

# Bioremediation: state of the art in Belgium

Inge Mestdagh  
POVLT Rumbeke - Beitem





# Which systems are installed in Flanders?

- type biofilter: 8
- type phytobac: 8
- 3 biofilters to be installed
- 1 phytobac to be installed
- 4 to 8 biofilters at research centres
- 3 to 8 phytobac at research centres





## Situation in Walloon area?

- type biofilter: **51** of which
  - 2 at research centre
  - 2 at community level
  - 3 at public green keepers
  - 44 at farms
- type phytobac: **3** of which:
  - 1 at a farm
  - 2 at research centres
- 32 biofilters to be installed



## Stories out of the field ...

- Phytobac

- Biofilter - Flanders



*'Closed systems'*

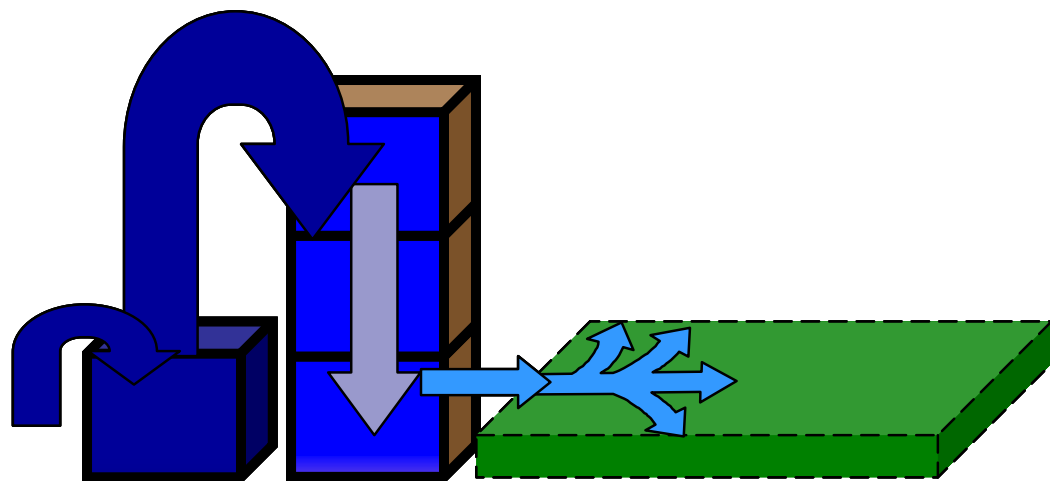
