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Variability of N₂ fixation in cowpea under phosphorus deficiency is related to phosphorus use efficiency.

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Low availability of phosphorus (P) is a major constraint to legume production, and efforts are being made to identify legume genotypes with tolerance to low P and greater P use efficiency (PUE). Cowpea (*Vigna unguiculata* L.) genotypes vary in their adaptation to low-P soils. In order to investigate to what extent this variation may be related to PUE for symbiotic nitrogen fixation (SNF), five genotypes, Adrar, El Kala, Djenet, Tizi Ouzou and Bejaia, were grown in semi-hydroponic culture with sufficient versus deficient P supply. At the flowering stage, the biomass of plants and nodules and their P contents was determined after measuring the quantity of N₂ fixed. The results showed that nodule and shoot biomass were less when P was deficient. The genotypes that presented the maximum growth during the experiment presented a high efficiency in use of the rhizobial symbiosis calculated as the slope of plant biomass regression as a function of nodulation. Under P-deficiency, efficiency in use of P for SNF was significantly increased in the genotypes El Kala, Djenet and Adrar and accompanied with an increase of the efficiency in use of the rhizobial symbiosis. Hence the large differences show that traits for more P uptake-efficient plants exist in the tested cowpea genotypes. This opens the possibility to breed for more P uptake-efficient varieties as a way to bring more sparingly soluble soil P into cycling in crop production and obtain capitalisation of soil P reserves.