



# Efficiency of several biomix to retain and degrade pesticides under Swiss pedo-climatic conditions

*N. Dakhel, N. Guisolan, J.-P. Burdet, S. Burgos*

# Context: Switzerland

---

- Most surface waters are contaminated with pesticides
- Swiss agriculture ≈ 1300T/year (2007)
- Wastewaters are separated (stormwater and sewage)
- No federal legislation about management of  
wastewaters contaminated with pesticides

# Objectives

---

- Test different biomix for retention and degradation of pesticides
  - Pesticides commonly used in viticulture
  - Conditions close to agricultural practices

# Experimental design:

	<b>Clay</b>	<b>Silt</b>	<b>Sand</b>	<b>OM</b>	<b>pH</b>
S1	<b>21</b>	43	36	3.6	7.8
S2	<b>28</b>	41	24	2.4	7.9

Biomix	Soil		Straw	Compost C1	Compost C2
	Type	%			
S1-70/30	S1	70	30	-	-
S2-65/35	S2	65	35	-	-
S2-50/50	S2	50	50	-	-
S2-25/50/25C1	S2	25	50	25	-
S2-25/50/25C2	S2	25	50	-	25





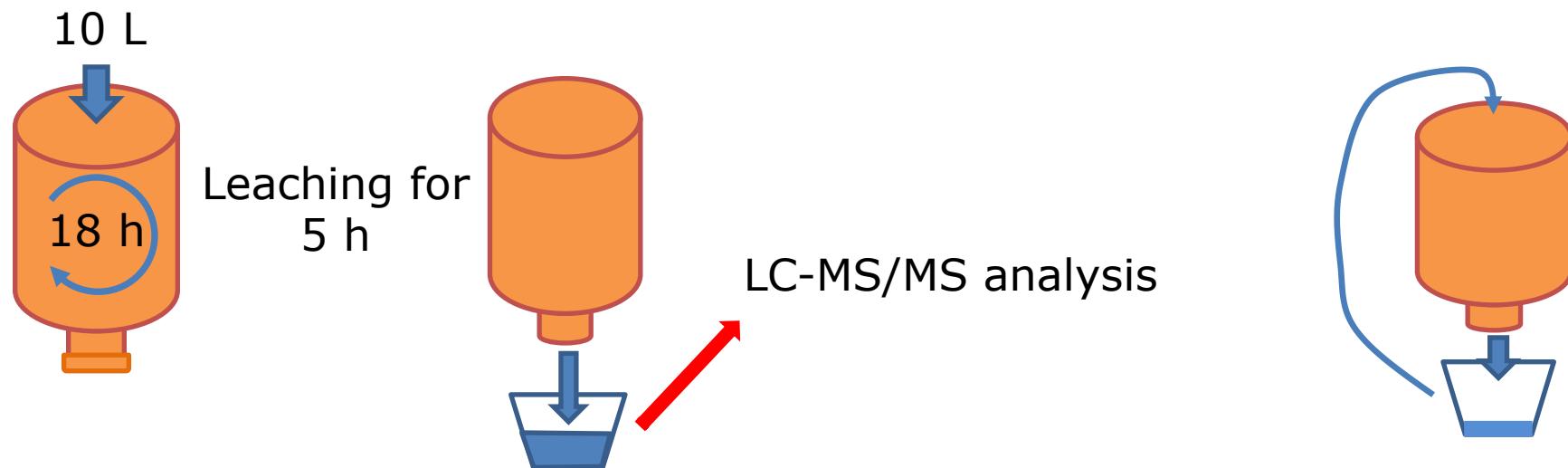
# Experimental design :

3 consecutive treatments of biobeds with 10 L tap water and

**2 Herbicides** : Banex® (*diuron*), Alce® (*terbuthylazin*)

**3 Fungicides** : Switch® (*fludioxonil + cyprodinil*), Flint® (*trifloxystrobin*)

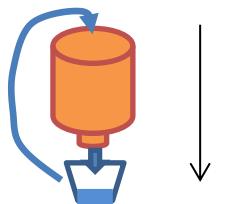
- 1) : 33 to 50 mg L<sup>-1</sup> each active substance
- 2) and 3) : 33 to 50 mg L<sup>-1</sup> fungicide active substance



# Experimental design:

Last treatment (3):

