# Gravel is Soil is Gravel

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Around 3.8 M ha of gravelly soil contributes to crop production in south west WA. Soil analysis and glasshouse experiments routinely take place in the absence of the ≥2 mm fraction. Typical processes include sample collection, air drying, and sieving (<2 mm) prior to experimentation or analysis. The ≥2 mm fraction is discarded as it is often considered inert, acting as a soil volume diluent, and problematic for routine chemical analysis when intact because of size and representativeness. However, the literature cites that the ≥2 mm fraction may contribute positively to soil chemical, physical and biological properties. A virgin lateritic soil containing 80% gravel from West Dale was separated into <2 mm, 2-4 mm, 4-6 mm, 6-8 mm and 8-10 mm fractions, and the gravel washed and air dried. 12 kg of each gravel size was incubated with 120 litres of 5, 10, 20, 40 and 100 mg P $L^{-1}$ for 10 days, after which the “phosphated” gravel was air dried. Dry matter for 3 sequential harvests of wheat grown for 6 weeks was determined in mixtures of four size fractions of 25 or 50% by volume of phosphated and non-phosphated gravel and inert white sand in triplicate. Basal solutions containing Cu, Zn, Mg, Co, Mn, Mo, K, S, B, Ca, Cl, Fe and N were applied to ensure that only responses to P were measured. Control pots of 100% sand with and without P were included. Phosphorus response curves were also developed for 100% inert white sand and the < 2 mm fraction from the gravel soil. Pots were watered to just in excess of field capacity weekly based on spot checks of volumetric water content using a ProCheck-10 and GS1 dielectric probe. Water requirements gradually increased from once a week initially to three to four times daily once plants were well established and evapotranspiration increased. Soil solutions were extracted weekly 16 hours after watering using rhizons (rhizosphere.com) from which P concentrations were determined. Colwell P was measured on intact and ground phosphated and non-phosphated gravels, and < 2 mm fraction. Phosphated gravel supplied P to wheat, and yield decreased with each harvest. Wheat responsiveness to the amount of P added followed Mitscherlich functions, with responsiveness increasing in the following order: <2 mm, 2-4 mm, 4-6 mm, 6-8 mm, 8-10 mm, inert white sand, suggesting the response was related to P buffering. Yield varied with gravel size, amount and P concentration, and yield decreased with increasing gravel size at some P concentrations. Colwell P of intact gravels was correlated 1:1 with Colwell P of ground gravels. Soil solution P concentrations varied with time, gravel size, gravel amount and the degree to which gravel was phosphated.