- Biofilter – Walloon area

*'Open system'*

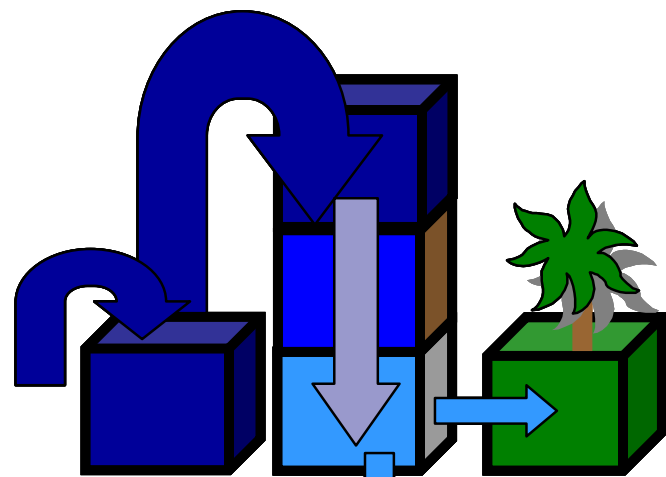




Provincie  
**West-Vlaanderen**  
Door mensen gedreven



**BIOFILTER CRA**



**BIOFILTER PCF**

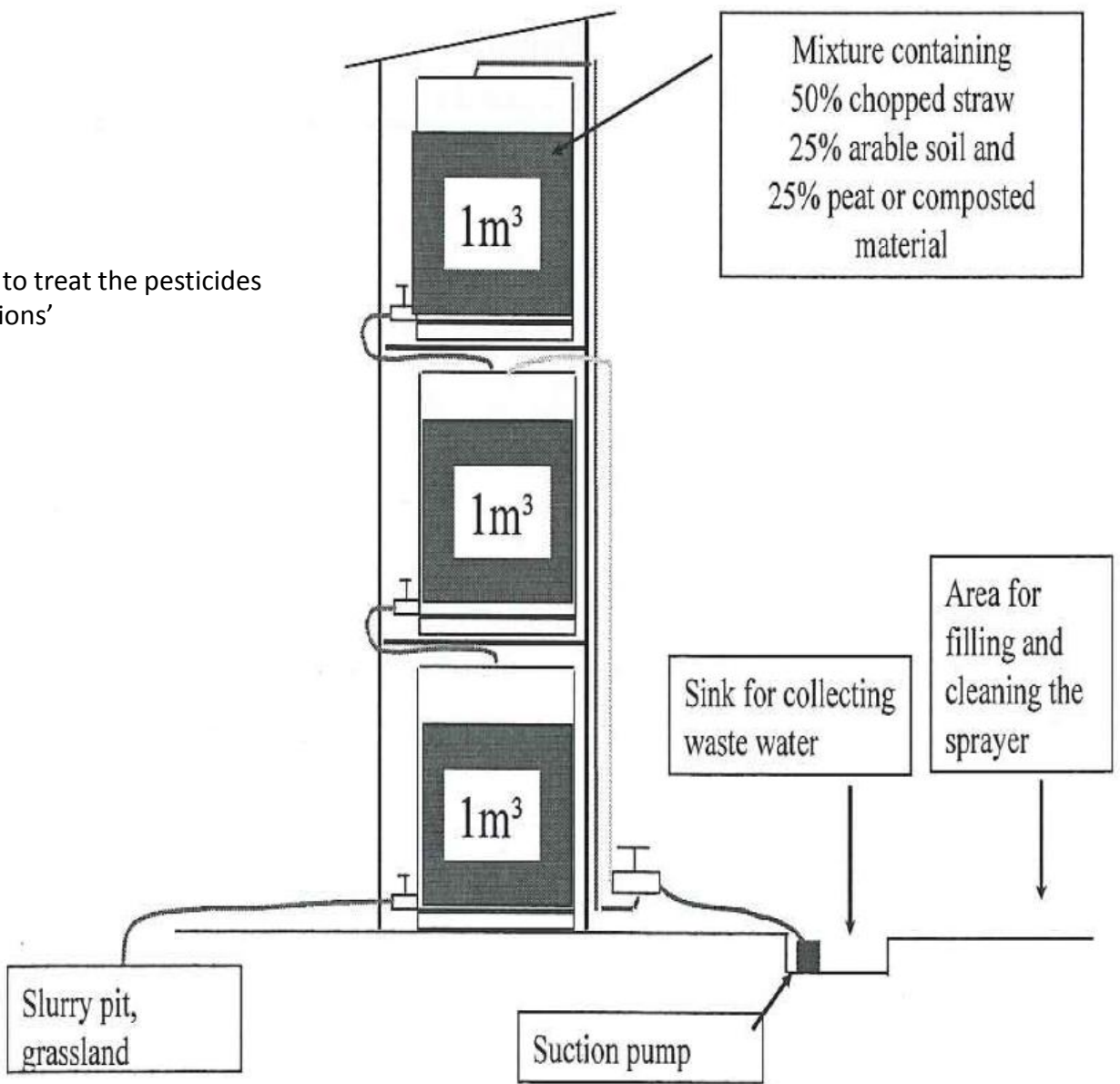


## Type Biofilter – Walloon area

- 3 m<sup>3</sup> OM → 5 m<sup>3</sup> waste water per year
- effluent: - field
  - sewage (with environmental permission)
  - irrigation water
  - effluent of cattle
- biofilter is permitted by Walloon government without an environmental permission
- OM can be put on the field at 1 m<sup>3</sup> OM / ha



Source: Pigeon et al. 'Development of biofilters to treat the pesticides wastes from spraying applications'



