



Automated Passive Capillary Lysimeters for Estimating Water Drainage in the Vadose Zone

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In this study, we demonstrated and evaluated the performance and accuracy of an automated PCAP lysimeters that we designed for in-situ continuous measuring and estimating of drainage water below the rootzone of a sugarbeet-potato-barley rotation under two irrigation frequencies. Twelve automated PCAPs with sampling surface dimensions of 31 cm width * 91 cm long and 87 cm in height were placed 90 cm below the soil surface in a Lihen sandy loam. Our state-of-the-art design incorporated Bluetooth wireless technology to enable an automated datalogger to transmit drainage water data simultaneously every 15 minutes to a remote host and had a greater efficiency than other types of lysimeters. It also offered a significantly larger coverage area (2700 cm²) than similarly designed vadose zone lysimeters. The cumulative manually extracted drainage water was compared with the cumulative volume of drainage water recorded by the datalogger from the tipping bucket using several statistical methods. Our results indicated that our automated PCAPs are accurate and provided convenient means for estimating water drainage in the vadose zone without the need for costly and manually time-consuming supportive systems.