Century Innovation On Land Drainage Pipe

Hydroluis Drainage Pipe System

Subsurface Drainage Pipe For Land Reclamation

- First Anti-Roots Land Drainage Pipes
- Working Without Yearly Maintenance

Patented Product

HİDROLUİS®
Drainage Pipe System

CEO & Inventor: Eng. Lui TOPALHASAN

About New Innovation
Hydroluis Drainage Pipe System

As is known to all, drainage pipes are used to drain excess water present in the soil (Water logging and Soil salinity problems). Construction or agricultural sectors whenever they start considering investments in field projects, one of the key issues for engineers is to deal with the drainage problems. When considered on this basis to establish significant amount of cost investments, an important consideration is the desire of drainage to remain running in the long term.

The first plastic pipe in the world was manufactured on 1962. Till date, manufacturers guarantee only pipe's underground strength and life cycle of plastic shape, excluding guarantees of continued function of the drainage pipes underground. However, it is more important that drainage pipe must keep on performing during it's underground life cycle. In addition to Iron oxide and Calcium carbonate, other factors like bacteria, silt or plant roots clogging problems affect the pipe performance. Therefore , periodic maintenance or laying new drainage pipe lines in the fields has been required since now.

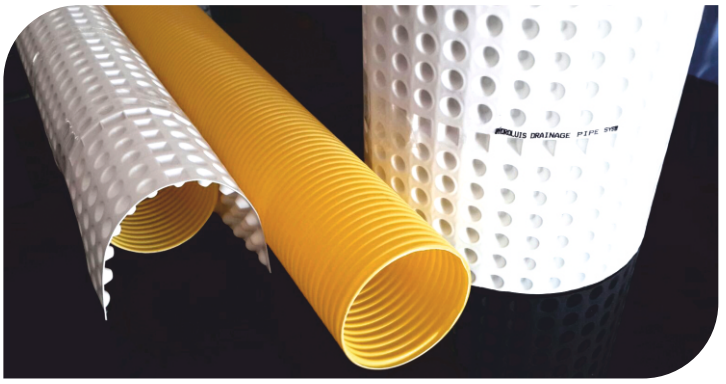
In order to increase water flow and prevent clogging problems worldwide, Organic, Mineral and Synthetic type of envelope materials are being used on drainage pipes in order to save the investment and have long life underground. In this regard, Gravel & Sand Envelope materials, Geotextile Envelope Materials, French Drain (Gravel&Sand plus Geo-textile envelopes) are available in the market.

The efforts of all such filter systems are to overcome the clogging issue. However , a hundred percent success rate could not be achieved yet (FAO). The most important works on these issues were being done by United State Bureau of Reclamation (USB), McGill University and the International Institute of Land Reclamation and Improvement ILRI, Wageningen University. We can search through their reports on these subjects and notice that clogging problems are one of the most discussed topics of the 21st century. Regarding International Commission on Irrigation and Drainage ICID very important commission works engaged with the World Food and Agriculture Organization FAO working on this subject too.

Our company signed on definitive solution to the clogging / maintenance problems in the drainage pipe by a valuable invention of this century and have developed the Patented HYDROLUIS® Drainage Pipe Systems. With this new technological innovation, we started the production of Hydroluis® drainage pipe systems invented by Mr. Lui TOPALHASAN in Istanbul city and President of Turkish National Committee of ICID (TUCID) president Mr. Ali RIZA DINIZ General Director of General Directorate of State Hydraulic Works, TURKEY (DSI), Nominated as our new Technology for Watsave Awards Program 2015 to ICID organisation.

