



# Fate of fertiliser-N in sugarcane agroecosystems

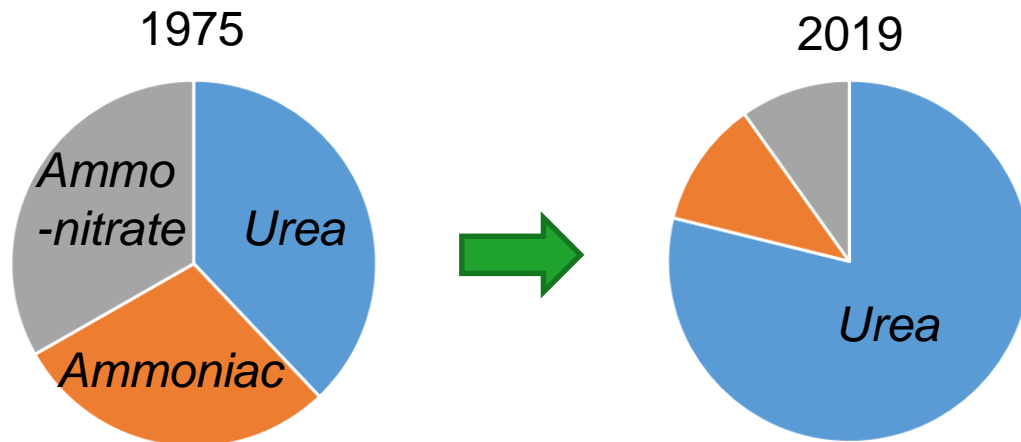
Soil Health Workshop  
March 1<sup>st</sup>, 2023

Antoine Versini

# Context and issues

## Agronomic upheavals in the 90's

World proportion of Nitrogen fertilizer use



→ Switching from ammonium sulphate to urea to fertilise sugarcane in Réunion

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- Switching from ammonium sulphate to urea



No mulch



Trash blanketing

→ Stopping **burning** and increasing **mechanisation**

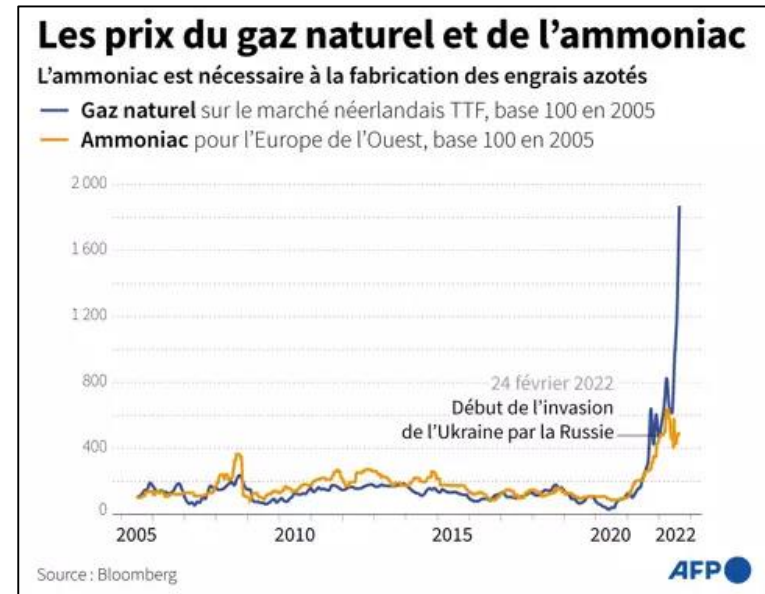
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## More recently

→ A lasting fertiliser crisis?



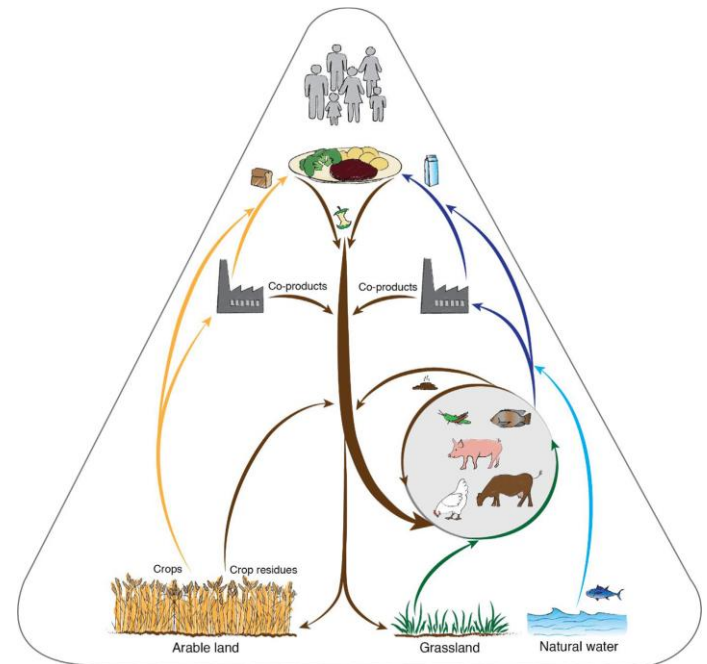
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→ What are the N losses and N use efficiency of these fertilisers associated to these new agronomic conditions?



