



# Nutri2Cycle

Transition towards a more carbon and nutrient efficient agriculture in Europe



*Floating wetland plants grown on liquid agro-residues as a new source of proteins*

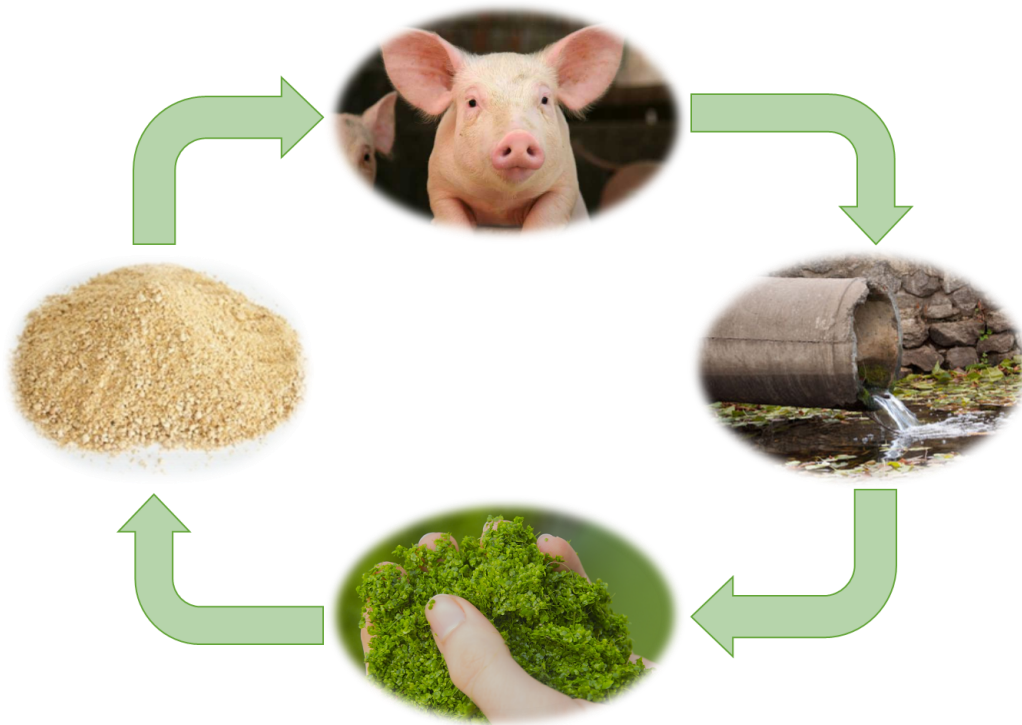


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773682.



