

Improved methods for the extraction of soil samples for root research

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Summary A monolith sampler is described which makes it possible to obtain pinboard samples from the field without digging a trench. Also, for container experiments a method is presented by which the complete soil column can be pushed out of plastic tubes (containers) to permit examination of the intact root system without cutting the tubes.

Introduction

The methods for the examination of root systems and roots used at the Institute for Soil Fertility have been described by Schuurman and Goedewaagen³. A more complete survey of methods was given by Böhm¹. Two recent improvements in the methods will be briefly described here.

The first is a rectangular monolith sampler driven by a hand-operated hydraulic pump that pushes a steel box into the soil and pulls it out containing a soil sample. The main advantage over the traditional methods that involve working from a trench is that the soil profile is disturbed over a much smaller area. This is especially important in root studies on small or permanent experimental fields. Some special provisions are necessary to keep the soil inside the steel box when the sample is retrieved. With these provisions, monoliths can be taken from very wet soils, even below the ground-water table. The monolith sampler can be operated by hand and consists of parts which can be carried to any corner of an experimental field inaccessible to motor vehicles.

The second improvement described here is a simple method by which the soil can be pushed out of plastic tubes used for root studies. By sealing the bottom of these tubes and injecting compressed air through the seal, the soil can be pushed out of the tube. This method replaces the one used so far, whereby the tubes were cut longitudinally before the root system was washed.

Monolith sampler

A steel box of 10 × 50 × 100 cm (width × length × depth) is pushed into the soil from a horizontal steel rod, fixed to two soil anchors positioned in the soil at either side of the sampling spot. Four smaller supporting anchors are screwed into the soil to prevent the steel rod from tipping over. Fig. 1 shows the set up in the field. Fig. 2 shows the design of the steel box. After the box has been pushed into the soil with a hydraulic cylinder to the desired depth (maximum 1 m), the following special features are necessary to keep the soil monolith inside the box during retrieval:

1. The claws (10 and 11 in Fig. 2) can be turned inwards from above by screws (8).
2. A metal thread (12) is hidden behind the sharp cutting edge when the sampler is pushed into the soil. By pulling the handles (12) the metal thread is stretched and in this way the sample is cut from the underlying soil.