Study changes the chemical properties of the limy soil around the drain cover in the absence and presence of sugarcane bagasse round drain cover

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Abstract: In order to analyze the application of sugarcane Baggase in controlling the clogging of the agricultural sub-surface drain envelopes, an experiment was conducted at the physical models experimental lab of the Shahid Chamran University of Ahvaz between February 2016 And September 2016. The physical model utilized in this practice for simulating the drainage trench consists of a 150cm High, 40cm Wide and 120cm Long trench. In the first case, the Sugarcane Baggase with a volumetric ratio of 30 to 70 was mixed with soil and placed around the drainage pipe and was established to flow continuously for 2,000 hours. in other tests not covered bagasse. The in-flow continuously passed through the system from the beginning to the end of the experiment. Before starting the experiment, soil chemical and physical properties were evaluated. To study the chemical properties of soil saturation extract was prepared. Also after the end of the test, chemical was re-evaluated soil. The results showed that the soil elements at the end of the experiment in both presence and absence of bagasse increased. The results showed that in the case of bagasse placed around the drain cover was an increase of less elements of the other.

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1. Introduction

While there are several types of salts in the soil, salts that have higher solubility in water are dissolved and removed from the soil, But salts with low solubility in soil, sediment layers hard to cause clogging in the soil or in their coverage. Among the salts in soils of the arid and semi-arid, three compounds calcium carbonate (whit solubility 0.013 gr/lit), magnesium carbonate (whit solubility 1.9 gr/lit) and calcium sulfate (with solubility of 2.5 gr/lit) salts, usually in these are areas and have low solubility. Among the above, magnesium carbonate accumulation in soils is very low, Calcium carbonate and calcium sulfate salts, can cause clog are caused by the sequential deposition. The amount of calcium carbonate in the soils of arid regions may reach up to 80 percent of soil weight. It provides the conditions for rapid deposition and a layer of rigid form and clog the system (FAO, 1973).

Hassan oghli and et al (1393) geotextile tubes and pipes were typical compared. The results showed normal drainage tubes coated with minerals (sand) better Operation than geotextile tubes. Of course, with heavier soil texture reduces the outflow of both tubes, but it affects more the geotextile tube.

Also in terms of soil particle transport and deposition of particles in the geotextile tube into the gravel and sand cover is greater than conventional tubes.

Tishezan (1381) Effect of Specifications hole drainage pipes and Soil gradation, in the amount of clogging drainage pipes were investigated. The results of this study show that the circular holes sedimentation rate less than its square and rectangular holes pass through.

El-Sadany Salem et al (1994) for two types of coarse-grained soil in Egypt, artificial coverings from Prestressed compared with conventional geotextiles. The results showed that despite the passage of amount of material, covered was fine and coating performance in terms of congestion does not cause concern. However, thin coatings are more at risk of being clogging.

Hashemi and et al (1388 and 2011) of alder wood particles, rice bran and palm leaves to provide a source of carbon (energy) Nitrification microbes used to remove nitrate water drainage. They have announced the use of all these cases it is desirable to achieve the desired goal, But palm tree leaves, rice bran and particle board have the highest efficiency in removal of nitrate.

Namasivayam (2008) of coconut as a bioreactor to remove some of pollutants water used and by measuring parameters such as temperature and acidity, the performance of the material in removal of nitrate anions and a favorable properties described.

2. Materials and methods

Physical Model

The main objective of this study was to evaluate the ability of sugarcane bagasse in controlling the clogging of the synthetic coatings of the drainage pipes in limy soils. For this purpose, a built using Plexi-glass material to represent a drainage trench. The model was 150 cm high, 100 cm long and 40 cm wide (Fig. 1). The model was fell with the local limy soils (Table 1) and a drain pipe with a length of 40 cm and a diameter of 125 mm was placed at the height of 35 cm from the bottom of the model. The soil used in this study had an overall loam texture (Table 1), and a pH and EC of about 7.64 and 5.02 dS/m, respectively.