Advantages and Characteristics of

Hydroluis® Drainage Piping Systems



1- First anti-plant roots drainage pipe on the world. (It does not emit moisture from the pipe holes).
2- Anti-bacterial (Iron oxide was effecting ıron ochre, calcium carbonate and sulfate was effecting bio-film clogging problems on other drain pipe envelope).
3- First drainage pipes saving the underground water in drought seasons. Works only when water table rises above specified levels.
4- Water flowing best performance in any soil texture triangle (Entrance Resistance) . Minimum sediment than all envelope systems during land fit period.
5- Eliminates requirement for annual maintenance or internal cleaning of drainage pipe and guarantees the strength life cycle and operational performance of plastic. (Hydroluis sheet applied drain pipe increasing the stiffness.)
6- Showing longer-term operating performance in all types of soil conditions as compared to competing drainage systems.
7- Long term operating costs of the drainage pipe proves to be the most cost-effective.
8- After laying the system, disadvantages of growing plant roots are turned in advantages as this system increases water flow in the direction of drainage pipe (like bio drain).
9- Usable in shallow impermeable grounds, and in ropy grounds i.e. (Even it's near the plant roots).

Hydroluis® drainage system has a special feature for tracking barcode, banners, and is a patented product. Copying and implementing without written permission is prohibited. Application of the system can be made only with the aid of special application tools. Hole-making, laying and installing this tool by our trencher machines is very easy. For manual applications, which can also be used as tools by hand, these aids can be obtained free of charge by our company to our costumers.

All these characteristic properties come from new filtration technique based on ground water filtering itself in hydroluis drainage pipe system. Other envelope materials like organic, mineral, synthetic envelopes, upon circulation/ installation on drainage pipe look like net based holes circularly is open for sediment and roots effects on drain. This new innovation water filteration system, on the other hand has holes that do not let out humidity from the pipe even when water table is lowered below the drainage pipe.
The innovation on new type of filter by ground water obtained incredible advantages in land drainage sector. To promote usage of hydroluis drainage pipe system worldwide, hydroluis company is open to corporate with local distributors, drainage contractors .

EFFICIENCY OF

HIDROLUIS DRAIN PIPE-ENVELOPE COMBINATION ON SUBSURFACE DRAINAGE SYSTEMS

By Prof. Dr. İdris BAHÇECİ

Abstract

Various filters and envelope materials have been produced in order to prevent siltation and blockage in subsurface pipe drainage systems. These are organic and inorganic materials, ready rough wound materials, synthetic and organic fibres. It was determined that Hidroluis pipe-envelope combination showed a great performance in terms of penetration resistance according to the first year's results of the study conducted in order to determine its potential to be used in subsurface drainage systems as a material that prevents penetration of plant roots into the pipe and that drainage waters carried 34 g m-3 of silt.

Introduction

It is expressed that the life of subsurface drainage systems is hundred years in average if no blockage and deformation occur in pipes (FAO, 1990; Stuyt et all., 2005). Blockage of the pipes generally occurs due to the reasons such as sanding, siltation, chemical and biological settlement, penetration of plant root into the pipe, accumulation of compressed filling soil in drainage trenches (in very wet environments), improper installation of individual piper and dysfunction of the filter (Eggelsmann, 1987).

In order to prevent entry of sediments into drain pipes and blockage, pipes are wound by jacketing materials selected according to the characteristics of the soil where they will be installed and sold ready to use in recent years. Sand-gravel, pre-wound organic fibers, synthetic fibers, synthetic fabrics are widely used envelope materials. A practical application that will prevent penetration of plant roots into the pipes until now is to increase installation depth.