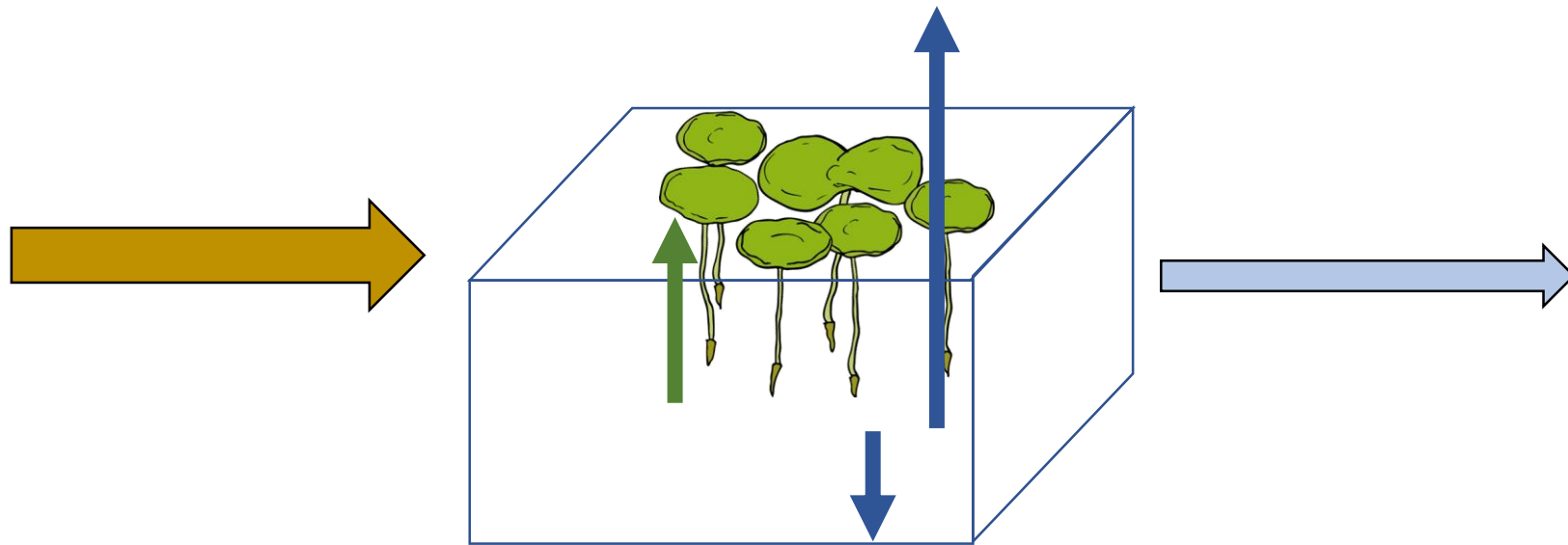
# Nutri2Cycle

## Description of the solution





## Description of the solution





## Spreading biological effluent

## Applying to a duckweed lagune

### Similarities:

Nutrient recuperation

### Differences:

Losses by nitrate leaching

N and P application limits

**Earlier in the season** February

### Differences:

**\*10 times** more biological effluent that can be applied

Limitation of **transport/logistic** costs

Later in the season – October

Constant demand



## Constructed wetland

## Applying to a duckweed lagune

### Similarities:

N and P removal

### Differences:

Higher removals efficiencies for N

### Differences:

Potential **feed source** with high protein content



## Algae

## Applying to a duckweed lagune

### Similarities:

Local protein production

### Differences:

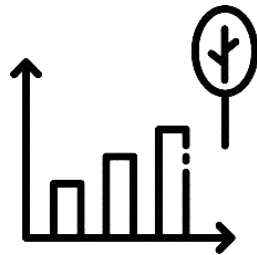
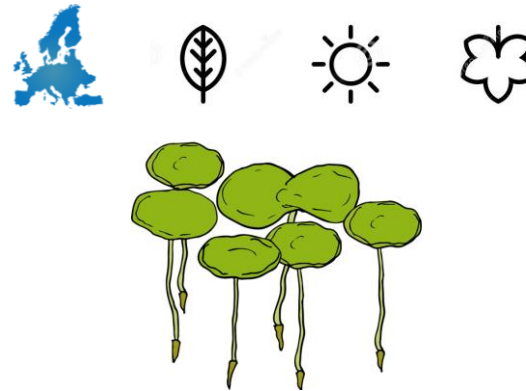
Higher productivities

### Differences:

Easy to harvest/wash  
Lower operational energy costs  
No effect of darker growing media



