
intercropping promotes the ability of chickpea and durum wheat to facilitate phosphorus and nitrogen acquisition through root-induced processes in an alkaline N-deficient soil

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Abstract

Intercropping of cereal and legume can improve the use of resources for crop growth compared to sole crops. Enhanced soil phosphorus (P) and nitrogen (N) acquisition by root activity of intercropped species has been proposed as a mechanism of facilitation. It has also been proposed that facilitation prevails over competition when resources are more limiting for crop growth. The objective of this study was to test the effect of intercropping chickpea and durum wheat on N and P availability in an alkaline N-deficient soil. Plant growth, N & P uptake and nitrogen index nutrition, rhizosphere pH and soil respiration were investigated in the field. Cereal and legumes were cultivated as sole crops or intercropped (durum wheat intercropped with chickpea). The major finding in this work is that chickpea intercropped with durum wheat considerably increased rhizospheric N and P availability and N concentration in durum wheat when it was grown intercropped with chickpea. Biomass, grain yield and consequently the amount of N taken up by intercropped durum wheat were significantly increased compared to those observed as sole crop. But no intercropping effect was observed on P uptake for durum wheat or chickpea. The high rate of N₂ fixing in an intercropping system was also associated with the root-induced processes such as pH change, root respiration and CaCO₃ solubilization. In its rhizosphere were thus probably the root-induced processes implied in the enhanced N and P availability for intercropped durum wheat.

Keywords: Phosphorus, Nitrogen, Facilitation, Intercropping, Rhizosphere.

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