UNIL | Université de Lausanne
Faculté des géosciences
et de l'environnement

Rôle du sol dans le transfert du glyphosate de la vigne aux eaux de surface

Silwan Daouk

I. Introduction

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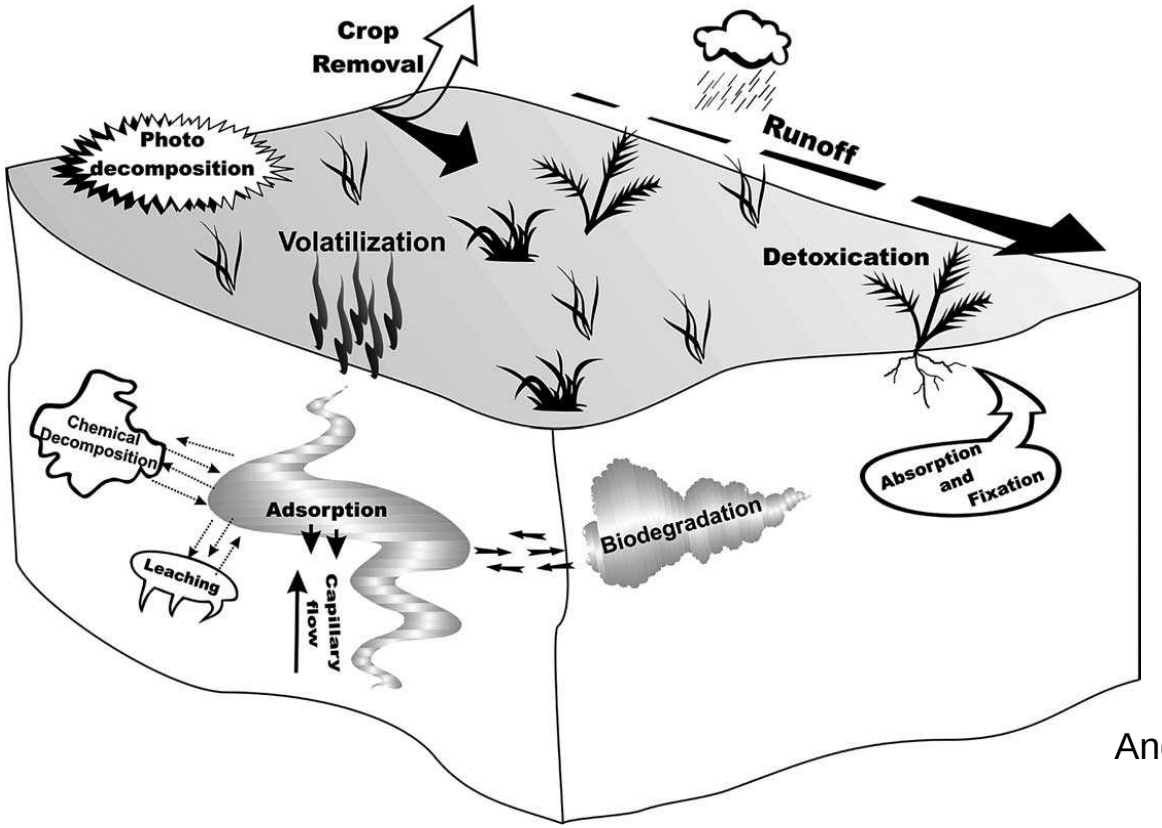
Devenir des pesticides dans le sol:



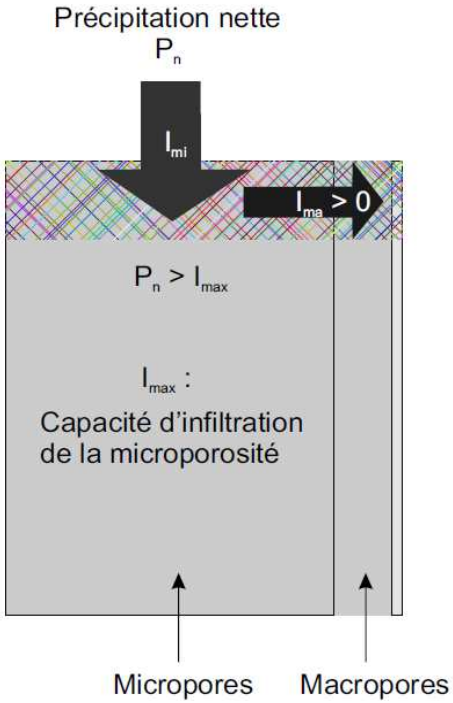
Andreu and Picó, 2004

- Importance des propriétés physico-chimiques des molécules
- Conservation vs transformation des molécules
- Interdépendance des processus

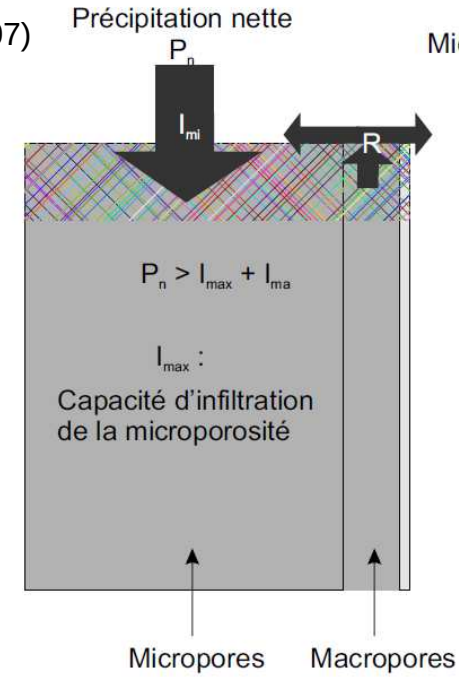
Transport:

Percolation et flux préférentiels:

(Alaoui, 2007)



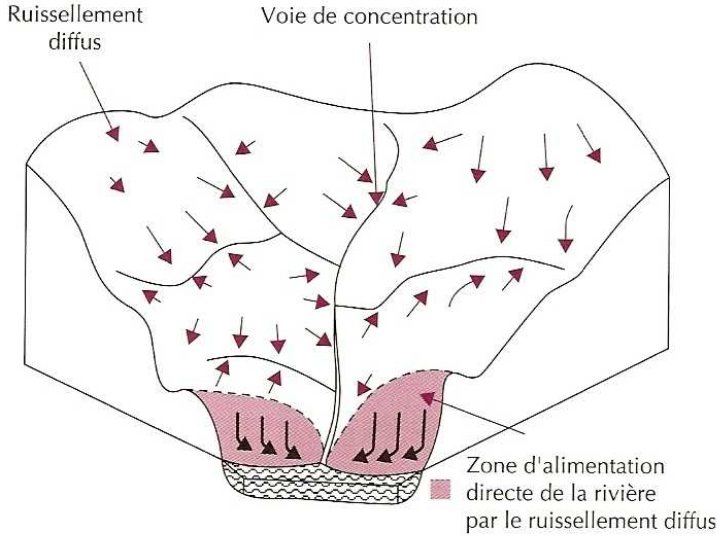
Erosion et ruissellement de surface:

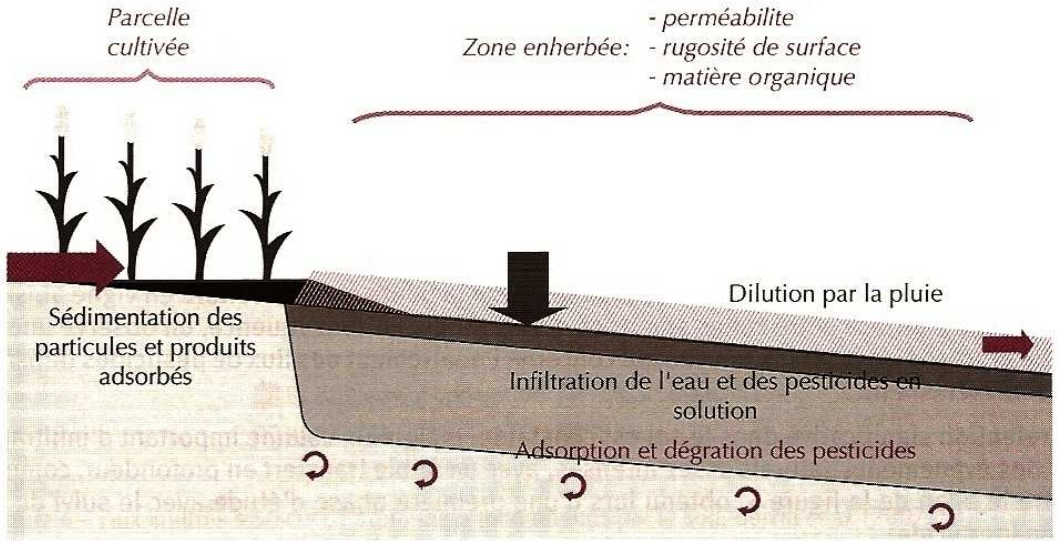


Zones tampons:

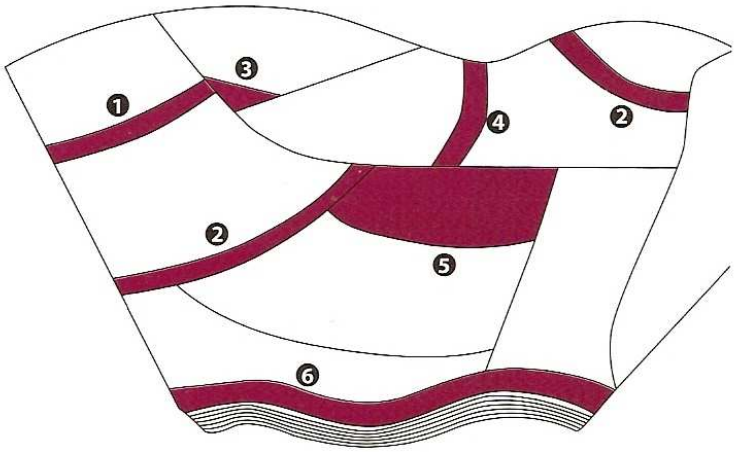
- Obligation légale actuelle (art. 7, OPD): 3m entre un champ et un cours d'eau

- PA 2011: 6m





(Lacas, 2005)



1. Bande dans la parcelle
2. Bande en bord de parcelle
3. Coin de parcelle
4. Chenal enherbé
5. Prairie en travers du talweg
6. Bande le long du cours

(CORPEN, 1997)

I. Introduction

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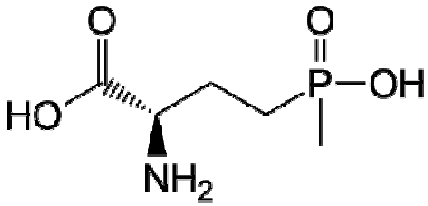
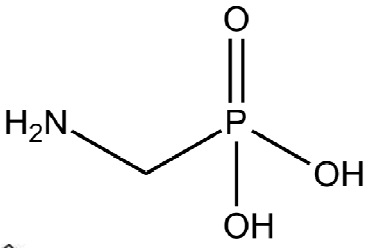
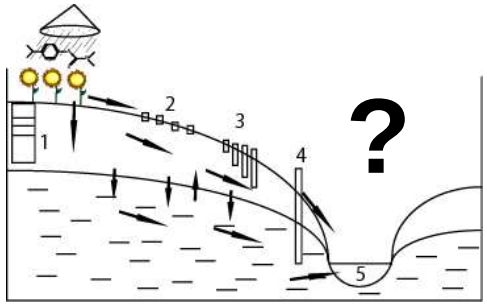
• Le **glyphosate** est un herbicide **largement utilisé en Suisse**: ~ 150t/an = ~ 10% des ventes de tous les produits phytosanitaires (Delabays et al., 2004)



• Son produit de dégradation, **l'acide aminométhyl phosphonique** ou **AMPA**, est plus persistent, plus soluble et plus toxique que le glyphosate



• Il n'existe que **très peu d'études** en suisse sur son devenir dans l'environnement car sa **quantification** reste **difficile** due à sa structure et son affinité pour les ions métalliques (Hanke et al., 2008)



• En 2009, l'institut fédéral de recherche en agriculture (ACW) a répertorié **une espèce exotique** dans une parcelle du vignoble du Lavaux: Conyza bonariensis, la première en Europe (Espagne, 2004) à développer une **résistance** au glyphosate (Delabays, 2009)

