Plan Overview

A Data Management Plan created using DMPonline.be

Title: An innovative approach to unravel the role of soil colloids and nanofertilisers on the bioavailability of phosphorus in highly weathered soils

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Template: FWO DMP (Flemish Standard DMP)

Project abstract:

In weathered soils, phosphorus (P) deficiency is a major limiting factor for crop growth due to fixation of P on iron and aluminium sesquioxides. This proposal addresses the idea to circumvent fixation using colloidal P as a new form of P fertilizer, either by provoking mobilisation of colloids native to soil via amendments, or by addition of nanofertilisers. We hypothesize that colloidal P is more bioavailable than added soluble P due to reduced sorption to minerals. Colloids move to plant roots by diffusion and locally release P in the rhizosphere. The nanoparticles (NP) entail newly developed P loaded Fe colloids (P-Fe NP) and hydroxyapatite NP with modified surface functionalities. A new method based on Diffusive Gradient in Thin Film (DGT) will be developed for in situ colloid sampling in the rhizosphere to better detect local concentrations of colloids and their impact on diffusive fluxes at micrometer scale. For the first time, colloidal P can be sampled in the undisturbed rhizosphere where it can be distinguished from dissolved P, allowing to prove (or disprove) its contribution to P fluxes. Those potentially higher colloidal P fluxes in the soil will be coupled to plant P uptake in order to prove its contribution to bioavailability. The project combines rhizosphere experiments with radio-/stable isotope analysis to distinguish added NP from native soil colloids and high resolution imaging of rhizosphere processes with laser-ablation-ICP-MS.

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An innovative approach to unravel the role of soil colloids and nanofertilisers on the bioavailability of phosphorus in highly weathered soils

FWO DMP (Flemish Standard DMP)

1. Research Data Summary

List and describe all datasets or research materials that you plan to generate/collect or reuse during your research project. For each dataset or data type (observational, experimental etc.), provide a short name & description (sufficient for yourself to know what data it is about), indicate whether the data are newly generated/collected or reused, digital or physical, also indicate the type of the data (the kind of content), its technical format (file extension), and an estimate of the upper limit of the volume of the data.

				Only for digital data	Only for digital data	Only for digital data	Only for physical data
Dataset Name	Description	New or reused	Digital or Physical	Digital Data Type	Digital Data format	Digital data volume (MB/GB/TB)	Physical volume
		Please choose from the following options: • Generate new data • Reuse existing data	*Please choose from the following options:* • Digital • Physical	*Please choose from the following options:* • Observational • Experimental • Compiled/aggregated data • Simulation data • Software • Other • NA	*Please choose from the following options:* • .por, .xml, .tab, .csv,.pdf, .txt, .rtf, .dwg, .gml, … • NA	*Please choose from the following options:* • <100MB • <1GB • <100GB • <1TB • <5TB • <10TB • <50TB • >50TB • NA	
WP1	Excel sheets metadata (DGT data)	Generate new data	Digital	Experimental	.xls	<1GB	
WP1	Laser scans (LA-ICP-MS), DGT images	Generate new data	Digital	Experimental	.jpg	<1GB	
WP2	Excel sheets metadata (DGT and nanoparticle data)	Generate new data	Digital	Experimental	.xls	<1GB	
WP2	Laser scans (LA-ICP-MS), DGT images	Generate new data	Digital	Experimental	.jpg	<1GB	
WP3	Excel sheets metadata (DGT, soil & plant data)	Generate new data	Digital	Experimental	.xls	<1GB	
WP3	Laser scans (LA-ICP-MS), DGT images	Generate new data	Digital	Experimental	.jpg	<100GB	

WP3	Plant and soil samples from pots and rhizoboxes	Generate new data	Physical				200 plant samples (<50g each), 500 soil samples (<100g each)
WP4	Excel sheets metadata (DGT, soil & plant data)	Generate new data	Digital	Experimental	.xls	<1GB	
WP4	Laser scans (LA-ICP-MS), DGT images	Generate new data	Digital	Experimental	.jpg	<100GB	
WP4	Plant and soil samples from pots and rhizoboxes	Generate new data	Physical				200 plant samples (<50g each), 500 soil samples (<100g each)

If you reuse existing data, please specify the source, preferably by using a persistent identifier (e.g. DOI, Handle, URL etc.) per dataset or data type:

NA

Are there any ethical issues concerning the creation and/or use of the data (e.g. experiments on humans or animals, dual use)? Describe these issues in the comment section. Please refer to specific datasets or data types when appropriate.

- No

NA

Will you process personal data? If so, briefly describe the kind of personal data you will use in the comment section. Please refer to specific datasets or data types when appropriate.

- No

NA

Does your work have potential for commercial valorization (e.g. tech transfer, for example spin-offs, commercial exploitation, …)? If so, please comment per dataset or data type where appropriate.

- No

NA

Do existing 3rd party agreements restrict exploitation or dissemination of the data you (re)use (e.g. Material/Data transfer agreements/ research collaboration agreements)? If so, please explain in the comment section to what data they relate and what restrictions are in place.

