

Effect of triple superphosphate (TSP) and KH_2PO_4 at different application rates on biomass and arsenic uptake by *Pteris vittata* L.

ABSTRACT

Pteris vittata L. has been demonstrated to absorb heavy metals, especially arsenic (As) from the soil. The interaction of As (V) and phosphate in the ferns that hyperaccumulate As is essential. Therefore, a glasshouse study was conducted to investigate the effect and interactions of phosphate in different forms at varying rates on biomass and uptake of As by *Pteris vittata* L. grown in naturally organic As-rich soil. *P. Vittata* was grown in soil subjected to 9 treatments including control (0 P treatment) and four different rates of P in solid form of Triple Superphosphate (TSP) and liquid form of potassium dihydrogen phosphate (KH_2PO_4) at 12.5, 25, 50 and 75 kg P ha⁻¹. Results showed a significant ($P \leq 0.0001$) increase in frond biomass compared to non-amended soil, whereas the biomass of roots showed no significant ($P > 0.05$) difference in all treatments. The concentration of As in the fronds ranged from 29 to 157 mg kg⁻¹ with the highest uptake of As being 0.71% in TSP, while in KH_2PO_4 , it was 0.331%, almost half the rate in TSP. The application of P has been shown to increase the phyto-availability of arsenic in soil, resulting in a positive response on *P. vittata* As uptake, that is, TSP performed better compared to KH_2PO_4 in terms of As uptake and plant growth. It is postulated that the increase in As uptake was accompanied or more likely a synergism by the addition of phosphate.