## Research withing N2C



Productivity  
> 10 ton/ha/yr  
30-35% Protein



Manure  
treatment  
capacity



Feeding value  
Cys-Met lacking  
Overall good  
profile



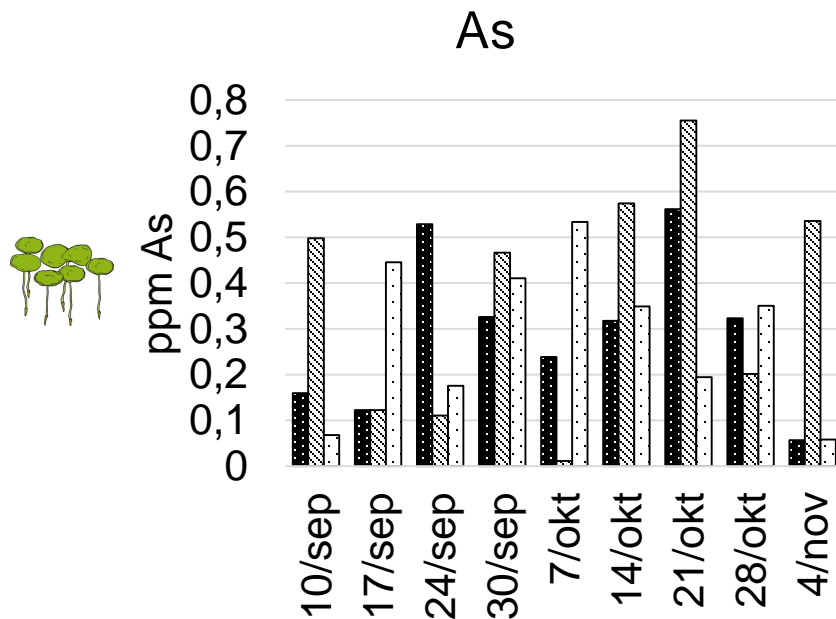
Feed safety  
HM



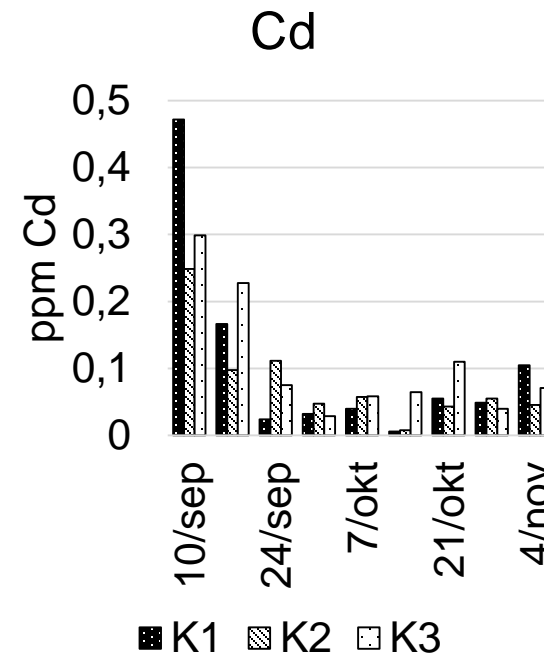
Economic  
feasibility



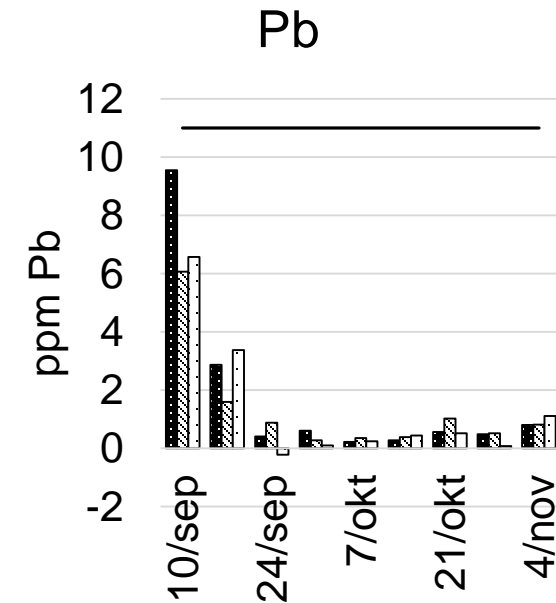
## Harmful elements (by Directive 2002/32/EC)



2.3 mg kg<sup>-1</sup> DM



1.1 mg kg<sup>-1</sup> DM



11 mg kg<sup>-1</sup> DM





## Valuable micronutrients

feeding standard/material	Mn [mg kg <sup>-1</sup> ]	Zn [mg kg <sup>-1</sup> ]	Fe [mg kg <sup>-1</sup> ]
Feeding standard for swine	30-40	20-165	90-100
Maximum limit piglets & sows		110	
Corn (grain)	5	15	26
Fodder yeasts	14	9	90
Soybean meal <sup>1</sup>	44	57	201
Duckweed	410 ± 60	250 ± 40	1000 ± 1300
<sup>1</sup> (Heuzé et al., 2020)			



## Future perspectives

- Integration with other wastewater treatment solutions + up-scaling
- $\text{NH}_3$ ,  $\text{CH}_4$ ,  $\text{NO}_x$  – emissions to the atmosphere?
- Life cycle analysis to take into account
  - Local protein
  - Storage emissions
  - Cultivation emissions
  - Water use
- Automatisatation
- Feeding trials



## Conclusions

- Nutrient recuperation technique
- Local protein source
- Good protein quality
- Potential use for mineral supplementation
- Good results for safety





Thank you for your attention  
[reindert.devlamynck@inagro.be](mailto:reindert.devlamynck@inagro.be)





**Nutri2Cycle**  
Nurturing the Circular Economy

---

**[www.nutri2cycle.eu](http://www.nutri2cycle.eu)**

**Twitter: #Nutri2Cycle**