II. Terrain

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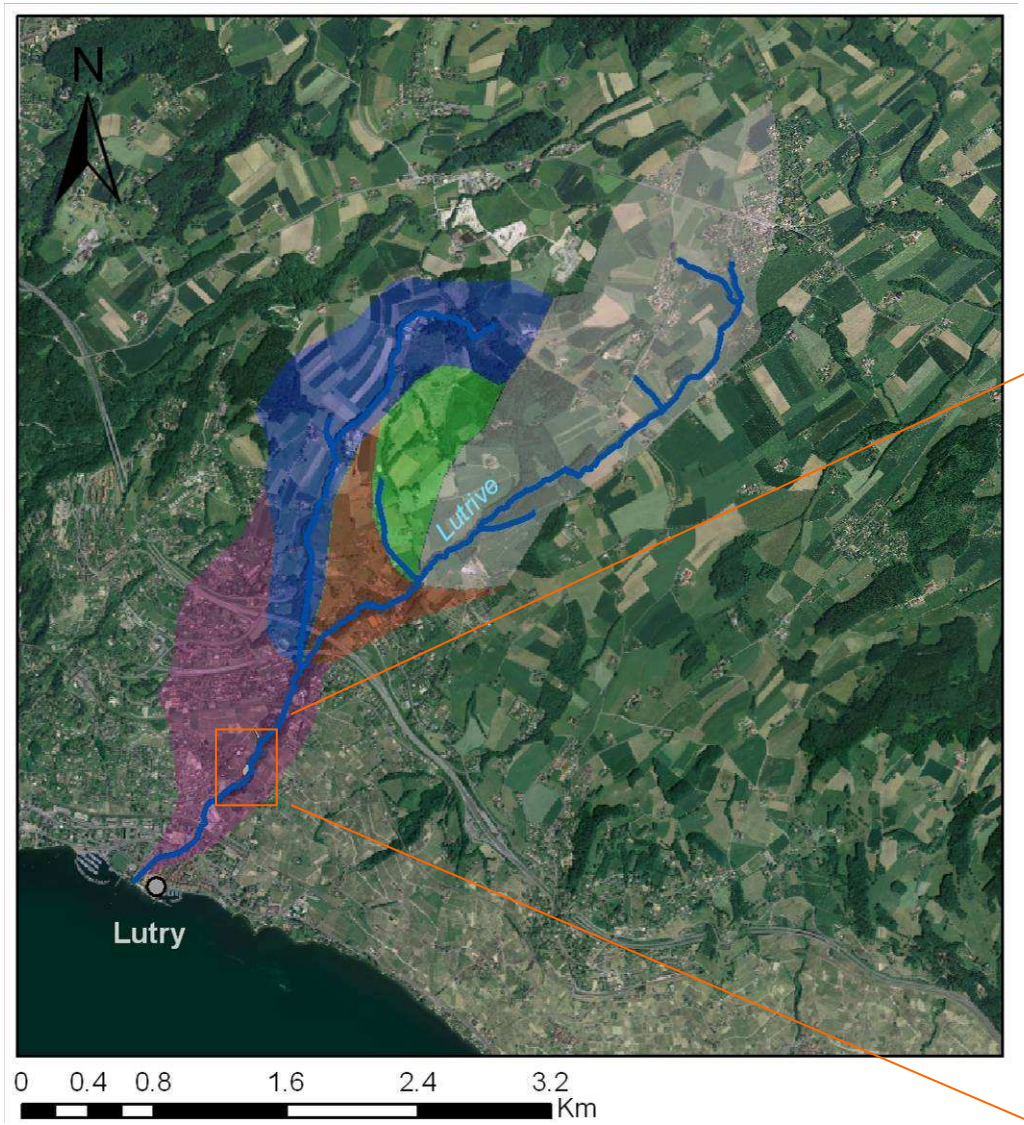

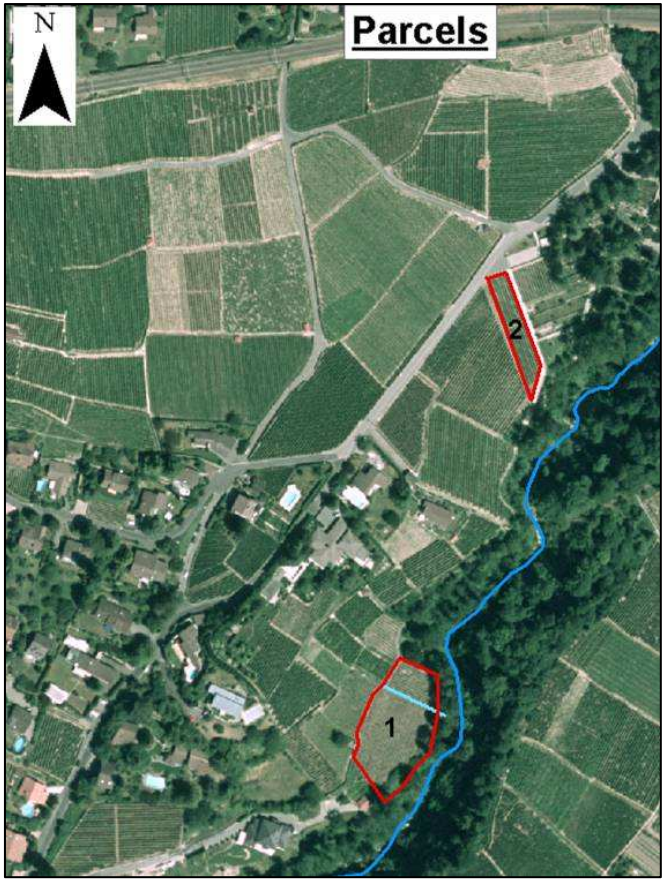

II. Terrain

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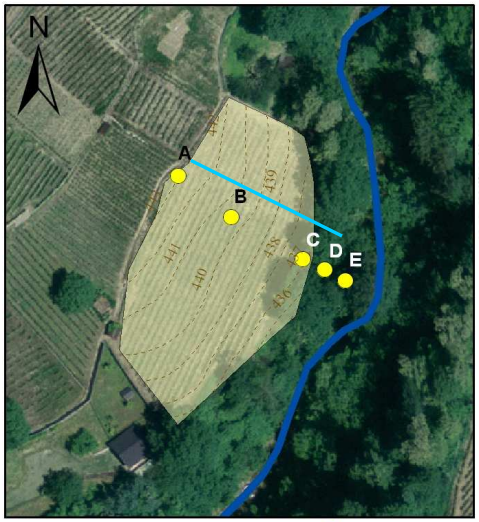
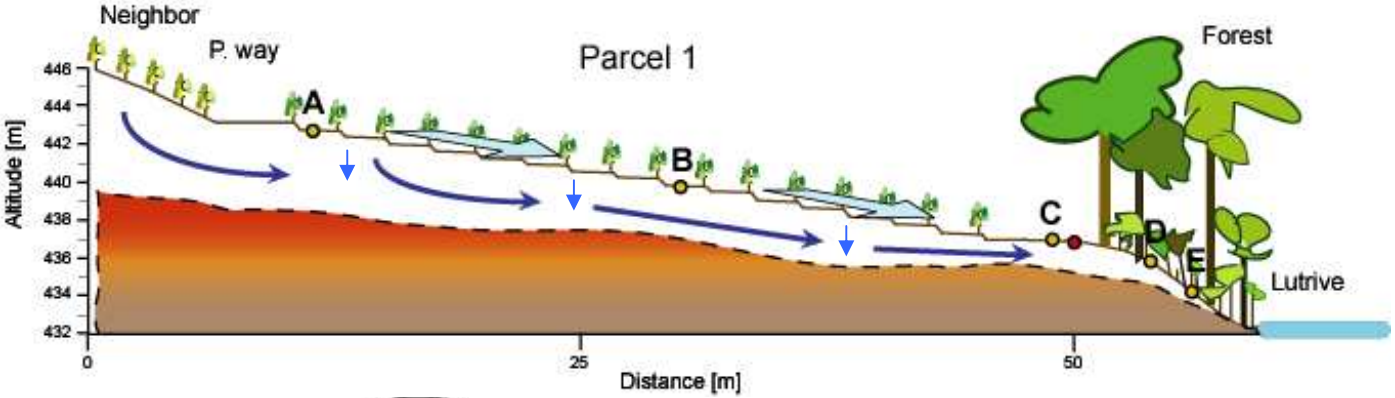
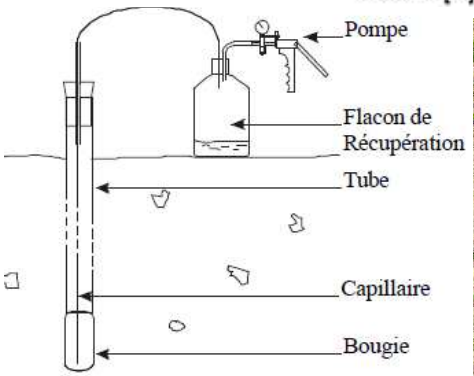
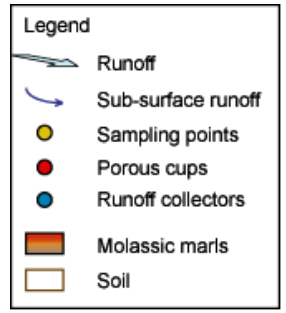
Parcelle 1



