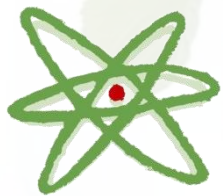


The BIOREM Project: Results from Practice

3rd European Biobed Workshop

Nico Hendrickx - August 31, 2010 - Piacenza



Research Station for Fruit Growing npa

Unit Applied Scientific Research

Zoology (animal parasites)
Mycology (fungal diseases)
Pomology (crop research of pomes)
Ecology (application techniques)

Experimental Garden for Pomes and Stone Fruits (PPS)

Services for Industry

GEP Trials for biological efficacy
(registration purposes)
Trials for Fytotoxicity
Resistance monitoring
Field Trials
...

Services for Farmers

Advice and Support on
Crop Protection,
Fertilization and
Techniques

Experimental Garden for Small Fruits (PAH)

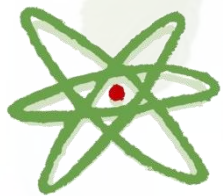


Ecology Department

Improve the Application of Plant Protection Products with respect for the Environment

- Applied Research for Optimization of Application Techniques for Plant Protection Products
- Applied Research for Optimization of 'On Farm' Bioremediation Systems
- Training operators, demonstration and advice to prevent losses of Plant Protection Products to the environment
- Services: spray drift trials in the field and indoor, chemical and biological purification techniques for plant protection products

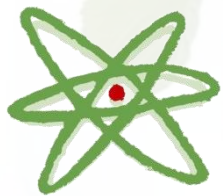
Contact Ecology Department: nico.hendrickx@pcfruit.be



The BIOREM Project

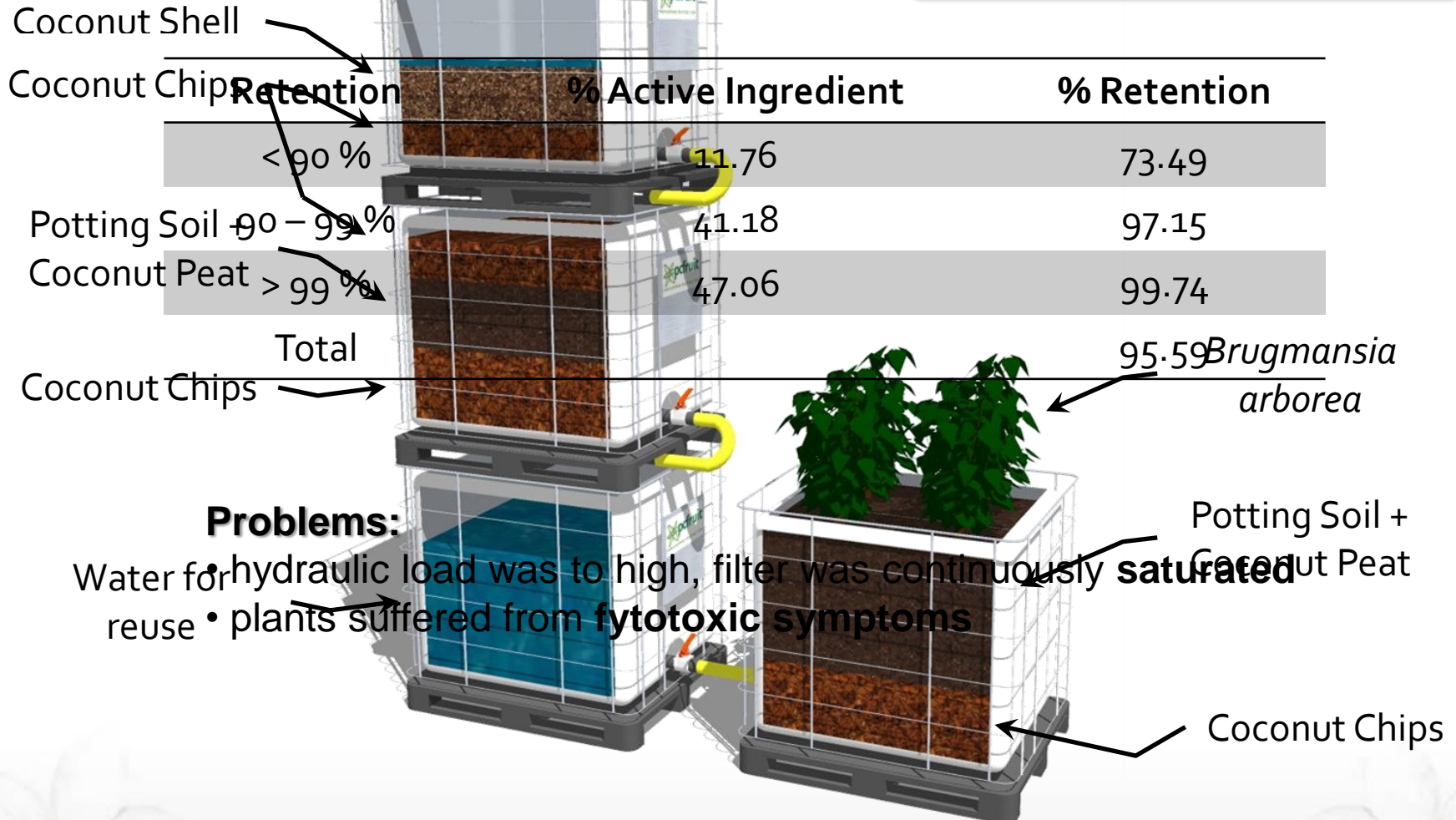
- Research Project in the Category 'Agricultural Research', funded by IWT
- July 2005 – December 2009
- Aim: optimization and evaluation of a bioremediation system for spray remnants
- Partners:
 - Division Soil and Water Management, Catholic University Leuven
Prof. Dr. ir. D. Springael
 - Laboratory of Crop Protection Chemistry, Ghent University
Prof. Dr. ir. W. Steurbaut
 - Ecology Department, pcfruit vzw
Dr. ir. N. Hendrickx