*September 2010*



Leachate 3

Freezed - unfreezed

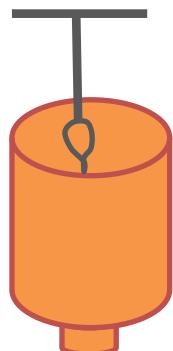
*January 2011*



Leachate 4

Biomix sampling

*January 2011*



T 4 months



MeOH extraction

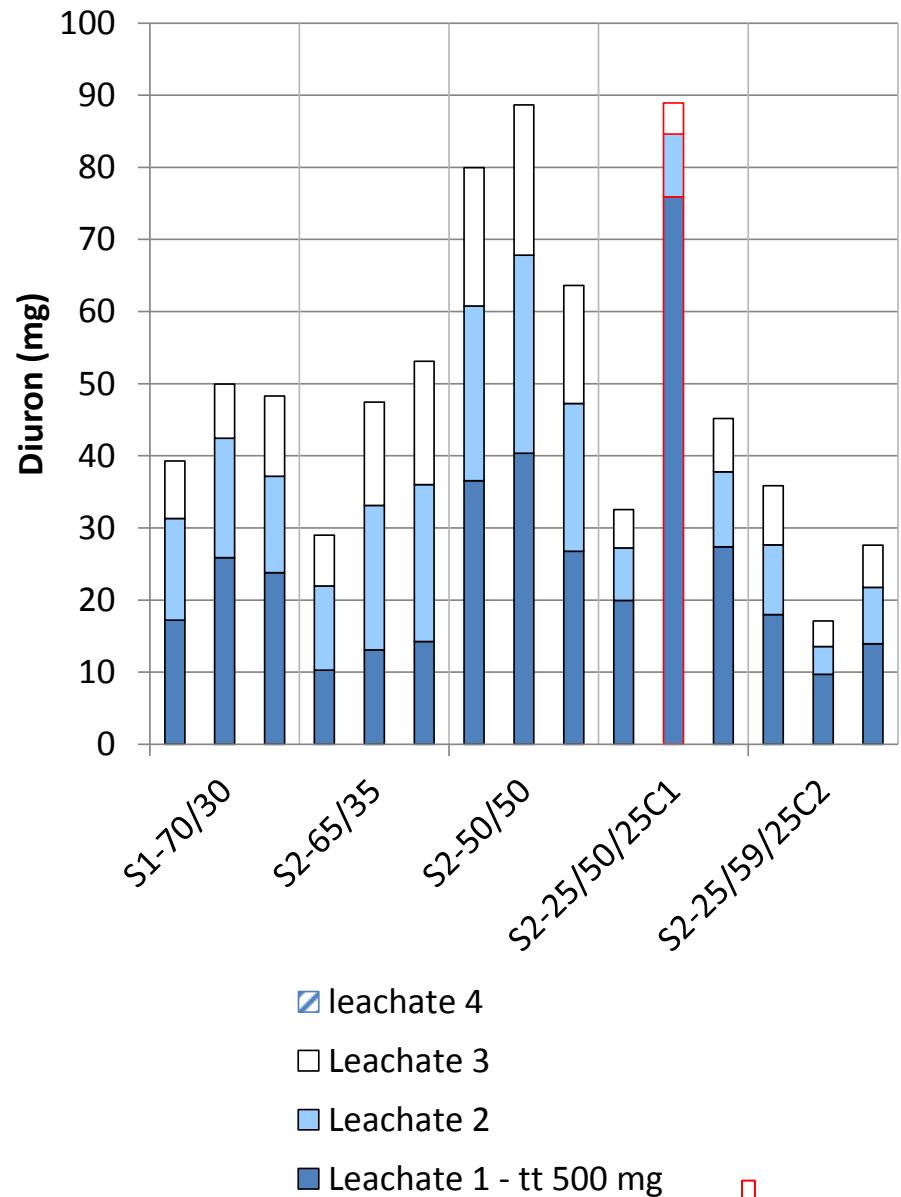
HPLC UV-DAD analysis



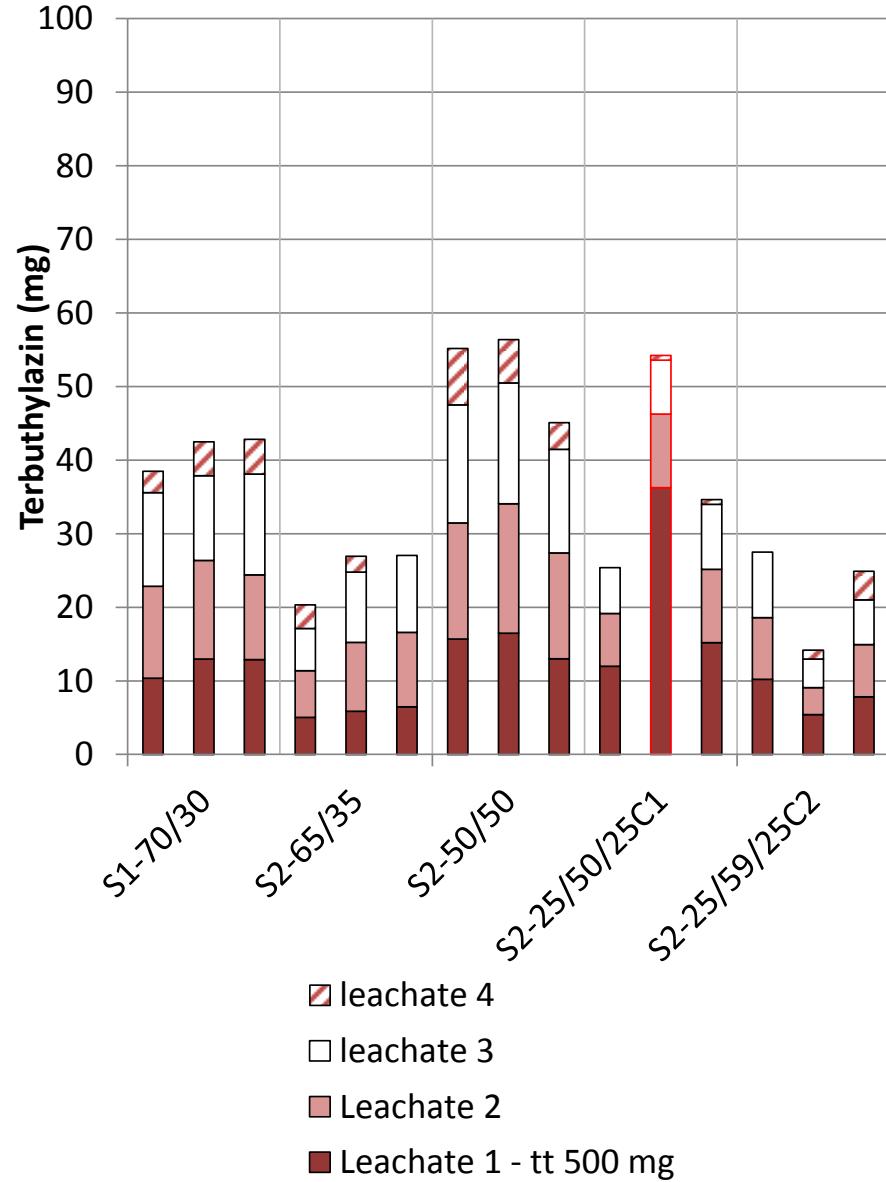
T 13 months

- Ambient temperature
- Watered (pF3) : march to july

