



SHORT COMMUNICATION

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Investigating the feasibility of using dried sludge wastewater treatment as fertilizer in urban green space

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Abstract

Today sludge disposal plant is one of the major problems in all countries, both developed and developing, is considered. In recent decades, with the legal restrictions on methods of burning and disposal of sludge on land and sea has arisen, Method of sludge on land as fertilizer is widely considered, However, due to the nutrients in sewage sludge can be used to improve soil, However, due to the risk of pathogenic micro organisms may cause a variety of diseases in humans, The aim of this study was to evaluate the feasibility of using dried sludge wastewater treatment plant in Ahvaz as fertilizer in urban green space with consideration of valid standards. In this regard, the application of chemicals and biological wastewater treatment Chonybeh examined, The results of the tests, including fecal coliform bacteria, total coliform and parasite eggs Environment America Organization standards (EPA) were compared. The results of this study indicate that the chemical properties of the fertilizer nutrients is a reasonable concentration, The only limiting factor of the chemical present in the sample, it is high salinity Installing drains in the area of green space in urban development projects and annual leaching and salt-tolerant plants can be minimized its effects. However, a maximum of microbial fertilizer on microbial USEPA Class B is standard. . This is suggested by the conditions in sewage sludge fertilizer) Co-Composting with composting) plant can be used to produce compost.

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Introduction

Today, sludge management, the development of wastewater treatment plants, including the construction of new treatment facilities or improving existing facilities, one of the most critical environmental issues has become. Due to the increasing development of municipal wastewater treatment plants in the country and produces a significant amount of sludges necessary provisions for the application of this product should be done with the wastewater treatment plant, Use of land, one of the most common methods of sludge disposal methods in many countries, both developed and developing is. The importance of this issue so far has found that over the past decade, the use of sewage sludge in agriculture has become a routine affair. Although sewage sludge due to its beneficial nutrients to plants and soil can be improved, But because sludge contains a variety of pathogenic microbes and microorganisms, Can cause disease to humans. , So in case of contaminated sludge, Application of sewage sludge in agriculture and urban green spaces has led to health concerns And can threaten public health. Unfortunately, the current study was to determine the quality of such counting parasite eggs in sludge wastewater treatment plants are not subject to and this is Fertilizer products have good quality and can cause parasitic diseases.

Farzadkia investigated Quality of wastewater sludge from Serkan City for reuse (2002), thus concluding that The waste sludge from the treatment plant sludge, raw areas that are not fixed their microbial quality is lower than Class B regulations microbial USEPA. The disposal or reuse of sewage sludge in agriculture, to health and to endanger public health and also cause soil and water contamination should therefore stabilize the sludge prior to disposal, must be emphasized. The present study aimed to

investigate the microbial contamination of feed chemical properties of sewage sludge Chonybeh to investigate the possibility of using it as compost in urban green space.

Materials and method

In this study, chemical and microbial characteristics of sludge wastewater treatment and sludge sampling choneybeh depot in the area of wastewater treatment was performed in Ahwaz. While chemical analysis on samples of PH, EC and percent sodium, potassium, calcium, phosphorus, nitrogen and organic matter, microbial contamination of important parameters such as the density of fecal coliform (FC), density of total coliform (TC) and eggs parasites were examined. Experiments based on standard methods of chemical analysis in the laboratory of soil and water institute of technology University Jihad and microbial tests are based on existing procedures were performed in the laboratory of Department of Medical Sciences, Ahvaz, Iran.

Results and discussion

To evaluate the impact of using sewage sludge fertilizer, samples were chemically analyzed in the laboratory, the results can be seen in Table 1. The results fit the nutrient concentrations required for plant growth, such as nitrogen, phosphorus and potassium. The application also contains good amounts of organic matter (13/72%) and carbon to nitrogen ratio reasonable (9/75). The only limiting factor of the chemical present in the sample, It is high salinity Despite the climate ahwaz raw water used for irrigation of green spaces in urban salinity, High and salty ground water level is a limiting factor for its application in urban green space installing drains in the area of urban green space development projects and Annual leaching plants tolerant to salinity and its effects can be minimized.

Table 1. Results of chemical analysis of sludge wastewater treatment plant in Ahwaz.

C/N	%OM	%N	%P ₂ O ₅	%Ca	%K	%Na	EC(mmoh\cm)	PH	View Sample
9.75	13.72	0.841	1.085	12.87	0.143	0.13	14.81	6.75	Samples of sewage sludge compost choneybeh

Since the aim of the current study The possibility of using manure sludge wastewater treatment plant is in the green area and in the discussion of the main issues is the National Health, On the other hand, any kind of soil and water pollution, green space due to its spread in the air and groundwater Karun River and it can be seen that the effects on the health of citizens.

Therefore, the main factor limiting the use of sludge in the green area is pathogenic micro organisms . In this regard, the samples in the laboratory, School of Public Health University of pathogenic microorganisms such as total coliform, fecal coliform and parasite eggs were analyzed the results are shown in Table 2.

Table 2. Results of microbial analysis sludge wastewater treatment plant in Ahwaz.

