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# Dye tracer study of soil structure and preferential flow patterns in Paddy rice fields

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Soil structure in Paddy rice fields is dynamically changing due to root growth, tillage induced stresses and flooding or draining induced swelling or shrinking. Reports of chemical leaching from such intensively cropped field sites indicate that soil structure dynamics possibly affects flow and leaching of dissolved chemicals despite of repeated 'puddling' and plough pan formation. The objective was here to qualitatively examine soil structure and identify preferential pathways. The experimental site is located in the subtropical SE-China in the province Jiangxi. In the ĆSunjian' watershed, two Paddy-rice fields of 100 to 300 $m^2$ were selected that have been cultivated for about 20 years. Dye tracer experiments were carried out by applying 50 L of Brilliant Blue (5 kg m-3) in a single pulse such the micro-relief of the soil surface remained undisturbed. One day later, vertical and horizontal soil profiles were created by removing 3 to 20 cm thick soil layers and photographing the prepared surfaces. Stained areas were counted by using a self-programmed image analysis tools based on the image processing toolbox of Matlab 6.5. The maximum depths of staining were 55, 84, 94, and 120 cm. Large immobile zones of the matrix were not stained at all thus contrasted by stained preferential pathways. Numerous stained biopores and cracks were visible within the plough pan. The crack system decreases with depth while the proportion of stained biopores increases. Both preferential flow systems are interconnected by a lateral crack network at the plough pan. The results suggest that preferential flow may occur in such Paddy rice fields even after swelling under flooding conditions. The quantitative effects of soil structure on preferential leaching will be the objective of future model-based studies.