

## SCIENTIFIC REPORT of Sandra López Rayo

The correction of iron micronutrient deficiencies is a problem still not fully solved in Agriculture. The low solubility of the iron compounds in the pH range of calcareous soils contributes, among other factors, to its low availability to plants. Remediation of iron deficiency is efficiently achieved by the use of formulations based on iron chelates. These commercial formulations must indicate on their label the amount and kind of metal chelate or complex present in the fertilizer (Regulation (EC) No 2003/2003).

The use of NMR for the quality control of fertilizers containing Fe is precluded by the strong paramagnetism of  $\text{Fe}^{3+}$ . Recently, has been developed a technique for removal of iron from EDDHA commercial iron chelates for the analysis and quantification by NMR (Lagui et al, 2009). Last year, we collaborated with the group that works in this NMR techniques in Cesena, Italy, testing the method proposed by Lagui for other iron chelates like those based on EDTA and IDHA or EDDS that have been appearing on the fertilizer industry to treat Fe deficiencies to plant. As a result was possible identify and quantify the ligand inside in some of these fertilizer samples by NMR after the successfully deferration and compare these data with HPLC results obtained in our laboratory. Also fertilizers containing Manganese and Copper (paramagnetics) have been measured by this method. However, this work could not be finished being necessary to obtain more time, about 2 weeks, in order to finish the analysis by NMR.

For that proposed, a short visit to the University of Bologna at Cesena was applied with the objective of finish the analysis by NMR of iron chelate fertilizer samples.

Thanks to this short visit, the completion of the initiated work has been done. Consequently, a manuscript is preparing to publish our results in a scientific journal. It will be a very interesting work about a new method to identify and quantify iron fertilizers throughout NMR.

The most interesting results showed that, the quantification work performed on some commercial samples, revealed conspicuous presence of chelating agents undeclared on the label, offering a direct proof that one of the advantageous peculiarities of NMR is the possibility to observe and quantify unknown impurities without the need of pure compounds to be used as internal standards.

Future collaborations could be useful in the study of new iron chelates emerging in the commercial market to obtain a good identification and quantification.