Amount	Unit	Description
10 ⁴ ×127	Mpn/1gr	The number of total coliform
10 ⁴ ×5	Mpn/1gr	The number of fecal coliform
4000	4 g dry/ Number	The number of parasite eggs

Since no current standards and regulations of the Environmental Protection Agency for the disposal and use of sludge discharged from sewage treatment is not provided. Hence, to evaluate the ability of the sludge disposal and reuse standards in other countries, such as the EPA must take into consideration the USEPA America. United States Environmental Agency (USEP.A) 1993 standards for sludge use and disposal are considered. The regulations under 40CFR Part 503 of the Regulations, are classified into two classes, A and B.

A) regulations to reduce pathogens in Class A

The overall goal of the class A, Reduce pathogens in sewage sludge (including pathogenic bacteria, enteric viruses and parasite eggs fertilized) is set to a low level. In the regulation of sewage sludge that is sold , Or in a bag or other container for use in the packaging and Or even the bulk sewage sludge that is used in

household lawn and garden These rules can be estimated. Limit for these rules is as follows:

- ✓ Lower fecal coliform per gram of total solids sewage sludge is 100MPN.
- ✓ Salmonella species are less than 3 MPN per 4 grams of total solids in sewage sludge
- ✓ Enteric viruses in less than 4 grams of total solids in the sewage sludge is 1PFU.
- ✓ Fertilized eggs per 4 grams of total solids less than a sewage sludge

It should be noted that Class A sewage sludge use and disposal of sludge is not to place any restrictions

B) regulations, reducing pathogens in Class B

The overall aim of the regulations is that pathogens in Class B, Pathogens are reduced to a level that is unlikely to reach, Public health and the environment under certain conditions, which are used to threaten.

For Class B sludge is only necessary to monitor and control fecal coliform and Its value should be less than 2 million MPN per gram of total solids sludge (dry weight basis) , Salmonella bacteria and enteric viruses when the density of fecal coliform geometric mean of the rate of decline. Reduced by a factor of at least 10. It is evident that some pathogens in sewage sludge remains.

Class B limits for sewage sludge on crop type and location of harvest time there, Therefore, harvesting, animal grazing and public recreation areas and for a limited time to environmental factors further reduce pathogen. These constraints sufficient to ensure that the reduction in parasite-resistant pathogens is considered fertile. . Class B sewage sludge can not be sold or packaged in bags or containers for use in the field

Places restrictions on the use of sludge in Class B

To minimize the potential for human and animal contact with sewage sludge, implementing land use restrictions on the type of product and time is essential So that environmental factors such as temperature, drought, sunlight and further reduce pathogens. Provisions of the final plans for the use of sewage sludge in urban green space is considered Class B limits of the following:

Public areas

For a land with a high potential for contact, such as football, baseball field and park, took about one year after application of sewage sludge limits are considered. . Intensive use of land and contact with soil (games, falling to the ground and get up, dust inhalation and ingestion) is the major route of transmission.

Grass Grow

Turf grown on land where sewage sludge is applied, for one year after application of sewage sludge will be used. . It is only if the land can be used as a potential call-up or a meadow Competent authorities may in

the course of time things safe and under different environmental conditions to reduce.

Table (2) shows 127×10^4 MPN / 1 gr total coliform, 5×10^4 MPN / 1 gr fecal coliform and 4,000 eggs per gram of 4 gram of dry matter .that Compared to EPA standards, America is placed within the Class.

Accordingly, the sludge in the best condition rescuing poor soils and forest areas, If the decision on their application in urban green spaces, parks and playgrounds for football, projects lawns is recommended that For one year after application of sewage sludge on land is not used by citizens, However, due to the warm climate of Khuzestan, especially in the hot summer months it will take less time.

This study investigated the effects of a municipal wastewater treatment plant sludge application on agricultural soil improvement (Case Study island) was conducted by Shafiepour *et al* (2010) correspond. The results of the study showed that fecal coliform index in the range of two classes A and B, respectively. The application analysis indicates salinity and high concentrations of sodium and calcium ions, the limiting factor for plant growth. Finally, the results showed that the sludge in the soil, while observing the required rate of plant nutrients and heavy metals pollution control, to be salt tolerant plants and native plants can be used in island. If planting susceptible plants, in order to prepare the soil for at least six months before the application can be added to soil physical and chemical conditions are suitable.

On the one hand the positive way in order to exploit the chemical properties of the sludge (high organic matter, nitrogen, phosphorus and potassium, low carbon to nitrogen ratio), they can be a Co-Composting (with compost) can be used. For this purpose, sludge composting plant residues, while enriching compost plant, the process of preparing consolidated during digestion and composting, microbial contamination will reduce it to an acceptable level.

Conclusion

The results indicated that since the action is not fully stabilized in Wastewater Treatment and according to the results of the analysis of biological samples of the microbial quality of their maximum class B standard USEPA placed.

As in the case of contaminated sludge, sewage sludge application on the part of urban green space and can lead to health concerns that threaten public health, This is suggested by the circumstances of sludge compost as Co-Composting plant can be used to produce compost or planting a green belt project Ahwaz be exploited.

As the need for application of sewage sludge on land all standards of excreted toxins and pathogens in sludge be provided. It is recommended by: design according to the degree of wastewater treatment and disposal requirements, and how to reuse wastewater and sludges, operation and maintenance of wastewater treatment facilities, Industrial wastewater from entering the sewage, sludge treatment and storage facility design and utilization of sludge treatment and monitoring of environmental toxins and pathogens and Disposal and re-use of sludge in the standard development environment is provided.

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