Soil Research **2019**, 57, 447–458
doi:10.1071/SR18223_AC

Supplementary material for

Insights into ^{33}phosphorus utilisation from Fe- and Al-hydroxides in Luvisol and Ferralsol subsoils

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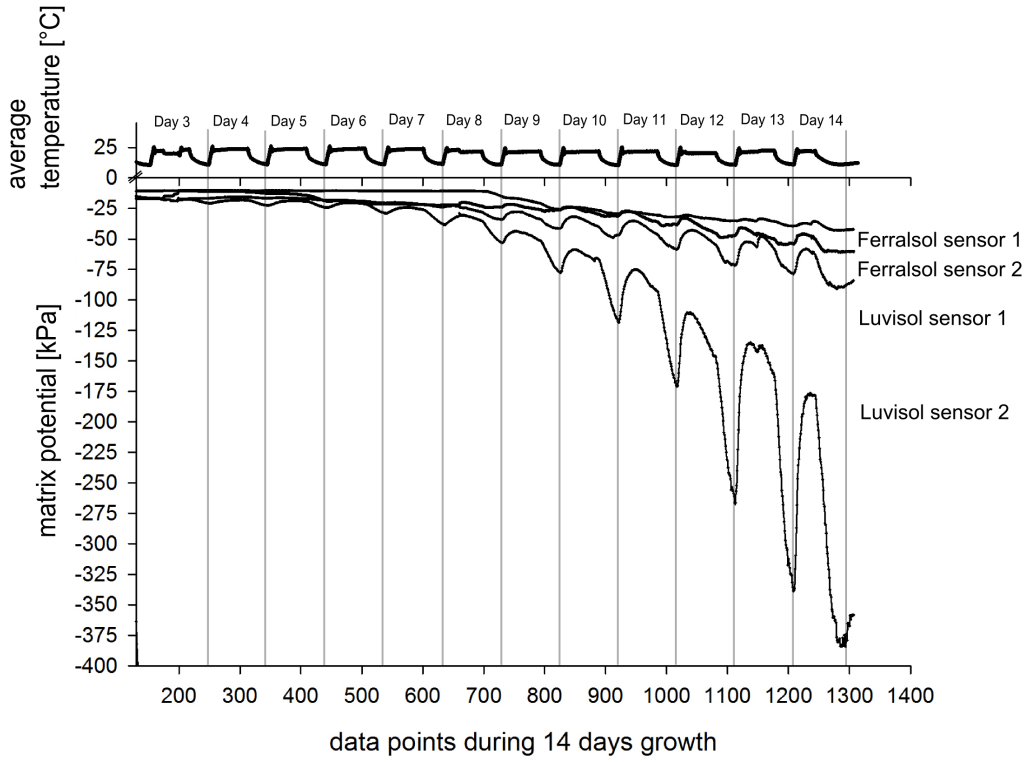

Figure S1. Average diurnal temperature [°C] and soil matric potentials [kPa] data points from Luvisol (Luvisol sensor 1 + 2) and Ferralsol (Ferralsol sensor 1 + 2) subsoil during a 14 days growth period of wheat plants in rhizoboxes. Valid measurement started after filling the ^{33}P radioactive-labeled soil treatments in soil bands of rhizoboxes, which were sealed with plastic foil at day 2 of growth. The data was conducted by dielectric water potential sensors (MPS2) and moisture sensors for the volumetric water content. In this figure all data points from night and day measurements are presented. It is obvious, that matric potentials were artificially affected by increasing temperature at the start of each day time, similar observations are stated by other users (Richter et al., 2012; Hartner, 2013). Authors also assumed effects by plant transpiration when plants reached the sensor area, but these effects were not that pronounced than the effects of temperature variations. However, plant transpiration can be expected to gain influence on the matric potential after day 7. Furthermore, matric potential producer estimated the sensor accuracy at -9 to -100 kPa to be approximately 25% (Decagon Devices Inc., 2016). However, these variations cannot explain the steep increase of the matric potentials measured by Luvisol Sensor 2, and we therefore assume that sensor-soil connectivity was not appropriate for this sensor.

