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Editorial

Carbon Sequestration and Soil Chemical Fertility Improvements Due to the Use of Cover Crops

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EDITORIAL NOTE

Global food demand generates a significant pressure on the natural resources used in its production. Soil is a complex system where crops grow, it is a reservoir of nutrients and it could be a potential sink of carbon (C). Within the soil organic matter (SOM) it is finally where the C is sequestered and the greatest amount of nutrients linked to the C cycle (Nitrogen (N), sulfur (S), zinc (Zn) and boron (B) are contained. Therefore, with practices that increase SOM levels, it is possible to sequester atmospheric C and improve the chemical fertility of soils, generating a win-win situation [1].

Cover Crops (CC) are crops that do not have a commercial purpose and are generally used during the winter to cover soil decreasing erosion processes. Before commercial crops are sown, CC are dried and their residues remain over the soil favoring C fixation and nutrients recycling. CC also have other benefits such as controlling herbicide resistant weeds, removing excess water, improving soil structure and generate a net contribution of N to the system (legumes), which is why they have begun to be named as service crops rather than cover crops [2].

In Argentina Republic there is extensive literature on C sequestration in soils by CC, being able to sequester between 100 and 400 kg C ha^{-1} yr^{-1}. The soil C sequestration potential will depend on the type of soil (mainly clay content and C), climate (temperature and rainfall) and the CC species (dry matter production and C/N ratio).The combination of these factors will determine the C fixation, the decomposition rate of the CC and the C sequestration potential by soil [3].

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In a study carried out in three characteristic edaphoclimatic environments of the productive core zone in Argentina, changes in the crop residues decomposition rate could be observed and also changes in the soil C dynamics due to the use of CC, generating an increment in the soil C sequestration. The increase of C occurred mainly in the labile fractions of the som, this also generated a redistribution of C within the different SOM pools. Among the evaluated factors, the variable that most affected the soil C sequestration was probably the climate because the areas with an adequate supply of water and mild temperatures favored the CC biomass production and the C accumulation in the soil [4].

With respect to soil chemical fertility in several long-term experiments increases in the nutrients availability or in the nutrients concentration of the som labile fraction could be observed as well. In four experimental sites with different soil texture, an increase in phosphorus (P) and N was observed in the som labile fraction [5].

An increment in Zn availability and Mn availability was measured. Therefore, CC are not only a tool for C sequestration and climate change mitigation, but they also favor the nutrient recycling and increase their labile organic fractions. In order to know the soil potential C sequestration, it is needed to be aware of the climate, the type of soil and the production and quality of the CC (concentration of C, N and C/N ratio) (Figure 1) [6].

Figure 1: Soil cover generated by a vetch (*vicia villosa*) as a cover crop, soil cover and Conyza sumatrensis control due to the use of oats as a cover crop and Soybean (*Glycine max*) emerging on the residue of wheat (*Triticum ssp*) used as a cover crop.

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