## Export of diuron

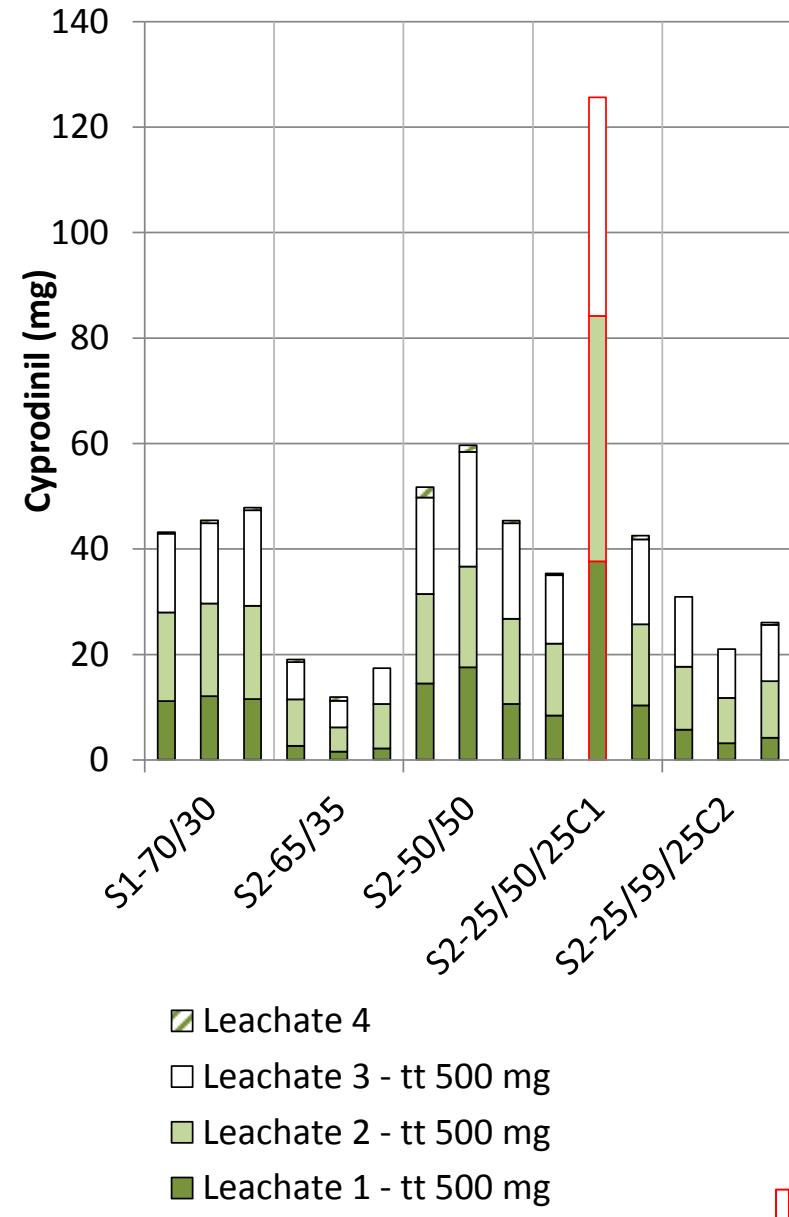


## Export of terbutylazin

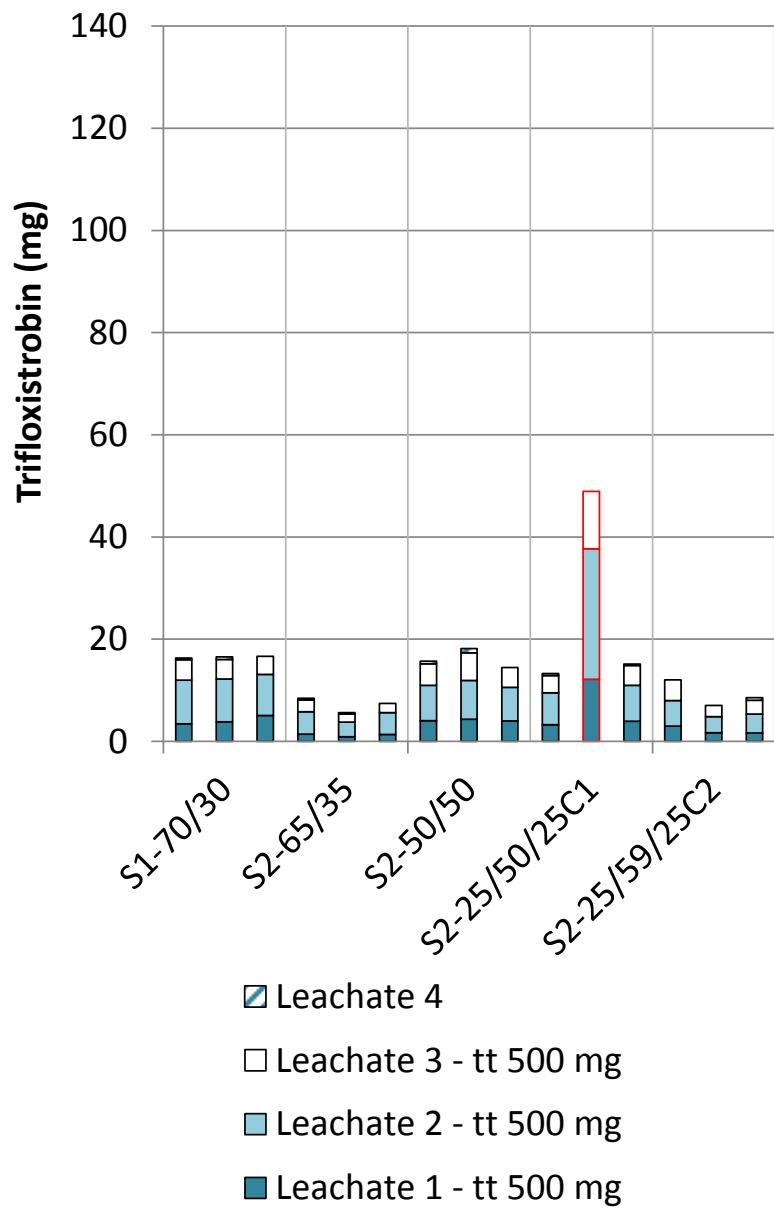


Biobed with immediate leaching

## Export of cyprodinil

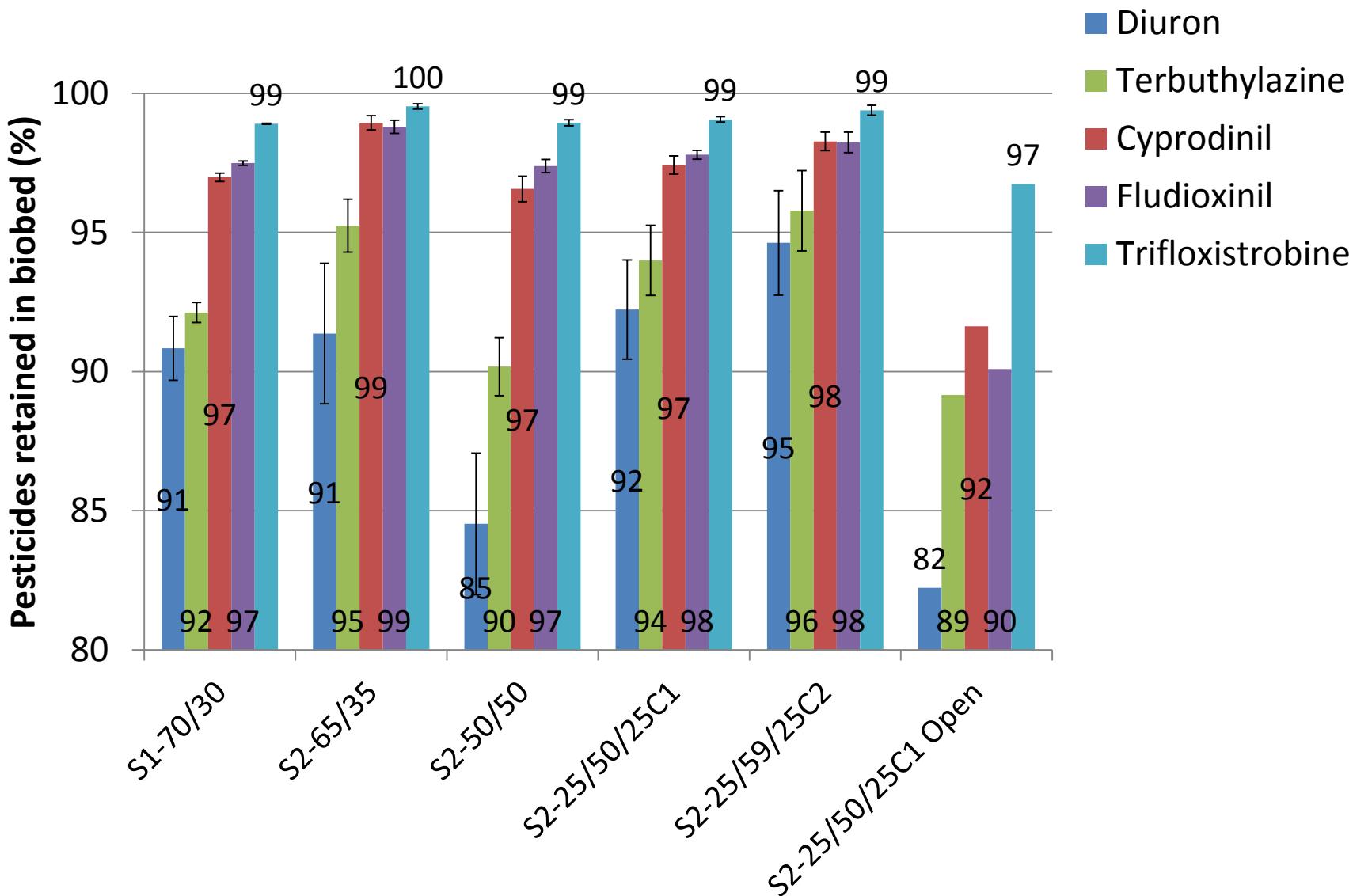


