

# A novel automatic soil extraction procedure and phosphate determination in a single flow-based approach



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PORTO



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## Introduction & Objectives

- Soil is a worldwide concern with direct impact on health.
- Soil extraction and analysis not adapted to the current analytical requirements.
- Phosphate is a macronutrient needed for plants growth.
- Real-time assessment of phosphate content in soil.

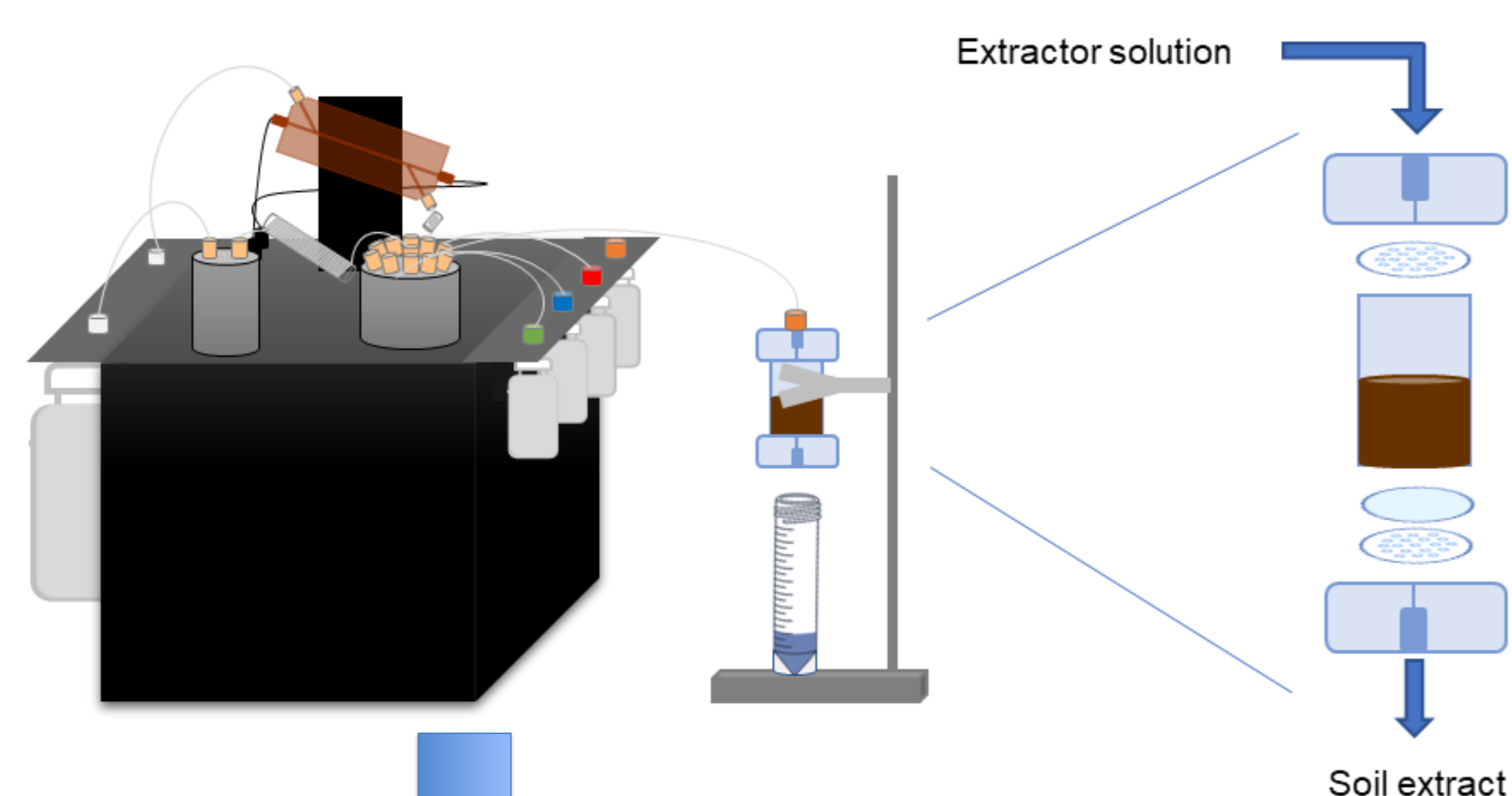
Development of a single integrative, miniaturized and automatic system for phosphate monitoring in soils

