Liming demand and plant growth improvements for an Oxisol under long-term no-till cropping

Abstract
The adequate management of soil acidity has long been a challenge in no-till (NT) cropping systems. Some studies conducted in sub-tropical conditions have demonstrated the feasibility of surface liming. However, for tropical regions with dry winters, little long-term information about adequate rates and frequencies of application is available. A 12-year field trial was performed under a tropical no-tillage system with an annual crop rotation scheme. The treatments were composed of four lime rates (0, 1000, 2000 and 4000 kg/ha), estimated via the base saturation (BS) method. Surface application of lime was found to be an effective method for improving the soil fertility profile under this long-term NT cropping system. All three acidity components (pH, hydrogen + aluminium (H + Al), exchangeable Al) and some fertility attributes (phosphorus, exchangeable calcium and magnesium, and BS) were adjusted to a linear function, and better soil chemical conditions were obtained in the 4000 kg/ha treatment, even 4 years after the final application. Due to soil chemical changes, the root length density of wheat and common bean was greater at depths <0.20 m, which led to a higher grain yield, even under unfavourable weather conditions. The results indicate that the application of lime at higher rates can be an acceptable criterion for a tropical Oxisol under a no-tillage system, reducing the frequency of lime application. (AU)