## Export of trifloxystrobin

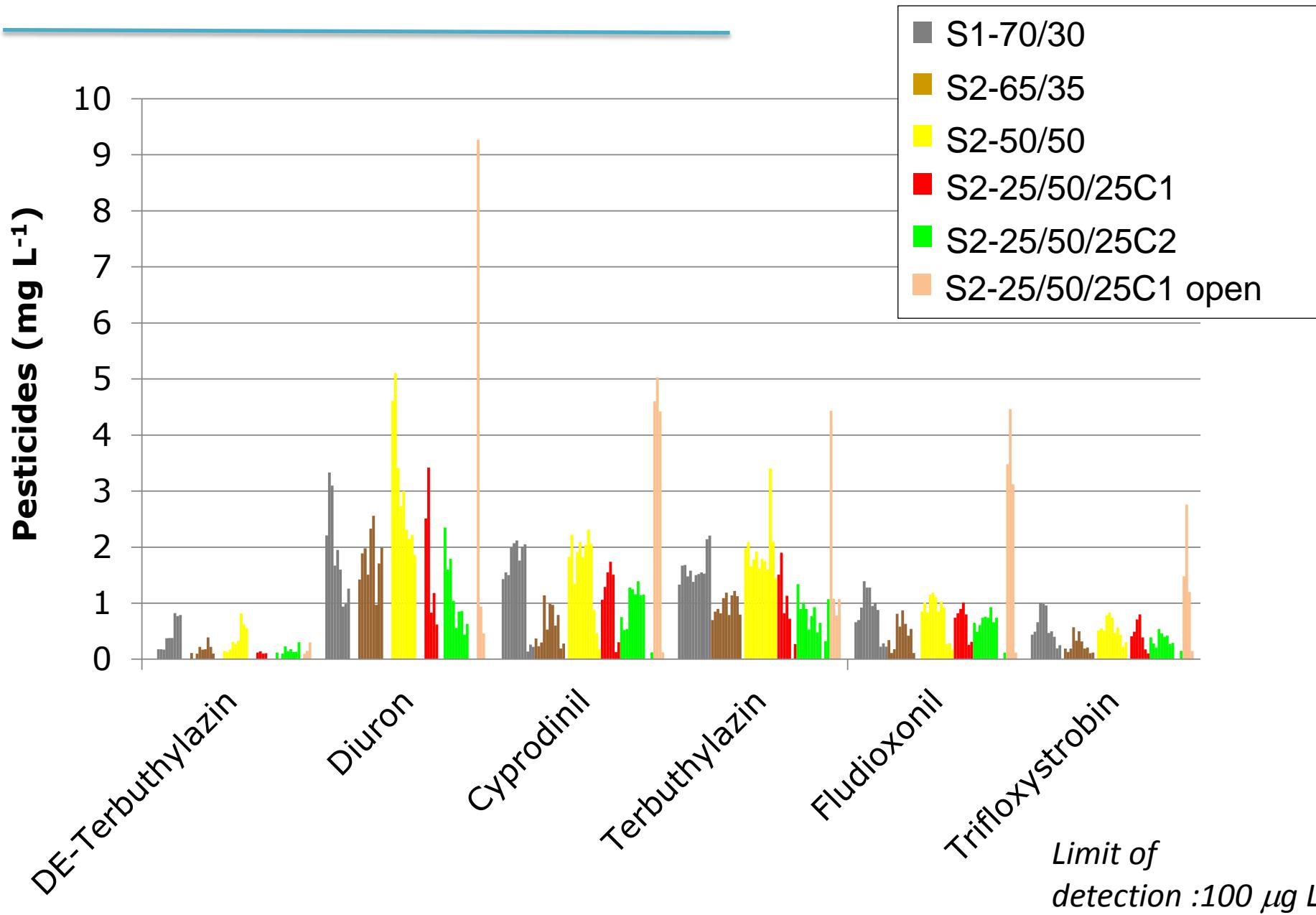


Biobed with immediate leaching

# Results retention :



# Results – Retention:





Biomix