WORKING SESSION 5: Limiting nutrient loss to the environment from effluents and leachate

ANIMATOR: Alejandra Campos (Fraunhofer IGB, Germany)
SECRETARY: Raf de Vis (PSKW, Belgium)
PARTICIPANTS: Everybody present

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689687

Our objectives

- To identify the **current situation** regarding the recycling of nutrients in different regions and types of crops
- To identify and evaluate the **available technologies** for reducing nutrient losses
- To identify what is **restricting the adoption** of these technologies
  - What are the bottlenecks and restrictions (e.g. economic, technical, legislative)
- To determine how we can **increase adoption**

FERTINNOWA

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689687

Main questions

- **What is the quantity and characteristics of the effluents**
  - Types of effluents (e.g. leachate, effluent, organic residues)
  - Produced quantities per unit of time (e.g. kg/h, liter/year)
  - Nutrient concentrations (e.g. N, P, K, Mg, Ca)
  - Pollutants concentration (heavy metals, organic pollutants)
  - Others? (concentration of other critical component, Na? ….)
- **What are the requirements for a suitable nutrient recycling**
  - Technical limitations
  - Economic constrains
  - Legal requirements
- **Solutions for the successful implementation of the technologies**

FERTINNOWA

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689687

Current situation

- **Nutrient problems (preliminary result of the survey)**
  - **North-West**
    - Rainwater is the most common source water
    - Nutrient discharge is limited (too concentrated solutions are usually diluted with fresh rainwater)
    - If ground water is used, there can be an excess of nutrients, but it's usually mixed with rainwater
    - Sometimes solutions to remove nutrients from ground water are needed (reverse osmosis)
    - Most regions have laws to enforce recirculation
    - N and P removing systems exist, but are not widely adopted
  - **Central-East**
    - Not much regulation enforcing recirculation
    - Groundwater is the main source, but rainwater is also common
    - Fertigation is not widely adopted and recirculation is rare
  - **Mediterranean**
    - No laws enforce recirculation or it is not controlled
    - Cost is the main bottleneck for adopting recirculation
    - Source water is mainly groundwater, so cheap and reliable nutrient removing systems are needed

FERTINNOWA

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689687

Current technologies

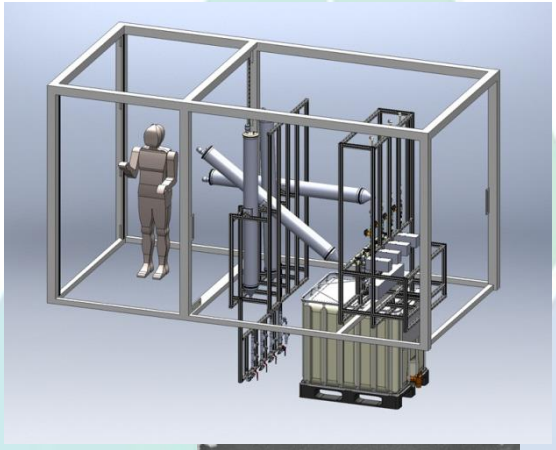
Nutrient removal

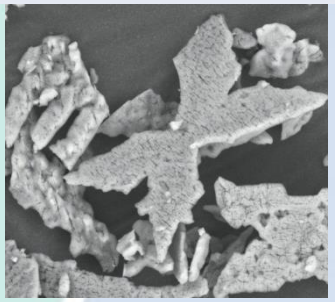
- N removal → Constructed wetlands (2 phases)
- P removal → P filtration (based on P absorption by iron coated sand)

FERTINNOWA

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689687

Current technologies





Nutrient recovery

- E-Phos technology
  - Electrochemical process
  - Chemical-free process
  - Electrochemical precipitation process
  - Nutrients N and P are recovered as magnesium ammonium phosphate (struvite)

FERTINNOWA

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689687

Current technologies

Nutrient recovery

- BioEcoSim concept
  - Valorisation of pig manure into high value products that can be easily handled, transported, and applied back in the agriculture

Biochar

P and N fertilisers

FERTINNOWA

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689687

Our objectives again

1. To identify the **current situation** regarding the recycling of nutrients in different regions and types of crops
2. To identify and evaluate the **available technologies** for reducing nutrient losses
3. To identify what is **restricting the adoption** of these technologies and how can we **increase adoption**

FERTINNOWA

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689687

To evaluate practical solutions, consider:

- effectiveness
- ease-of use (“farmer-friendly”)
- robustness
- existing use in horticulture/agriculture (feedback from growers)
- Need for support
- context: crop type, farming system
- suitability to different types of growers
- Costs (e.g. investment, operation)
- anything else? Suggestions?

FERTINNOWA

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 689687

GETTING STARTED

- Order of discussion

For each region (NW, CE, MED):

A. Current situation
B. Available technologies
C. Conditions and way of implementation

- For each crop type and cropping situation identify the best techniques considering:
  - Effectiveness
  - Farmer-friendliness
  - Robustness
  - Cost
  - etc.

FERTINNOWA

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689687

WORKING SESSION 5:

DISCUSSION PART
Report of exchanges between participants

Overview of raised issues and proposed solutions

FERTINNOWA

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689687

A) Current situation

- Uk Heavy regulated
- Fr first ornamentals lettuce good irrigation is necessary before treating residual water
- NL reuse of struvite is not allowed in Nl so no solution for the long term unless possible to export. Source:P is coming from manure. Legal bottleneck
- Feasability: was discussed in session before (reciculation). Quality of water should be good at the start. High cost for cleaning up water at the start
- BE. Drainage in strawberry can be reused. Mix with fresh water. Leackage to environment: larga amount of rain water with low N of PPP. Solution needed

B) Available technologies

Nitrate discharge: what are the regulations: BE max 50 mg in small didges. If above, causes are searched and farmers are approached. Recirculation is compulsory. Apply less fertilizer is stimulated

IT. Same problem. Vulnerable regions. But control is still missing, could change in future. Control is driving force to adapt the systems. For the moment not

Valencia: poluted 200_300 ppm in ground water; Taken into account for fertigation or fertilisation. Adapt fertilisation in raini season. Urban supplies: water should be lower than 50. Sometimes need to mix . Remove nitrate. Residual water goes to reservoir, then used to irrigate. Cost are paid by village, not sustainable

C) Technology implementation

- Phosporous
- Be trials at rowers. Now more difficult to meet the norms for P than for N. Compound fertilizers are not adapted to needs.