**Figure 1** : schematic representation of the biofilter.





## Type biofilter - Flanders

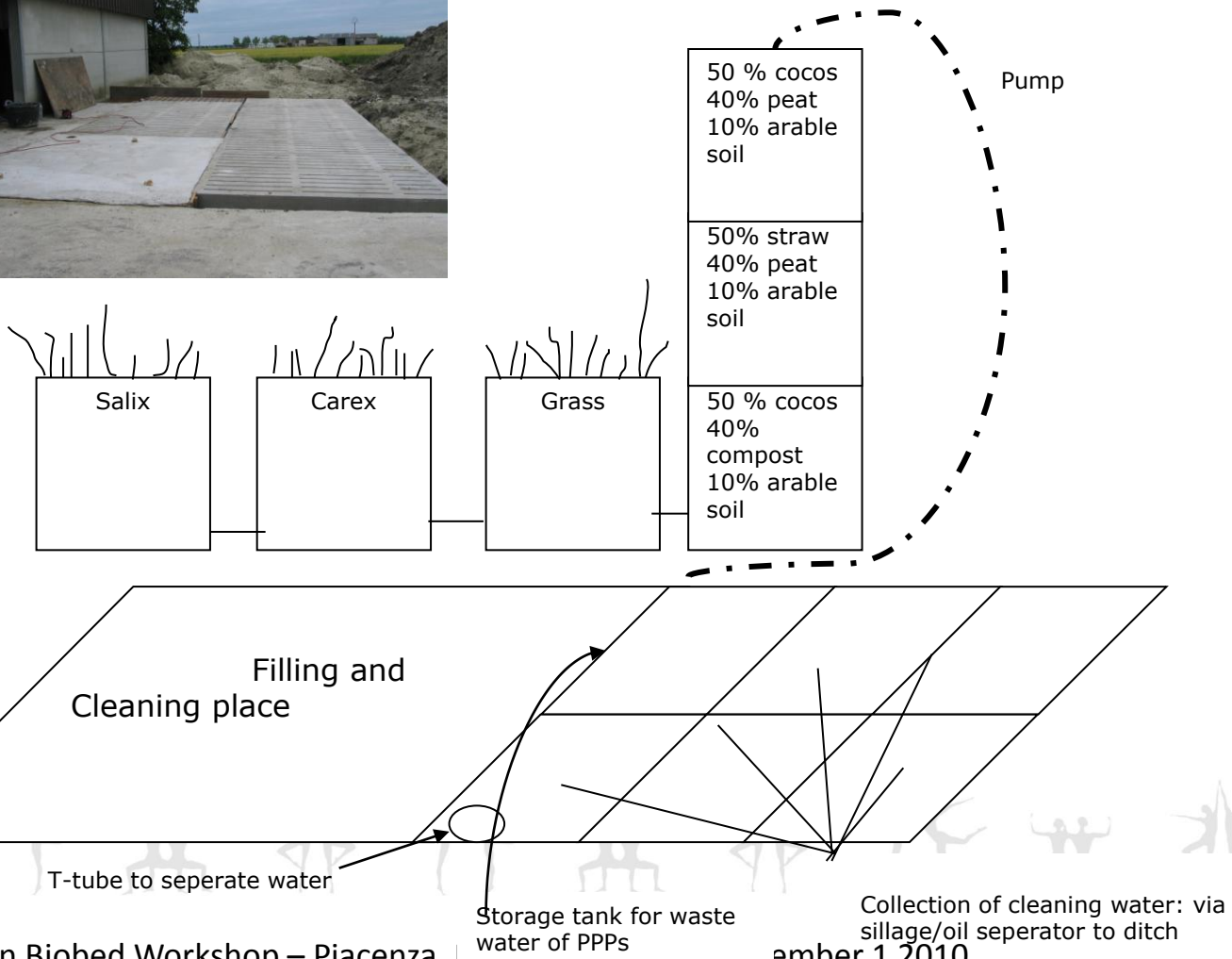
- Agricultural farm with 120 ha: winter wheat, corn, potatoes, sugar beets, persil
- To treat on a yearly basis:  $\pm 3 \text{ m}^3$
- $2 \text{ m}^3$  OM for  $1 \text{ m}^3$  waste water
- No effluent allowed
- No clear legale framework + OM ???