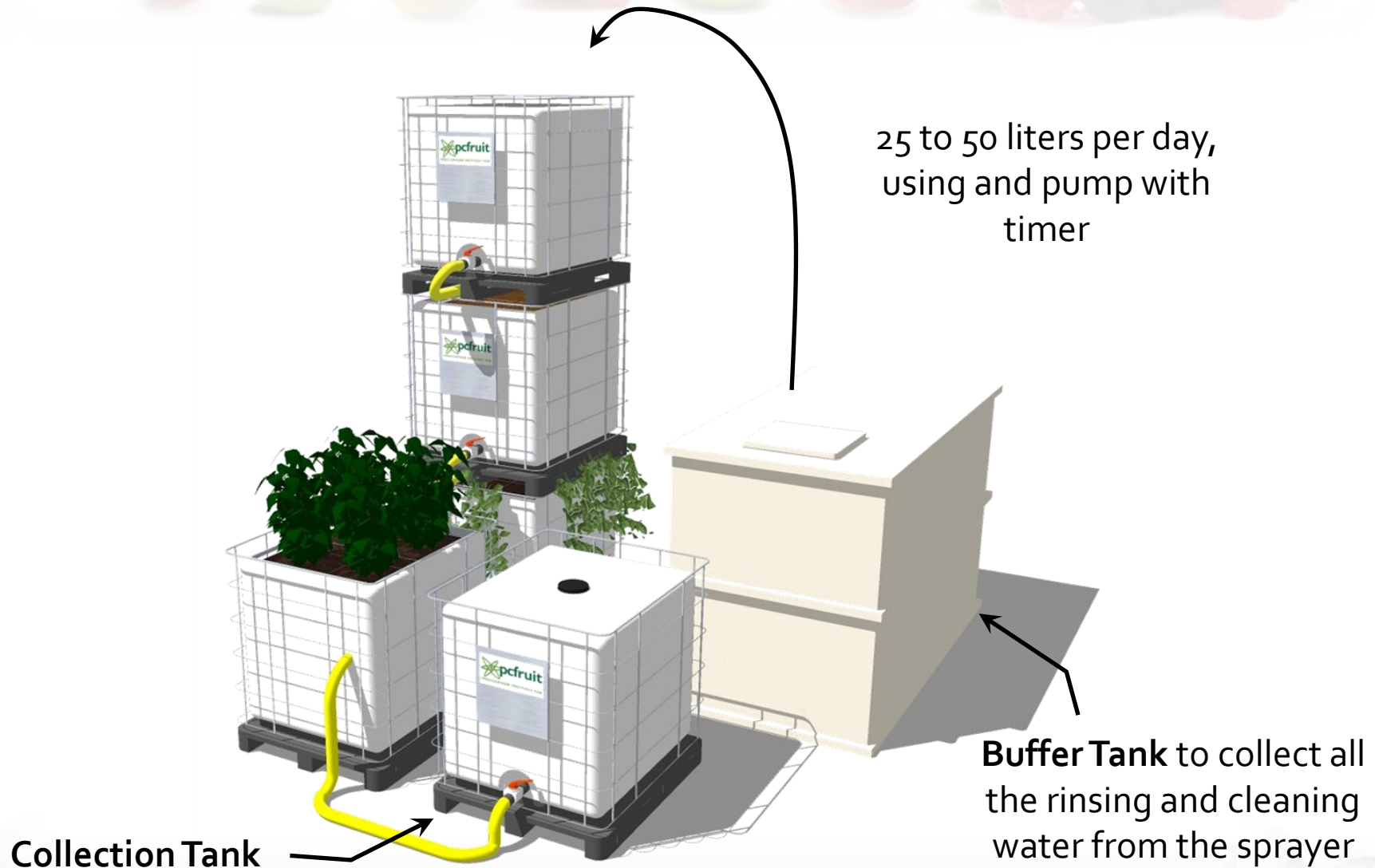
In the beginning...

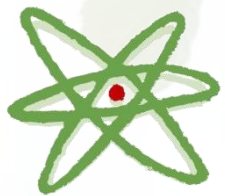
Arable Farm in Leefdaal





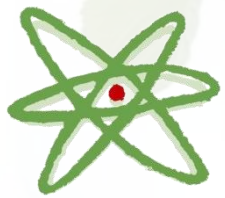
Leefdaal 2006





Leefdaal 2006

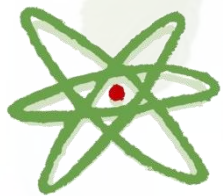




Leefdaal 2006

Arable Farm in Leefdaal



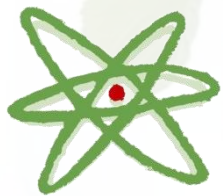


'The Greenhouse Trial'

- Aim: Compare 'inoculated system' vs 'non-inoculated system'
 - 'Inoculated': Soil from the orchard
 - 'Non-Inoculated': Sterilized soil
- 5 selected reference pesticides:

	Mobility	Persistency
Bentazon	Very high	Low
Isoproturon	High	Low
Linuron	Low	Low
Metalaxyl	High	Low
Metamitron	Moderate	Low