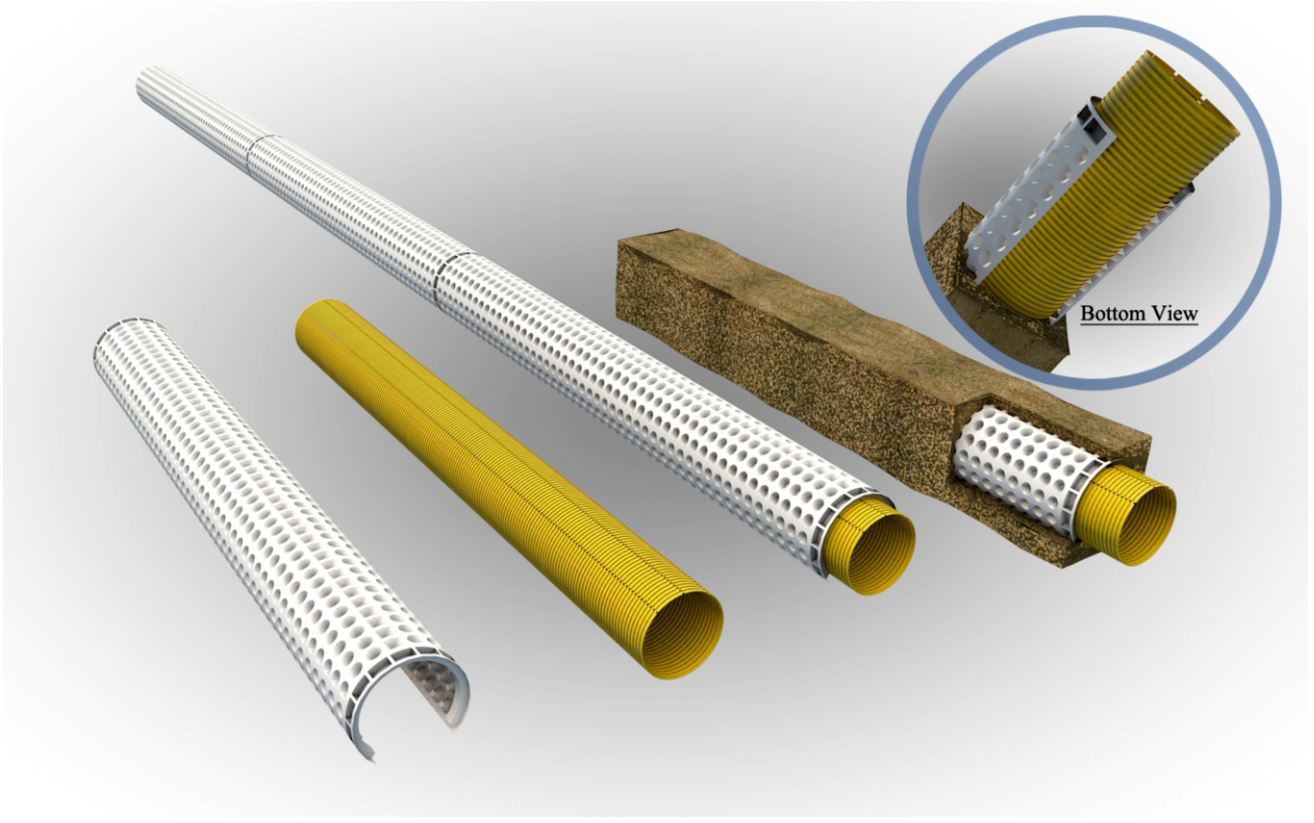
In soils that are problematic in terms of siltation, it is very important that penetration of soil grains into the drain pipe to be prevented (Zaslavsky, 1978). The material wound around the pipes in order to prevent sediment penetration into pipes must have the feature that does not increase penetration strengths (Wesseling and Homma, F., 1967).

Load losses that occur due to the compression during the entering of water into the drains, reduce efficiency of the systems. Increasing hole widths and consequently hole areas of plastic drain pipes decrease resistance values (Cavelaars, 1965). Robert et all., who tested different envelope options (1987), achieved the greatest flow rate and lowest siltation in their study conducted in horizontal sand tank and fine sand loamy soil, in the pipes where geotextiles were used.

In fact, the materials that will perform all functions that are expected from the drain envelope are sand gravel materials that are obtained from natural sand gravel pits and designed according to the characteristics of foundation soil. However this is not functional as it is very expensive and material pits are not uniform and designed wrong.

