



HAL
open science

Changes of the plant-available soil phosphorus in the Qualiagro experiment for 9 years of cropping and repeated applications of different urban composts

Rodolphe Lauerjon, Alain Mollier, Sabine Houot, Guillaume Bodineau, Jean-Noel Rampon, Aurélia Michaud, Vincent Mercier, Christian Morel

► To cite this version:

Rodolphe Lauerjon, Alain Mollier, Sabine Houot, Guillaume Bodineau, Jean-Noel Rampon, et al.. Changes of the plant-available soil phosphorus in the Qualiagro experiment for 9 years of cropping and repeated applications of different urban composts. 15. Conférence Internationale RAMIRAN. Recycling of organic residues for agriculture: from waste management to ecosystem services. RAMIRAN 2013., Jun 2013, Versailles, France. 2013. hal-01192544

HAL Id: hal-01192544

<https://hal.science/hal-01192544>

Submitted on 3 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Changes of the plant-available soil phosphorus in the Qualiagro experiment for 13 years of cropping and repeated applications of different urban composts (poster, submitted)

**LAUVERJON Rodolphe^{1,3}, MOLLIER Alain¹, HOUOT Sabine², BODINEAU Guillaume²,
RAMPON Jean-Noel², MICHAUD Aurélie², MERCIER Vincent², MOREL Christian¹**

(1) INRA, UMR1220 INRA-BORDEAUX SCIENCES AGRO, Transfer soil-plant and nutrients cycling in agrosystems, 33883, Villenave d'Ornon, FR

(2) INRA, UMR1091 INRA-AGROPARISTECH, Environment & Arable Crops, 78850 Thiverval-Grignon, FR

(3) ADEME (French Environment and Energy Management Agency)

rodolphe.lauverjon@bordeaux.inra.fr

Introduction

Urban composts represent a source of nutrients to plants, but their availability to plants could vary considerably depending on origin and processing prior to application. Monitoring and predicting soil P changes under continuous cropping receiving urban composts over decades are crucial issues. The Qualiagro field experiment was carried out to investigate on many scientific and agronomic objectives associated with the spreading of urban composts in agricultural fields. One was to analyze the long term changes of the plant-available soil P in the plough layer. We will present results obtained for 13 years on (1) the effects of the 4 organic amendments and the OP treatment on the P chemically extracted by the Olsen¹'s method in relation with the cumulative P budgets (B_{cum}) and (2) the P fertilizer value of the different urban composts.

Material and Methods

The Qualiagro experimental site (48°90'N and 1°95'E), located in Feucherolles (Yvelines department (78), France), was initiated in 1998 (Gabrielle et al. 2005). It is cropped with a maize (*Zea mays* L.) and wheat (*Triticum aestivum* L.) rotation and includes the nil P treatment, which is the reference to assess changes in plant-available soil P, and 4 organic amendments applied in 1998, 2000, 2002, 2004 and 2006: **i**) a municipal solid waste compost obtained by composting solid municipal wastes after removal of dry and clean packaging (MSW); **ii**) a compost derived from co-composting a mix of 70 % green wastes with 30% sewage sludge (GWS); **iii**) a biowaste compost produced by co-composting green wastes with a source-separated organic fraction of municipal solid wastes (BIOW); **iv**) a cattle farmyard manure (FYM).

Two mineral N fertilization regimes (optimum and minimum mineral N fertilization) are applied on all treatments in two separate sections of the field experiment. The soil is a typic Hapludalf with a loam texture, a pH of 6.9 with negligible $CaCO_3$ content. Organic amendments were applied on an organic carbon basis, about 4 t ha⁻¹, and spread once every 2 years on wheat stubble before ploughing. By the end of 2006, the annual means of applied P were 21.8, 101.3, 42.9 and 40.0 kg P ha⁻¹yr⁻¹ for MSW, GWS, BIOW and FYM, respectively. Grain yields and their P content were determined every year for all plots to calculate the annual and cumulative P budget, i.e. the added P to soil minus the P removed in grain yields. Soil samples, taken up every 2 years before each soil amendment spreading, were analyzed for plant-available soil P by the worldwide Olsen's chemical extraction.

Results

Due to highly different C/P ratio and carbon-based application, amounts of applied P highly vary between urban composts treatments. The cumulative P budgets (B_{cum}) for the optimal N fertilization were -309 kg P ha⁻¹ for the OP treatment, and -68, +1097, +298, +142 kg P ha⁻¹ for the MSW, GWS, BIOW and FYM treatments, respectively, after 13 years of experimentation. Our poster will present, compare and discuss relationships that link changes in P_{Olsen} with B_{cum} for the nil treatment and the different urban composts, for the two regimes of nitrate fertilization.

Conclusion and perspectives

In conclusion, the P fertilizer value of the different organic amendment will be calculated. The next step will be to analyse and understand the eventual difference in P fertilizer value between organic amendments.

¹ 1 g of soil mixed for 30 minutes in 20 ml of 0.5 M NaHCO₃ solution at pH of 8.5 before filtration