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BOOK OF ABSTRACTS

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Edited by Ina Körner  
Institute of Wastewater Management and Water Protection  
Hamburg University of Technology (TUHH)  
Hamburg, Germany

With the assistance of  
Gerlinde Löbkens, TuTech Innovation GmbH, Hamburg, Germany  
Steffen Walk, Institute of Wastewater Management and Water Protection, TUHH

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Christiane Lüdke (11, 41, 80, 155)  
BioResourceInnovation, Ina Körner (1, 5, 64, 73, 106, 124, 146, 178)

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## TA-P\_13 Phosphorus availability in the tropical soils of Reunion – Comparison of various methods

**Nobile, C.<sup>1</sup>; Bravin, M.N.<sup>1</sup>; Ravelet, M.<sup>1</sup>; Tillard, E.<sup>2</sup>; Becquer, T.<sup>3</sup>; Paillat, J.-M.<sup>1</sup>**

<sup>1</sup> CIRAD, UPR Recyclage et risque, F-97408 Saint-Denis, Réunion, France, <sup>2</sup> CIRAD, UMR Selmet, F-97410 Saint-Pierre, Réunion, France, <sup>3</sup> IRD, UMR 210 Eco&Sols, CIRAD-INRA-SupAgro, 2 place Viala, F-34060 Montpellier Cedex 2, France  
[cecile.nobile@cirad.fr](mailto:cecile.nobile@cirad.fr)

### Objectives

Application of organic wastes is expected among other beneficial effects to enhance phosphorus (P) availability in soils, but this fertilizer effect largely depends on soil properties [1].

Phosphorus availability in the soils of Reunion (a French tropical island in the Indian Ocean) has been poorly studied [2]. Despite a similar volcanic origin, these soils are expected to exhibit very different P availability due to their distinct pedogenic evolutions.

Accordingly, the aims of this preliminary study are i) to determine P availability in a wide range of soils of Reunion supplied or not with various mineral and organic fertilizers and ii) to evaluate the relative relevance of different soil P tests and their respective correlation with P uptake in various crops (phytoavailability).

### Methodology

Fifty soil samples were collected in 5 field trials, encompassing the main soils types (i.e. hydric andosol, chromic andosol, andic cambisol, nitisol and hyperskeletal fluvisol), and cropping systems (fodder, sugar cane, market garden crops) of Reunion.

Phosphorus availability in soil samples was measured with 4 chemical methods: i) CaCl<sub>2</sub> (0.01M) extraction to mimic soil solution ii) DGT (diffusive gradient in thin films) technique to estimate the diffusive and kinetically-labile pools and iii) the Olsen (0.5M NaHCO<sub>3</sub> at pH 8.5) and Olsen-Dabin (0.5N NaHCO<sub>3</sub> + 0.5N NH<sub>4</sub>F at pH 8.5) extractions that respectively target the moderately and weakly available pools.

Phosphorus concentration in shoots was then measured on plant digests by ICP-MS.

### Results

Available P is expected to vary highly with both soil types and the chemical method used. Phytoavailable P is further expected to vary between crop species.

The analysis of data distribution will highlight the capacity of each chemical method to discriminate the soils tested. The search for correlations between chemical methods could then reveal differences or similarities between results obtained with the different methods.

Linear regressions of phytoavailable P against soil available P and comparison of the coefficient of determination obtained between each chemical method will highlight the efficiency of each soil P test to reflect phytoavailable P. With some methods, available P is expected to be correlated with P uptake in most of the soils tested, while it could be correlated just in some soil types with others, such as Olsen-Dabin extraction, which is known to extract a large pool of P weakly available.

### Conclusion

Olsen-Dabin extraction, which is the traditionally soil P test used in Reunion to fit P fertilization to crop requirements, is expected to be unsuitable for tropical soils such as those of Reunion [3]. One other method able to distinguish P availability as a function of soil types and fertilization management and more closely related to P phytoavailability will be selected and further used to discriminate the respective contribution of soil types and organic fertilization on P availability in soils.

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