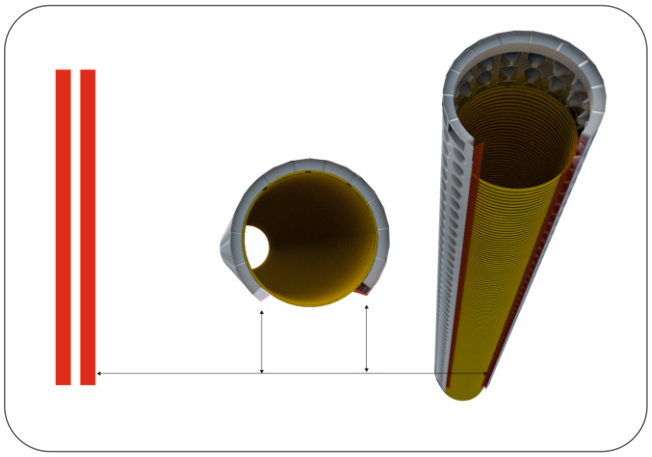
Although there are many studies and publications (Bahçeci et all., 2001) claiming that there is not need for envelope for the filter (Vlotman, 1990) in matured, structurally developed, stable soils that contain certain amount of clay, no non-filtered drainage areas in drainage systems established have been found in irrigated areas in our country.

Recently developed Hydroluis pipe-envelope system has been designed in a way that penetration of plant roots and rough materials into the pipe is prevented. In this system, there is a pipe-envelope combination in a way that top-external surface of corrugated plastic pipes are covered by a plastic layer track welded inside. Plastic pipes for application are manufactured without holes and holes are drilled starting from about 2/3 of the pipe to upwards during installation and coated hydroluis cover.



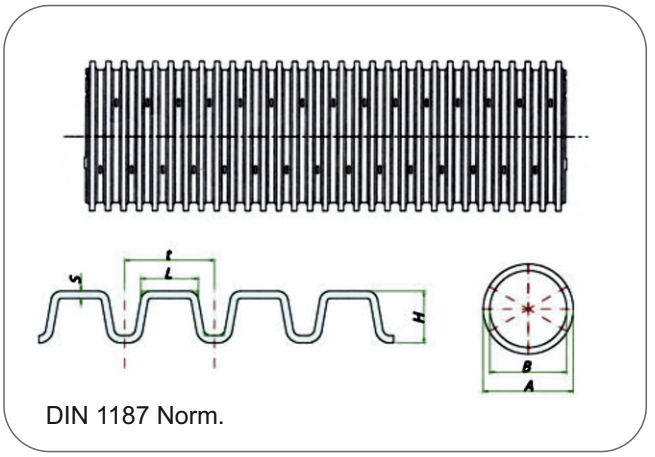
Entrance Measurements of Water Holes by square per meter.

Hydroluis Drainage Pipe System
For Ø 100 mm diameter Pipe is 160 cm² per meter



Diameter	Surface Area Per Meter cm² / m	
Hydroluis Standard Production		Special Production
80	160	
100	160	Depends on
125	160	customer
160	160	request
200	160	

Universal Standard Drainage Pipe System
For Ø 100 mm diameter Pipe is 25 cm² per meter



Diameter	Surface Area Per Meter cm² / m
80	25,3
100	24,3
125	41
160	41
200	56

In the mentioned pipe-envelope system, a known approach has been benefited. As it is known, about 70% of water entry to drain pipes takes place with radial flow underneath the pipes. In ordinary drain envelope system, water flows fast or slowly into the pipe through the holes around corrugated plastic pipes depending on the hydraulic load upon rising of underground water. Penetration of fine materials around the pipe into the pipe takes place depending on the hydraulic load on the pipe and water penetration speed into the pipe and soil structure. Water entry to drain pipe takes place as the result of rising of water through the channels between the covering material and corrugated pipe and its flowing into it. Thus, during its flowing into the drain pipes, particles heavier than buoyancy force of water cannot enter inside the pipe as they settle. As those, which rise with water and carried into the pipe on the other hand, are in weigh that can be carried easily with water again, siltation problem is eliminated or minimized.

