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Strategies for improving phosphorus acquisition efficiency of potato (*Solanum tuberosum* L.) genotypes on acidic soils

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Use of P-efficient cultivars can lead to reduced P fertilizer consumption and is an important priority to adapt to the dwindling P resource worldwide and to sustain food security. The use of genetically enhanced plants with improved P acquisition efficiency may represent the most sustainable solution to increase crop yields in agricultural systems on P-deficient acid soils. The strategies included: plant breeding and the use of agricultural practices for improving P use efficiency of potato cultivars. Field investigations were conducted with 12 potato genotypes on P-deficient acid soil at two levels of P (No P and 63 kg P/ha) to study their differential behavior to P stress. Significant increase in tuber yield, P concentration and accumulation and chlorophyll content was observed in all the cultivars, though the response varied. The cultivars showing maximum P response were rated as the most susceptible and those showing least response were least susceptible. The relative susceptibility of potato cultivars to P stress was; SSC 606>Kufri Khasigaro>Kufri Badshah>SSC 1101>SSG 849> Kufri Lalima>Kufri Jyoti>SSG 1999>UP-to-date>M 70>SSC 562>JH 214. Almost similar sequence was followed by different cultivars to response of P accumulation. The multiple-regression analysis indicated that Fe:P ratio, P concentration and chlorophyll content of the fourth leaf (from top) collected 60 days after planting accounted for 75% (R^2=0.747) of the variability in the P response. The Fe:P ratio was the most important of these as evident from the test of significance. The multiple-regression equation developed was, tuber yield (t/ha)= 12.235+67.777 (Fe:P)–0.992 chlorophyll (mg/g). Genetic manipulation for optimum, Fe:P ratio, P concentration and chlorophyll traits can be used to breed potato genotypes for P-deficient acid soils.

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