Is **application rate** the only driver of **P phytoavailability** in tropical soils receiving **mineral and organic fertilizers** over an **extended period**?

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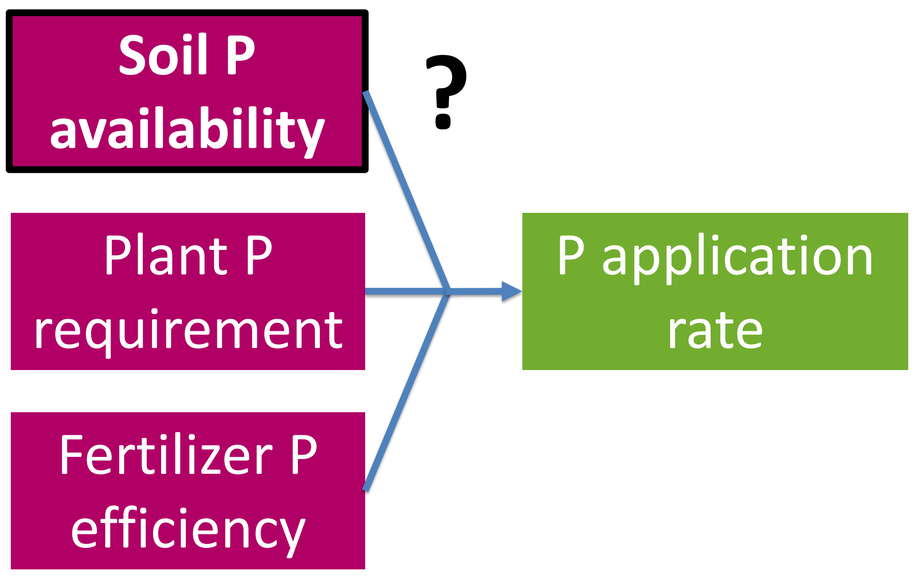
** The one who did the job*

1- Usual P fertilization guideline



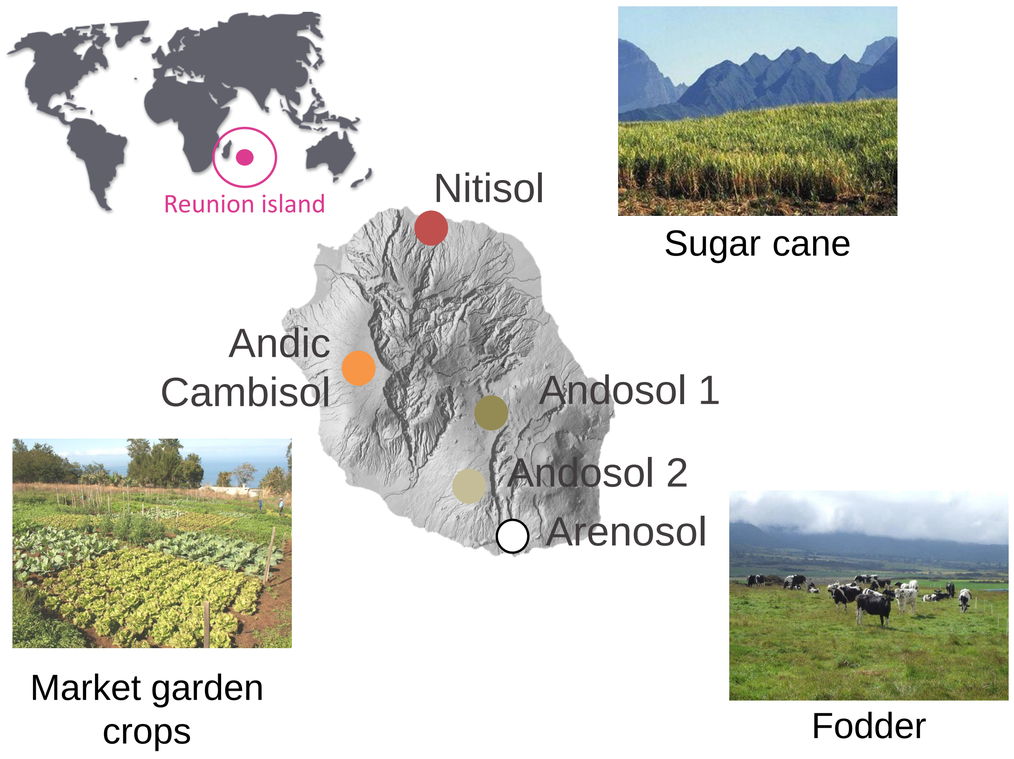
Fertilization guideline usually determines the annual application rate of fertilizer to meet plant requirement while accounting for fertilizer efficiency

