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Some Thoughts on Soil Sampling and Monitoring

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Abstract

Soil testing is a very important task in modern agricultural production. Through soil testing, we can know the soil moisture, nutrient content, pH, pollution and other data related to soil and soil quality. The data obtained from soil testing is vital to agricultural production.

Keywords

Soil testing; Detection; Sampling; Monitoring plan.

1. Introduction

According to the background information and the results of on-site investigations, a certain number of samples are collected for analysis and determination, which are used to initially verify the spatial heterogeneity of pollutants and determine the degree of soil pollution, and provide a basis for formulating monitoring plans (selecting the method of placement and determining the number of monitoring items and the number of samples). Preliminary sampling can be carried out at the same time as the on-site investigation.

Soil environmental monitoring refers to determining the environmental quality (or pollution degree) and its changing trend through the determination of the representative value of the factors affecting the soil environmental quality. Generally speaking, soil monitoring refers to soil environmental monitoring, which generally includes technical content such as spot sampling, sample preparation, analysis methods, result characterization, data statistics, and quality evaluation. China's standards for soil environmental monitoring include the "Technical Specifications for Soil Environmental Monitoring" (HJ/T 166 -2004), which belongs to the environmental protection industry standard of the People's Republic of China. General soil monitoring can be divided into national regional soil background, farmland soil environment, soil environmental evaluation of construction projects, soil pollution accidents and other types of monitoring. Priority monitoring of soil pollution should be a substance that has an important impact on the health of the population and the maintenance of ecological balance. Such as mercury, cadmium, lead, arsenic, copper, aluminum, nickel, zinc, selenium, chromium, vanadium, manganese, sulfate, nitrate, halide, carbonate and other elements or inorganic pollutants; petroleum, organic phosphorus and organic Chlorine pesticides, polycyclic aromatic

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hydrocarbons, polychlorinated biphenyls, chloral and other biologically active substances; infectious bacteria and viruses introduced by feces, garbage and domestic sewage.

2. Collection and Preparation of Soil Samples

2.1. Soil Sample Collection

The collection of soil samples is an important part of soil testing. Collecting representative samples is a prerequisite for truthfully reflecting the objective situation. Therefore, representative plots and representative soil samples should be selected, and relevant sampling rules should be adopted according to different projects. In order to ensure the representativeness of soil samples, the following technical measures must be taken to control sampling and experimental errors.

2.1.1 Sampling unit and representative area

Before sampling, the project area is divided into several sampling units according to the topography of the project area, the degree of contiguousness, and the area of newly added cultivated land. The topography of each sampling unit is required to be similar, and each sampling unit collects one mixed sample.

Each project area is divided into at least 3 sampling units. Every 100 acres is used as a sampling unit.

2.1.2 Sampling depth

The sampling depth is different for different crops. Generally, the sampling depth of dry land is 0-30cm, and the sampling depth of paddy field is 0-20cm.

2.1.3 Soil mixture

In a sampling unit, according to a certain layout and sampling method, a mixed sample composed of the collected soil from 5 sampling points. The specific collection method is as follows:

a) Diagonal line method: suitable for farmland soil irrigated by sewage, draw a diagonal line from the water inlet of the field to the water outlet, divide it into at least five equal points, and use the equal points as the sampling points. The soil is very different and can be divided equally to increase the number of points.

b) Plum blossom point method: It is suitable for plots with small area, flat terrain, uniform soil material and pollution degree, and set about 5 points.

c) Checkerboard method: suitable for plots with medium area, flat terrain and insufficient soil uniformity, with about 10 points; however, for soil contaminated by sludge and solid wastes, there should be more than two points.

d) Snake-shaped method: suitable for plots with large areas, inhomogeneous soils and uneven terrain, with about 15 points, mostly used for agricultural contaminated soils.

2.1.4 Sampling method

The soil sampling depth and sampling volume at each sampling point should be uniform, and the ratio of the upper layer and the lower layer of the soil sample should be the same. The sampler should be perpendicular to the ground and enter the soil at the same depth. Shovel a section of the cultivated layer first when sampling with a soil shovel, and then shovel the soil parallel to the section.

2.1.5 Sample weight:

A mixed soil sample should take about 1 kg of soil. If there are too many samples, the excess soil can be discarded by the quarter method. The method is to place the collected soil sample on a plate or plastic cloth, smash and mix it, spread it into a square, divide the soil sample into four parts by drawing a diagonal line, and combine the two diagonal parts into one part respectively,

and save One portion, discard one portion. If there are still a lot of samples, you can use the quartering method to process until the required number is reached.

3. Air-drying, Preparation and Storage of Samples:

3.1. Air Dry

Place the collected soil sample on a wooden tray or on a plastic cloth, spread it out into a thin layer, and place it indoors to ventilate and dry in the shade. When the soil sample is half dry, crush the large soil block (especially the clay soil), so as not to form a hard block after it is completely dried, which is difficult to grind. The air-drying place strives to be dry and ventilated, and it is required to prevent the pollution of acid vapor, ammonia gas and dust.

After the sample is air-dried, the remains of animals and plants such as roots, stems, leaves, insects, stones, and nodules (lime, iron, manganese) should be removed. If there are too many stones, the stones should be weighed and the percentage should be noted.

3.2. Crushing and Sieving

The air-dried soil sample is poured into a wooden plate with a steel glass bottom, and finely ground with a wooden stick to make it all pass through a 2mm sieve. After mixing well, divide into two parts by quartering method, as shown in the figure below. One part is used for physical analysis and the other part is used for chemical analysis. The soil samples used for chemical analysis must be further finely pulverized so that they all pass through a sieve with a 1mm or 0.5mm aperture.

Pay attention to the grinding process. When grinding soil samples, you can only use wooden sticks to roll them, not hammers; the soil samples for determining Si, Al, and Fe need to be finely ground with an agate mortar. A porcelain mortar will affect the results of Si determination.

3.3. Save

Generally, samples are stored in jars or plastic bottles with ground stoppers for half a year to one year for inspection when necessary. Standard samples need to be stored for a long time to avoid mixing. After the sample bottles are labeled, they should be sealed with paraffin wax to ensure that they remain unchanged.

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