- In Greenhouse under controlled conditions



The Greenhouse trial: Setup

Inoculated System

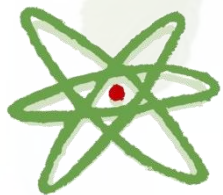
Non-Inoculated System

25 % Straw
25 % Coconut Chips
5 % Dried Cow Manure
35 % Potting Soil
10 % Soil

Carex paniculata
Carex acutiformis

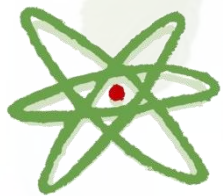
Buffer with
reference pesticides

10 % Coconut Chips
5 % Dried Cow Manure
75 % Potting Soil
10 % Soil



The Greenhouse trial: Setup

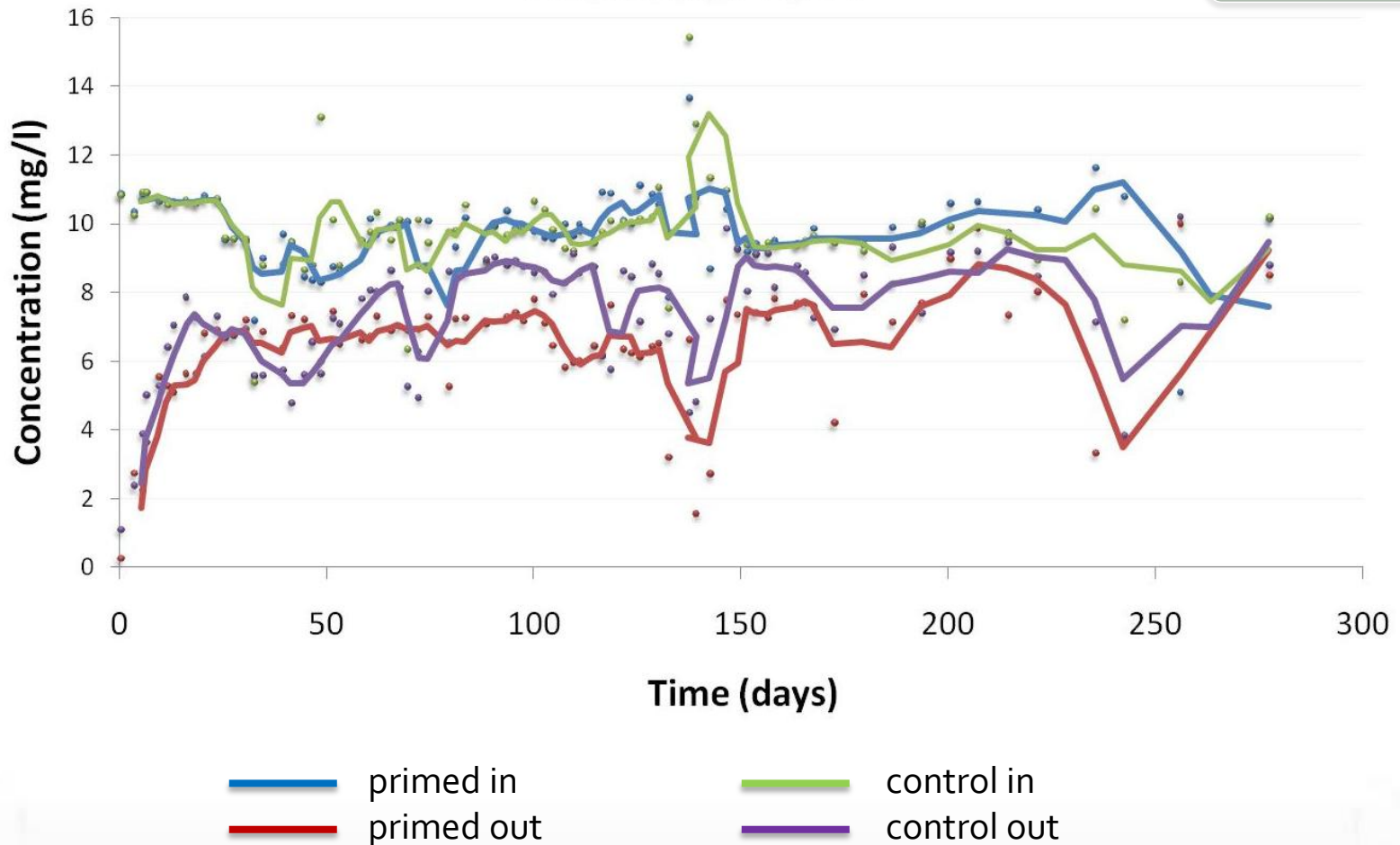


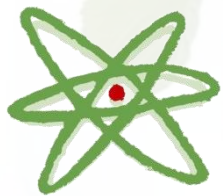


The Greenhouse Trial: Results

Bentazon

Unit 1

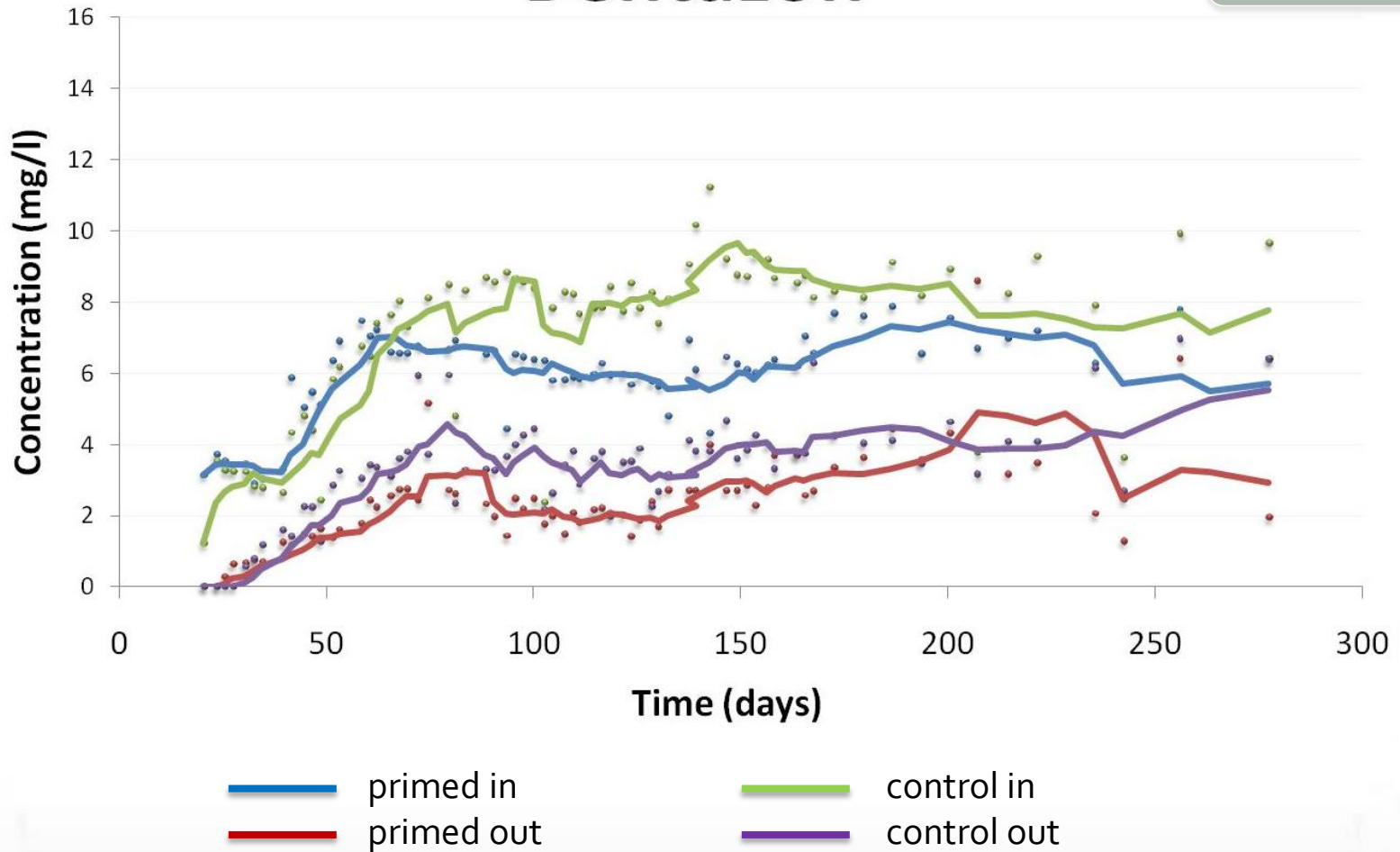


