5 - 03 Effect of slurry application and its acidification or injection on soil biochemistry indicators in an ongoing field trial

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Injection of slurry and band application of acidified slurry are considered alternative efficient solutions to minimize ammonia emissions during and after slurry application to soil. The aim of the present work was to assess the effect of those alternatives relative to traditional slurry broadcast and mineral N application on soil quality indicators, assuming that soil management may impact on the microbial processes over a shorter time scale.

A field experiment, still ongoing, was established at Castelo Branco in 2012 in a sandy-loam dystric Cambisol (pH H_2O - 5.9 and OM - 15.3 g kg^{-1}). The results take into account the first two years of experimentation, with application to oat (autumn/winter) and maize (spring/summer). Pig slurry acidification is performed by addition of H_2SO_4 to reach a pH of 5.5. Application rates were equivalent to 80 and 170 kg N ha^{-1} for oat and maize, respectively. In this presentation, only five treatments are considered: non amended soil, mineral N, untreated slurry injection, surface untreated slurry application, and surface acidified slurry. Soil samples were collected at the end of each crop (0-20 cm layer) and kept at 4ºC until analysis. β-glucosidase, acid and alkaline phosphomonoesterases, urease and arginine-deaminase activities and nitrification potential were determined.

Despite interactions between treatments and dates were significant, only the overall effect of the treatments in all the dates is presented here. All the considered biochemistry parameters showed significantly lower values in control than in soil receiving mineral N (except for arginine-deaminase -endoenzyme), or receiving pig slurry, including acidified slurry. Acidification affects significantly the nitrification potential and enzyme activities, except for arginine-deaminase. However, injection of the non-treated slurry depressed significantly both phosphomonoesterases, arginine-deaminase, and nitrification potential when compared with acidification. Relative to mineral N fertilization, the acidified slurry presented values significantly higher, excepting for β-glucosidase.

After two years of experimentation, the available results suggest that band application of acidified slurry affect some of the indicators of soil quality when

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compared to raw slurry. Nevertheless, the second alternative solution for minimizing ammonia emission, injection, presented a more negative impact on the parameters under study.