Study the soil chemical quality in artificial filter PP450
(Case study: Ramhourmoz rejion)

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Abstract: An essential part of each drainage system is the filter of drains. Drains filter is one of important factors in underground drainage system performance. The goal of this study was study Soil chemical quality in artificial filters in 2000 hours testing. The soil of Ramhourmoz area is studied in three treatments with three replication. First treatment in a continuous exploitation condition, second treatment is done by continius and discontinius flow and the third treatment is done through heating. Sampling process is done in 1/5 meter depth of installed drains in Soltan Abad region (In area lands of Fajr Ramhourmoz project). The model was made of Polyethylene Cylinder which consists of lace, sand, artificial filters, soil and water. The exit water is used again. The quality of water and soil of the region was measured before the test. After three months soil quality is measured again and the result is presented in tables. The results indicates rises in all elements after 2000 hours data processing. Element rises percentage is the most in the over heating treatment due to the gravity of this treatment, Then is discontinius treatment and the one is constant treatment. Gyps and Carbonate amount in all measuring parts were zero.

Keywords: chemical quality, artificial filter, drainage

1. Introduction

Using artificial filters in any location needs familiarity about benefits and challenges of its usage. Currently artificial filter is widely used in many places in the world. But it hasn't been accepted in Iran because there isn't enough knowledge and information about benefits and disadvantages of artificial filters (Ritzema, 2006). Drainage filters are the spongy materials around drainage pipes which protect them from soil movement and it's sedimentation. In many cases the name at this spongy materials around drainage pipes``drainage filter``. The role of filter is to maintain the soil elements on its back, and the small elements may be congregated inordinately. So filter and soil around it will be clogged. While an appropriate drainage cover prevent the sedimentation gravity (Stuyt et al, 2007). Filters and Geotextile cover which were usesd more than 50 years and they brings us successful and unsuccessful experiences results in making an equipment which is assessed by engineers now. In this 50 years the filters sometimes were appreciated and sometimes were condemned. Now a day there is no eager to use Filters and Geotextile filter in other Geotechnic engineering science in Iran. A lot of studies band researches is done about the artificial cover in all over the world (Giround, 1997). Naseri and Arvahi (2005) compared the performance of two artificial cover PP450, PP700 with standard sand filter and region sand. As the results indicated, the best Technical and economical option in applying the underground drainage system is the best filter to underground drainage filtration. The option which has the best performance in statics and salinity level controlling. Ramezani Moghadam (2009) considered three kinds of PP450 artificial filters of.

Domestic and foreign productions in one of heavy soil in khozestan by using Sand Tank physical model. The results showed that primary clogging and sedimentation in drainage pipes with Dutch filters is less than Iranian filters. Ghobadinia and Rahimi (2012) analyzed Geotextile cover clogging. The results if their studies show that in the exit apertures, the areas which have aerobic and anaerobic conditions, the sedimentation is more than other areas. Wilson-Fahmy et al (1996) in their studies found that clogging is happened more than in the middle part of current moving into drainage (pipe or through its elements) and the fiber clogging is less. So it is obvious that the more studies should be done on this aspect. Youshan et al (2001) in their analysis about Geotextile filtration found that testing by hydraulic Gradient has reliable result rather than other testing like discharge.

2. Material and Methods

Table 1- Measuring method of Water and soil properties

Measuring method	Type Factor
Reading by Ec meter	EC
Reading by PH meter	pH
Titration by EDTA	Ca^{2+}
Titration by EDTA	Mg^{2+}
Titration by Silver nitrate	Cl^-
Titration by sulfuric acid	CO_3^2
Titration by sulfuric acid	HCO_3^-
Flame photometer	Na^+
Flame photometer	K^+
Hydrometer	Soil texture

The project area has arid and semiarid climate with the hot and longtime summer, climent and short winter. The rainfall pattern is following the Mediterranean rainfall pattern. So most of raining is in the winter and the region is totally arid in the summer. Sampling process is done in 1/5 meter depth of installed drainas in Soltan Abad region. This study consists of three treatments: First treatment in a continuous exploitation condition, second treatment is done by in wetting and drying and the third treatment is done through changing the temperature. After 2000 hours testing, the soil of each cylinder is got out and its chemical features was measured. Water and soil features Measuring method is summarily indicated in the table 1.

3. Results

Physical and chemical properties of soil is shown in the tables 2 and 3. As it can be seen silt, sand and clay percentage is collected by soil pattern, clay-loam soil pattern. In tables from 4 to 6 chemical properties of soil at the end of testing is shown.