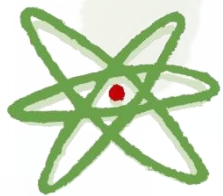


The Greenhouse Trial: Results

Bentazon

Unit 2

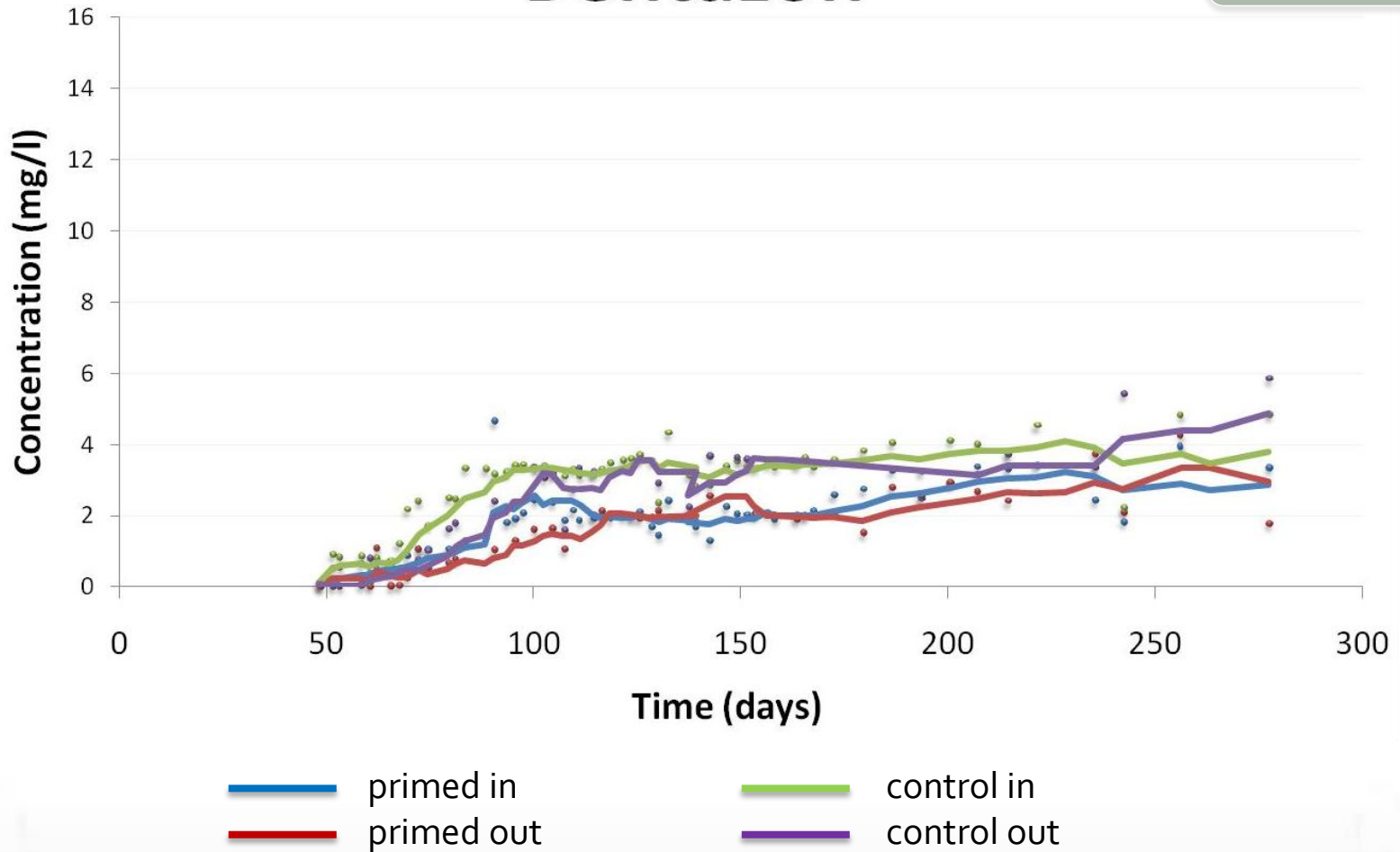


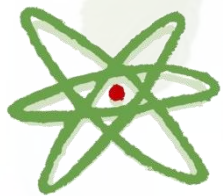


The Greenhouse Trial: Results

Bentazon

Unit 3

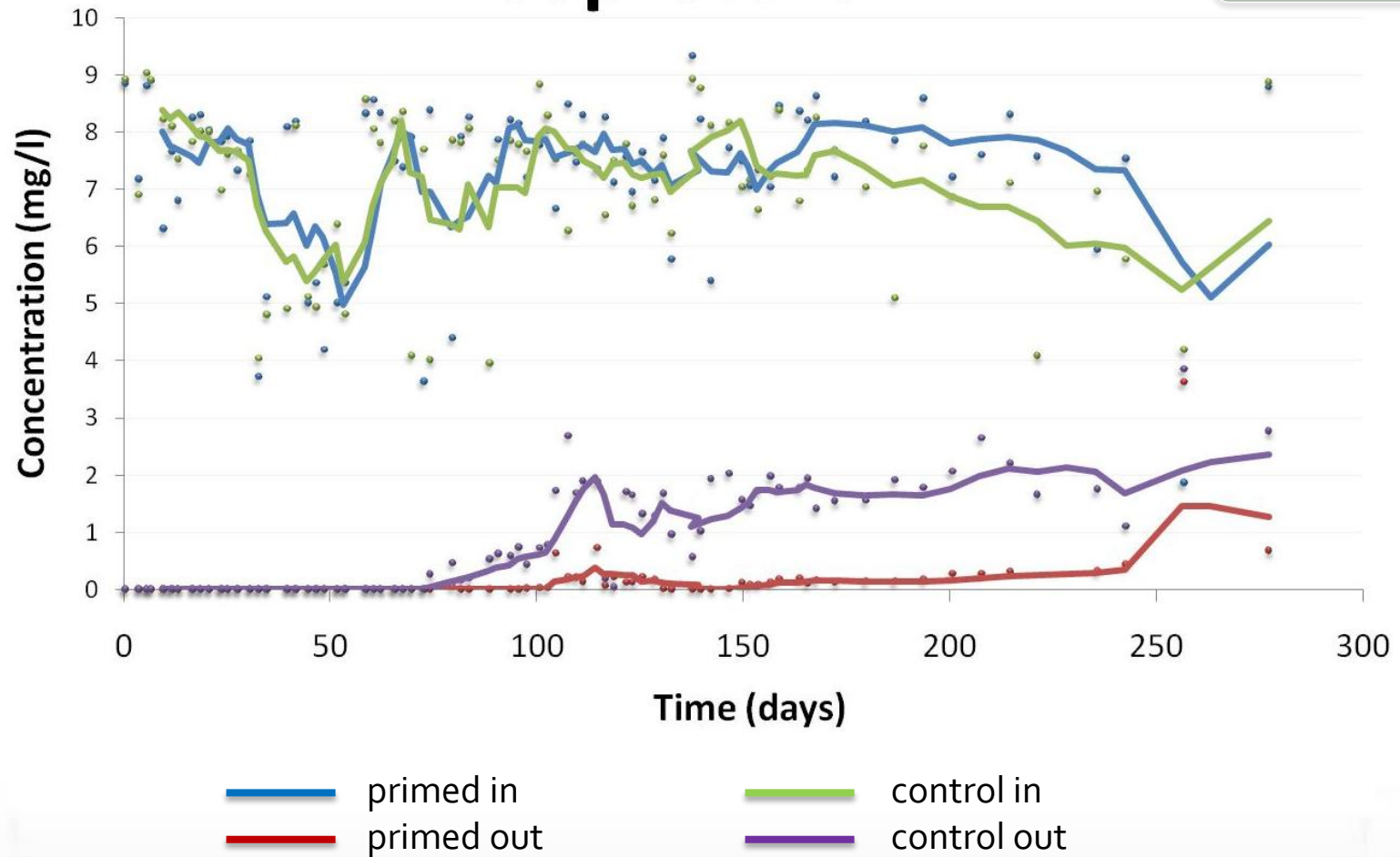


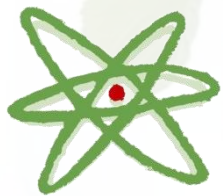


The Greenhouse Trial: Results

Isoproturon

Unit 1

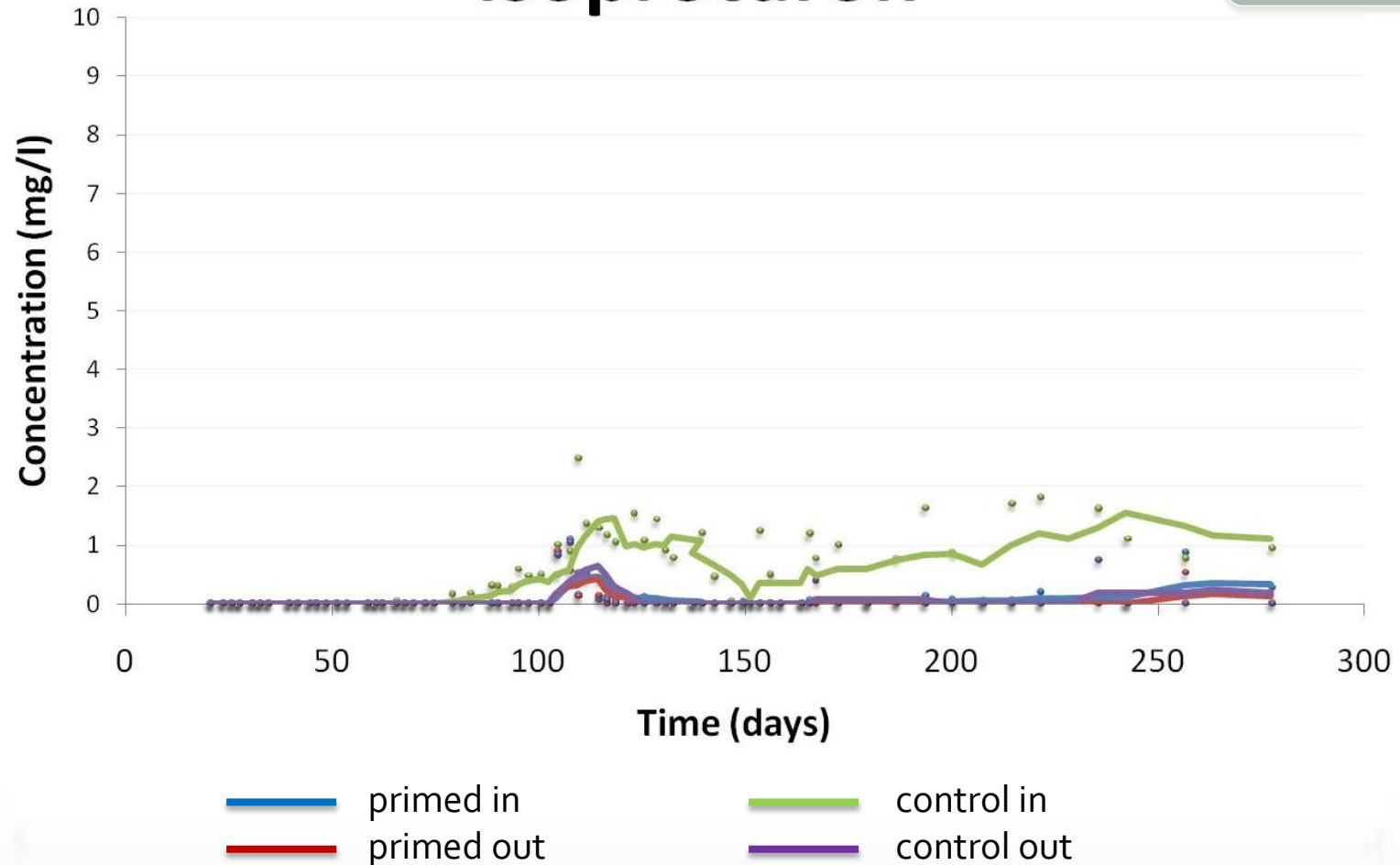


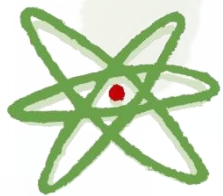


The Greenhouse Trial: Results

Isoproturon

Unit 2

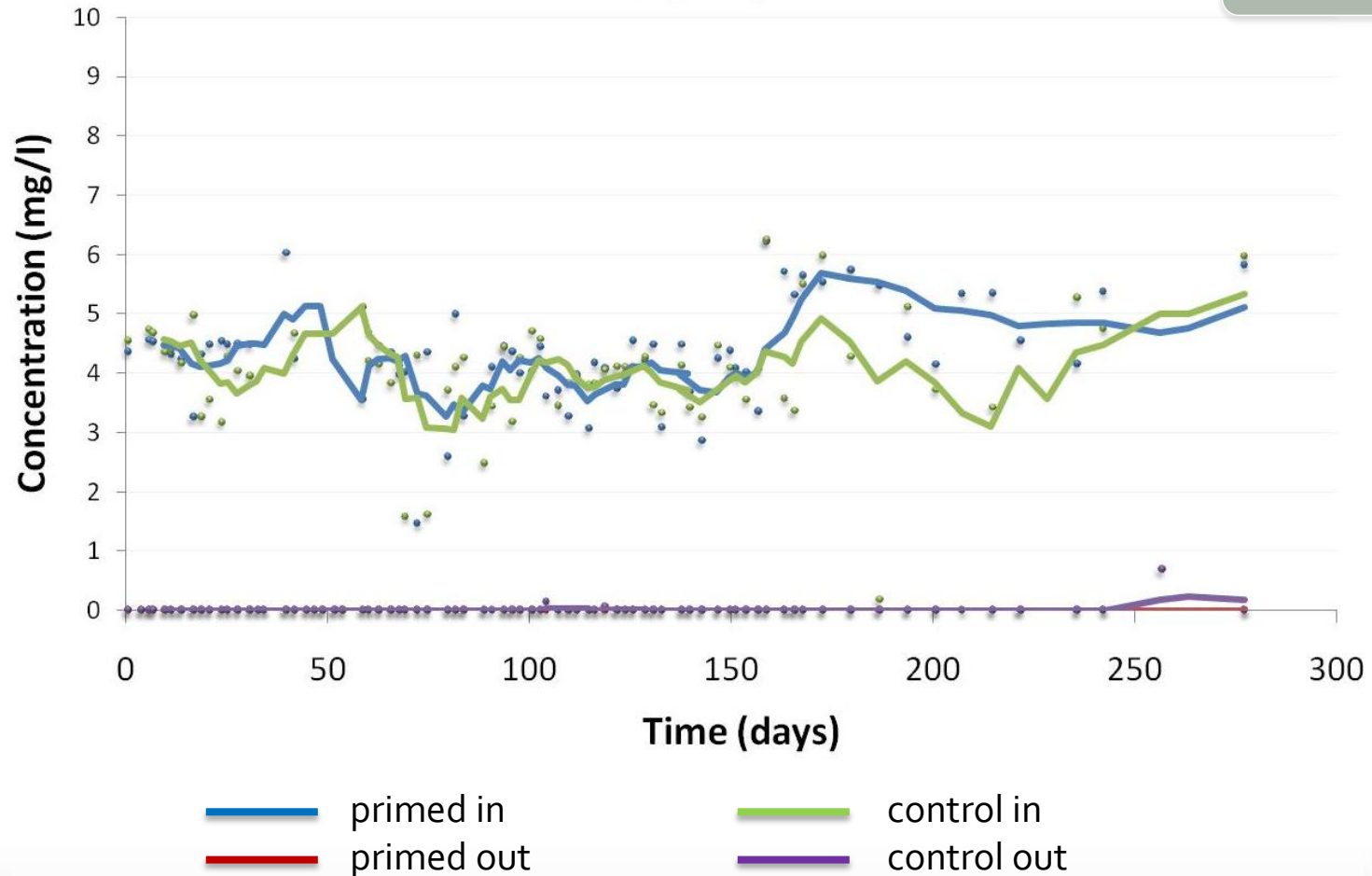


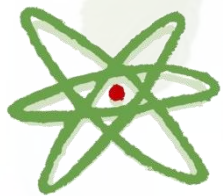