Provincie  
**West-Vlaanderen**  
Door mensen gedreven

# Filling and cleaning place with collection of waste water of PPP



## Filling and cleaning place with collection of waste water of PPP





Provincie  
West-Vlaanderen  
Door mensen gedreven

## Advantages and disadvantages type biofilter?

+

- simple and practical
- can be build by the farmer
- reasonable price
- excellent for limited volumes ( 2 m<sup>3</sup> to maximum 5 à 6 m<sup>3</sup> per year in Flanders, up to 10 m<sup>3</sup>/year in Wallonia)
- biological system
- user friendly

-

- legal framework in Flanders?
- not suitable for high volumes of waste water or in case of a high chemical load







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Door mensen gedreven

## Type phytobac

- Agricultural Crops:  
potatoes, winter wheat,  
corn, sugar beets
- Vegetables: peas, beans,  
spinache
- volume of waste water to  
treat on a yearly basis:  $\pm 18$   
 $\text{m}^3$
- no effluent allowed
- $2 \text{ m}^3$  OM for  $1 \text{ m}^3$  waste  
water



3rd European Biobed























50% straw  
25% compost  
25% soil

August 31 – September 1 2010





# Advantage and disadvantage type phytobac?

+

- can treat higher volumes of waste water (up to 20 m<sup>3</sup>)
- biological system
- can be installed by the farmer himself
- user friendly

-

- price is quite high compared to biofilter
- larger construction compared to biofilter
- high chemicals loads need to be avoided
- legal framework in Flanders?



## Type Sentinel<sup>®</sup>: pilot project contract sprayers

- 16 contract sprayers are involved
- treated within project:  $\pm 50 \text{ m}^3$
- physico-chemical system
- open system
- fast treatment  
(1  $\text{m}^3$ / 5 à 6 hour)



