

Current Situation and Prevention Measures of Soil Pollution in Farmland in China

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Abstract

The pollution of farmland soil in China is becoming increasingly serious, and the pollution rate of farmland soil has increased from less than 5% in the late 1980s to the current 19.4%. The three major sources of agricultural soil pollution are fertilizers, pesticides, and agricultural mulch. The excessive and unreasonable use of fertilizers, pesticides, and agricultural mulch is the direct cause of agricultural soil pollution. This article analyzes the characteristics and harmfulness of farmland soil pollution, outlines the three major methods of farmland soil remediation, namely physical methods, chemical methods, and biological methods, and proposes countermeasures to prevent and control farmland soil pollution.

Keywords

Farmland; Soil Pollution; Soil Remediation.

1. Introduction

In recent years, the problem of farmland soil pollution in China has attracted widespread attention from all sectors of society, and the problem of farmland soil pollution in some areas has become quite serious. How to control and manage soil pollution in farmland is related to the national economy and people's livelihood, agricultural product safety, ecological environment, and the sustainability of China's agricultural development. With the increasingly prominent soil environmental issues, the continuous improvement of public environmental awareness, and the formulation of the "Soil Pollution Prevention and Control Law (Draft)" and "Soil Pollution Prevention and Control Action Plan", it is evident that the situation of soil pollution is very severe, and the country is paying more and more attention to soil environmental protection work. In this context, it is urgent to strengthen the control and restoration of farmland soil pollution, achieve stable and increased grain production, improve the quality and efficiency of agricultural products, and solve the problem of "food safety" for the people.

2. The Reality of Soil Contamination in Rural Areas

Through the investigation and analysis of rural Soil contamination, it is found that heavy metals are the main pollutants of rural farmland, and the pollution scope shows a trend of gradual expansion. In the context of rapid socio-economic development, industrial development bases are gradually shifting from urban to rural areas, with some relatively densely populated rural areas experiencing more severe industrial pollution. In terms of grain production in China, heavy metal pollution not only reduces grain production, but may also endanger human life and health due to heavy metal poisoning. At the same time, some enterprises also lack scientific and inadequate treatment in sewage discharge treatment, which can lead to changes in soil properties, limit the normal growth of crops, and reduce the production yield of food crops. In addition, there is a problem of excessive application of fertilizers and indiscriminate use of pesticides in agricultural production in rural areas, which not only weakens soil fertility and

reduces land use efficiency, but also leads to a reduction in food crop production. At present, the problem of soil pollution in rural areas of China is very serious, and it is urgent to strengthen soil environmental protection efforts and implement effective soil pollution remediation and control measures.

3. Sources of Soil Pollution in Farmland

Source of farmland soil pollution: It mainly comes from human production and life, such as liquid and solid pollutants in industrial production, radioactive pollutants, excessive pesticide and fertilizer, daily life waste water and waste, and the discharge of non degradable garbage, which may make pollutants accumulate in soil for a long time. Soil pollution is mainly divided into liquid pollution, gas pollution, and solid waste pollution, which have the characteristics of concealment, accumulation, and irreversibility.

3.1. Emission of Industrial Heavy Metal Pollutants

In recent years, with the rapid development of China's industry, petroleum, chemical industry, medical treatment and scientific research will lead to an increase in the discharge of heavy metals and radioactive substances. The excessive discharge of heavy metal pollutants without treatment is a serious problem, especially the discharge of Toxic heavy metal such as lead and mercury that cannot be degraded for a long time and enter the human body through agricultural products, seriously endangering human health.

3.2. Excessive Use of Pesticides and Fertilizers

In order to increase crop yield and increase per mu income, many regions have the problem of excessive use of pesticides and fertilizers. China's annual use of fertilizers has reached over 40 million tons, making it the country with the highest fertilizer use in the world. The long-term infiltration of chemical substances such as nitrogen, phosphorus, and potassium in fertilizers into the soil can disrupt the balance of the original nutrient structure of farmland, resulting in land desertification, fragmentation, decreased soil quality and water storage capacity. More seriously, heavy metal pollution causes the accumulation of various harmful substances during crop growth, such as nitrate and dioxins, which can pose a threat to human health and pose a serious food safety issue.

3.3. The Harm of Air Pollution on Farmland Soil

Due to the increase in exhaust emissions and harmful gases such as carbon dioxide and nitrogen oxides in the air, acid rain often occurs, and acid rain can directly harm the soil quality of farmland and cause direct harm to crop growth.

4. Analysis of Soil Pollution Remediation Technology

4.1. Physical Repair Technology

Physical separation technology is a fundamental soil remediation technology that can separate pollutants from soil, reduce pollutants in soil from a physical perspective, and improve soil environment. Hydrodynamic screening technology, magnetic separation technology, particle size separation technology, and other physical separation technologies are widely used in soil pollution remediation. Among them, different physical separation technologies have different effects, and technicians need to choose targeted physical separation technologies based on factors such as soil pollutant types and pollution levels.

4.2. Bioremediation Technology

Soil microbial remediation technology can use microbial Decomposition to repair soil. Under appropriate environment, microorganisms can transform, degrade, and absorb harmful

pollutants in soil through their own metabolism, so that harmful pollutants can be transformed into water, carbon dioxide and other substances. Usually, this technology requires the application of indigenous or artificially domesticated microorganisms, and different types of microorganisms have different soil remediation functions. In addition, the use of this soil remediation technology is affected by factors such as external temperature and oxygen. Once the external environment exceeds the tolerance range of microorganisms, the remediation work will stop accordingly. Therefore, the efficiency of this soil remediation method is relatively low.

4.3. Chemical Remediation Technology

The electrodynamic properties of soil layers and pollutants are different, and based on this, electrodynamic remediation technology can be used for soil remediation. The principle of this technology is similar to that of batteries, and in practical applications, it can cause pollutants on the surface of soil particles to move, accumulate pollutants, and achieve centralized treatment. Electrodynamic remediation technology has strong environmental protection, high remediation efficiency, low investment, and can protect the soil structure and the ecological environment of groundwater. However, it is not suitable for non-polar organic pollutants.

5. Conclusion

In summary, in the process of China's socio-economic development, industrial production has developed rapidly, energy consumption is constantly increasing, and soil pollution problems are gradually emerging. In the face of serious soil pollution, relevant departments need to strengthen the research on soil pollution remediation technology, adopt physical remediation technology, Bioremediation technology, chemical remediation technology, etc., to reduce the damage of various pollutants to soil and protect the soil ecological environment. In the future ecological environment protection, environmental protection departments need to increase their attention to soil pollution, promote soil pollution prevention and control through various means, build a comprehensive soil pollution monitoring system, improve vegetation coverage, and protect the soil ecological environment.

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