

Investigations of fine root dynamics of beech proveniences (*Fagus sylvatica* L.) using minirhizotrons

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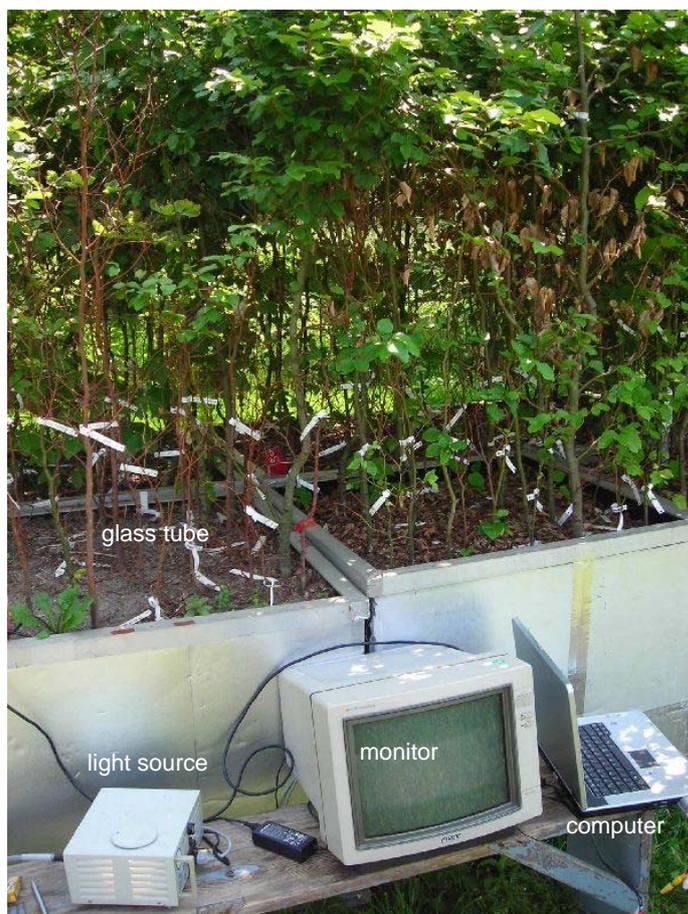
Investigation of the hidden half

The root systems of plants play an important part in the carbon allocation and for the uptake of nutrients and water (Waisel et al. 1991). Soil and ingrowth cores give only estimates of standing root biomass and relative growth. The minirhizotron method, in contrast to destructive methods, permit the measurement of the fine root production, mortality and turn-over. The minirhizotron technique can be used to monitor the same root(s) over selected time intervals, which can vary from days to years. Fine root production and mortality can be estimated by combining data from minirhizotrons and soil cores. Seasonal changes in the root dynamic can be related directly to above ground production. Furthermore, minirhizotrons can provide qualitative information on root color, branching and mycorrhiza.

A pilot study were conducted at the Botanical Garden in Berlin to investigated the root growth of beech proveniences. Four transparent glass tubes with a diameter of 3 cm were inserted per each proveniences (Fig. 1). Root observation were made with a endoscope (75 cm length) and pictures of roots were recorded with a CCD-CAM (Kappa, Göttingen) mounted on the endoscope (Storz, Germany) (Fig 2). Digital images were stored on a personal computer.

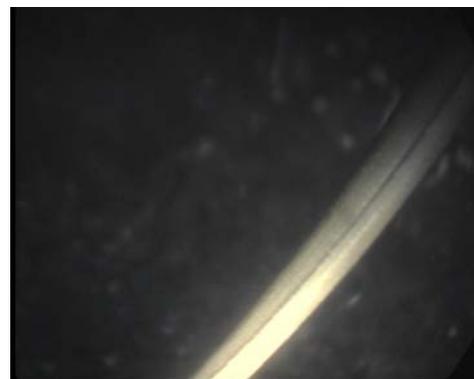


Endoscope and CCD-camera



Root growth investigation at the Botanical Garden Berlin

Images of beech roots



Use of minirhizotrons

The minirhizotron is a useful tool for the investigation of the fine root dynamics even under field conditions. Future development of the minirhizotrons needs an improved system of analysis to optimise the data analysis. The high number of images requires an automatic detection of roots in minirhizotron images (Erz et al. 2005). Further investigations on the relation between minirhizotrons and soil coring are still needed for the specific sites.

References:

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