

# Vertical and horizontal root distribution in pea-oat intercropping with profile-wall method and FTIR analysis

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## Questions

- Is it possible to illustrate the root distribution of two intercropped species?
- Is the root growing pattern changing in intercropping?
- Can the root distribution at flowering give an indication about the use of resources?

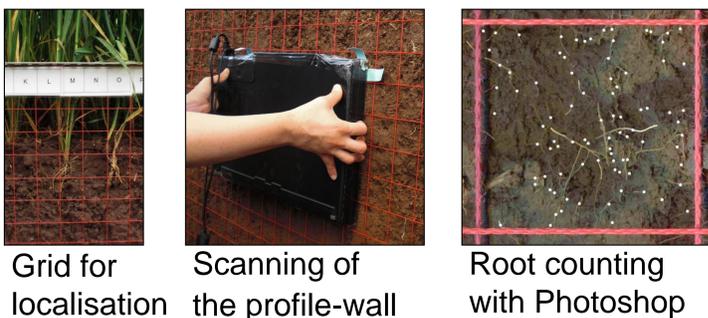
## Material and methods



**Pea (*Pisum sativum* L.)**  
c. Santana  
100 seeds m<sup>-2</sup>

**Oat (*Avena sativa* L.)**  
c. KWS Contender  
300 seeds m<sup>-2</sup>

**Pea-oat intercropping**  
80 pea seeds m<sup>-2</sup>  
60 oat seeds m<sup>-2</sup>



- Fourier-transformed infrared (FTIR) spectroscopy of dried roots (Alpha, Bruker)
- Differentiation by spectra search (sole crop as reference library) and cluster analysis (Opus Software, Bruker)

## Results and discussion

- Maximum root depth (cm)
 

	sole crop		intercropping	
pea	80	≈	85	
oat	115	↘	95	
- Maximum root depth of 75 % of total roots (cm)
 

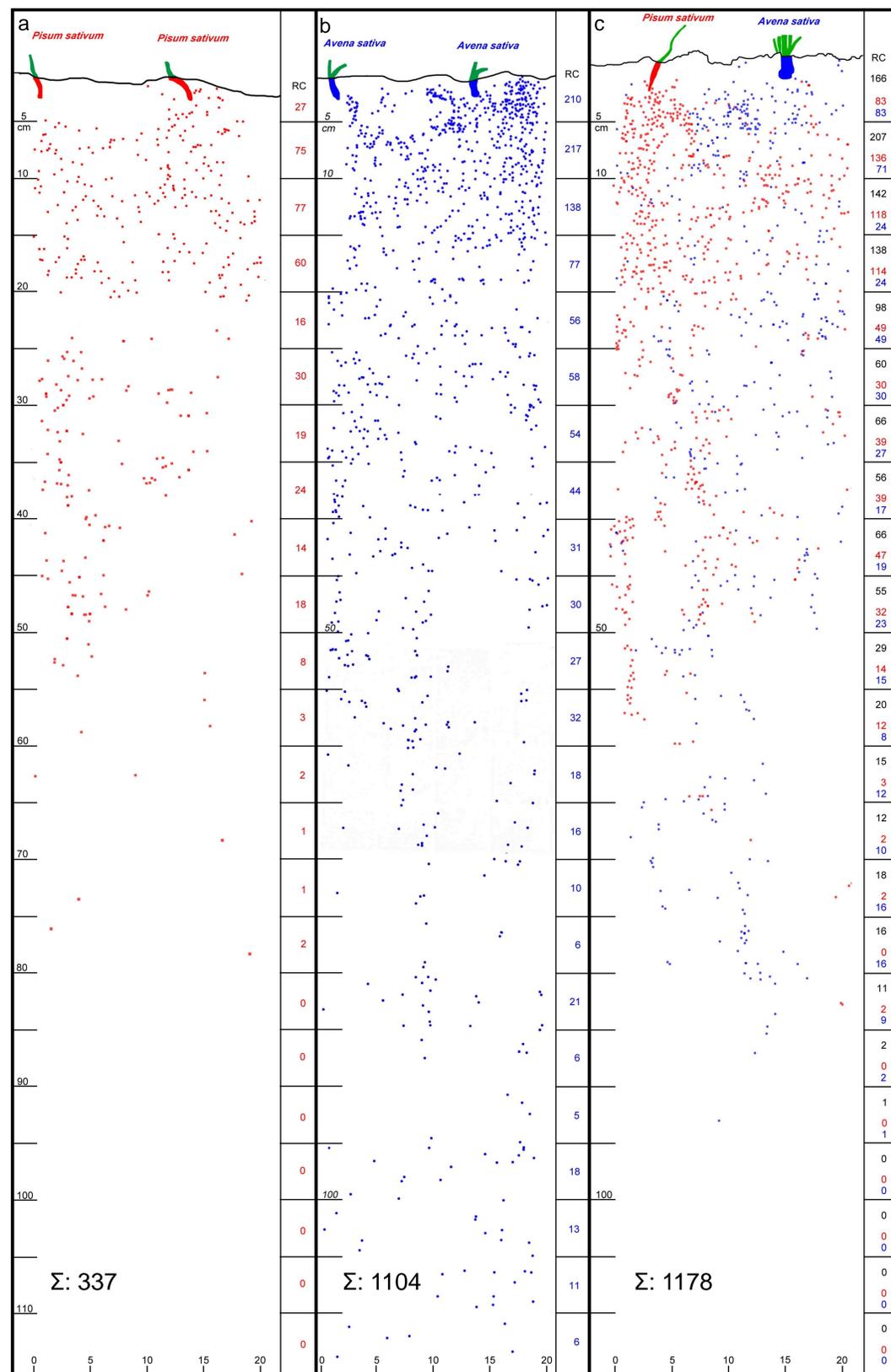
	sole crop		intercropping	
pea	35	↗	40	
oat	45	↗	50	

=> shift of distribution

- Intercropped roots: intermingled with each other
- More roots in the intercropping than in the sole crops (related to one plant)

amount of total root count (RC)	pea	oat
sole crop	189	552
intercropping	722 ↗	456 ↘

=> substantial increase in pea roots, slight decrease in oat roots



**Fig. 1:** Root distribution of pea sole crop (a), oat sole crop (b) and pea-oat intercropping (c) displayed for 20 cm width and 115 cm depth. Plants grew at the site Flöhburg, Reinshof, Germany. Root acquisition took place on 18 to 19 June (pea sole crop, BBCH 63: flowering), 20 to 21 June (oat sole crop, BBCH 55: heading) and 26 to 28 June 2013 (pea-oat intercropping, BBCH 70/59: fruit development/end of heading). Additionally, the sum of root counts (RC) for each five horizontal cm is displayed. In the intercropping red dots as well as red numbers represent pea roots, blue dots and numbers represent oat roots, and black numbers of RC represent the sum of intercropped pea and oat roots.

## Conclusions

- ✓ Root distribution of two intercropped species can be illustrated.
- ✓ Root growing pattern did change in the intercropping: substantial more pea roots and maximum root depth was shortened in oat.
- ✓ More roots in total as well as more pea roots in the intercropping may indicate better use of resources and N transfer.

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