

## Growth and phosphorus efficiency in leguminous plants grown in sand irrigated with nutrient solutions, and with inorganic iron and calcium phosphates

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### Abstract

Some plant species have the capacity to produce root exudation that contributes to the liberation of phosphorus in inorganic combinations. Root induced pH variations, growth and phosphorus use and absorption efficiencies (PUE and PAE), were evaluated during early vegetative growth using two cultivated (bean and cowpea) and the wild leguminous species *desmodium*, grown in sand irrigated with P-deficient nutrient solutions prepared with barely soluble P-inorganic sources of iron and calcium bound phosphates (Fe-P and Ca-P). Thirty plants were planted per species and irrigation treatment and 3 plants were randomly sampled every third day during the exponential growing phase to evaluate for dry weight and leaf area determinations and total P concentration at the end of the experimental period. The results indicate that these legumes can access and utilize with varying capacities P from Ca-P, but in comparison with pigeon pea (used as the reference species), the results showed a higher capacity to access P from Ca-P than Fe-P as shown in lower root and leaf area growth reflected in low relative growth rates (RGR) for total biomass. The variation in pH reflect changes in rhizo-spheres as a consequence of exudation of radicals and unequal absorption of ions. Even though PUE was higher with Fe-P, cowpea had the highest value with Ca-P, but wild *desmodium* had the desired combination of both high PUE and PAE. Pigeon pea had a similar PAE with the three forms of P, but a higher PUE with Fe-P. The combination of growth strategies with the efficient use of P absorption could pen up possibilities of realizing a better selection of genotypes that are tolerant to P in marginal soils.

**Key words:** Calcium-phosphates, growth analysis, iron-phosphates, legumes, phosphorous deficiency, phosphorus efficiency.

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