# Complete assessement of N-fertiliser fate

## Long-term and highly-monitored environmental research observatory

2014-2028

Evaluating impact of organic fertilisers on crops, soils, atmosphere and water

Mechanised, trash blanketing



Urea



Liquid pig slurry



Sewage sludges

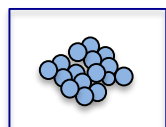
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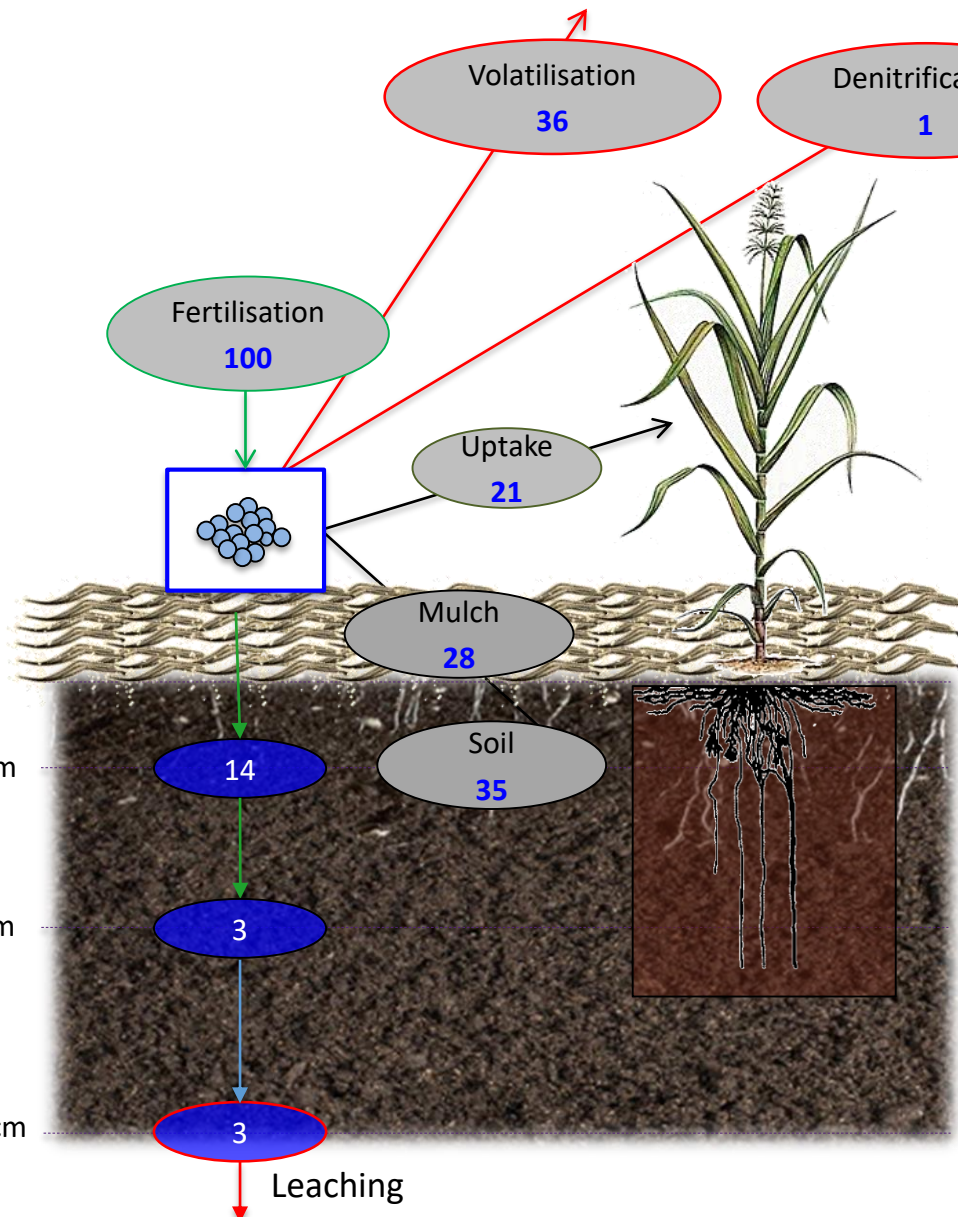


### Methods





# Complete assessement of N-fertiliser fate

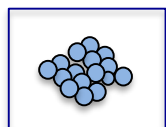


## UREA

- High volatilization
- Low N Use Efficiency
- Low water contamination
- Supplying N soil fertility

