Towards the fine root identification key of common tree species

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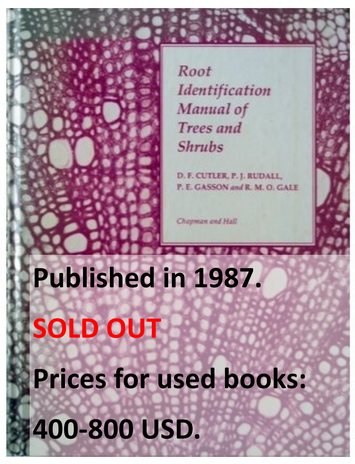
Fine roots of woody plants and their importance in forest ecosystems

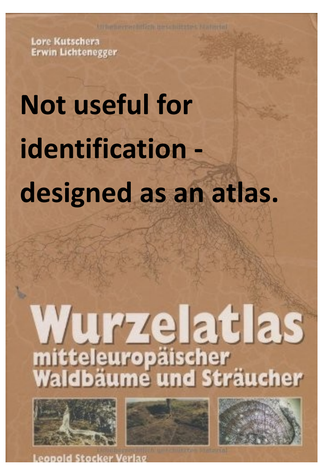
- fine roots = roots thinner than 2 mm
- less than 2 % of the tree biomass in temperate and boreal forest stands
- great importance in the **formation of belowground carbon pools** because of their short turnover rates (Brunner & Godbold 2007)
- quantitative analyses of species' root distribution may reveal **belowground carbon allocation patterns** and **competition relationships** (Rewald et al. 2012)

Characteristics of the fine root system that can potentially be used for determination purposes

- Anatomy of wood and bark (anatomy of roots can differ significantly from the anatomy of stem!)
- Morphology: → diameter of lateral branches
  → branching pattern
  → colour
  → texture of the root bark or epidermis
  → type of mycorrhiza

Existing literature





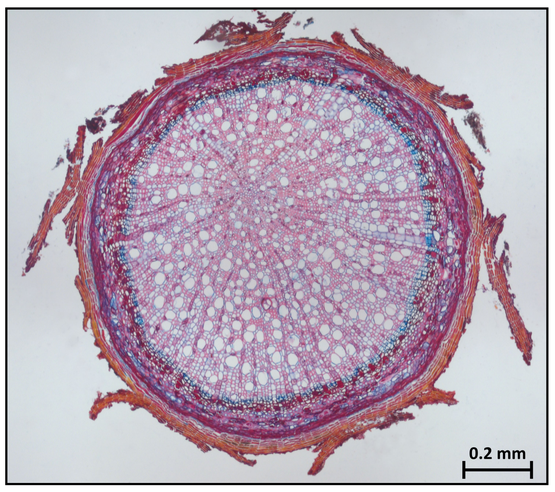
Up to our knowledge no identification key exsists that would include morphological characteristics of fine roots.

Our goal: to test which characteristics are the most valuable, consistent through the selected size classes (studied diameters 5, 3, 1 mm and the thinnest roots) and easy to apply → identification key for the selected tree species

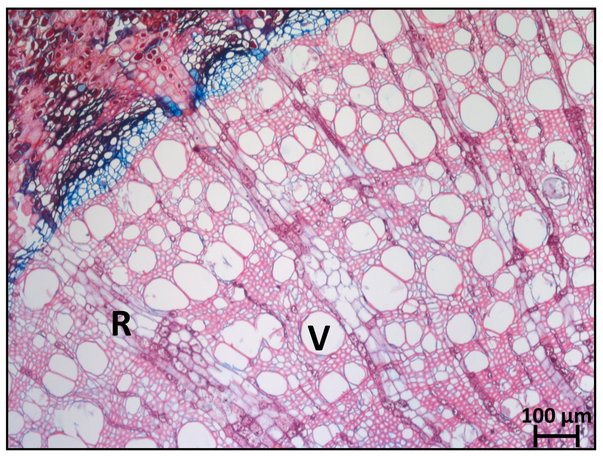
- ***Fagus sylvatica* L.**
- ***Picea abies* (L.) Karst.**
- ***Abies alba* Mill.**
- ***Pinus sylvestris* L.**
- ***Larix decidua* Mill.**
- ***Prunus avium* (L.) L.**
- ***Carpinus betulus* L.**
- ***Popolus nigra* L.**
- ***Quercus robur* L.**
- ***Quercus petraea* (Matt.) Liebl.**
- ***Castanea sativa* Mill.**
- ***Fraxinus excelsior* L.**
- ***Acer pseudoplatanus* L.**

Part of the fine root system of *F. sylvatica* with different types of ectomycorrhiza (root scanned in water on EPSON Photoscanner V700)

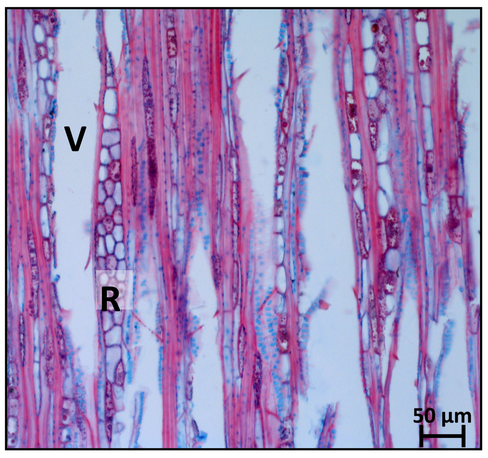
Roots of *F. sylvatica* are reddish-brown with wavy texture of the bark. Bark comes off in small flakes (photographed in water under Zeiss StereoLUMAR V12).



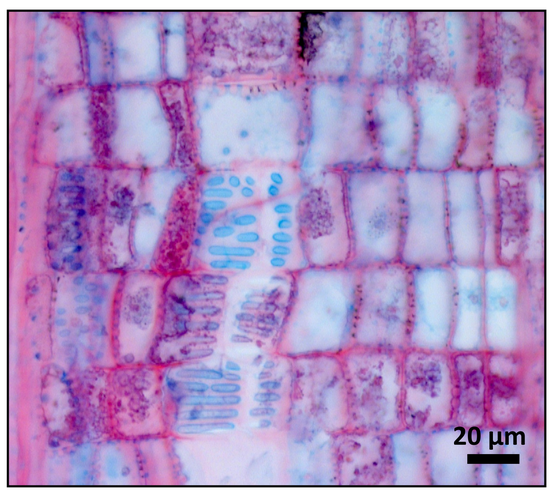
Transversal section of 1 mm root of *F. sylvatica*, stained with safranine and astra blue



Transversal section of *F. sylvatica* root (R=ray, V=vessel)



Radial section of *F. sylvatica* root (R=ray, V=vessel)



Longitudinal section of *F. sylvatica* root. Scalariform cross field pits are visible. Type of cross field pits is one of the diagnostic characters for determination of wood samples.

All photomicrographs photographed under Zeiss Axio Imager Z2.

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