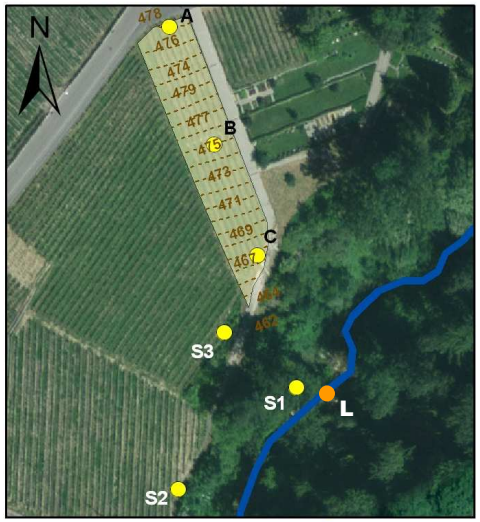


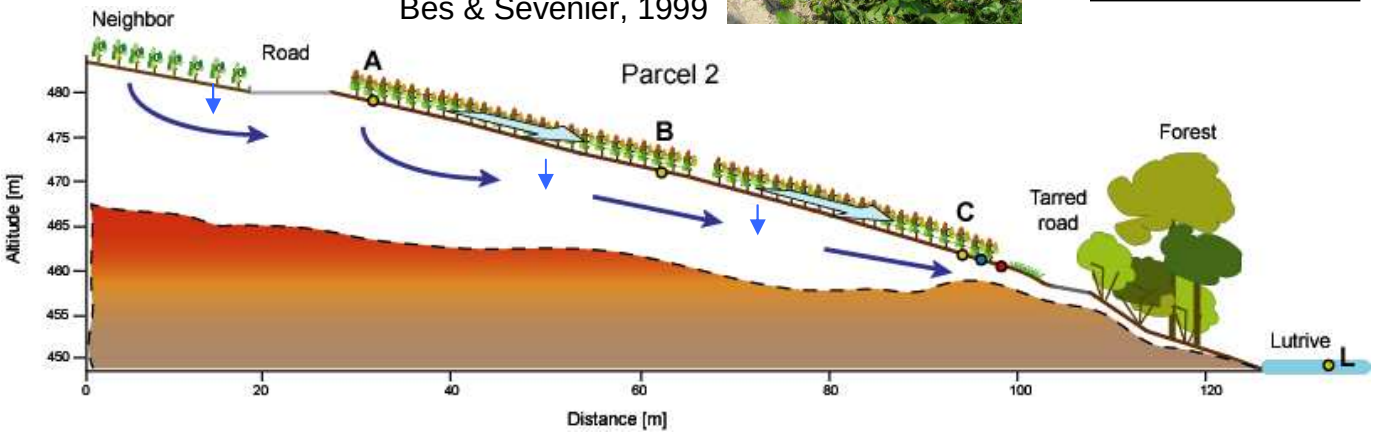


Bès & Sévenier, 1999



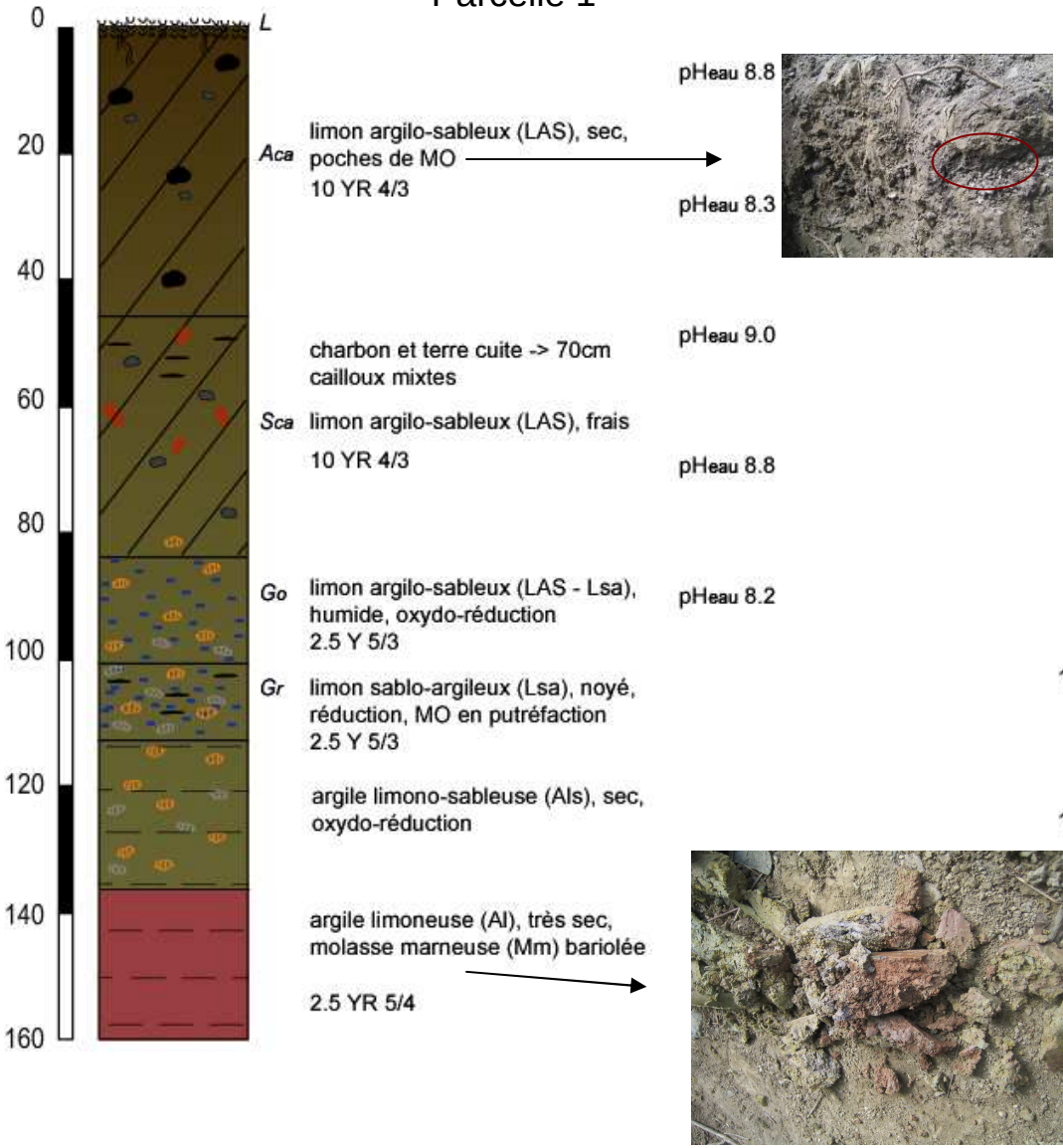
Parcelle 2



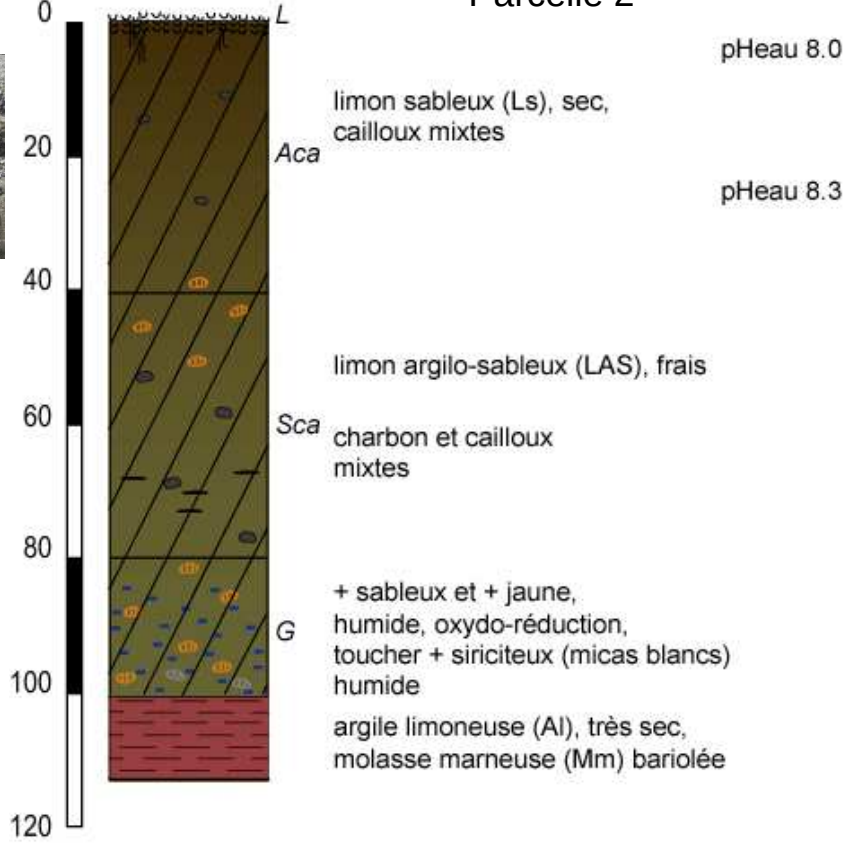