Table 2- Physical properties of studied soil

soil pattern	clay percentage	sand Percentage	silt Percentage
clay- loam	31.5	30.5	38

Table 3- Primary Chemical properties of soil

EC (dS/m)	pH	CaCO$_3$ (%)	CaSO$_4$	HCO$^-_3$ (meq/lit)	CO$_3$ $^{2-}$ (meq/lit)	Cl$^-$ (meq/lit)	Ca^{2+} (meq/lit)	Na$^+$ (meq/lit)	Mg^{2+} (meq/lit)	K$^+$ (meq/lit)
5. 02	7.64	24.56	0	23	0	35	30	10	25	.8

Table 4- Chemical properties of soil in continuous treatment at the end of test

EC (dS/m)	pH	CaCO$_3$ (%)	CaSO$_4$	HCO$^-_3$ (meq/lit)	CO$_3$ $^{2-}$ (meq/lit)	Cl$^-$ (meq/lit)	Ca^{2+} (meq/lit)	Na$^+$ (meq/lit)	Mg^{2+} (meq/lit)	K$^+$ (meq/lit)
5.76	7.74	24.87	0	25	0	55	35	11.6	35	0.9

Table 5- Chemical properties of soil in discontinius treatment at the end of test

EC (ds/m)	pH	CaCO$_3$ (%)	CaSO$_4$	HCO$^-_3$ (meq/lit)	CO$_3^{2-}$ (meq/lit)	Cl$^-$ (meq/lit)	Ca^{2+} (meq/lit)	Na$^+$ (meq/lit)	Mg^{2+} (meq/lit)	K$^+$ (meq/lit)
6.13	7. 81	24.91	0	28	0	60	40	12.2	40	0.9

Table 6- Chemical properties of soil in heating treatment at the end of test

EC (dS/m)	pH	CaCO$_3$ (%)	CaSO$_4$	HCO$^-_3$ (meq/lit)	CO$_3$ $^{2-}$ (meq/lit)	Cl$^-$ (meq/lit)	Ca^{2+} (meq/lit)	Na$^+$ (meq/lit)	Mg^{2+} (meq/lit)	K$^+$ (meq/lit)
6.27	7.89	25.23	0	35	0	65	45	12.8	45	1

By comparing the results of table 2 with tables 4,5 and 6 it can be seen that all elements are increasing. In all water and soil samples, the amount of gyps and carbonate is zero.

In the continuous treatment the amount of Potassium increases 12/5%, Magnesium 28/5 %, Sodium 16%, calcium 16/6%, chlorine 57/1%, Bicarbonate 8/6 %, lime 1/28%, electrical conductivity 14/7 %, Acidity 1/3%. The increases of elements is because of salinity and water quality changes.

In the discontinius treatment the amount of Potassium increases 12/5%, Magnesium 60 %, Sodium 22%, calcium 33/3%, chlorine 71/4%, Bicarbonate 21/7 %, lime 1/42%, Acidity 2/22%. As you see the element has the most increasing in the heating treatment because of gravity of this treatment, then is the discontinius treatment and the least one I'd continuous treatment.

In the heating treatment the amount of Potassium increases 25%, Magnesium 80 %, Sodium 28%, calcium 50%, chlorine 85/7%, Bicarbonate 52/1%, lime 2/72%, Acidity 3/27% electrical conductivity 24/9 %. Elements increasing percentage is shown in the table 7.

Table 7 - Percentage of elements and parameters increases in different treatments.

EC (dS/m)	pH	Lime (%)	HCO_3^- (meq/lit)	Cl^-	Ca^{2+}	Na^+	Mg^{2+}	K^+	
14.7	1.3	1.28	8.6	57.1	16.6	16	28. 5	12.5	continuous treatment
22.1	2.22	1.42	21.7	71.4	33.3	22	60	12.5	Fitful treatment
24.9	3.27	2.72	52.1	85.7	50	28	80	25	heating treatment

The reason of electrical conductivity increasing is that the exit water is used again as an input.

Testing continuous, fitful and heating treatment showed that heating treatment had the most changes, then fitful treatment and finally continuous treatment had the least changes. The most change is for chlorine in heating treatment about 85.7 percent and the least changes for acidity in continuous treatment about 1.3 percent.

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References:
1. Ramezani Moghadam, J.(2009). Analyzing the artificial underground covers in laboratory which made inside the country and comparing them with similar outside product. MA Thesis, water engineering science college, Shahid Ghamran Ahvaz University.
2. Ghobadinia, M & Arvahi, A.(2012). Drainage cover clogging.7th drainage and environment workshop (December,2012).
3. Naseri, A & Arvahi, A (2007). Technical and economical artificial cover usage in underground drainage system and comparing it with common sand filters in Abadan Palms. *Iran agricultural science journal*, agricultural and Natural sources Tehran university,38 (3).
4. Giround, J. P.1997. Geotextiles Filters: Reliable Design and Instalation. Presented at Precoeedings of Geotextiles Geomembranes Rencontres 97 Reims, France: 170-196.
5. Ritzema, H. P, Nijland, H. J. and croon, F. W.2006. subsurface drainage practices: From *manual Installation to large-Scale Implementation. Agricultural water management*. 86(1-2): 60-71.
6. Stuyt, L. C. P. M. Dierickx, W. and Beltran, J. M. 2005. *Materials for Subsurface Land Drainage Systems in the Netherlands. Geotextiles and Geomembranes*.5(2),123-140.
7. Wilson-Fahmy, R. F.1996. Geotextile filter desin critique. Proc. symposium in recent developments in Geotextile filters and prefabricated drainage geocompostites, West conshohock, PA, USA, pp 132-1.

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