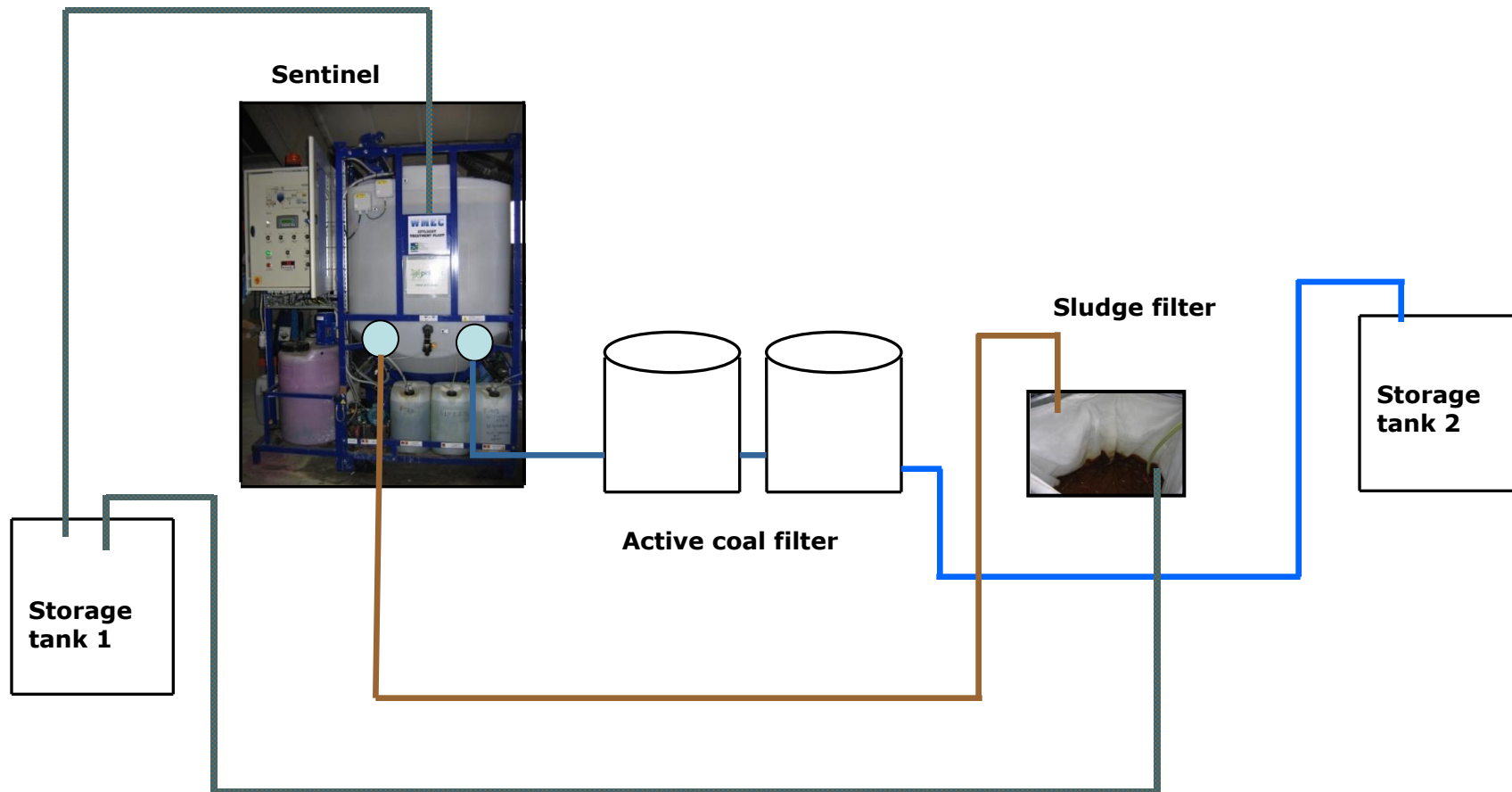






Provincie  
**West-Vlaanderen**  
*Door mensen gedreven*

# How does the Sentinel work?

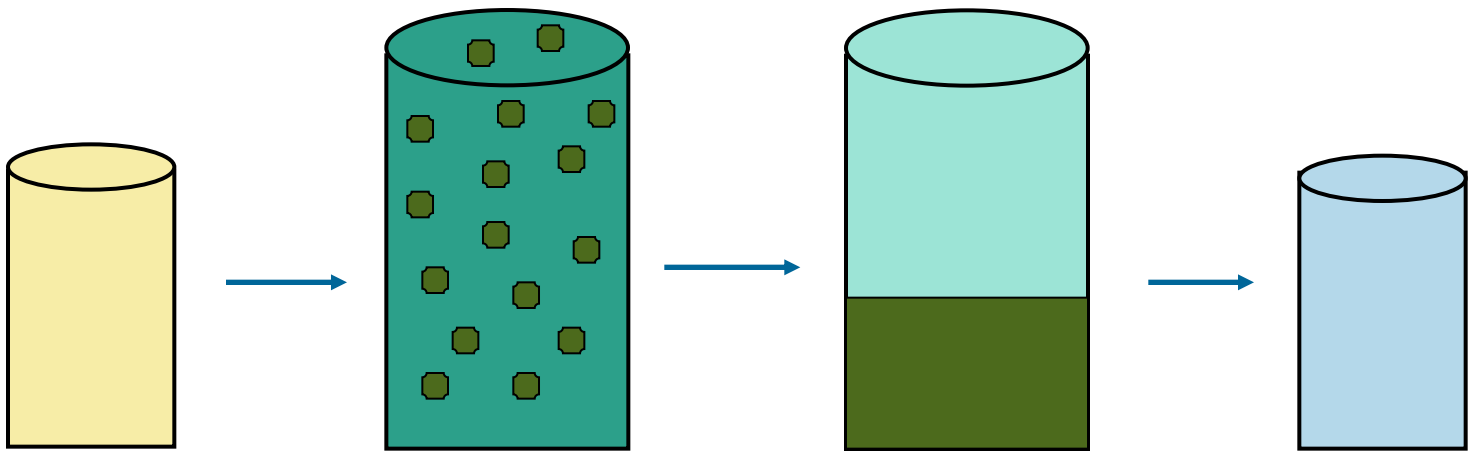


# How does the Sentinel work?



**Flocculation**

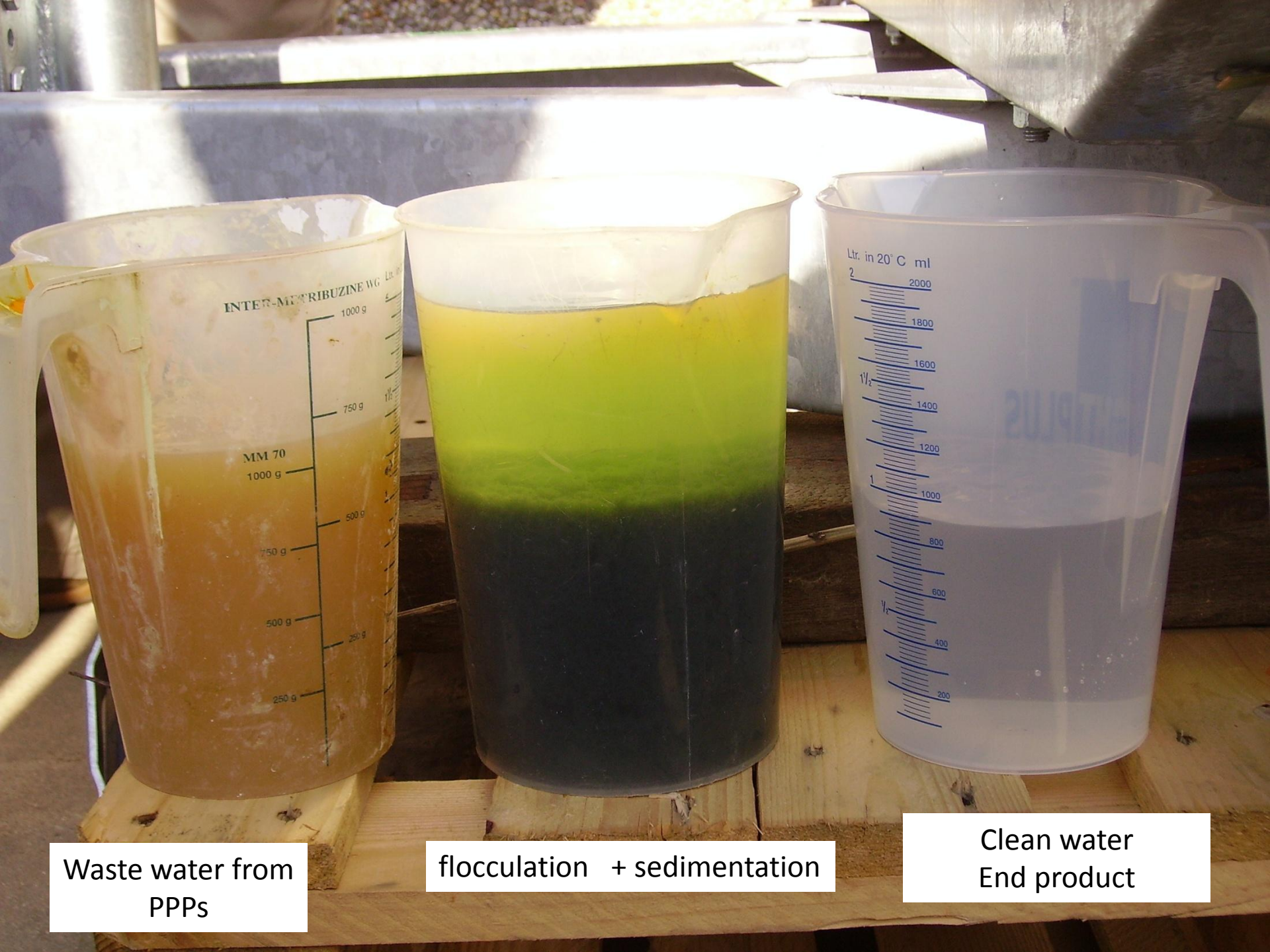
**Sedimentation**



**+  $\text{FeSO}_4$**   
**+ NaOH**  
**+ poly electrolytes**

**+ sulphuric acid**  
**+ active coal**





Waste water from  
PPPs

flocculation + sedimentation

Clean water  
End product





# Advantages and disadvantages Sentinel?

+

- can treat higher capacities/volumes
- can be used by others than the owner/farmer
- can handle a broad range of chemical loads
- water can be reused (total herbicide treatment or 1<sup>st</sup> rinsing)

-

- expensive system
- training needed
- legal framework?



# Comparison of the different systems

- Smaller volumes: only biofilter is rendable

- Higher volumes:

————→ depending on the volumes

- Volumes up to 20 m<sup>3</sup> on a yearly basis with low chemical load: phytobac

- Larger volumes or volumes with a high chemical load: physico-chemical system



# Conclusion

- Biofilter and phytobac are achievable and practical systems for the agri- and horticultural sector
- The platform for such installations grows but the installation of pilot systems on farms is necessary to enhance the implementation in practice
- Flexibility of the installation and location on the farms is required
- Urgent need for a clear legal framework in Flanders

**A change in 'spray behaviour' together with the installation of a bioremediation system reduces point source pollution enormously via a strong decline in the amount of waste water and its treatment**