

SSC 107 - LABORATORY EXERCISE 6

Installation and Use of Porous Ceramic Cup Solution Samplers for the *in situ* Extraction of Soil Solution

Introduction

The collection of soil solutions and the determination of their chemical composition has become a very important part of environmental and agricultural sciences. The chemical composition of soil solution can yield important information on the spatial and temporal distribution of soil nutrients, soluble salts, and chemical contaminants.

A commonly used method for collecting soil solutions is the vacuum extraction technique in which a vacuum source is applied to a porous solution sampler. This type of sampler is constructed of a porous ceramic cup mounted on PVC tubing with an acrylic site tube and rubber septum at the top. Spaghetti tubing runs out through the septum and into a sealed sample bottle. The vacuum is applied to the sample bottle and solution sampler by a hand vacuum pump.

Some porous ceramic cup solution samplers are able to function as a solution samplers and tensiometers simultaneously. Tensiometers employ a similar porous cup design as the solution samplers and are used to read soil-water potential which is a measure of the energy status of the water within the soil pores. The dual tensiometer-sampler allows for the collection of soil water potential data and soil solution samples from a single probe at the same location.

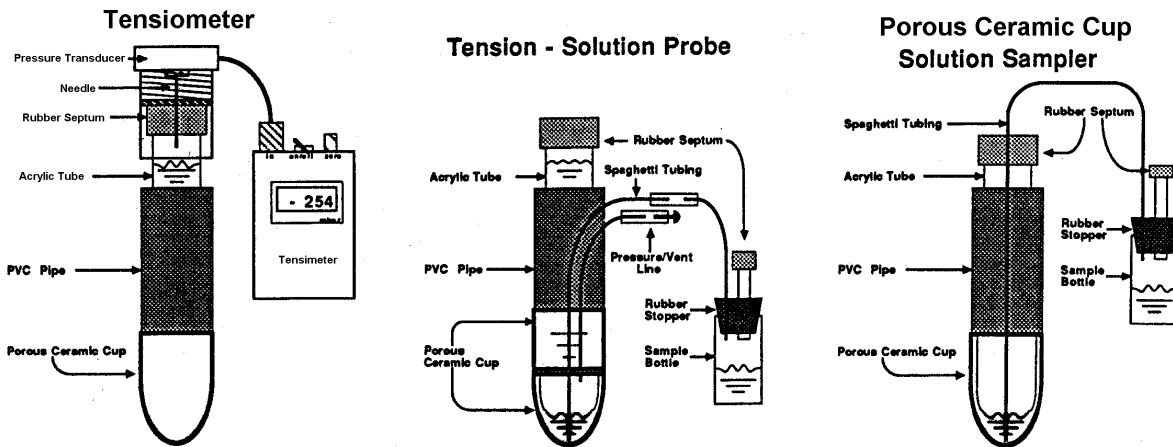


Figure 6-1. Schematic view of tensiometer, tension-solution probe, and solution sampler.

In this lab we will demonstrate the installation and operation of a tensiometer, solution sampler, and tension/solution dual probe.

Procedure

Installation: Core a hole using an auger or soil sampling tube the same diameter or slightly larger than the diameter of the soil solution sampler.

Insert the solution sampler into the hole to the desired sampling depth.

There must be good contact between porous cup and soil. Backfilling local soil around the installed sampler making sure to compact as you go can ensure good contact and seal the cored hole. Alternatively methods a soil slurry or silica flour may be poured into the hole at a depth that will cover the ceramic cup. The hole can then be backfilled with soil or wet bentonite mix.

Sample Collection: A vacuum of between 50 to 85 kPa is applied to the sampler using hand vacuum pumps applied to the sample bottles. Sampling duration depends on the volume of sample required, the amount of vacuum applied, soil water content and hydraulic conductivity of the soil.