Pedologie: sols calcaires issus de moraine sur molasse marneuse bariolée

Parcelle 1



Parcelle 2



III. Résultats

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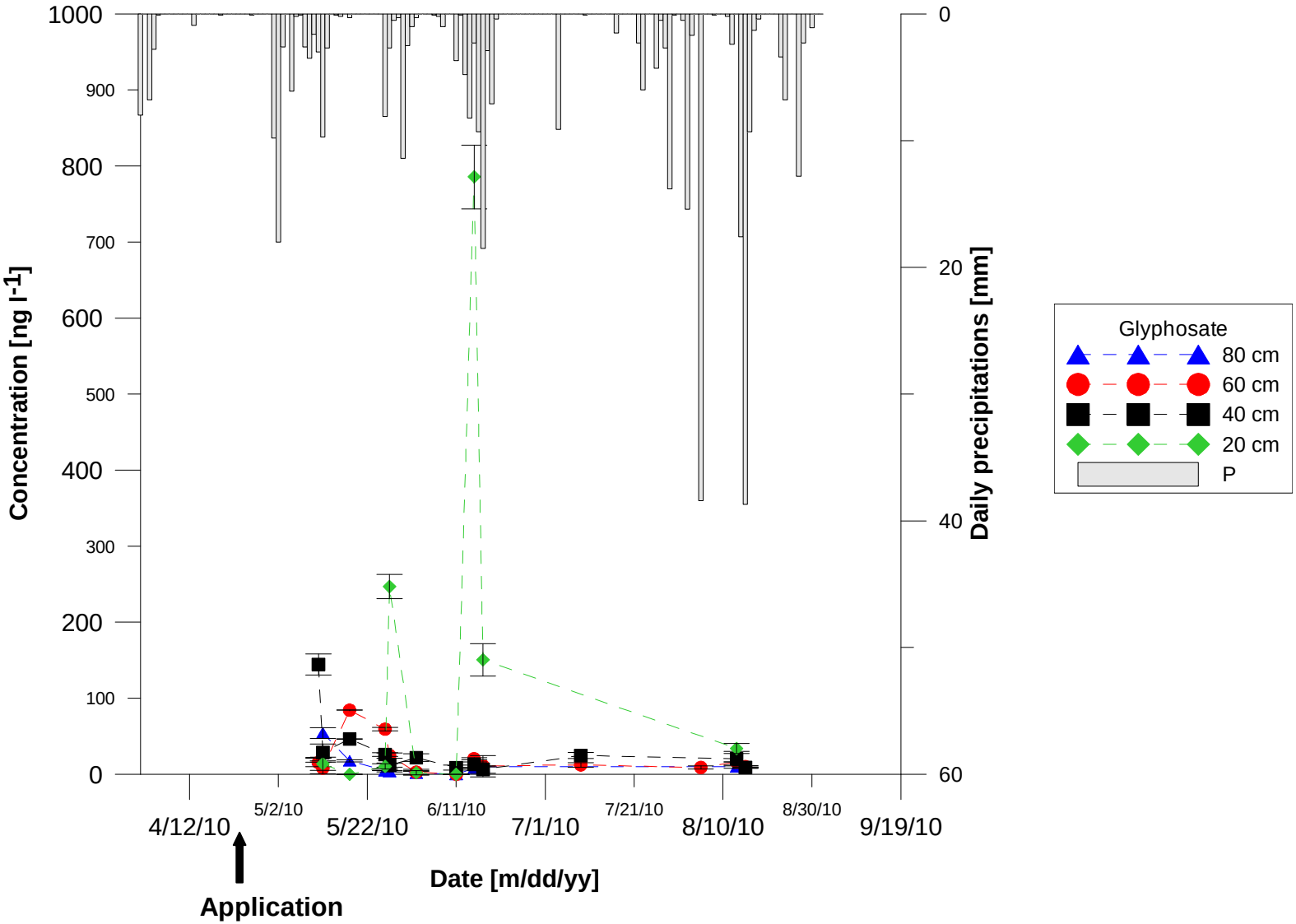
Parcelle 1:

Application fin avril – 5 l/ha Round-up © = 1800g/ha



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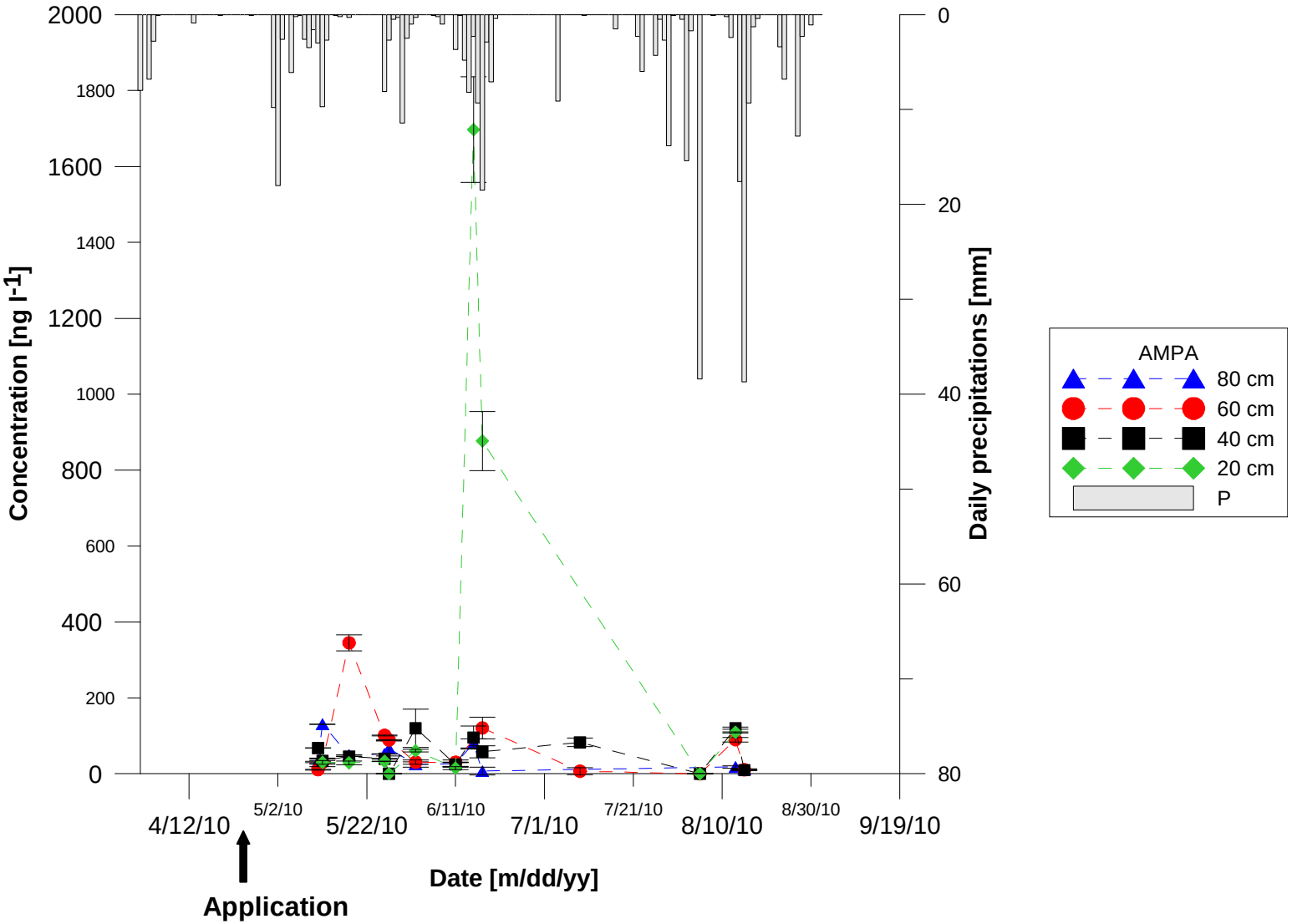
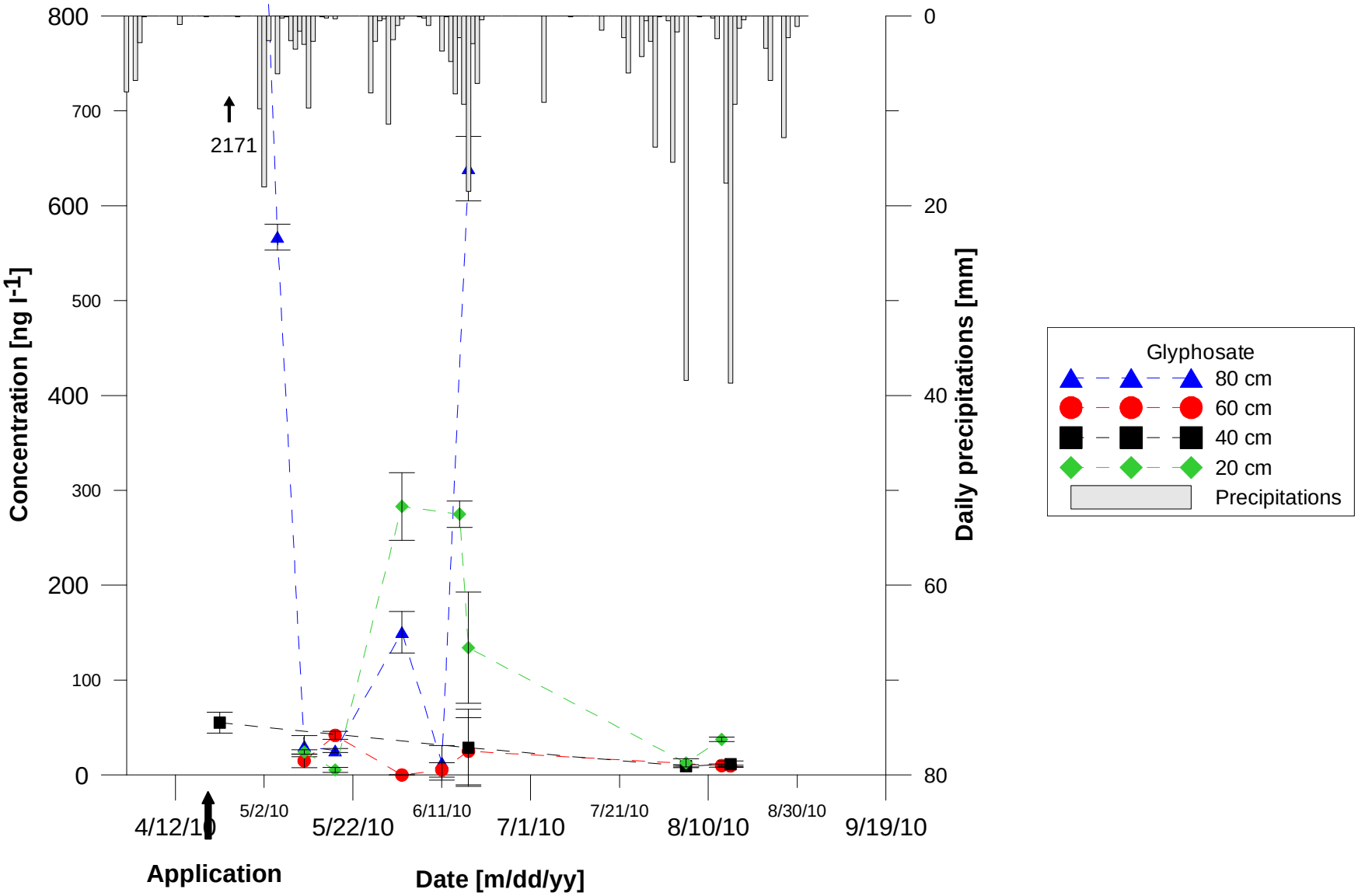


