PHOSPHORUS ACQUISITION BY COTTON CULTIVARS UNDER DEFICIENTLY-BUFFERED-P CONDITIONS

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ABSTRACT

To evaluate P-acquisition ability of six cotton cultivars, pre-germinated seedlings were grown in nutrient solutions containing tri-calcium phosphate (TCP) @ 0.5 g L^{-1} as P source, in a bid to maintain deficiently-buffered solution-P concentrations throughout growing period. The cultivars harvested 15 days after transplanting, exhibited substantial growth differences in terms of biomass production, P-acquisition and utilization efficiency. Maximum shoot dry weight (SDW) was accumulated by 'NIAB-92' followed by 'CIM-443' and 'CIM-1100'. The other three cultivars ('NIAB-78', 'FH-634' and 'S-12') produced significantly lower SDW. A positive correlation existed between root dry weight (RDW) and SDW of the cultivars, and increased RDW of efficient cultivars was not due to preferential translocation of photosynthates to roots at the cost of aerial plant parts. Phosphorus concentration in roots of the cultivars was higher as opposed to shoots, and a negative correlation existed between root-P concentration and shoot as well as root dry weights (SDW r = -0.84, RDW r = -0.93**). Phosphorus concentration of nutrient solutions remained fairly constant during growing period and no evidence of rhizosphere acidification was observed. Higher SDW of the cultivars was related to their better P-acquisition ability, which in turn was related to higher Ca uptake. Thus, cultivars having efficient Ca accumulation ability can acquire higher amounts of P from P-deficient soils and adapt well to such P-deficient soil conditions.*