Effect of phosphorus and organic matter on soil-plant phosphorus relationships in spinach

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Abstract

To determine the effect of application of phosphorus (P) and organic matter on soil-plant P relationship at different growth stages of spinach, an experiment was conducted at greenhouse conditions. Treatments consisted of two levels of organic matter (0 and 2% of sheep manure) and three levels of P as $Ca(H_2PO_4)_2$ (0, 20 and 60 mg P kg^{-1}soil). Soil and plant samples were collected at five growth stages (the first sampling was in the fourth week after emergence, and the other samplings were each one week after the first sampling). The results showed that crop yield increased with the increase of soil P at all growth stages, whereas it had no significant effect on plant P content. In the 4th week of growth, plant P increased with an increase of soil P, and it remained relatively unchanged in the 5th week. But it decreased significantly in the 6th to 8th week. Concentration of plant nutrients depends not only on soil nutrients concentration but also on plant age and availability of other nutrients. In some stages of the plant growth, the growth rate might be too fast such that total uptake of the nutrients is not enough to maintain the necessary concentration. Plants required adequate P at early growth stages for optimum growth. Phosphorus uptake was increased with plant growth in all samples. Soil P content was higher in all organic matter treatments (especially in the 6th week after emergence). Phosphorus uptake in samples with organic matter, and no addition of P, was more than the samples which received P. This might be due to mineralization of organic P added to the soil.

Keywords: Vegetables, Macronutrients, Sheep manure, Growth stages.

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