- No

NA

Are there any other legal issues, such as intellectual property rights and ownership, to be managed related to the data you (re)use? If so, please explain in the comment section to what data they relate and which restrictions will be asserted.

- No

NA

2. Documentation and Metadata

Clearly describe what approach will be followed to capture the accompanying information necessary to keep data understandable and usable, for yourself and others, now and in the future (e.g., in terms of documentation levels and types required, procedures used, Electronic Lab Notebooks, README.txt files, Codebook.tsv etc. where this information is recorded).

- Digital data: all data is ordered in folders via following cascade system: Workpackage => Phase => Experiment. In each experiment folder, one README.txt file and one METADATA.xls file
  can be found. The README.txt file includes the set-up of the experiment, the planning of the experiment (what preparation/analysis/data collection has been done on which date), the
  protocols used for every analysis, where the resulting data can be found in the METADATA.xls file, and how this data can be interpreted.
- Physical data: all plant and soil samples are labeled with my name, sample date, sample location, workpackage number, task number, experiment title (same as in the folder structure for
  digital data), and plant/soil identification (e.g. pot & replicate number for pot trials).

Will a metadata standard be used to make it easier to find and reuse the data? If so, please specify (where appropriate per dataset or data type) which metadata standard will be used. If not, please specify (where appropriate per dataset or data type) which metadata will be created to make the data easier to find and reuse.

- Yes

As explained above, each experiment folder contains one METADATA.xls file, with an accompanying README.txt file that explains the data in the METADATA.xls file.

3. Data storage & back-up during the research project

Where will the data be stored?

The KU Leuven OneDrive is used for storage of data and allows for active use of the data during the project. The PhD fellow has access to this OneDrive everywhere, including the lab in
Madagascar, where he will immediately make a backup of all data upon collection.

How will the data be backed up?

The KU Leuven OneDrive automatically makes a back up of all data. Additional back-ups are made on the personal computer of the researcher and on the KU Leuven server (:J).

Is there currently sufficient storage & backup capacity during the project? If yes, specify concisely.
If no or insufficient storage or backup capacities are available, then explain how this will be taken care of.

- Yes

The total volume of the files is < 206 GB, while 250 GB is available on the KULeuven staff OneDrive.

How will you ensure that the data are securely stored and not accessed or modified by unauthorized persons?

The KU Leuven OneDrive is secured, however, there is no need for special security since no sensitive data is generated in this project.

What are the expected costs for data storage and backup during the research project? How will these costs be covered?

The storage is provided by KU Leuven servers, no extra costs required.

4. Data preservation after the end of the research project

Which data will be retained for at least five years (or longer, in agreement with other retention policies that are applicable) after the end of the project? In case some data cannot be preserved, clearly state the reasons for this (e.g. legal or contractual restrictions, storage/budget issues, institutional policies...).

All METADATA.xls files and README.txt files will be stored on the KU Leuven server (:J) for 10 years.
All published data will be stored on the Research Data Repository of KU Leuven.
All physical data (soil and plant samples) will be stored for at least five years.

Where will these data be archived (stored and curated for the long-term)?

The data will be archived on the KU Leuven central server (:K) archive drive, conform the KU Leuven RDM policy.

What are the expected costs for data preservation during the expected retention period? How will these costs be covered?

The datasize fits within the overhead server storage, no additional costs required.

5. Data sharing and reuse

Will the data (or part of the data) be made available for reuse after/during the project? In the comment section please explain per dataset or data type which data will be made available.

- Yes, in an Open Access repository

The full dataset will be deposited in cvs format in KU Leuven RDR under a CC-BY license.

If access is restricted, please specify who will be able to access the data and under what conditions.

NA

Are there any factors that restrict or prevent the sharing of (some of) the data (e.g. as defined in an agreement with a 3rd party, legal restrictions)? Please explain in the comment section per dataset or data type where appropriate.

- No

NA

Where will the data be made available? If already known, please provide a repository per dataset or data type.

The full dataset will be deposited in cvs format in KU Leuven RDR under a CC-BY license.

When will the data be made available?

Upon publication of the research results.

Which data usage licenses are you going to provide? If none, please explain why.

The full dataset will be deposited in cvs format in KU Leuven RDR under a CC-BY license.

Do you intend to add a PID/DOI/accession number to your dataset(s)? If already available, you have the option to provide it in the comment section.

- Yes

The KU Leuven RDR uses a DIO (not yet available).

What are the expected costs for data sharing? How will these costs be covered?

There are no expected costs for data sharing. Deposition of smaller datasets in KU Leuven RDR is covered by the repository and for sharing physical data the costs are typically paid by the
researcher requesting the materials.

6. Responsibilities

Who will manage data documentation and metadata during the research project?

The PhD researcher.

Who will manage data storage and backup during the research project?

The PhD researcher.

Who will manage data preservation and sharing?

The promotor

Who will update and implement this DMP?

The PhD researcher and promotor