On the other hands, as pipes are covered with Hydroluis plates, plant roots cannot penetrate into the pipes. Plates not only prevent penetration of roots into pipes, but also prevent spread of humidity due to capillarity, especially in arid periods and consequently prevent diversion of plant roots to the pipe side, by functioning as a barricade between the top soil and pipe.

With the recently developed HYDROLUIS Pipe-Envelope system, it is aimed to prevent siltation and penetration of plant roots into the pipe. During land fit period best than all systems.

Material And Method

The study was conducted at GAPTAEM research station in Harran Lowland. Soils are deep profile and have more than 40% clay and 10-15% lime content. They are structurally developed and have high water conductivity.

Harran Lowland is hot and arid in summers and cold and rainy in winters. Mena annual precipitation is 365, average temperature is 17.2 °C and open water surface vaporization is 1850 mm. Distribution of precipitation in seasons is; 56% in winter, 30% in spring, 13% in autumn and 1% in summer. Average number of rainy days is 70 and number of days covered with snow is 3.

Hidroluis Pipe Envelope Combination

In this system, drain pipes are manufactured without holes and holes are drilled while winding the pipe around at the same time during installation. Thus, it is ensured that holes coincide to the top and sides of the pipe. Since, lower parts of the pipe, which contact to soil are hole-free, no water penetration from these areas take place. Plates wound on the pipe also increase solidness of the pipe by providing a mechanical support from stiffness side.

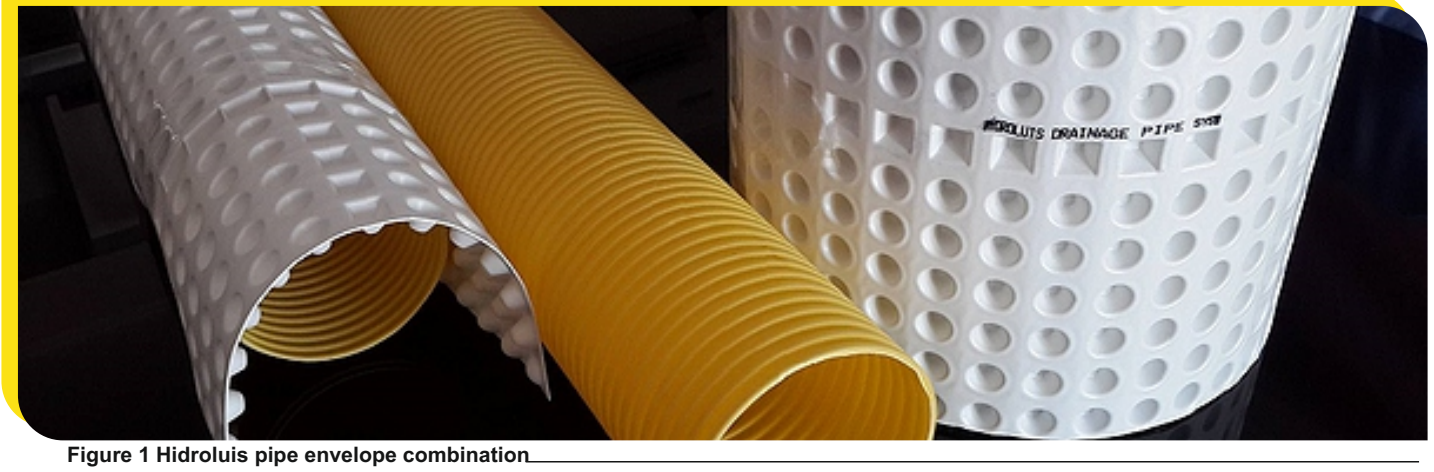


Figure 1 Hidroluis pipe envelope combination

Method In the study, Hidroluis Drain pipe envelope system was compared to other pipe-envelop systems. Following subjects were handled in field trial set up in trial station.