III. Résultats

Silwan Daouk

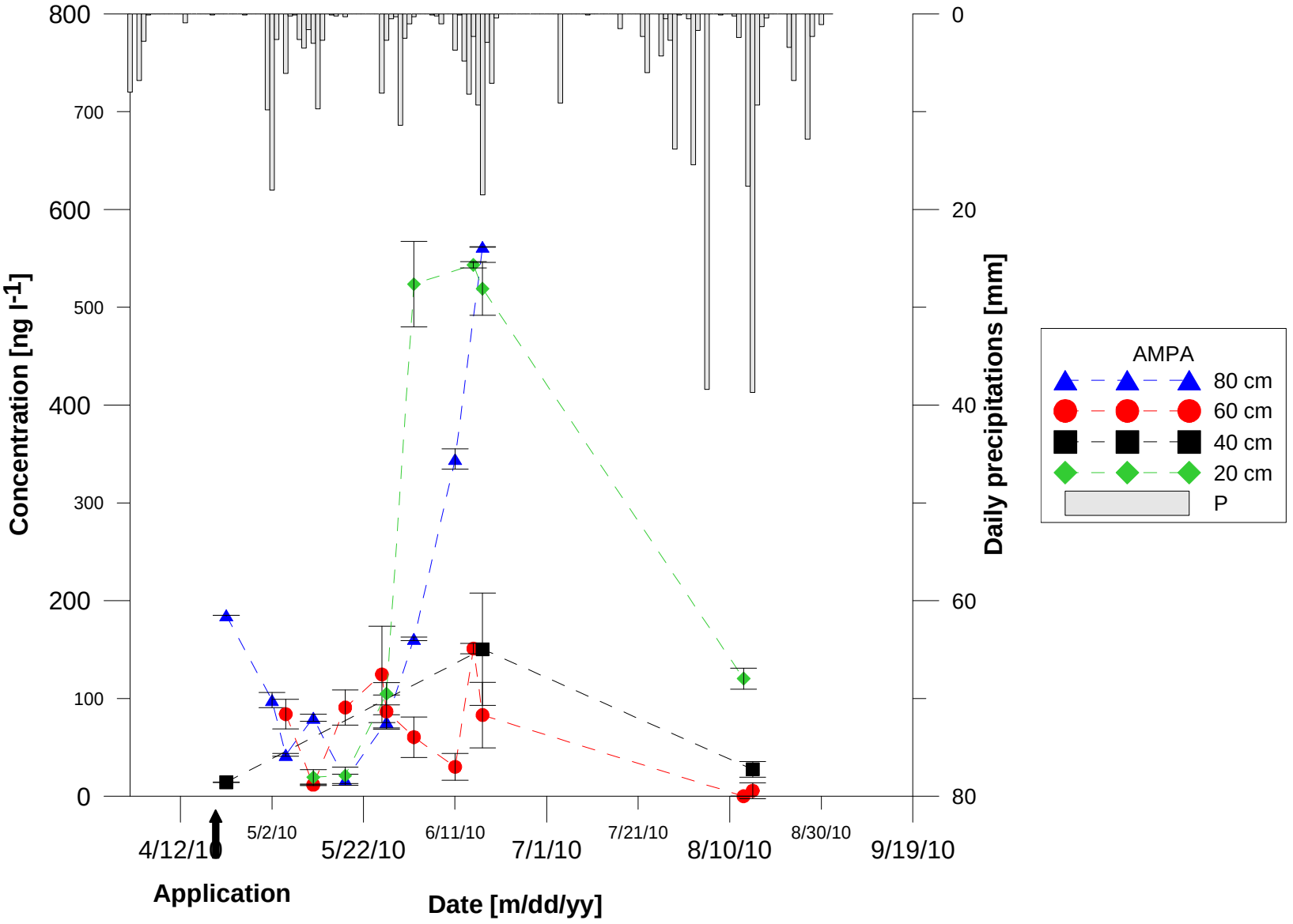
Parcelle 2: Application fin avril – 3 l/ha Glyfos © = 1080g/ha



