Assessment of N mineralization from pelletized and non-pelletized compost through an incubation experiment

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INTRODUCTION

Composting allows to obtain a stabilized fertilizing material, free of pathogens and weed seeds and with the humification of the organic matter. However, the mineralization in the soil, which is important to the crop's uptake, can be affected not only by the sources of the composted organic materials but also by the physical form of the compost. The stability of the pellets is an important factor of their quality since it allows them to remain in their physical form during the transportation and application. How the pellets stability affects the N and P availability for crops is still poor understood.

OBJECTIVES

The objective of this work was to evaluate the N mineralization after compost addition to soil through an incubation experiment under controlled laboratory conditions for 7 weeks.

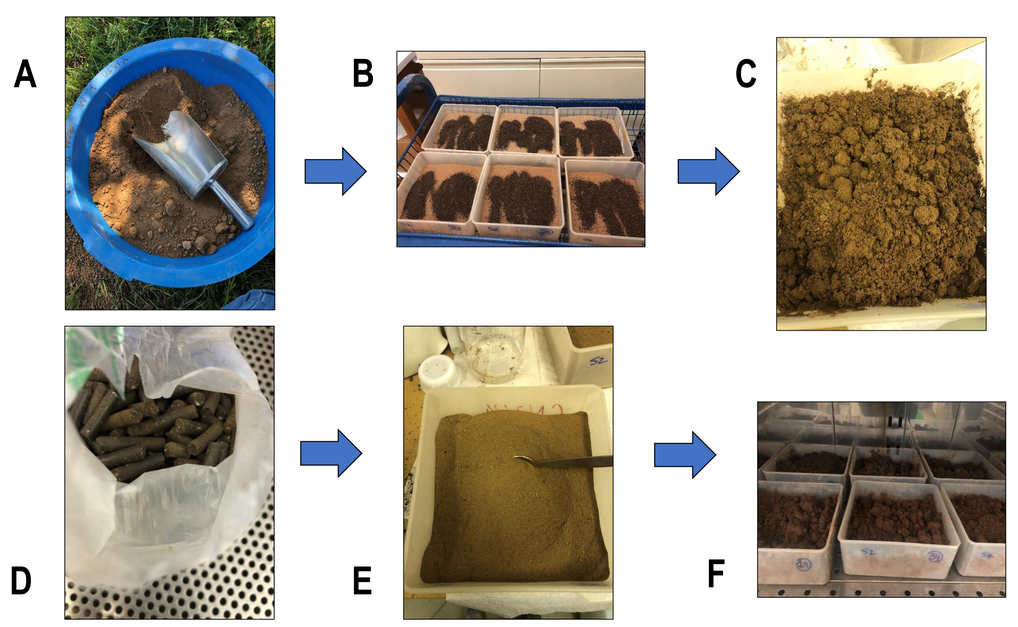

Figure 1: A) dystric Regossol soil; B) non-pellet compost; C) soil mixed with non-pellet compost; D) pellet compost; E) soil mixed with pellet compost and F) soil incubation

MATERIALS AND METHODS

Composts were obtained from two different sources: pig slurry (CS) or the dry fraction of the digestate (after the anaerobic digestion of the pig slurry, CD). These composts were in two different forms: pelletized (PE) and non-pelletized (NPE). The soil used in the experiment was a dystric Regossol (Figure 1). The experimental design was completely randomized with 5 treatments (3 replicates). The treatments were: control without fertilization (C); non-pelletized compost from pig slurry (CS-NPE); pelletized compost from pig slurry (CS-PE); non-pelletized compost from digestate (CD-NPE); and pelletized compost from digestate (CD-PE). N Fertilization was done at a rate equivalent of 340 kg N ha^{-1}. The temperature of incubation was 28 ºC and the soil was kept at 75% of field capacity. The experiment started at 05/23/2022, and a soil sample was taken weekly from each treatment and replicate.

RESULTS

- The results indicate that the NPE and PE composts, increased the mineral N in the soil after 49 days of incubation with respect to C. The treatments from CD showed the highest increases in mineral N (23.8 -PE and 23.1-NPE mg kg^{-1} respectively), while the treatments from CS showed lower increases (13.8-PE and 14.3-NPE mg kg^{-1} respectively).

- Nitrate correspond to the main N mineral form at 49 days, with 64% for C and 90% for CD-PE (Figure 2).

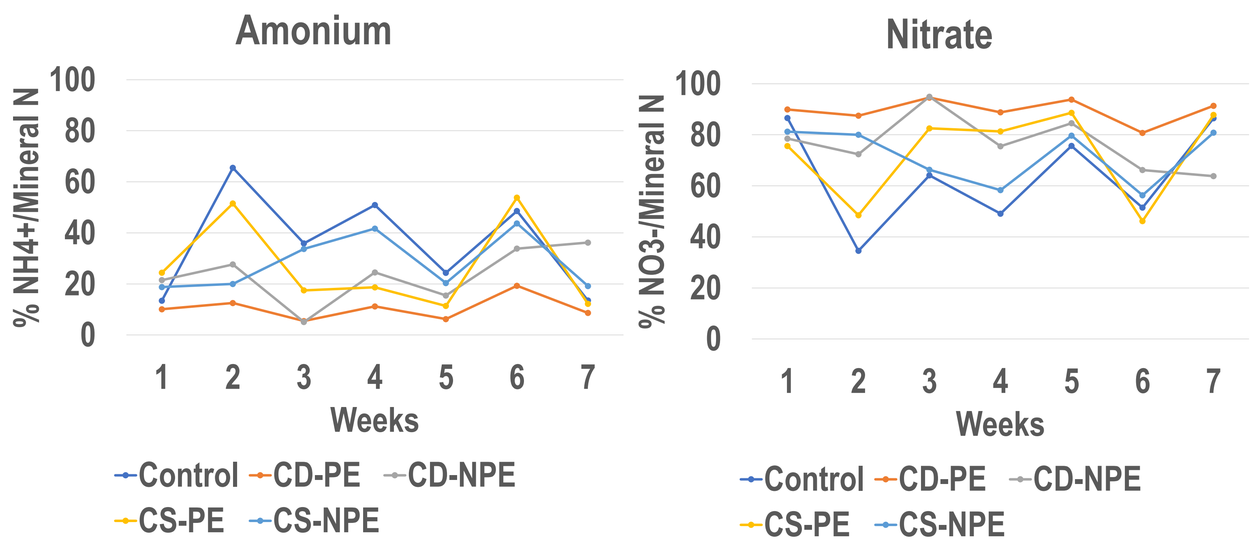

Figure 2: A) Percentage of amonium with respect to N mineral; B) Percentage of nitrate with respect to N mineral

CONCLUSIONS

- As a preliminary conclusion the results suggested that the sources of organic materials used for composting affected the N mineralization. Moreover, the pelletized composts showed higher increases in mineral N with respect to non-pelletized treatments.

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