to 10cm height up lysimeter floors, to following this we strew farm soil on the saved until water exit easily of lysimeter floors sampling of farm soil do by Oger in 0-45cm depth and sample transfer to mechanic soil laboratory. A result for physical-chemical test of soil in the lysimeter is as follows:

Tab 1: Physical–chemical properties of the soil in to lysimeter before irrigating too domestic refined sewage and drains

SAR	pH	EC	Total porosity (%)	Specific mass of soil	Soil moisture	Soil tissue
8/72	7/2	5/68 ds/m	38	1/52 gr/cm3	13/7 6/14	30% 28% 42%

After determining soil texture and detecting physical–chemical feature for soil we sow colza seeds in 5 first lysimeter, alfalfa seeds in 4 second lysimeter and basil seeds in 3 third lysimeters 3 lysimeters also placed in and of a pilot as control sample and they irrigated to pit water. Manner for irrigate lysimeter was so that in 5 first lysimeters , we use of perrefined sewage and drain result from these use as irrigation water for 4 second lysimeter and also drains obtained of 4 second lysimeter or second drain use for 3 third lysimeter contain basil. Of course, we sampling for each of treatments of the raw domestic sewage, first drain, second drain and pit water and determining their physical–chemical feature. Average for all samplings is as follows:

Tab 2: The properties of predefined domestic sewage for irrigate colza lysimeter the properties of first drain result from colza lysimeter and

Parameter	$\frac{namgca}{meg/lit}$	$\frac{cltss}{m9/lit}$	SAR	pH	EC	COD	BOD 5
	Meq/lit	Meq /lit	-	-	D s/m	ppm	ppm
Value	24 15/0 25 14/7	1/82 208/81	5/81	7/20	4/80	232	150

Tab 3: Soil of alfalfa lysimeter

Parameter	$namgca$	$\underline{cltss}$	SAR	pH	EC	COD	BOD 5
	Meq /lit	Meq /lit	-	-	D s/m	ppm	ppm
Value	18/10 12/17 12/20	1/60 19//17	4/82	6/98	3/81	30	15

Tab 4: The properties of second drainage result from colza lysimeter

Parameter	$namgca$	$\underline{cltss}$	SAR	pH	EC	COD	BOD 5
	Meq /lit	Meq /lit	-	-	D s/m	ppm	ppm
Value	17/92 11/98 12/10	1/50 188/14	4/63	6/94	3/42	8	5

Tab 5: Water control for irrigating colza, alfalfa and basil

Parameter	$namgca$	**	Cl	SAR	pH	EC	COD	BOD 5
	Meq /lit	n.t.u	Meq/lit	-	-	D s/m	ppm	ppm
Value	9/40 2/81 5/02	16/5	7/42	5/01	7/60	1/62	18/01	2/42

Agricultural stages for sowed plant tacked place. Bused on irrigating rounds and aquatic requirements of the plants and till colza, alfalfa and basil reaching to final growth seed and leaves, they has irrigated to domestic sewage and drain treatment, in that level penetration rate measured. By use of penetration rate equation in the doubled cylinders. In order to measuring final penetration rate in the soil in to lysimeter applied 2 doubled cylinders to genus of white iron to 25cmin diameter and 20cm in height. In reality, cause for use of equation and doubled ring is that because of we work to short term efficiencies in irrigation systems , there fore this equation give us better results at short – term periods. After preparing doubled rings has placed them to height about 15cm in the lysimeter soils. Then swage water in to cylinder until gradually penetrate in side lysimeter soils, it is mentionable that this test tacked place in all the colza, alfalfa and basil and pit water lysimeter and obtained digits are moderate average of 5 lysimeters that during this study doesn't show any significant different. Of course, the reason for use of 2 doubled rings is that preventing of side penetration of the water in the soil. Along examination we effort with cordial addition of water inside rings fixed water surface in cylinders and the by means of volume of additive water in cylinders and dividing it on section

surface of cylinder, we able to culwatering penetrated water height. By this meaner, test is carried out accurately. for each lysimeter need to 100 minute times for calculate permeability rate of water in the lysimeters soils, which in one a growth season are irrigated by domestic sewage, first drainage and second drain. Results are as follows:

Tab 6: The penetration rate for water in soil in each of colza lysimeter of the 100 minuets

Parameter	*namgca*	**	**Cl**	**SAR**	**pH**	**EC**	**COD**	**BOD 5**
	Meq /lit	**N.T,U**	**Meq/lit**	**-**	**-**	**D s/m**	**ppm**	**ppm**
Value	9/40 2/81 5/02	16/5	7/42	5/01	7/60	1/62	18/01	2/42

Tab 7: It is mentionable that colza is irrigated by predefined domestic sewage

Parameter	*namgca*	*cltss*	**SAR**	**pH**	**EC**	**COD**	**BOD 5**
	Meq/lit	**Meq/lit**	**-**	**-**	**D s/m**	**ppm**	**ppm**
Value	17/92 11/98 12/10	1/50 188/14	4/63	6/94	3/42	8	5

Tab 8: First drain from colza lysimeter, perching domestic wastewater

lysimeter	**First lysimeter**	**Second lysimeter**	**Third lysimeter**	**Fourth lysimeter**	**Fifth lysimeter**	**Control**
	Mm/min	**Mm/min**	**Mm/min**	**Mm/min**	**Mm/min**	**Mm/min**
Penetration rate	0/56	0/56	0/57	0/56	0/57	0/57

Tab 9: Second drain from alfalfa basil, predefined

lysimeter	**First lysimeter Mm/min**	**Second lysimeter Mm/min**	**Third lysimeter Mm/min**	**Fourth lysimeter Mm/min**	**Fifth lysimeter Mm/min**	**Control Mm/min**
Penetration rate	0/56	0/56	0/57	0/56	0/57	0/57

After, found penetration rate in each of lysimeters contain colza. Alfalfa and basil that their interior filled by similar soil that of farmland before examination, each of averages in ever row of lysimeters be compared to control sample itself and together. Results analysis and decreasing and increasing percentage for permeability in each of treatments in results and discussion.

RESULTS AND DISCUSSION

After studying and calculating radius amounts of final penetration rate for domestic sewage and it is drain in the lysimeter soils containing colza, basil and alfalfa, we achieve a useful result which is as follows: The digester table

for final penetration rate of domestic swage and first drainage as compared with control sample. By studying above table , it is cleared that soil and plant has played main roles in filtration of raw sewage because cause for reducing final penetration rate for sewage and it is drain is that suspended materials on the filtered domestic sewage, which were using for irrigating colza, were than first and second drainages and pit water. Also, suspended and nutrients materials on the first drain was more than second drain and pit water. For this reason, As much as we will move towards front, different between second drain and pit water with, respect to their final penetration rate become smaller (%7). This show that domestic sewage after passing of soil and colza filters leave parts of suspended and organic material it self in colza soil. As results from analysis first and second drains also emphasize this subject.

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