were sampled and removed in january 2011, 4 months after last treatment

# Results

---

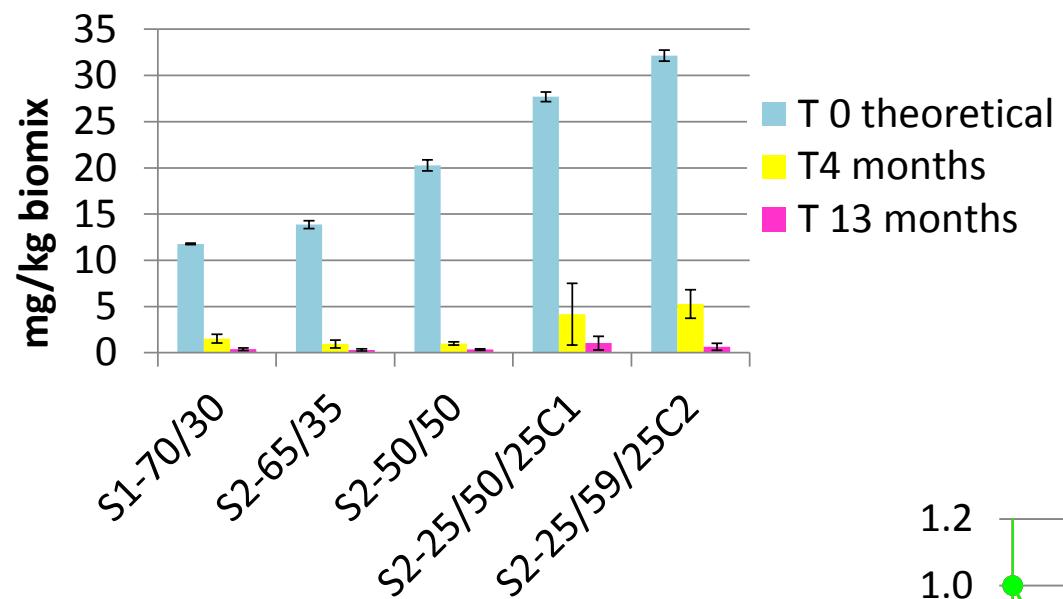
Biomix with high amount of soil showed reductive processes

