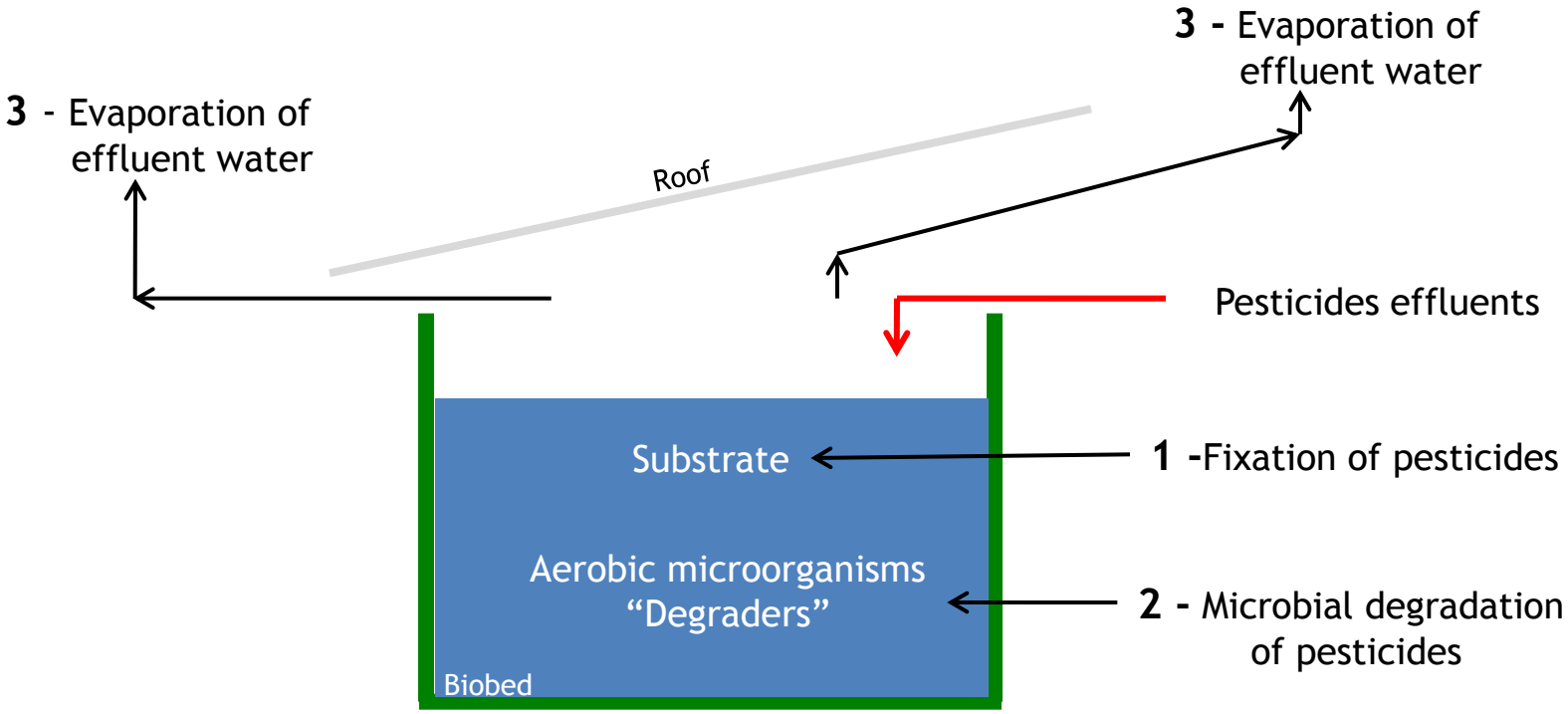
How to improve Biobed efficacy ?

Gérard CATROUX and Nicolas LIGNY
BIOTISA, Agronov, RD31,F-21110 BRETENIERE

The three mechanismes of a Biobed



Improved Biobed technology will maintain or increase efficacy at less cost. This will make the technology more affordable and attractive for clients

Fixation of pesticides on substrate

- Temporary fixation of pesticides on the Biobed substrate reduces their direct evaporation and thus will limit atmospheric loss and pollution of the air.

- To improve this fixation, the substrate must contain adsorptive materials like clays and silts generally presents in the soil used to prepare the substrate .

- Organic materials could also be used, like straw or other biodegradable products interesting also as a carbon source for the “degraders”.

- Fixation could decrease the bioavailability of pesticides in the Biobed, extending persistence. However the substrate is maintained for several years.

2 - Microbial degradation of pesticides

- Microbial degradation of pesticides in the substrate is performed mainly by aerobic microorganisms and therefore, the substrate must be kept moist, but aerobic. Therefore control of moisture content is crucial.

- The substrate contains two principal types of "degraders" :
  - (1) those which carry out pesticides degradation without requiring an additional carbon source (metabolism)
  - (2) those requiring an extra carbon source (co-metabolism)

- Therefore, adding organic matter to the substrate will increase its capacity to degrade pesticides

- In order to facilitate the adaptation of microorganism to degrade, it may be interesting to maximize the contact time and uniformity of exposure between the effluent and the "degraders"

- Inoculation of the substrate with strains or communities of "degraders" could be interesting to accelerate the degradation of recalcitrant pesticides

3 – How to optimize the evaporation ?