The Greenhouse Trial: Results

Linuron

Unit 1

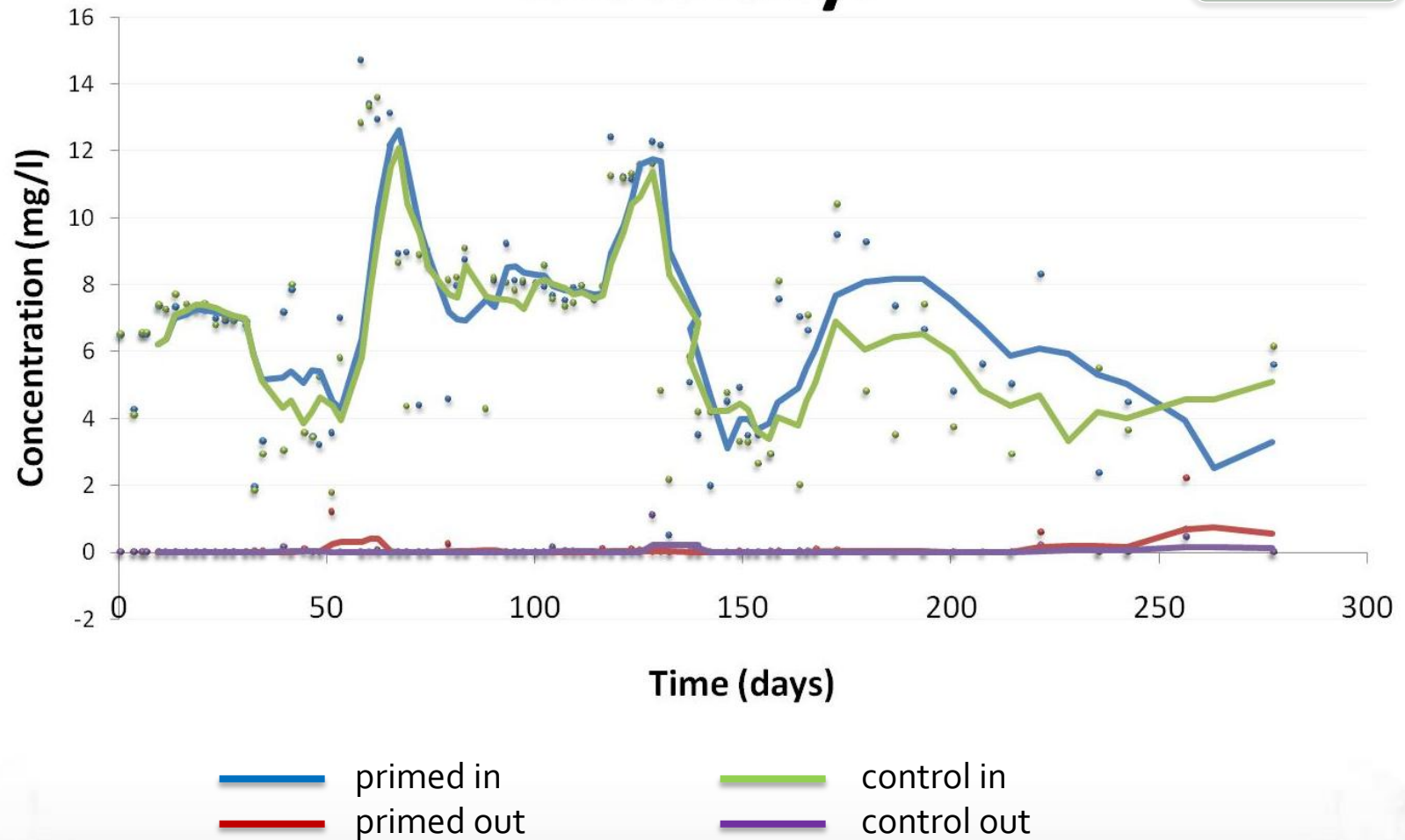


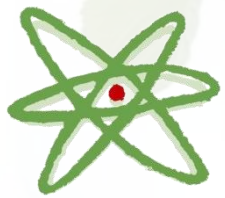


The Greenhouse Trial: Results

Metalaxyl

Unit 1





Leefdaal 2007

Arable Farm in Leefdaal

Coconut Chips

Potting Soil +
Coconut Chips

Coconut Chips

50 % Straw
40 % Potting Soil
10 % Primed Soil

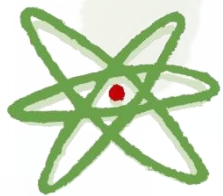
Hedera helix in
Potting Soil

50 % Straw
40 % Potting Soil
10 % Primed Soil

Carex acutiformis
Carex paniculata

90% Potting Soil
10 % Primed Soil

Coconut Chips



Fytotox Trial

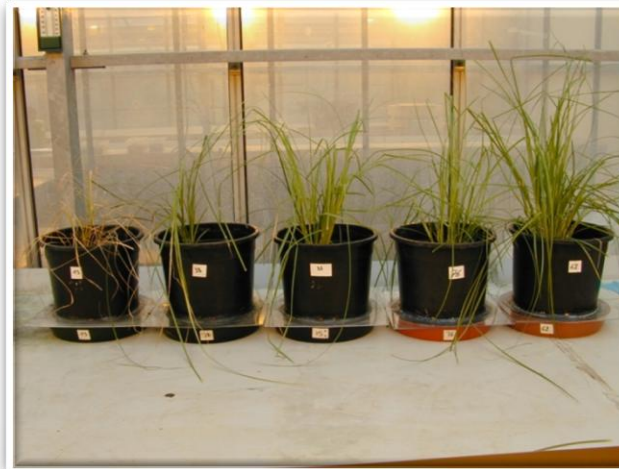
- Aim: Select plants to incorporate in the bioremediation system based on resistance against pesticide mix
- Mix used:

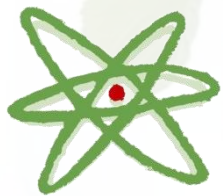
Active Ingredient	Effect	Plant Group	Mobility	Persistency
2,4-D	Leaf	Dicotyl	High	Not persistent
Amitrol	Leaf	Mono/dicotyl	Moderate	Not persistent
Bentazon	Leaf	Dicotyl	High	Not persistent
Clopyralid	Leaf	Dicotyl	High	Not persistent
Diflufenican	Root	Monocotyl	Low	Persistent
Isoproturon	Root	Mono/dicotyl	High	Not persistent
Lenacil	Root	Dicotyl	High	Persistent
MCPA	Leaf	Dicotyl	Low	Not persistent
Metamitron	Root	Mono/dicotyl	Moderate	Not persistent