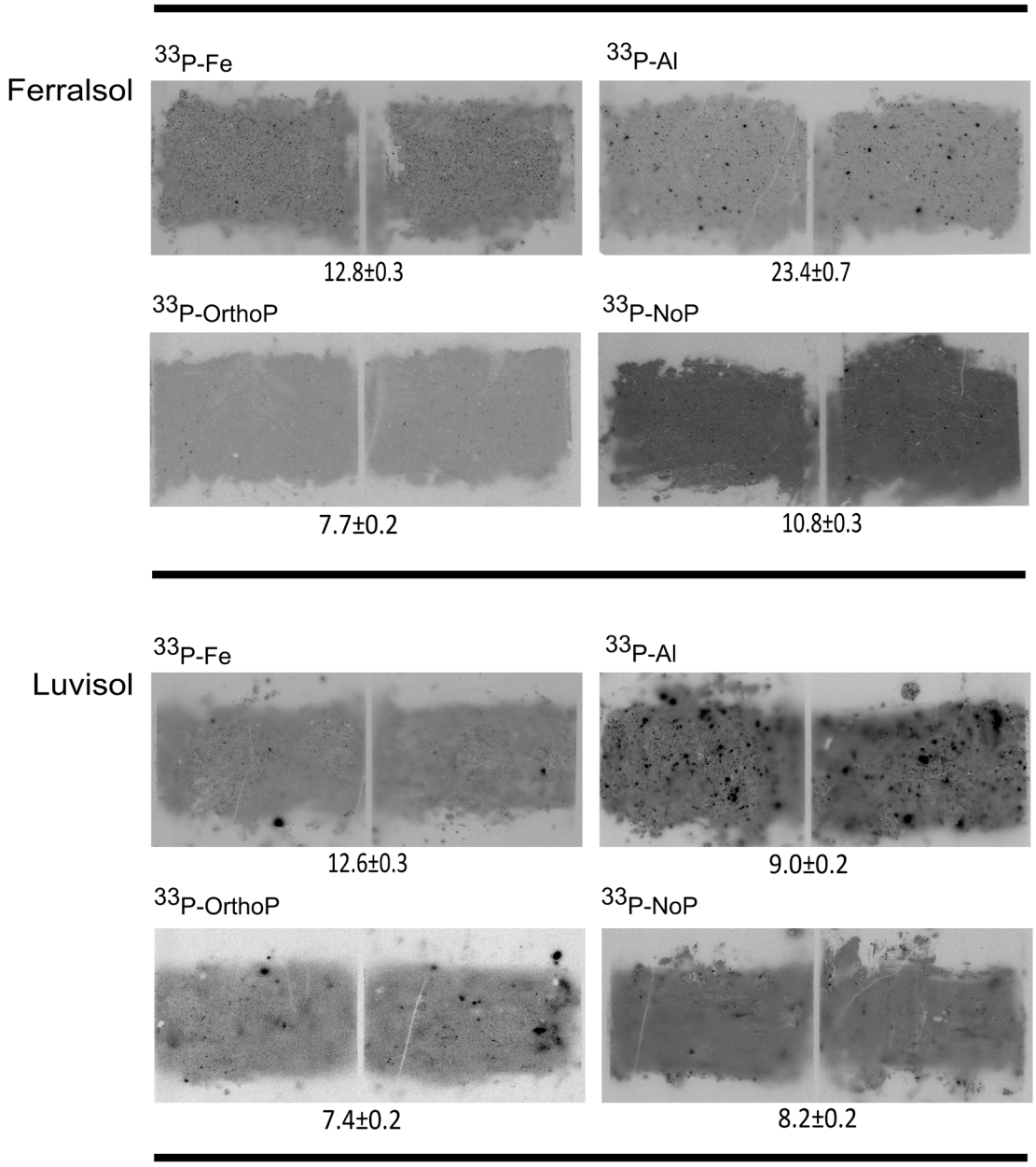

Figure S2. Digital images of ^{33}P labeled soil bands of a Ferralsol and Luvisol subsoil with associated and carrier-free ^{33}P radioisotopes (^{33}P Fe-hydroxide, ^{33}P Al-hydroxide, ^{33}P-OrthoP, and ^{33}P-NoPo) in duplicates (two replicated chambers). The standard deviation (SD) ± standard error of the mean bulk soil signature is displayed below the digital image.