- Evaporation of effluent water is the limiting factor for sizing a Biobed

- Evaporation depends on:
  - Climatic conditions
  - Exposure to sunlight and wind
  - Substrate moisture content
  - Presence of plants

- The higher the substrate moisture content, the higher the evaporation rate.

- However, substrate moisture must not be so high that gas diffusion is rate limiting and the substrate becomes anaerobic

The challenge then is a balance between maximizing substrate moisture content, while maintaining aerobic conditions

The Biotisa solution ?

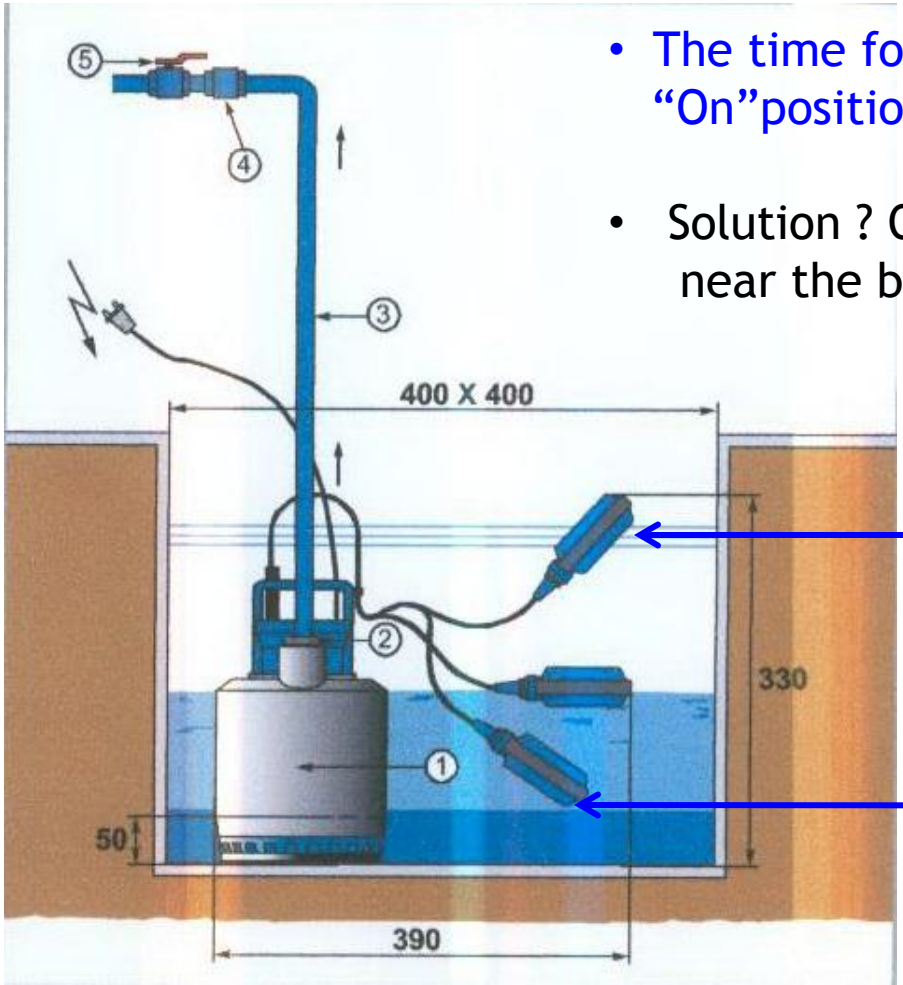
- In order to automatically regulate the substrate moisture content, we have designed a unique drainage system for recycling the effluents in the storage tank
  (*European Biotisa patent*)

- As the excess of water is eliminated from the substrate in a short time, it becomes possible to increase the frequency of irrigation events and duration of irrigation times

- The result is a more uniformly saturated upper layer of substrate with a higher evaporation rate, under continuously aerobic conditions

Another important point

- Irrigation is made using a pump immersed in the effluent storage tank.
- Most pumps are controlled with a level detector



- The time for the detector to move up until the "On"position is lost for irrigation
- Solution ? Other type of pump ? Level detector near the bottom of the trap?

The pump is in « On » position and will function with the timer

The pump stays in « On » until the level is as low as 10-12cm.
After, the pump is in "Off" position and will not come back to "On" before the upper limit is reached

Last questions

Some risks of small contaminations must be taken into account to have a Biobed as safe as possible and fully acceptable by the Administration

- To date, we are seeking to reduce the risks of contamination of the effluents without pesticides (rain, washing without pesticides) during their separation with effluents contaminated by pesticides
  But generally, the effluents are very diluted at the end of washing.

- Another point is the possible contamination of the sediments recovered by decantation on the line of pesticides effluents. They could be add to the substrate providing their volume is not too important.