Fytotox Trial: Setup

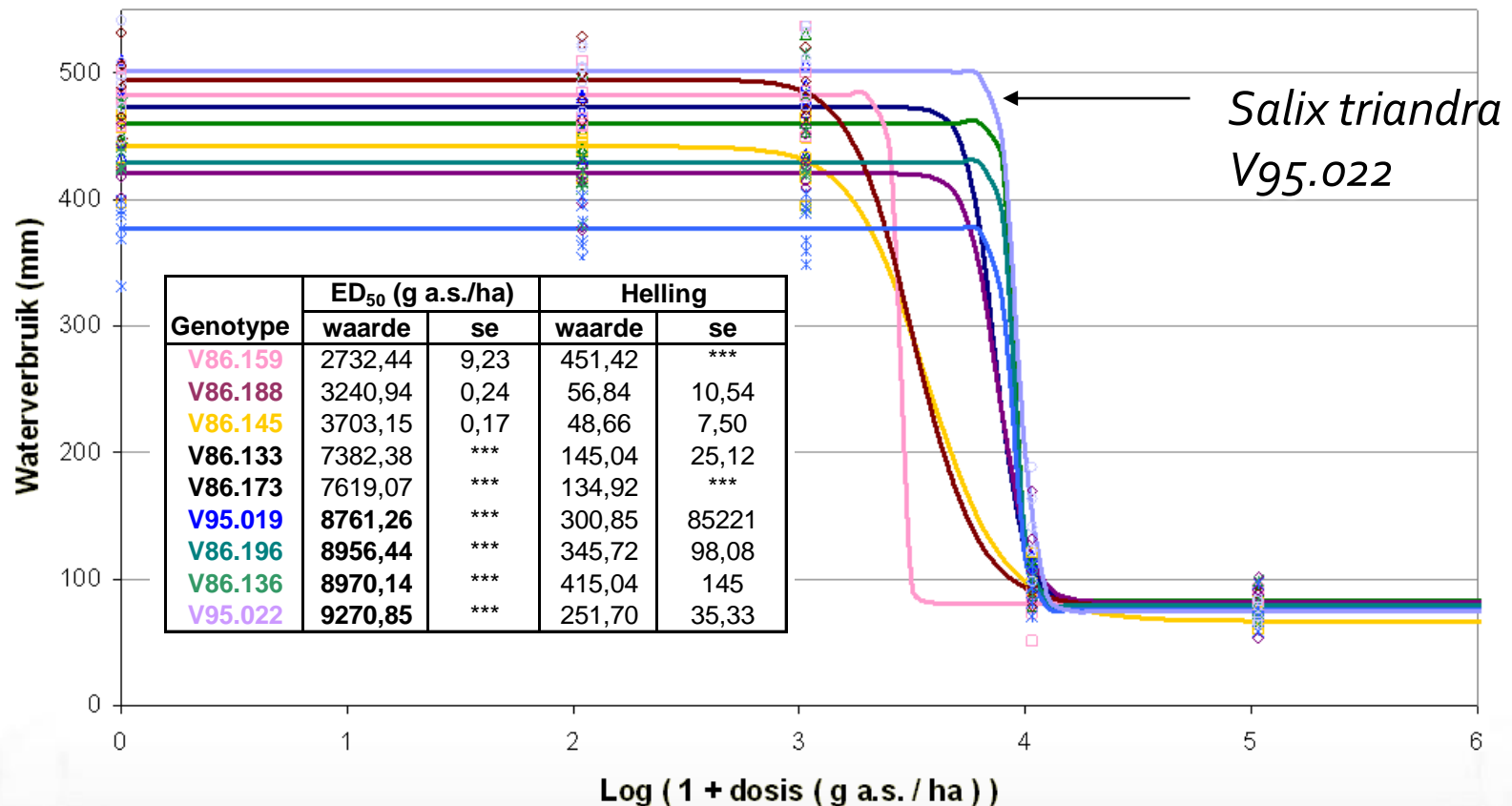
- Several doses of the pesticide mix were used, till 10 times field dose
- Several parameters were measured (water use, shoot length, biomass)
- Dose-respons curves were defined for *Hedera helix*, *Carex* and *Salix*





Fytotox Trial: Results

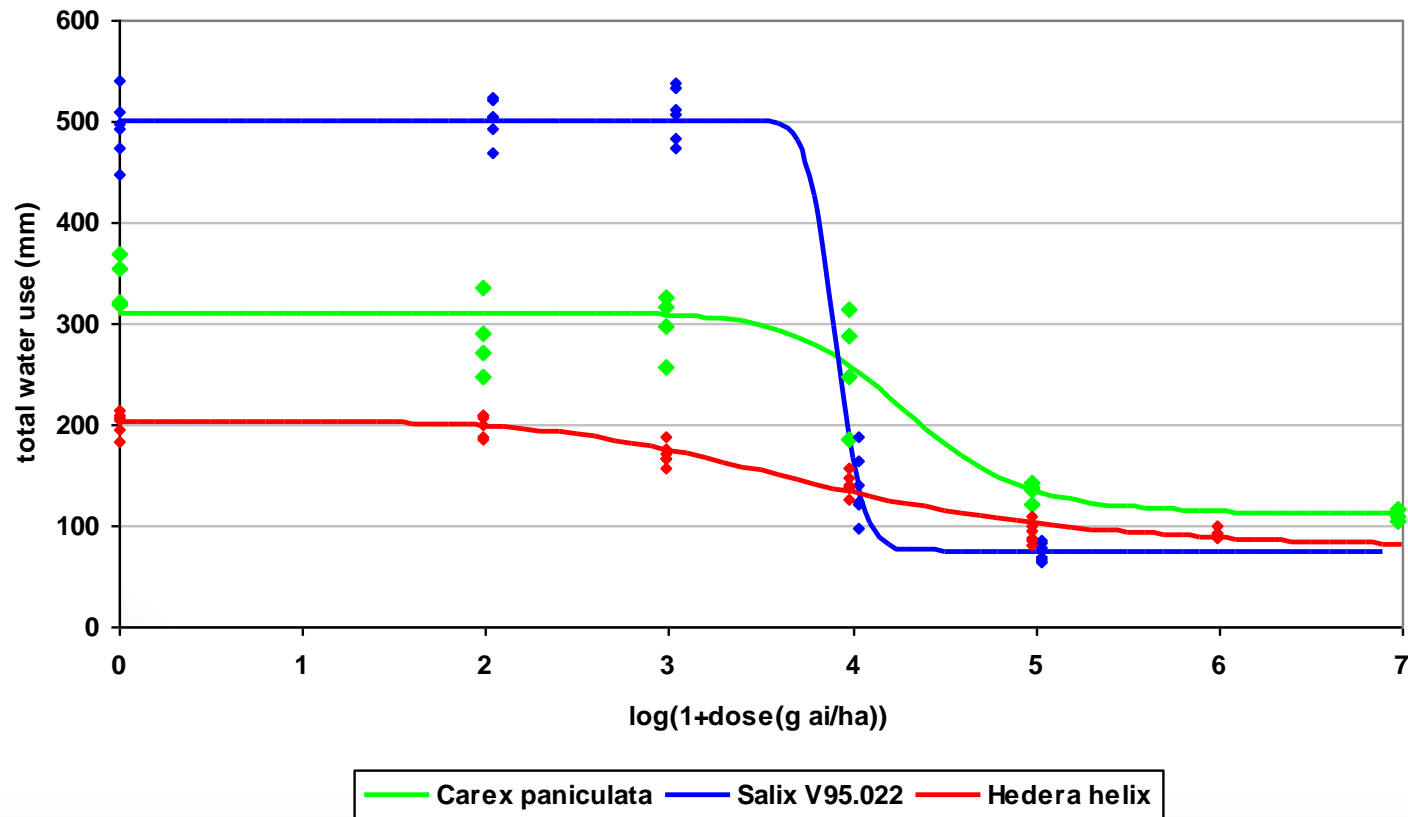
- Dose-Response curve 76 days after treatment of 9 *Salix* genotypes