Subjects:

- Hidroluis pipe envelope combination
- Sand-gravel filter envelope wound drainage pipe
- Non-filtered drainage pipe
- Fiber filter enveloped drain pipe

Measurement And Assessment

Simple method was used for measurement and assessment. This method is useful for irrigation areas. Although the entire area where the absorber is active feeds the drain in rainy areas, the area fed by the absorber drain in irrigated areas is variable. There is a continuous variability between the irrigated drain length (L) and drain interval. Thus, calculating the qu value in the equation correctly is very difficult and even impossible in field conditions.

Enterence Resistance Evaluation Criteria (Ritzema, 1994)

Evaluation criteria		Enterence Resistance	Drain Performance
K r_e/L	$h_3/(h_2+h_3)$		
<0.4	<0.2-0.3	Normal	Good
0.4-1.5	0.3-0.6	High	Midle-Low
>1.5	>0.6	To High	low

	$h_3/(h_2+h_3)$	Drain performance
D1(Geotextil envelope)	0,38	Midle-Low
D2(without envelope)	-	-
D3 (Gravel-sand)	0,25	Good
D4 (Hydroluis drainage pipe system)	0,28	Good

Table 2

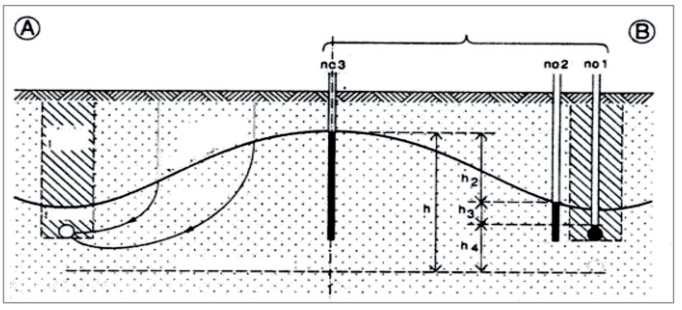


Figure 1 Schematic view of the piezometers located for determining entry resistances

Findings And Discussion

In order to compare effects of different envelope materials on entry resistances under same soil conditions, water table heights inside the water, just outside the drain trench and central point of two drains on the irrigation period when the water table rose, were measured. Different pipe envelope combinations, load losses incurred and entry resistances were determined from water level measurements (Table 2).

			Katyonlar (me/L)					Anyonlar (me/L)				
	pH	EC dS/m	Na me/l	K me/l	Ca me/l	Mg me/l	Toplam me/l	CO_3^- me/l	HCO_3^- me/l	Cl me/l	Toplam me/l	**Silt (g/l)**
D1 (GeoTextile envelope)	7.50	0.985	2,36	0,03	5,05	2,56	10	1,06	5,04	3,90	10,0	**0,035**
D2(without envelope)	7.20	1,029	2,25	0,01	5,55	2,55	10,36	1,32	5,19	3,85	10,36	**0,046**
D3 (Gravel sand envelope)	7,19	0,955	1,7	0,03	4,72	2,34	8,79	1,54	3,47	2,86	8,79	**0,026**
D4 (Hydroluis drainage system)	6,95	0,971	1,79	0,02	5,08	2,71	9,6	1,78	3,97	3,38	9,6	**0,034**

Table 2

As seen from Table 2, according to the simple method applied for the irrigated areas, drain performance in sand-gravel and hydroluis pipe combination is found good while geotextile took part medium-weak group.
Hydroluis drain envelope combination took the 2nd place in terms of silt content of drainage waters. Sand-gravel drains carry 26, hidroluis carry 34, geotextile carry 35 and envelope drain pipe carry 46 gm3 of silt. *It can be said that hydroluis envelope material has lower filtering feature than sand-gravel but higher than geotextile and non-filtered drains.* However, these siltation values are not high when they are evaluated in terms of irrigation water. But it was in land fit period Clean than all other systems without maintenance, for other systems we used flashing and cleaned.
On the other hand, pH, Ec and Silt analysis were performed by taking drainage water samples. There is no considerable difference between pH and EC values of drainage waters and it was understood from these values that pipe envelope combinations do not have a distinguishing effect.