# Complete assessement of N-fertiliser fate

Fertiliser N use  
efficiency



18 - 30 %

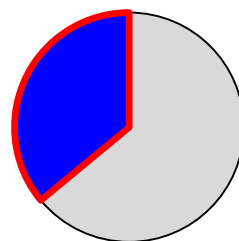


4 - 16 %

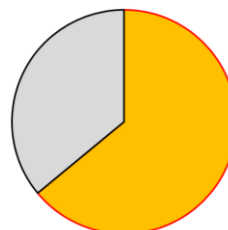


5-18 %

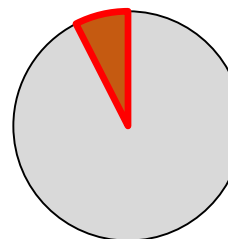
Fertiliser N loss  
via volatilisation



36 %

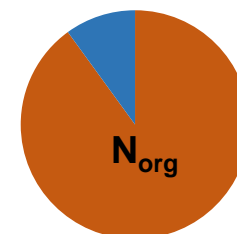
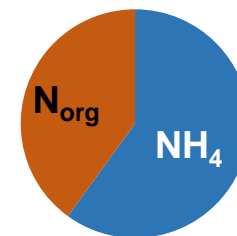


63 %



7.5 %

NH<sub>4</sub> proportion

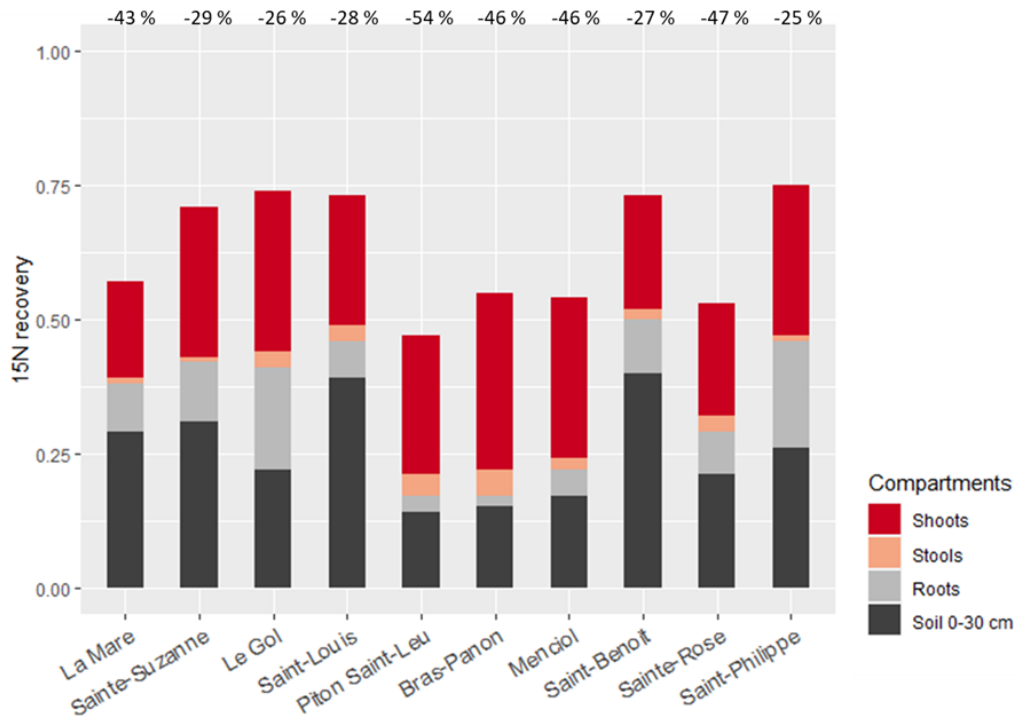
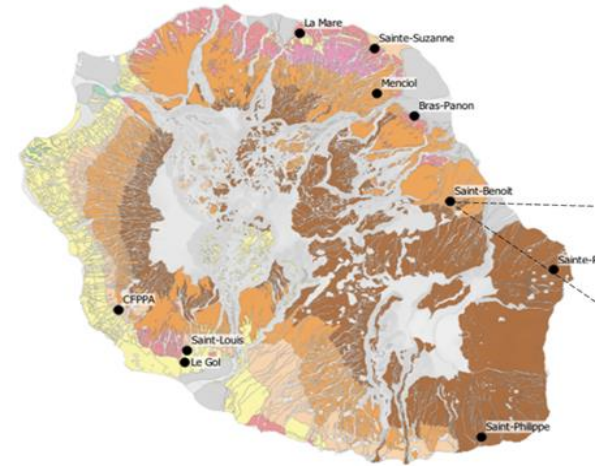


→ Thick mulch, windy and hot weather conditions = volatilization  
4t/ha of straw collected = 9% of N fertilizer saved (Pinheiro et al. 2018)

# NUE and N losses in 10 sites



$^{15}\text{N}$ -labeled  
Urea recovery  
in crop and  
soil



→ Losses 37% (25-54%)

→ NUE 38% (25- 50%)

→ Soil 25% (14-40%)

# Reducing the volatilisation: a crucial stake to improve sugarcane N use efficiency

- burying fertilisers but... manpower or mechanisation
- improved fertilisers (coated, inhibitor, etc) but... expensive
- other N forms (ammonitrate, sulfammo, etc) but... storage?, acidity?
- Organic residues but... availability and knowledge
- Intercropping legumes but... effect on sugarcane yield and environment ?