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Evaluation of distribution and manganese availability in soils under soybean cultivation

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Manganese (Mn) deficiency in soybean became a problem in Brazil, mainly, due to soil low fertility use or soil high pH due to incorrect lime use. However, the manganese deficiency have not been thoroughly investigated. The effect of Mn soil application on Mn distribution among exchangeable, organic matter, amorphous Fe and Al oxides, crystalline Fe and Al oxides, and residual fractions were studied on a Typic Quartzipsament (RQ), a clayey Typic Haplustox (LVA) and a sandy clay loam Typic Haplustox (LV), in a greenhouse experiment carried out in Jaboticabal (SP) – Brazil (21º14'05" S and 48º17'09" W). A complete randomized design with three replications of treatments in a 3 x 6 factorial arrangement (three soils and six manganese rates) was used. Five soybean plants were grown during 34 days in pots with 2.5 kg of soil. The Mn contents in these fractions were correlated with those extracted by DTPA and by Mehlich-1 extractants and with soybean shoot Mn contents. Mn rates (0, 5, 10, 20, 40 and 60 mg kg-1) were applied using manganese sulphate (MnSO4). In the Oxisols, most of the Mn was associated with the Fe and Al oxides (amorphous and crystalline) and residual fractions. In the sandy soil (RQ), higher contents were found in exchangeable and residual fractions. Exchangeable fraction was the most important Mn supplier to soybean plants. Multiple regression analysis showed that Mn extracted by DTPA and Mehlich-1 were associated with soil exchangeable fraction.