

Waste Alkaline Residues Impact in Desertification Treatment in Iraq

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Abstract. Waste Cement waste (the by-product of the cement industry) is produced from a dry and wet method for manufacturing cement. These wastes are produced in large quantities from various cement factories that are estimated in tons thrown in the land located in different places of the country, for example, Kufa cement factory in addition to a huge amount of cement dust produced by (450Tons per day) and their influence on the environment. Therefore, a safe method must be found so that can eliminate these wastes because the by-product contains heavy metals and their oxides which are harmful to the human and to the environment especially air pollution and desertification. In this research it has been utilized these wastes as major and minor nutrients for sand soils (major nutrients Ca, K, S, Fe and small nutrients (Mn, Zn, Cu)), cement dust is added in certain proportions to the sandy desert lands. The result showed significant yields by increasing the content of sandy soil from the major and minor nutrients. This enables us to gain a safe environment and solve desertification problem which has a major cause to the environmental pollution.

Keywords. Treatment desertification, Cement waste, Alkaline Residues.

1. Introduction

The natural soil was formed as a result of the influence of a number of physical and chemical factors. The chronological age of the soil that a person deals with in his daily activities ranges from hundreds of thousands to millions or may be more. Over this age, the fluctuations in natural conditions, as new soils are constantly being formed and existing layers are compacted. Additionally, external factors such as wind, the influence of water and temperature fluctuations play as well a significant role in changing soil composition, in addition to other, no less important factors such as earthquakes and volcanoes. The basic components of soil depending on engineer scale can be summarized into three basic components:

- Solid particles.
- The spaces between the particles (Voids).
- Water or air inside the spaces, singly or in combination.[1]

Pollution is one of the major problems faced by modern man. The problem is further complicated by the fact that man himself has a clear role in increasing its danger through its various activities that threaten human life as well as its effect on organisms life and hence other living things that cause a change in the natural balance of the environment and its various components, living and non-living.

Pollution can be divided according to the medium into three main types: Air pollution, water pollution and soil pollution. [2, 3]

One of the main causes of this pollution is chemical and biological waste which is raised in many different forms which possess many characteristics such as; the physical states and reusable potentials, biodegradable potentials, source of production and the degree of environmental impact [4,5]. The waste can be classified broadly into three main types according to their physical states;

these are liquid, solid and gaseous waste. Although it is clear that several classifications exists in different countries. The most commonly classifications are illustrated below.

- Physical state (Solid waste, Liquid waste, Gaseous waste).
- Source (Household/Domestic waste , Industrial waste , Agricultural waste , Commercial waste , Demolition and construction waste , Mining waste)
- Environmental impact (Hazardous waste, Non-hazardous waste) [6].

In this research, the waste of Kufa cement waste was mixed in certain proportions with soils that are not suitable for agriculture (barren land) for treating desertification and reducing the non-planted areas and hence improving the environment.

Cement is a commodity the whole world needs, but the waste from its manufacture is a ghost of death that creeps into the environment and people. As it is considered one of the most dangerous environmental pollutants in the areas surrounding cement factories, due to the accuracy of its size and high smoothness which is between (20-100) microns and the proportions of chlorides, sulfates and alkalis contained in the source of risk in this soil in terms of health or environmental and represent obstacles in the path of circulation attempts, in addition to the ease of flying in the surrounding air, causing serious pollution to the environment and affects human health and respiratory system in particular. More, the cement waste is neither cement nor a component that can be used in recycling for cement making again; this led to him being dumped out by the cement factories. Therefore, the waste of cement factories represents a major environmental problem, as air pollution is also possible to contaminate the water if these wastes are dumped near rivers and water ways. Economically, these wastes cost hundreds of millions of dollars annually if they are disposed of in a healthy and safe way by burying these.

The aim of the project study the effect of adding cement residues to the soil disposing of cement factories waste, which constitutes a burden on the environment, which makes this friendly project to the environment. Further, determining the optimal content of cement residues for the soil.

2. The Materials

- A sandy soil model
- A model of (cement dust), the by-product of the cement industry
- Containers for agriculture
- The seeds of plants for planting



Figure 1. Shows (a) Cement Waste (b)Sandy soil.

1.1. Preparation Method

- Taking a 100% sand soil model alone as a control.
- Taking another sample with 25% of the by-product of the cement industry mixed with 75% of the desert sandy soil.

- Taking another sample with 50% of the by-product of the cement industry mixed with 50% of the desert sandy soil.
- Taking another sample with 75% of the by-product of the cement industry mixed with 25% of the desert sandy soil.
- The two types are planted with the same type and the same quantity of seeds. A comparison is made between them in the planting and the time period of planting.

3. Result and Discussion

Three types of plants were planted, namely, jute and basil with different percentages of sandy soil unsuitable for agriculture and cement waste.

Figure (2a) shows the jute plant , Figure (2b) shows the basil plant and (2c)tomato plant one week after planting. It has been noticed growth of plants in pots that contain different proportions of sandy soil with cement waste residues, while, there was no growth in the container that contains only sandy soil as control as shown in Figure (2).

Figure (3) represents the growth of plants after two weeks of planting. Where we note the difference in the growth rate according to the different proportions of sandy soil and the proportions of cement waste, and from Figure (3) (a) ,(b)and (c), we note that the best rate of plant growth is 50% sandy soil and 50% of cement waste and then 25% sandy soil and 75% of cement waste. Figure (4) and Figure (5) represents the growth of plants after three and four weeks of planting, respectively.



Figure 2. Shows (a) the jute plant (b) The basil plant (c) tamato plant one week after planting.



Figure 3. Shows (a) The jute plant (b) The basil plant (c) tamato plant two week after planting.



Figure 4. Shows (a) The jute plant (b) The basil plant(c) tamato plant thee week after planting.



Figure 5. Shows (a) The jute plant (b) The basil plant(c) tamato plant four week after planting.

Conclusion

Industrial wastes can be solid, liquid, or gas, all can cause a serious problem to the human beings, other living organisms in addition to the environment which led to desertification, pollutions and even changing the climate conditions. The way of disposal and storage can be different depending on the productions and wastes. Managements by the government and owners of factories are made to make the situations from consumers but still the waste represent a real threaten to the environment.

Here in this paper, method was done by using different ratios of wastes mixed with sandy soil which is not suitable for planting, from the practical it has been concluded a significant ratio was by adding cement waste to the sandy soil with 50% of each (i.e 50% of cement waste and 50% of sandy soil) although other ratios also caused a growth of plants but the 50% proportion was the best, and this is

due the sandy soil obtained enough metal oxides and elements that make them suitable as nutrient for plant to grow .

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