Conclusion

*Hydroluis pipe envelope combination showed performance close to sand-gravel in terms of siltation and entre resistance*s. Prevention of penetration of plant roots into the pipe makes this material advantageous. Furthermore, Hydroluis pipe envelope combination has outstanding features when compared to sand-gravel which is a similar material. It has features that prevent or reduce deformation in pipes by providing mechanical support. Fair production costs, transportation and installation easiness also increase potential of using Hydroluis pipe envelope combination.

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HARRAN UNIVERSITY
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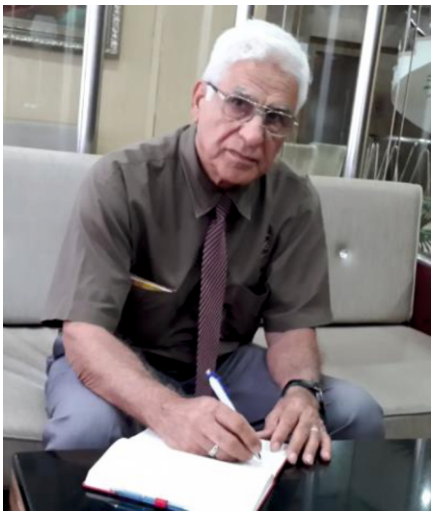

Reference Letter for
Hydroluis Drainage Pipe System

Dr. Ahmed Mohammad AZEEZ; as a Researcher and Expert, I have a research and application background of 40 years on salinization and rising water table problems in soil reclamation. I have high achievement awards rewarded in Rio De Janeiro, Brasil 20-22/Jun/2012 RIO +20 organized in the leadership of The United Nations Secretary General, Ban Ki-mun, active membership in ICID (International Commission on Irrigation and Drainage), active membership in Iraq Scientists Union in the USA and Iraq Scientists Association in Iraq.

Salinization in soil reclamation and rising of water table are encountered as a general problem for countries around the world. And we know that there are some challenges in choosing envelope materials suitable for the land and soil Agricultural closed drainage project applications as a necessity of this. Regarding to this, there are many filter envelope materials, sand/gravel envelope mixture, coconut fibre, envelope materials with synthetic fiber, straw and others. In 1974, we conducted a study at Wageningen University on selecting the materials suitable for the soil structure by comparing these filters.

The reason we visit Turkey is to understand, see the operation logic of the recently developed Hydroluis Drainage Piping system that prevents penetration of plant roots and does not require maintenance and to examine results of the tests conducted. The fact that new filter material is the underground water itself, has attracted us. We met Prof. Dr. Mr. Idris BAHÇECI, for conducted tests with this drainage system that is made with a special method and area, at GAPTAEM Talat Demirören Research Center and I evaluated the results in terms of competency. Since we consider a period of 6 months to 1 year generally suitable for soil settlement, a found the trial period of about 2 years for the pipes laid, sufficient. I found its success in declining the water table pleasing and good. We consider the success of this method in reducing blockage maintenance expenses and plant root prevention as a very logical and good progress. We are sure that this invention will take its place among soil reclamation materials in all countries in the future. Therefore, we congratulate Lui TOPALHASAN, who is the owner of the invention and invite him to the 66TH ICID Congress in Montpiller in order to present his product and introduce it worldwide, so that all countries around the world can know the success of Turkey. While world countries have not achieved any innovation in this area for many years, the fact that new method will constitute a standard for both blockage problems and all other areas in soil texture triangle, seem to bring many advantages.

Best Regards,
Dr. Ahmed Mohammad Azeez

Your Comments:

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Address: Aura Residance Pegagaz Street No: 4 / A Blok
D86 Yeni Mah. Kartal / İSTANBUL - TURKEY

Email: hydroluis.drainage@gmail.com
Tel:+90 532 265 92 04 Fax +90 216 672 12 83
www.hydroluis.com

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