This implies to evaluate soil P availability :

- With **adequate soil P tests**
- By accounting for **changing soil properties induced by long-term fertilizer application**

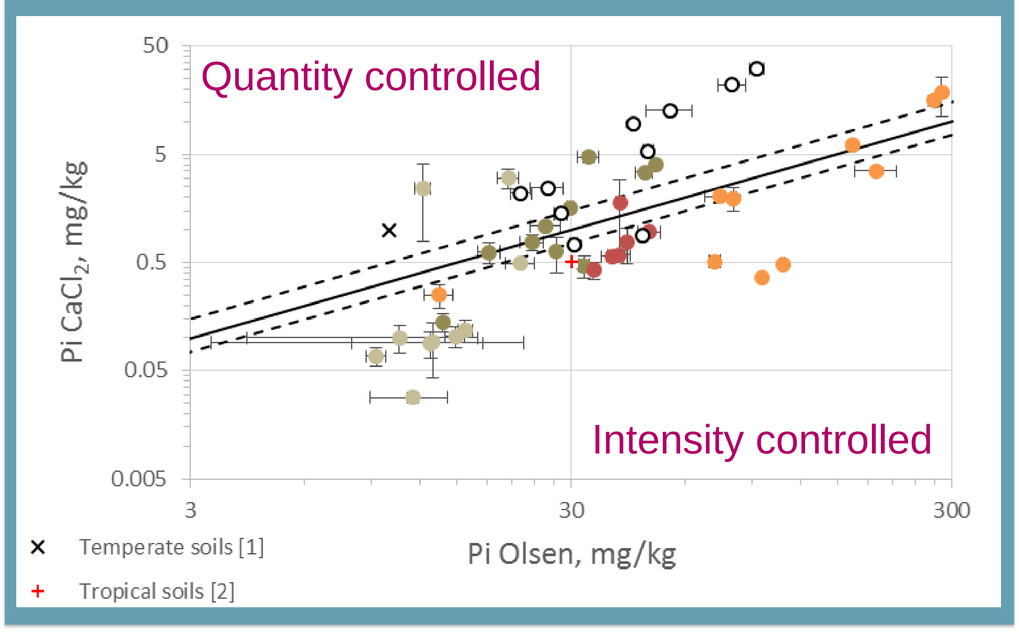
2- Adequacy of soil P tests

5 field experiments in Réunion with decadal no, mineral or organic fertilization



Phosphate availability in Réunion soils is:

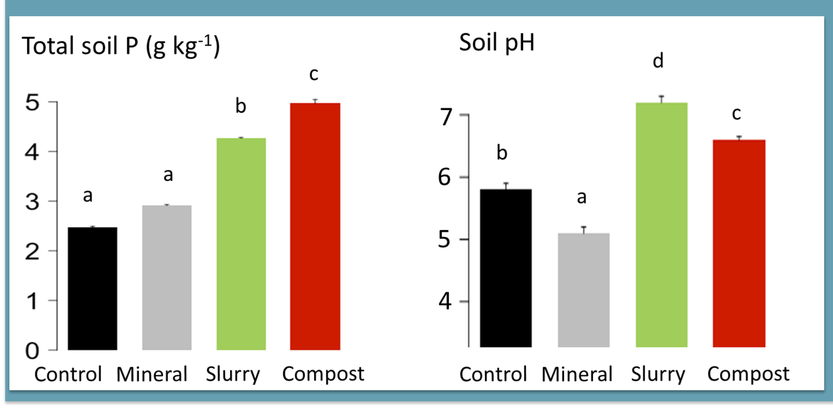
- Intensity controlled in andosol 2, nitisol and cambisol as usually observed in tropical soils
- Quantity controlled in arenosol as usually observed in temperate soils
- Both intensity and quantity controlled in andosol 1



