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Auxiliary feeding device and feeding method of soil element analyzer

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Abstract: Based on the limitations of traditional soil analyzers, this paper proposes an auxiliary feeding device and feeding method of soil element analyzer, including an outer cylinder with a discharge port and a hollow structure, and a material conveying device in the outer cylinder. The outer cylinder is also provided with a feeding device coaxially, and the feeding device is provided with a plurality of storage silos, and the feeding device rotates the materials placed in the storage silo into the material conveying device in turn, and is transported to the discharge port by the material conveying device; The feeding device is set on the sliding bracket, the outer cylinder is set on the base, and the sliding bracket is sliding connected with the base. This method can realize a large number of automatic feeding at one time, which greatly reduces the labor intensity of the staff.

Keywords: Feeding device; Auxiliary feeding, Automatic feeding.

1. Soil analyzer

1.1. Soil analyzer features

Soil analyzer is also known as soil speed tester, soil analyzer adopts rotary colorimetric cassette design, testing four samples at the same time, large screen LCD Chinese character backlight display to guide the operation process; The main unit is equipped with a microprinter. It can quickly test nitrogen, phosphorus, potassium, organic matter, humic acid, pH in soil, fertilizer and plants. The instrument stores the nutrients required for the growth and development of 60 kinds of crops, and can output the guidance fertilization amount according to the user's needs and print it out. Whether it is solving soil health problems or developing scientific fertilization programs, scientific soil testing is an indispensable part of the long run. Soil analyzer provides a simple and effective rapid detection technology of soil nutrients for agricultural planting, which plays an important role in further promoting the faster and better development of agriculture.

In the application of elemental analyzers in similar fields, the total soilC, the atmospheric particulate matter C[13 ~ 16] and the marine sediment inorganic C were also determined. In past studies, there were also methods for the simultaneous determination of N and C in soil samples with elemental analyzers [6,9], and the soil samples selected by Zhang Wei et al. were all acidic soils, and their conclusions could only represent the full N and organic C analysis of such soils; The carbon analyzed by Yu Zhaoshui et al. is the total carbon including organic carbon and inorganic carbon; Wei Xiaojun et al. discussed some problems in the determination of calcareous soils C and N by elemental analyzers, but they were not solved.Method for the determination of organic C in calcareous soils by elemental analyzers; The N and C measured by the Vario EL III elemental analyzer are total nitrogen and total carbon, and soil samples, especially alkaline soils, generally contain inorganic carbon, and this study can be used to determine all N and organic C at the same time by removing inorganic carbon and pretreatment of organic C and all N in the sample, and apply it to practical work based on the developed method.

1.2. How to use the soil analyzer

(1) Preparation of agents

Preparation of soil extractant: take a bag of soil combined extractor powder, put it into a volumetric flask, and add distilled water to set the volume.

(2) Preparation of soil nutrient solution to be tested

Weigh the soil sample into the soil leaching flask, add soil extractant to the leaching flask, and then take a level spoonful of soil decolorizing agent into the leaching flask, shake vigorously, and then filter it in the dry leaching flask, that is, the soil available nutrient to be tested, this liquid can determine soil ammonium nitrogen, nitrate nitrogen, available phosphorus and available potassium.

(3) Determination of soil ammonium nitrogen

(4) Start the instrument test.

The blank liquid is placed in one channel, the standard solution is placed in the second channel, and the liquid to be measured is placed in other channels except the first and second channels, click the detection button, and the corresponding channel of the test solution shows the value of ammonium nitrogen content in the soil.

2. Auxiliary feeding device and its feeding method

2.1. Auxiliary feeding device

The existing soil element analyzer adopts an automatic mechanical structure, and the sample package is sent into the instrument through the feeding hole in turn for test analysis. Due to the small number of test sample packages stored at one time in the original feeding structure, the staff needs to repeatedly carry out the feeding work during the whole test process, especially at night, and special personnel are also required to load the material, resulting in the great intensity of the staff's work. Object of the present invention is to provide an auxiliary feeding device and feeding method of soil element analyzer, which can realize a large number of automatic feeding at one time, greatly reducing the labor intensity of the staff.

