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SAARELA, INTO, HUHTA, HARRI, VIRKAJÄRVI, PERTTU,
Effects of repeated phosphorus fertilisation on field crops in Finland 2. Sufficient phosphorus application rates on silty and sandy soils

Keywords acid ammonium acetate method, soil test P, soil phosphorus, sufficient P fertilisation,

Abstract

In order to update fertilisation recommendations for Finnish silty and sandy soils, the effects of repeated phosphorus (P) fertilisation on the yields of cereals, grasses and other crops were measured at ten sites for 9 to 18 years. Results of some earlier studies were also used in examining the relationships of the yield responses to applied P and to the soil test values measured by the Finnish ammonium acetate method (Pac). Significant effects of P fertilisation were observed at all sites that had low or medium Pac values; in the case of potatoes, even at sites with fairly high values. The mean relative yield without applied P divided by yield with 60 or 45 kg P ha⁻¹ of the ten sites was 81% (mean Pac 11.6 mg dm⁻³) varying from 55% at the Pac value of 4.7 mg dm⁻³ to 100% at the highest Pac values. In order to achieve a relative yield of 97%, which is considered the optimum for cereals and leys, the required mean annual application of P in the later parts of the experiments was 25 kg ha⁻¹ (variation 0-42 kg ha⁻¹). On the six soils that had low or medium Pac values (4.5-9.1 mg dm⁻³, mean 8.0 mg dm⁻³), relative yield was 97% at the P application rate of 35 kg ha⁻¹ (variation 22-42 kg ha⁻¹), while 11 kg P ha⁻¹ (variation 0-25 kg ha⁻¹) sufficed on the four soils that had higher Pac values (mean 20.8 mg dm⁻³, variation 11.7-35.2 mg dm⁻³). Reasons for the poor availability of P in silty and sandy soils were discussed.

Contact into.saarela@mtt.fi

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