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ELECTRICAL CONDUCTIVITY, pH AND POTENTIAL ACIDITY IN SOIL FERTILIZED WITH POULTRY LITTER COMPOST

CONDUTIVIDADE ELÉTRICA, REAÇÃO DO SOLO E ACIDEZ POTENCIAL EM SOLO FERTILIZADO COM COMPOSTO DE CAMA DE AVES

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Brazil produced in 2013, around 13.1 million tons of poultry meat, which generates 10.7 millions of tons of poultry litter. The practice of adding residues from poultry or manure residues to the soil demands a monitoring to realize the correct use on the treatment of the soil as a biofertilizer to prevent the impact by excess of mineral elements into waters and soil. This work aimed to study the effects of poultry litter compost used in soil over the electrical conductivity (EC), pH in $CaCl_2$ and soil potential acidity (H + Al). Treatments studied were five doses of poultry litter compost 0; 20; 40; 60 and 120 Mg/ha. Soil was classified as a haplorthox, sampled in 20 cm deep, dried, sieved and homogenized with the following chemical initial composition: pH $CaCl_2$= 4.9; H+ Al^{3+}= 31.0 mmol/dm^3; electric conductivity = 36.4 μs/cm. Organic compost was obtained by biodigestion in an aerobic fermentation during 60 days. Compost was then artificial dried at 55ºC for 48 hours. Results from organic compost analysis of N, P, K, Ca and Mg were 29.4, 39.3, 25.5, 92.4 and 11.8 g/kg, respectively. Organic fertilizers were homogenized and sieved in 3 mesh sieves, corresponding to a free opening of 0.67 cm and mixed to the soil. The experiment was carried out in a green house, in a randomized blocks design with five replications. The incubation and neutralization curves were determined in dried samples of soil, evaluating pH data in solution of $CaCl_2$ 0.01 mol/L in a proportion of 1:2.5 (soil: solvent) related to the increasing doses applied of dolomitic lime (PRNT = 130%, CaO = 44% e MgO = 20%), aiming to evaluate the effects of soil reactions and to compare with the application of poultry litter compost. The data were analyzed by the mixed procedure (SAS Inst., Inc., Cary, NC). The application of poultry litter compost increased significantly the pH values, decrease the potential acidity. The incubation curve for this soil with increasing amounts of lime showed values of pH $CaCl_2$ increasing linearly and adjusting to the equation y = 0.86x + 3.91 (R^2 = 0.94**) where x = amount of lime (t/ha). Considering pH values obtained by addition of 20 Mg/ha of organic compost, it can be estimated though the equation that corrective values of this product is equivalent to application of 2.43 tons of lime per hectare, using poultry litter compost. The amount of changeable Al in the soil and Al saturation (m%) decreased with the compost application in comparison to the control treatment, and as a consequence, a decrease on the potential acidity values (H + Al), a decreasing on the changeable Al in the soil, which can be explained by the aluminum complexation, by the acids fractions fulvic and humic from organic matter, which are very reactive and increase significantly in the soil with addition of higher amounts of carbon. The electric conductivity values (EC) from soil were altered by the bio fertilizer doses applied on the soil. Values of EC showed higher levels after poultry litter compost application (from 86.5 to 2,447.0 μs/cm). As results, this work shows that altering concentrations of Ca, Mg and K, besides the pH, responsible for the nutrients and micro nutrients availability also alters the EC in the soil. High content of sodium (2,842.0 mg/kg) on poultry litter compost explains also the increase on the EC. The critical values superior to 400 μs/cm (4 dS/m) were obtained with doses above 20 Mg/ha of poultry litter. The fertilizing potential of the poultry litter must be monitored and doses must be used inferior to 20 Mg/ha in the way to prevent negative impacts and environmental risks avoiding chemical and physical soil unbalances.

Keywords: organic fertilizer, poultry litter, physical-chemical soil properties.