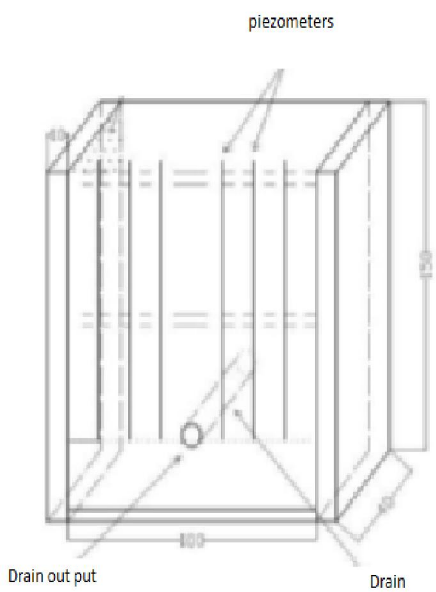

Fig. 1. Physical model details.

Table 1. physical properties of the soil (%).

Silt	Clay	Sand
38	31.5	30.5

Experiment set up

This experiment was conducted in the form of two treatments: (i) with baggase (WB) and (ii) without baggase (WOB). In the first treatment, namely; WB, a layer of sugarcane baggase was placed around the agricultural drain pipe installed at the depth of 115 cm from the soil surface. While in the other treatment, namely; WOB, no baggase was placed around the pipe. For each treatment the model was exposed to continuous water flow for 2000 hr. chemical characteristics of the soil were determined and before and after exposal to the water flow.

3. Results

Physical and chemical properties of soil

Chemical characteristics of the soil prior to the experiment run are illustrated in Table 2. According to this data the quantity of element Cl was the greatest, being equal to 60.0 meq/lit, followed by Ca (with 40.0 meq/lit). This is while the quantity of HCO_3^- and Mg was almost the same in the soil, being equal to 25 meq/lit, each. Furthermore, chemical analysis of the soil indicated the almost 0.8 meq/lit of the element K and a negligible amount of CO_3^{2-} in the soil.

Table 2. chemical properties of the soil before the start of experiment.

HCO_3^-	CO_3^{2-}	K	Na	Mg	Ca	Parameter
25	0	0.8	10	25	40	(meq/lit)

The results of chemical analysis for the soil in the treatment WB is given in Table 3. According to this data, the quantity of the elements Cl, Ca and Mg stood at 62.0, 42.0 and 32.0 meq/lit, respectively. Furthermore, the amount of HCO_3^-, Na and K was about 27.0, 11.0 and 1.0 meq/lit, respectively. Here again, there was a negligible amount of CO_3^{2-} in the soil.

Table 3. chemical properties of the soil at the end of the experiment in the treatment WB.

HCO_3^-	CO_3^{2-}	K	Na	Mg	Ca	Parameter
27	0	1	11	32	42	(meq/lit)

This is while, according to the data obtained for the treatment WOB (shown in Table 4), the amount of Cl, Ca, Mg and Na stood at the rates of 65.0, 45.0, 34.0 and 14.0 meq/lit, respectively. The conducted test also detected almost 30.0 meq/lit, 1.0 meq/lit and negligible amount of

HCO_3^-, K and CO_3^{2-}, respectively.

Table 4. chemical properties of the soil after the end of the experiment in the treatment WOB.

HCO_3^-	CO_3^{2-}	K	Na	Mg	Ca	Parameter
30	0	1	14	34	45	(meq/lit)

4. Discussion

A comparison between the information shown in the tables 1 to 4 reveals the fact that despite the amount of six out of the seven chemical parameters studied in this practice have increased in both treatments, this increase was smaller in the treatment WB, in comparison with the other treatment, namely; WOB. This implies that existence of sugarcane baggase around the drain pipe in the treatment WB has lowered the rate of the nutrients deposal in the soil.

By comparing the chemical properties of soil at the beginning and end of both treatments, in can be concluded that sugarcane baggase has the ability to control the nutrients deposal in the soil.

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