Naturally coloured roots as a tool for studying root interactions in mixed cropping

ABSTRACT

The objective of this study was to evaluate the usage of species with coloured roots to study root growth patterns during intercropping. Red beet (Beta vulgaris L. cv. Detroit), having clear red roots, was used in a semi-field and field experiment to allow identification and quantification of roots of the individual species in the mixture. In the field experiment, red beet was strip intercropped with lucerne (Medicago sativa L. cv. Creno) and kale (Brassica oleracea L. var. Sabellica), respectively while the red beet-lucerne intercropping was conducted in large rhizoboxes where root growth distribution and 15N isotope uptake was determined. The study confirmed that the direct visual measurement of root growth using species with coloured roots and indirect tracer uptake measurements contributed to the success of studying root growth dynamics in intercropping systems. Red beet root intensity was not considerably affected by the strip intercropping when the crops were established at the same time, but when established between existing lucerne strips, a reduction in roots at the border row was shown. Lucerne and kale were both observed to be able to exploit the deep soil layers beneath the red beet border row.