PHOSPHORUS RECYCLING IN FERTILIZERS
FOR A CIRCULAR ECONOMY

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- National fertilizer industry association
- 50 producers (lime, mineral and organic fertilizers, biostimulants)
- Official mandate to collect national statistics on fertilizer deliveries
- Supporter of the French normalization process for all kind of fertilizers within the BNFerti on behalf of AFNOR
Phosphorus recycling in fertilizers

1. P, a key nutrient for life
2. P in animal excreta represents 53% of total P brought to soils
3. P balance is close to equilibrium in France
4. Sewage water brings additional resources for P
5. Struvites, a way to reconcentrate P
6. As a straight fertilizer or a raw material?
I. Decrease of P input, a long term trend

- **Animals, total excreta**: 53%
- **Mineral fertilizers**: 38%
- **Organic fertilizers and biowastes**: 9%

First estimates for biowastes and import of organic fertilizers

Source: UNIFA
II. P in animal excreta, a major contributor

Total input in kg P/ hectare of ag. land

France: 21 kg P/ha (Last 3 fertilizer years 2011-2013)
of which 8 kg P in mineral fertilizers
III. P balance close to equilibrium

Source: UNIFA
IV. Contrasted P balance across regions

Input – Output in Kg P/ hectare of ag. land

4.4 kg P/ha (mean of 3 fertilizer years 2011-2013)
V. Sewage water, an additional resources for P

Human excreta = P in sewage water
Lack of data on P collected in sludge (50% of P in sewage water? Increasing?)

Estimation of 60% sewage sludge used in agriculture for France (direct application and after a compost process)

Extract more soluble P from sewage water through struvite crystallization

Increase the share of sludge used in agriculture (limit contaminants)
VI. Struvite(s) as a straight fertilizer or a raw material

Reconcentration of P from sewage water

Recrystallization with Mg and N (ammonium)

A straight fertilizer granulated (N-P-Mg) or a raw material for NPK formulation

Control of contaminants
Stability of composition
Homogeneity for handling, storage, processing and formulation
Sufficient quantities of the same struvite type
SOME CONCLUSIONS

• Extraction of soluble P in waste waters helps to recycle additional P

• Regulation is needed that brings control of contaminants

• Stable quality product is required both for the use as a straight fertilizer or as a raw material for compound NPKs

• Struvite(s) differ according to processes or waste streams, there is a need for standardization for the end-user and the industry

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Thanks for your attention