Carbone and nitrogen sequestration through microbial biomass changes in the rhizosphere of intercropped cereal and legumes under low phosphorus conditions

Latati M[a*], Bargaz A[b] , Lazali M[c] and Ounane S.M[a]

[a]Ecole Nationale Supérieure Agronomique, Département de phytotechnie, Hassan Badi, El Harrach, Algiers, Algeria.[b]Université des sciences et téchnologie d'El Sania, Oran , [b]Swedish University of Agricultural Sciences (SLU), Department of Biosystems and Technology, Box 103, SE-23053 Alnarp, Sweden, [c]Université de Khmiss Malyana, département d'agronomie, Algérie,

Introduction

Enhanced nutrients ressources efficiency has been repported in intercropping compared to sole crop systems, especially in low-input Agroecosystems (Latati et al., 2014, 2015; Betencourt et al., 2012). However, to the root-induced direct modification of C and N availability in the rhizosphere via N2 fixing legumes compounds by nodules roots, facilitation can also occur as a consequence of microbially mediated processes, as a result of a shift in the microbial biomass.

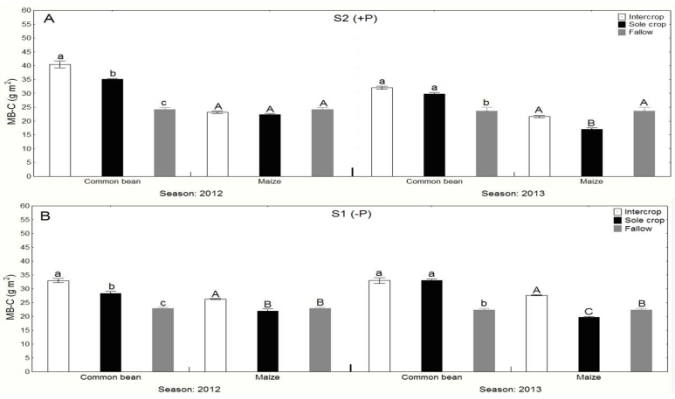
We hypothesized that intercropping leads to an increase in MBC and MBN in the rhizosphere due to a higher C and N input of nodules.

Materials and methods

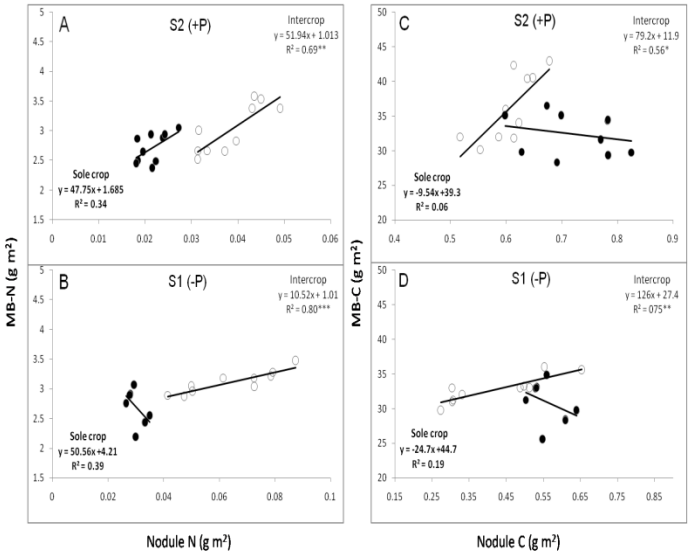
In Setif agrosystem and under multilocal conditions, common bean and maize were grown as sole- and inter-crops in two experimental sites; S1 (P-deficient) and S2 (P-sufficient) during two growing seasons (2012 and 2013). In this study, intercropping maize/common bean, was investigated in a Multilocal conditions, we evaluated the effect of intercropping on microbial biomass and soil respiration

Results and discussion

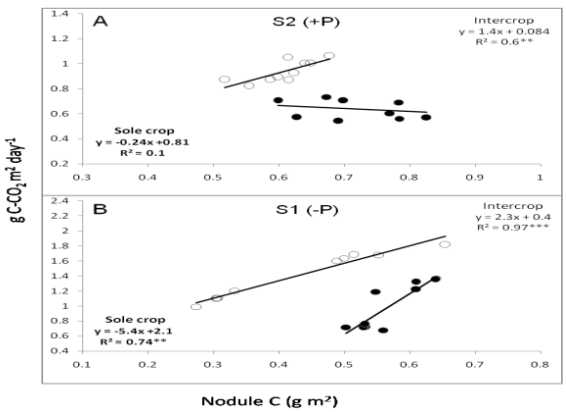
C and N in microbial biomass



Effect of CN nodule stock on CN in microbial biomass



Relation between nodule C sequestration and soil respiration



Conclusion

Our findings suggest that modifications in the microbial biomass were significantly associated with increase of C and N sequestration in nodule, especially when common bean was grown intercropped whit maize and under P deficient soil.

Nodule give N and C rich materials as substrates for microbial biomass by there own senescence and also by senescence of organs of host plants. Such low C:N ratio material as nodule tissue would result in high proliferation of bacteria in soil.