Phosphate extraction

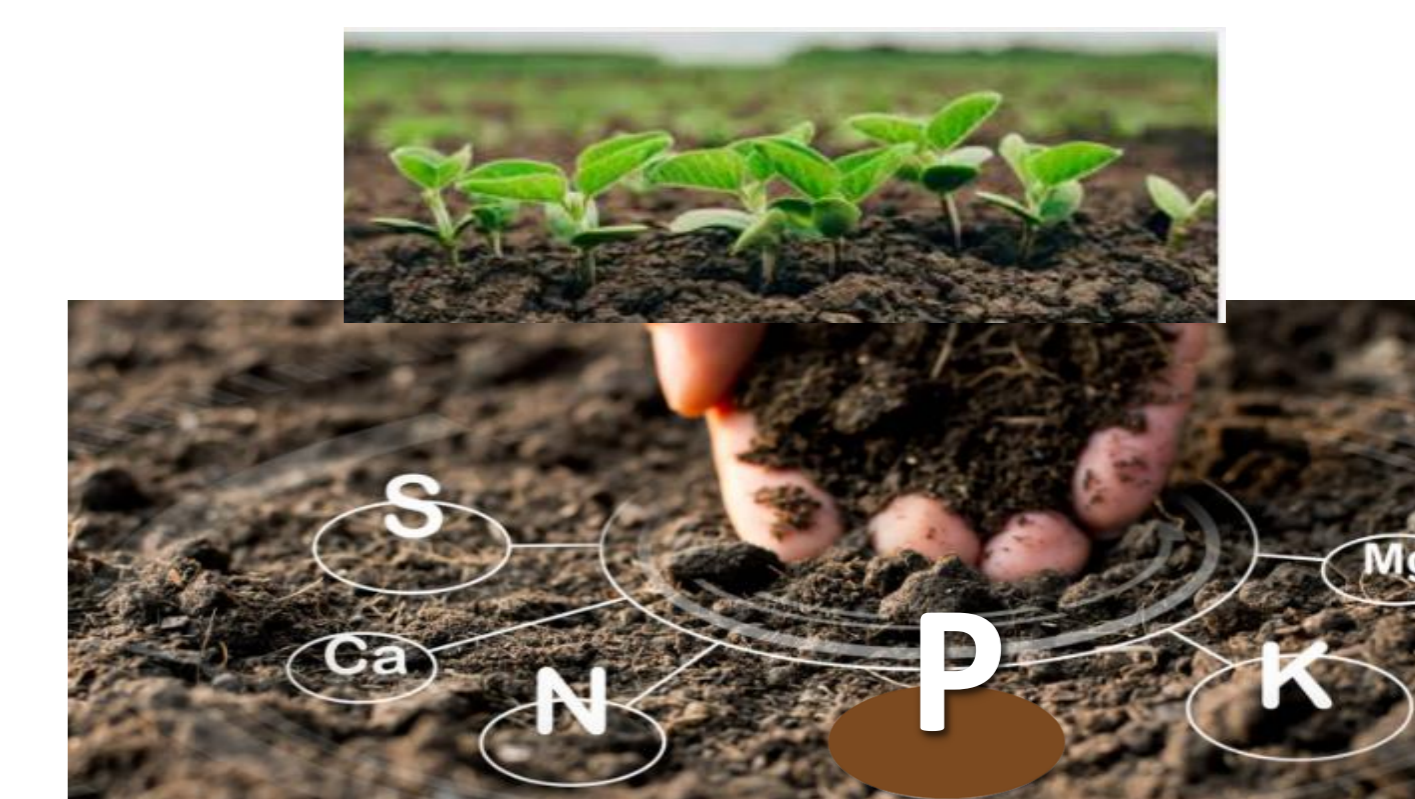
Phosphate determination

## Method & Results

Integrative flow-based system for the extraction of soluble phosphate in soils followed by spectrophotometric determination