The auxiliary feeding device of this soil element analyzer includes an outer cylinder with a discharge port and a hollow

structure, and a material conveying device is provided in the outer cylinder; The outer cylinder is also provided with a feeding device coaxially, and the feeding device is provided with a plurality of storage silos, and the feeding device rotates the materials placed in the storage silo into the material conveying device in turn, and is transported to the discharge port by the material conveying device; The feeding device is set on the sliding bracket, the outer cylinder is set on the base, and the sliding bracket is sliding connected with the base. The material conveying device adopts a screw conveying device disposed on the inner wall of the outer cylinder, and the outer cylinder is driven by the outer cylinder drive device to rotate. The discharge port is disposed on the circumferential surface of one end of the outer cylinder, and the position of the discharge port corresponds to the outlet position of the screw conveying device. the outer cylinder drive device is mounted on a drive device support plate provided at one end of the base, and the rotation axis of the outer cylinder drive device is connected to the outer cylinder through an outer cylinder drive plate disposed on one side of the outer cylinder; The lower end of the base is also provided with an outer barrel bracket that adapts to the outer diameter of the outer cylinder. The feeding device includes a coaxial and internally and externally sleeved drum and guide cylinder, the drum and guide cylinder are hollow cylinder-shaped structures, the surface of the drum is provided with a plurality of storage silos, the surface of the guide cylinder is provided with a feeding port corresponding to the storage silo, the drum and the guide cylinder are respectively driven by the drum drive device and the guide cylinder drive device to rotate, and the materials placed in the storage silo fall into the material conveying device through the feeding port. The drum is provided with a drive device support, the drum drive device and the guide drum drive device are respectively disposed in the drive device support, the rotation shaft of the guide drum drive device is connected with the guide cylinder after passing through the hollow rotation shaft of the drum driving device, and the hollow rotating shaft of the drum drive device is connected to the drum and the drive device support Connect with a sliding bracket. The circumferential surface of the drum is uniformly provided with a plurality of axial silo groups along the circumference of the drum, and each group of axial silo groups comprises a plurality of storage silos uniformly disposed on the circumferential surface of the drum along the axial direction; On the circumferential surface of the guide cylinder, several feeding ports are provided along the axial direction of the guide cylinder, and several feeding ports correspond one-to-one with the positions of several storage silos in the axial storage silo group. The left and right ends of the drum are respectively provided with a left spoke plate of the drum and a right spoke plate of the drum, the left end and right end of the guide cylinder are respectively provided with a left spoke plate of the guide cylinder and a right spoke plate of the guide cylinder, and the left spoke plate of the drum and the left spoke plate of the guide cylinder are respectively connected with the left end of the drive device support through the left bearing of the drum and the left bearing of the guide cylinder; The rotating shaft of the guide barrel drive device is connected to the guide cylinder drive shaft through the coupling, and the guide barrel drive shaft is connected with the right spoke plate of the guide cylinder after passing through the hollow rotating shaft of the drum driving device, and the right spoke plate of the drum is rotated and connected with the right end of the drive device support through the right bearing of the drum; The right spoke plate of the guide cylinder is rotated and connected with the right spoke plate of the drum through the right bearing of the guide cylinder. The left end of the drive device support between the left bearing of the drum and the left bearing of the guide barrel is provided with an isolation sleeve.

2.2. Feeding method

The present invention uses the rotation of the feeding device to make the materials placed in the storage silo fall into the material conveying device in turn by gravity, and then the material conveying device to the discharge port in turn, and the material enters the feeding hole of the element analyzer through the discharge port in turn, so as to realize the feeding work of the soil element analyzer one by one according to the set feeding time. Further, the present invention uses a drum and a guide cylinder that can be rotated separately to realize the unloading control of the material, that is, the separate storage of the material is realized by the storage silo in each group of axial storage silo groups uniformly set on the drum, and then the guide cylinder is used to realize the feeding and discharging control of the storage silo, as well as the limit position of the material; When the storage silo on the drum and the feeding port on the guide cylinder are located at the lowest end and the position is corresponding, the material is driven down by gravity; When the drum and guide cylinder are located in other positions, the position of the material in the storage silo on the drum is limited by the guide cylinder wall to prevent the material from falling off, which has the advantages of simple structure and reliable use. At the same time, the present invention realizes the timing of the materials in the storage silo in a plurality of storage silo groups by controlling the multiple fixed angle rotations of the material drum, and cooperates with the screw conveying device disposed on the inner wall of the outer cylinder, according to the set feeding gap, the material is put into the feeding hole of the element analyzer through the discharge port in turn.

3. Summary

It provides an auxiliary feeding device and feeding method of soil element analyzer, which can realize a large number of automatic feeding at one time, greatly reduce the labor intensity of staff, avoid the drawbacks of repeated feeding operations in the existing testing process, and do not need to be attended at night for feeding.

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