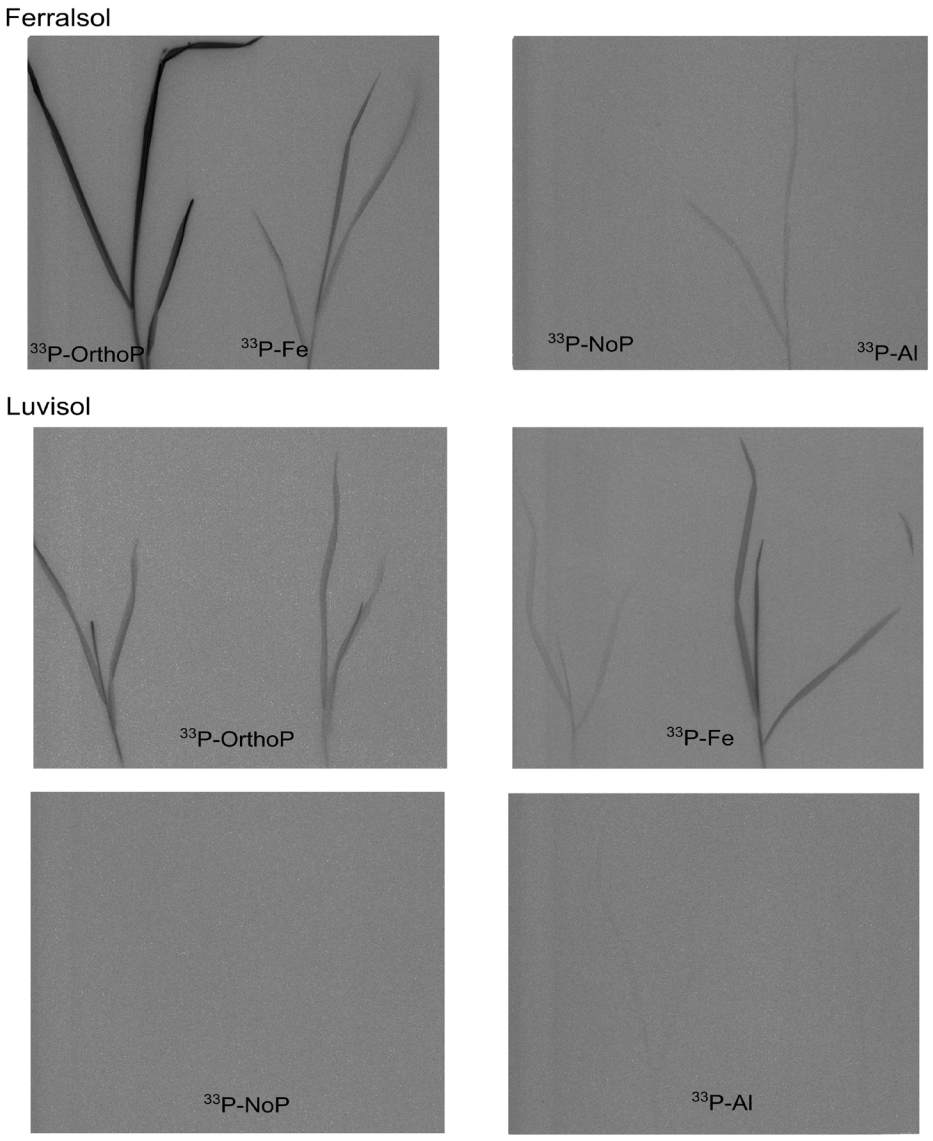

Figure S3. Digital autoradiographic images of 14 days old wheat plants grown in rhizoboxes with different ^{33}P labeled treatments (^{33}P-Fe: ^{33}P associated to amorphous Fe-hydroxide; ^{33}P-Al: ^{33}P associated to amorphous Al-hydroxide; ^{33}P-OrthoP: ^{33}P applied in KH_2PO_4 solution; ^{33}P-NoP: ^{33}P radiotracer applied alone without P addition) in Ferralsol and Luvisol subsoil. Imaging plates were exposed for 4 hours to the plant material followed by a 100 µm sensitive scan with the scanner unit Bioimager CR35 Bio. Images are processed with AIDA and presented with a gamma resolution at 2.