Sequential injection method for the spectrophotometric determination of  $\text{PO}_4^{3-}$  (using the molybdenum blue chemical reaction)



Automatic and miniaturized  $\text{PO}_4^{3-}$  soil extraction with water as extractor

Optimization of the soil extraction procedure

Column volume

Extractor flow-rate

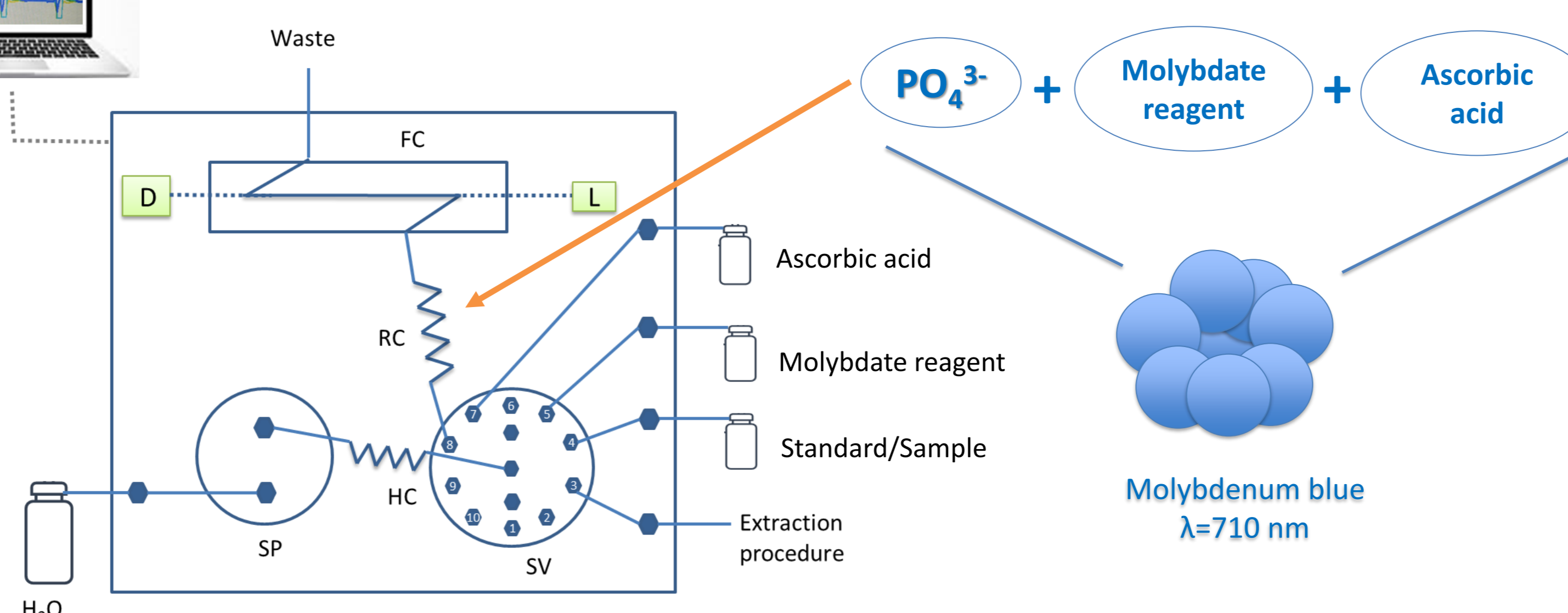
Soil mass

Extractor volume

Ongoing studies...

Validation by comparison with conventional extraction procedures

Figure 1. Sequential injection manifold for the spectrophotometric determination of phosphate in soil extracts. SP, syringe pump; SV, selection valve; HC, holding coil; RC, reaction coil; FC, flow cell; L, light source; D, CCD - charged coupled device detector ( $\lambda = 710 \text{ nm}$ )



## Conclusions

The developed method for the extraction followed of phosphate determination in soil, in a single integrated automatic system, showed to be an efficient tool for soil real-time monitoring.

The use of a flow-based strategy for the automatic and miniaturized on-line extraction applied to soil analysis showed to be an interesting procedure when compared with the conventional extraction techniques.

## Acknowledgements

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