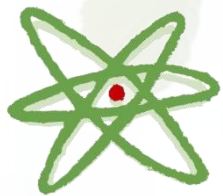




Fytotox Trial: Results

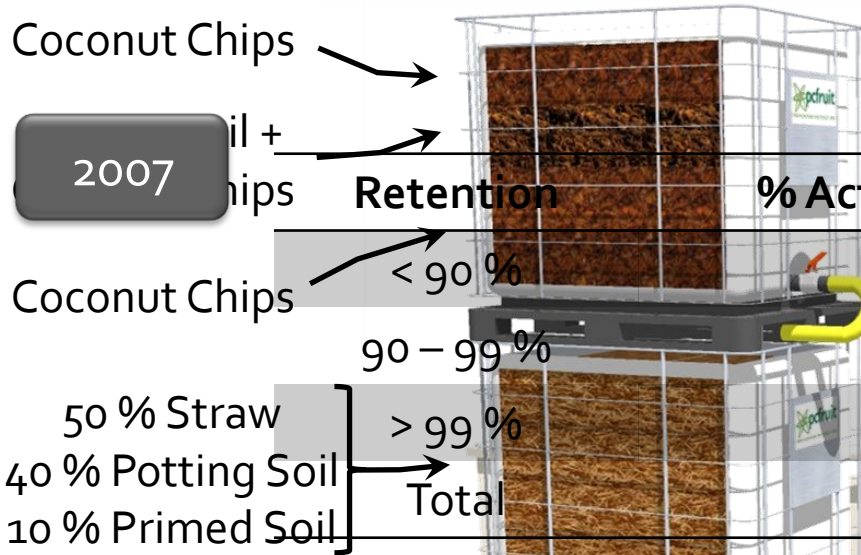
- Dose-respons curve of *Carex paniculata*, *Salix triandra* and *Hedera helix*





Leefdaal 2007

Arable Farm in Leefdaal



2007

Retention

% Active Ingredient

% Retention

< 90 %

14.29

58.95

90 – 99 %

17.86

Carex acutiformis

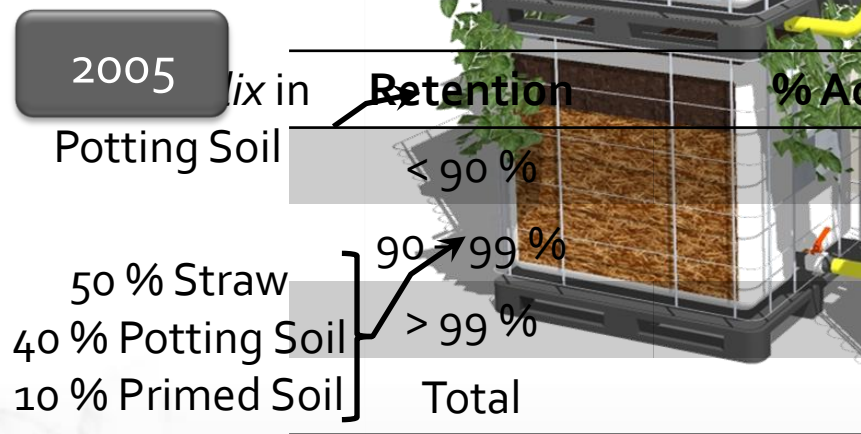
> 99 %

67.86

Carex paniculata

Total

93.26



2005

Retention

% Active Ingredient

% Retention

< 90 %

11.76

73.49

90 – 99 %

41.18

97.15

> 99 %

47.06

99.74

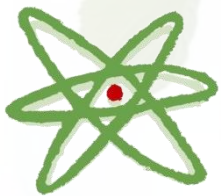
Total

95.59

90 % Potting Soil

90 % Primed Soil

90 % Coconut Chips



Leefdaal 2008

Arable Farm in Leefdaal

Coconut Chips

Potting Soil +
Coconut Chips

Problems:

Coconut Chips

at startup, the **hydraulic load was too high** (45 l/day), so that the

Carex was not able to grow and showed **phytotoxic symptoms**

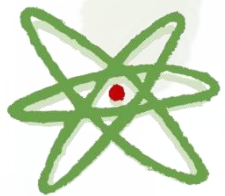
Carex acutiformis
Carex paniculata

50 % Straw
40 % Potting Soil
10 % Primed Soil

50 % Straw
40 % Potting Soil
10 % Primed Soil

90 % Potting Soil
10 % Primed Soil

Coconut Chips



Leefdaal 2009

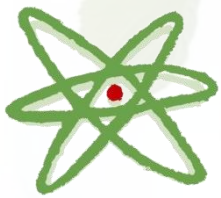


20 liters per day,
using a metering
pump



Leefdaal 2009

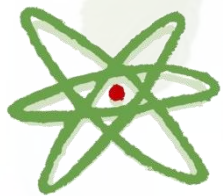




Evapotranspiration Trial

- Aim: measure the water use of a plant system to make a zero output dimensioned open bioremediation system
- Log:- temperature
 - rain fall
 - water gift
- Vegetation used:
 - *Carex paniculata*
 - *Carex acutiformis*
 - *Salix triandra*
 - *Hedera helix*
 - *Poa* spp.

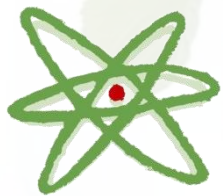




Evapotranspiration Trial: Results

- Total water use (02/2009 - 09/2009)





Leefdaal 2009

Arable Farm in Leefdaal

Coconut Chips
2009
+
Coconut Chips
Coconut Chips

Retention

< 90 %

90 - 99 %

> 99 %

Total

2005
2007

W

Soil
Soil

Retention

< 90 %

90 - 99 %

> 99 %

Total

Carex acutiformis
Carex paniculata
% Active Ingredient

-
10.00
90.00

% Retention

95.08

99.93

99.45

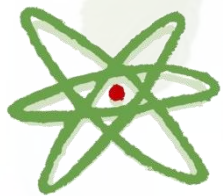
% Active Ingredient

2005 2007
11.76 14.29
41.18 17.86
47.06 67.86

% Retention

2005 2007
73.49 58.95
97.15 69.08
99.74 99.74
95.59 93.26

Coconut Chips



Acknowledgments

Catholic University Leuven



Dirk Springael
Jaak Ryckeboer
Kristel Sniegowski
Karolien Bers

Proefcentrum Fruitteelt vzw



Nico Hendrickx
Tim Goossens
Peter Jaeken
Christof Debaer
Nik Rutten

Ghent University

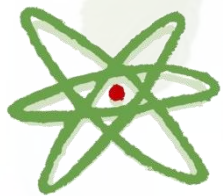


Walter Steurbaut
Pieter Spanoghe
Tineke De Wilde

Arable Farm Leefdaal



Walter Everaert



Running Projects

- Interreg IV Project Interactive Water Management
 - Constituent project on point source contamination and bioremediation
 - Partners: Boerenbond (BE), Waterschap Brabantse Delta (NL), ZLTO (NL)
 - Website: www.interactiefwaterbeheer.eu



Europese Unie

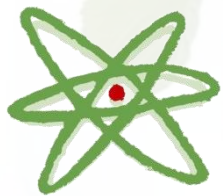
Europees Fonds voor Regionale Ontwikkeling



- Demonstration Project Ijzer-Demer
 - Demonstration and training in prevention of point source pollution in two basins Ijzer and Demer
 - Partners: POVLT

Met steun van de
Vlaamse overheid





Contact Information

Proefcentrum Fruitteelt vzw

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