$CaCl_2$- vs. Olsen-extracted phosphate (Pi) in soils

3- Fertilizer-induced changes in soil properties and P (phyto)availability

Beyond the increase in total soil P:

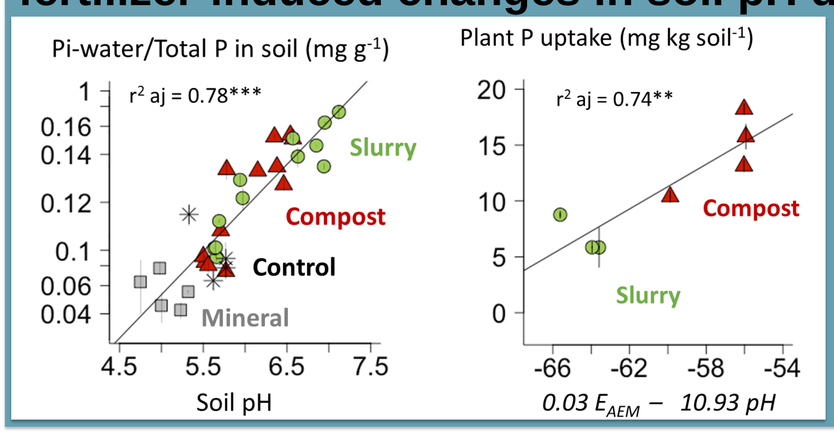


- Mineral fertilization decreases soil pH
- Organic fertilization increases soil pH

Decadal fertilization induced changes in total P and pH in soils

Decadal sampling of andosol 1 from field experiment

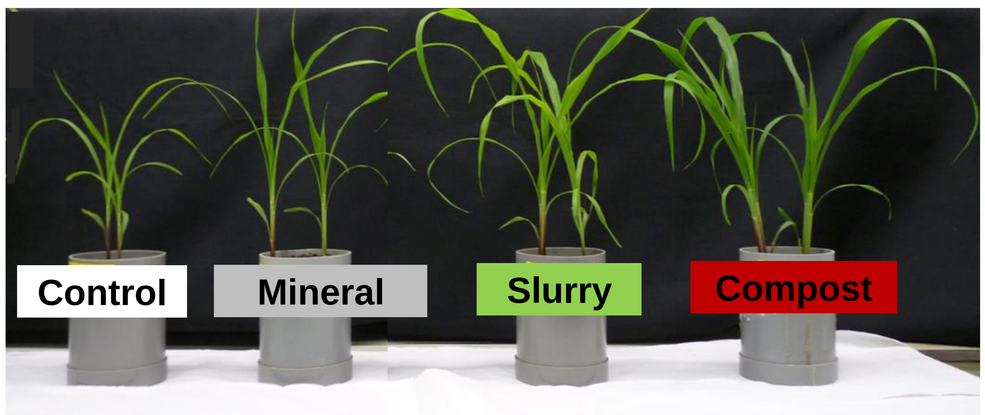
In addition to total soil P, fertilizer-induced changes in soil pH drive:



- P availability in soil
- Plant P uptake

P availability in soils and uptake in plants

Plant P uptake in pot exp.



References

[1] Nawara et al. 2017 *Eur. J. Soil Sci., doi: 10.1111/ejss.12486*
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[3] Nobile et al. 2018 *Soil Use Manage., in press*