S2-65/35

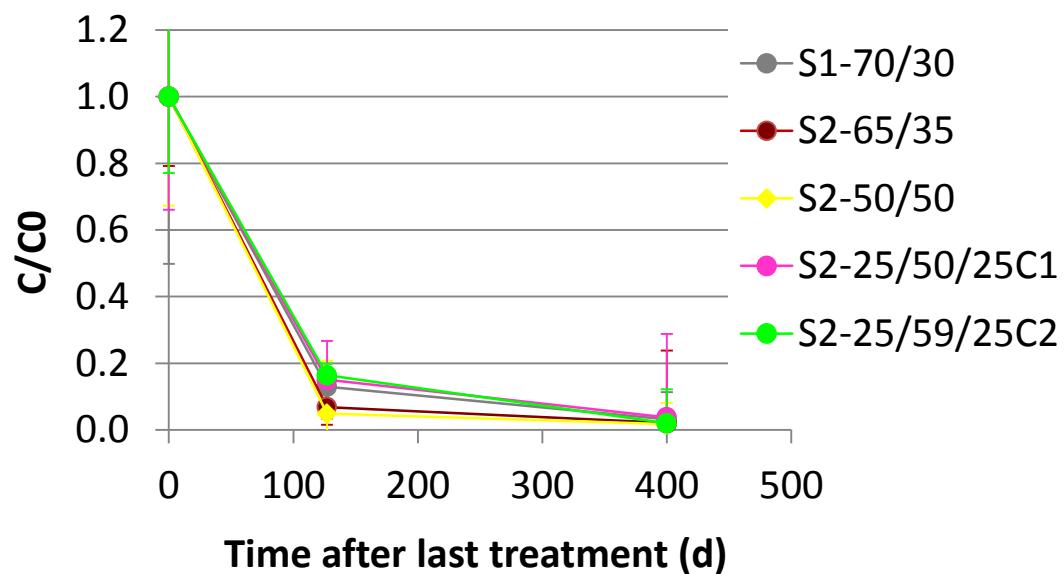


# Results Degradation:

Diuron

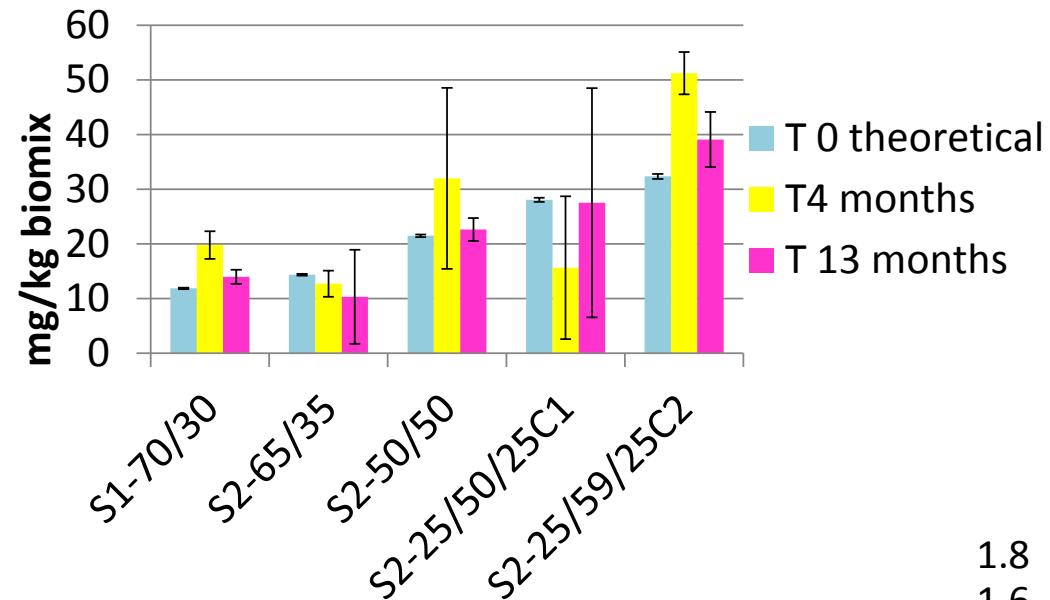


Diuron

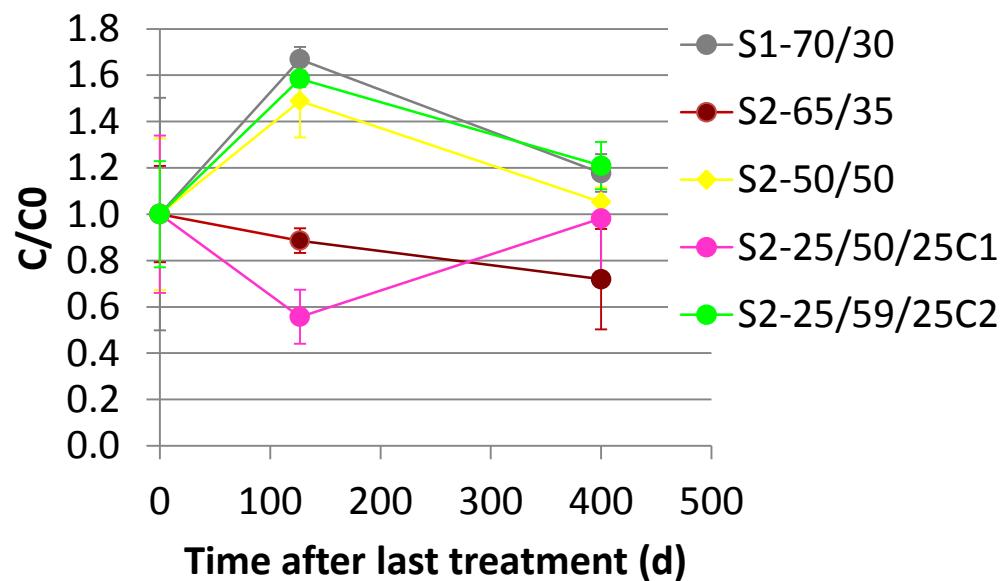


# Results Degradation:

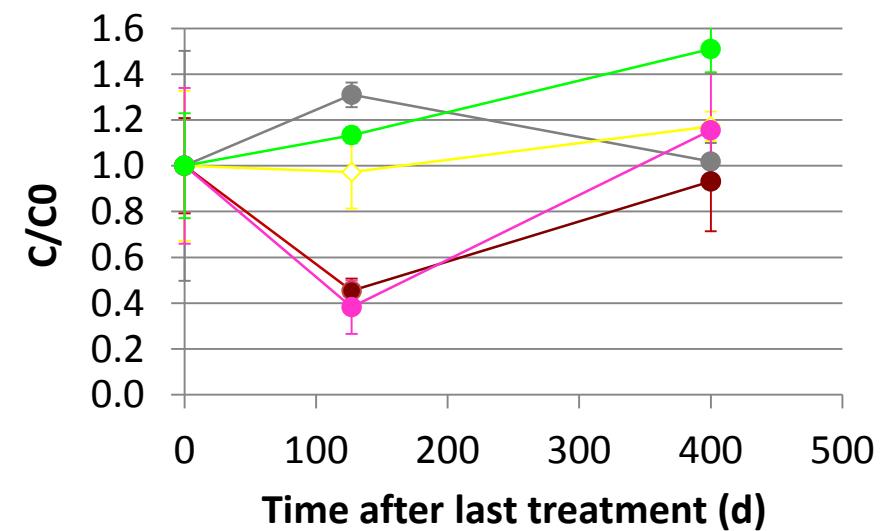
**Terbutylazin**



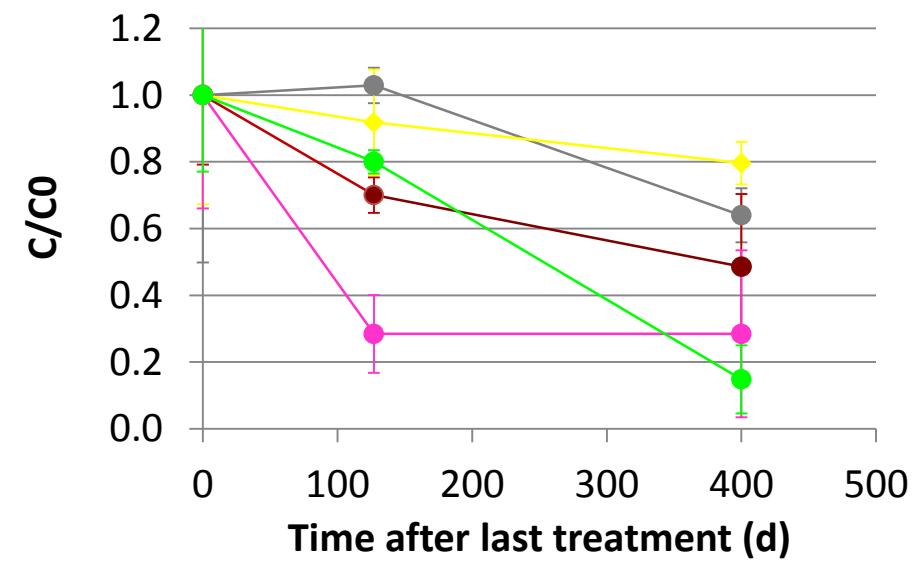
**Terbutylazin**



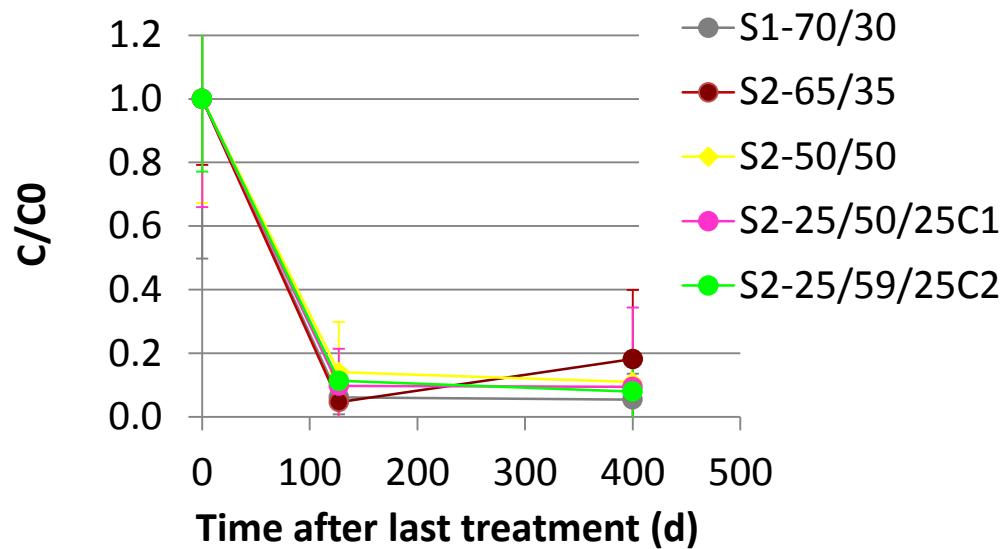
## Fludixonil



## Cyprodinil



## Trifloxystrobin



# Conclusions:

---

- Good efficiency for water clean-up : 90 – 99 %
  - Biomix with compost more efficient
  - Biomix with 65-70 % soil : problems of permeability
- «cleaned» water still contains pesticides - metabolites ?
  - spread in the field ?
  - legislation ?
- What about old biomix ?
  - spread in the field ?
  - legislation ?

Thanks to:

---

**Swiss Federal Office for Environment for financial support**

**Center for Ecotoxicology, Geneva, M. Coster,**

for LC-MS/MS analysis

**Véronique Guiné, Cyrielle Coutant and Elisabeth Fortier**

for technical assistance