Iron spatio-temporal variability in an acid rice soil

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The aim of this work was to assay the spatio-temporal bio-available iron variation of an acid rice soil during different rice growth stages. The experiment was performed on a typical Plintacualf with two consecutive years under irrigated rice, where 0, 625 and 1250 kg.ha^{-1} dolomite were added. Three samplings at 11.9 x 20 m were done (seedling, tillering and flowering), and Fe-Mehlich-1 concentrations were assayed.

The global effect of submergence on Fe-Mehlich-1 concentration was positive. The highest increase during the first 28 days was observed in the control parcels. The interaction between the days under flood water x the lime doses added produce a strong liberation of soluble iron, increasing the mean values 78% during the first 28 days under flood water and 64% on the 28 following days. The treatment with 625 kg.ha^{-1} amendment showed the highest increase since the second sampling with soluble iron concentrations higher than 2100 mg.kg^{-1} at flowering time.

The results from the structural analysis and the kriging available iron for the three treatments and vegetative stages reach a stable sill with a nugget effect lower than 15%. The adjusted semivariograms were seven of spherical type and two circular, and their range oscillated between 42 and 56 m. The correlation between the values estimated by kriging and the experimental data obtained by crossed validation was higher than 0.64 and higher than 0.7 in seven of the nine cases studied. The absolute errors mean (EM) of the available iron was lower than 0.017 and the adimensional mean square error (ECMA) were close to the unit. Bioavailable iron spatial variability and temporal fluctuations showed an important increase along the rice vegetative cycle. The variances the mapped estimation errors showed extraordinary high maximum absolute values although the variation coefficients of the kriging errors are never higher than 20%, and are frequently lower than 10%, especially during the seedling time.