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[C3.3-4] Soil Management Strategy for Enhancing Crop Yields

Phosphate Fertilization in the Soil and Penergetic Application in the Grain Yield of Common Bean

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The development of technologies that provide higher availability of P to plants could provide reducing the amount of P fertilizers applied to the soil, causing economic and environmental benefits, since these P fertilizers are produced from mineral reserves of non-renewable character. The Penergetic technology consists of applying Penergetic products K and P from bentonite clay subjected to application of electric and magnetic fields. These products, according to the manufacturer, are used 1. As bioactivator of soils (Penergetic K applied to the soil) that enhances and balances the microbial activity in the soil and 2. As bioactivator of plant, which provides more energy to the photosynthetic process and facilitates interaction + plant microbe beneficial. There are already promising results of the use of these products in wheat, vegetables, common bean, potato and barley. However, despite of these results there are still many questions regarding the use of this technology. There are virtually no studies that seek to correlate the application of Penergetic with P fertilizer. So we started with the hypothesis that the application of Penergetic (P and K) will provide greater utilization of P from the soil and will provide the highest grain yield of common bean with the application of lower doses of the nutrient. The objective was to determine the grain yield and yield components of common bean as affected by P fertilization and applying Penergetic K (soil) and P (plant).
The experiment was conducted at Fazenda Guaribas, Unai, Minas Gerais State, Brazil, in the years 2012 and 2013. The site had soil type Oxisol, loam with clay loam. The climate of the region is classified as Aw, tropical savanna, mesothermal, according to Koppen's classification. The region 's historical average of precipitation (1983-2010) is 32, 8.3, 4.3 and 12.6 mm precipitated in the months of May, June, July and August, respectively, and average temperatures of 21.8, 20.6, 20.8 and 22.6 °C in the same months , respectively. The experiment was conducted in the area of no-tillage after soybean cultivation. The experimental design was a randomized complete block design in factorial design 4 x 2 with eight replications. The plot dimensions was 7 m long x 2 m wide. It was considered useful plot the two central rows disregarding 0.50 m from each end. The treatments consisted of four levels of P applied to the soil (0, 40, 80 and 120 kg ha-1) in the presence and absence of Penergetic application. The application of Penergetic was done in two steps: 1. 250 g ha-1 of Penergetic-K applied right after the desiccation of cover crops in the soil, one day before sowing common bean, and 2. 250 g ha-1 of Penergetic-P at the V4 vegetative stage of common bean plants.
The application of Penergetic regardless of the combination with the P doses provided greater values of grain yield of common bean than those treatments without the product. Corroborating this information it appears that when applied Penergetic the agronomic efficiency of P application was much higher than that of non- application of the product, especially in the year 2013, with had much greater efficiency at lower doses of P. For treatments with Penergetic notes a significant increase in productivity up to a dose of 82.2 kg P2O5 ha-1, reaching 5313 kg ha-1 of grains. On the other hand, without the application of penergetic response to application of P was linear, and the maximum yield was 3903 kg ha-1 of grains. Based on the results it can be inferred that the application of Penergetic allowed highest yield with lower dose of applied phosphorus. This result may indicate that there was greater availability of P to plants when applied Penergetic possibly from the soil colloids and organic or part due to increased microbial activity in the soil. It is necessary to development further studies to confirm these hypotheses, since farmers are using these products and reporting positive increments in crop grain yield and as observed in this experiment.

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