III. Résultats

Silwan Daouk

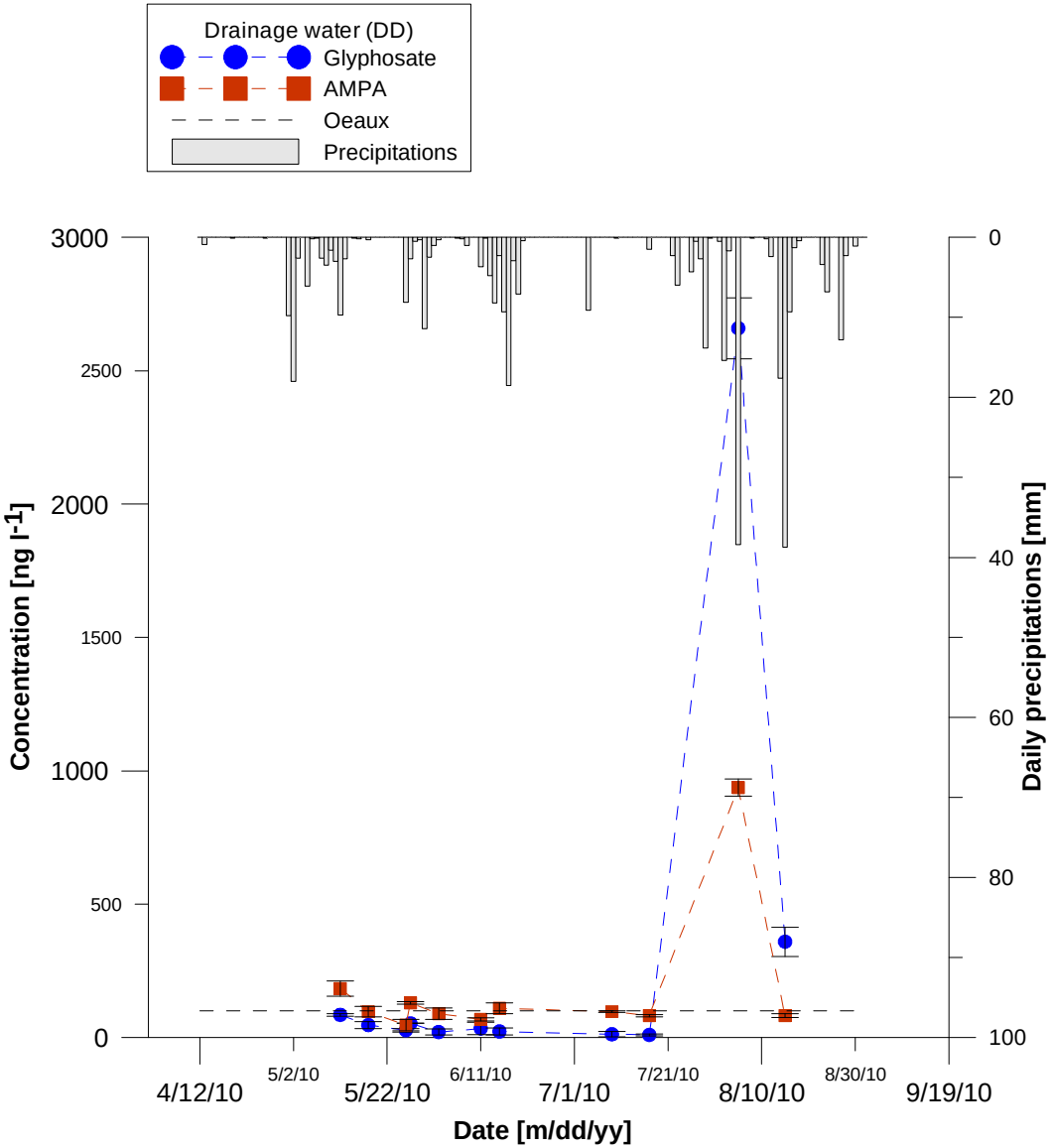
Parcelle 2: Application fin avril – 3 l/ha Glyfos © = 1080g/ha

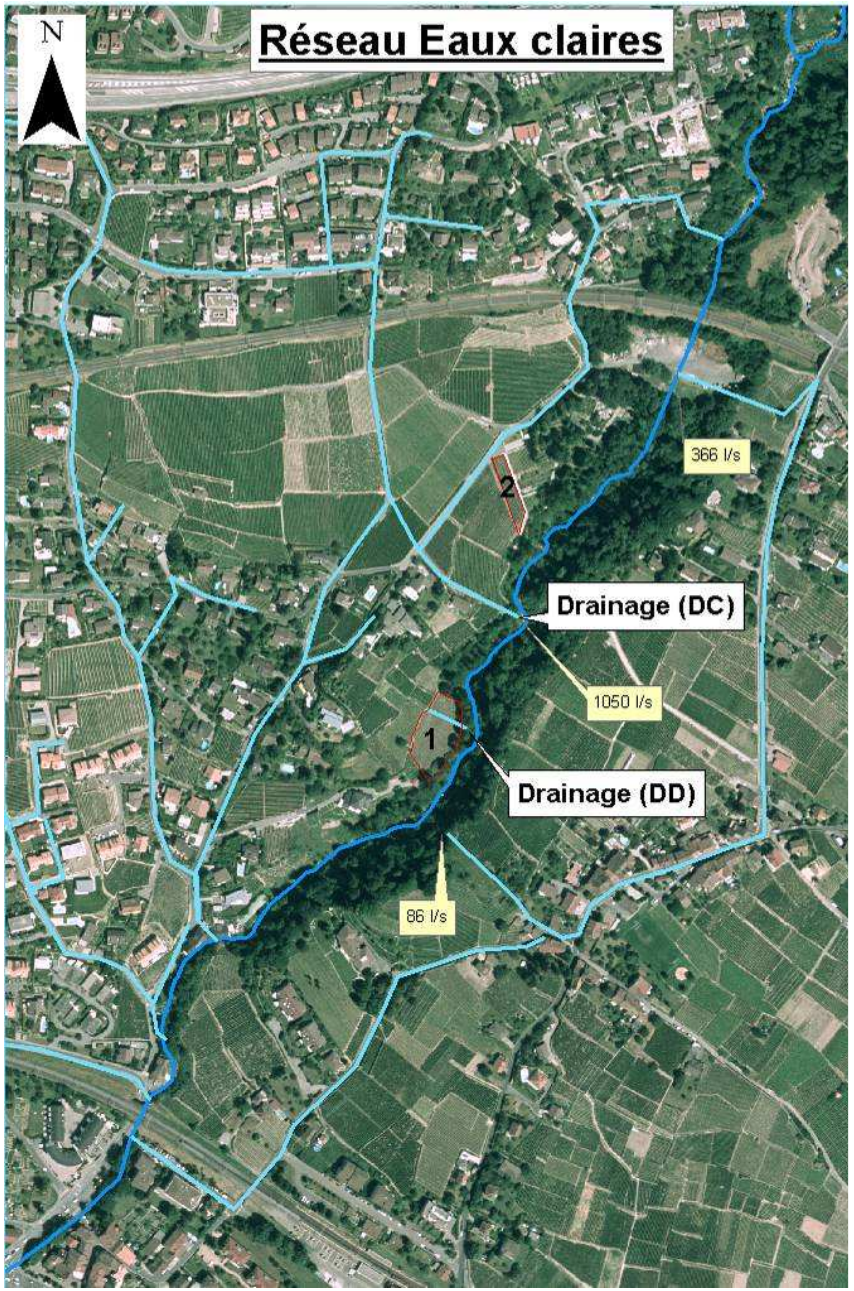


III. Résultats

Silwan Daouk

Drainage:





III. Résultats

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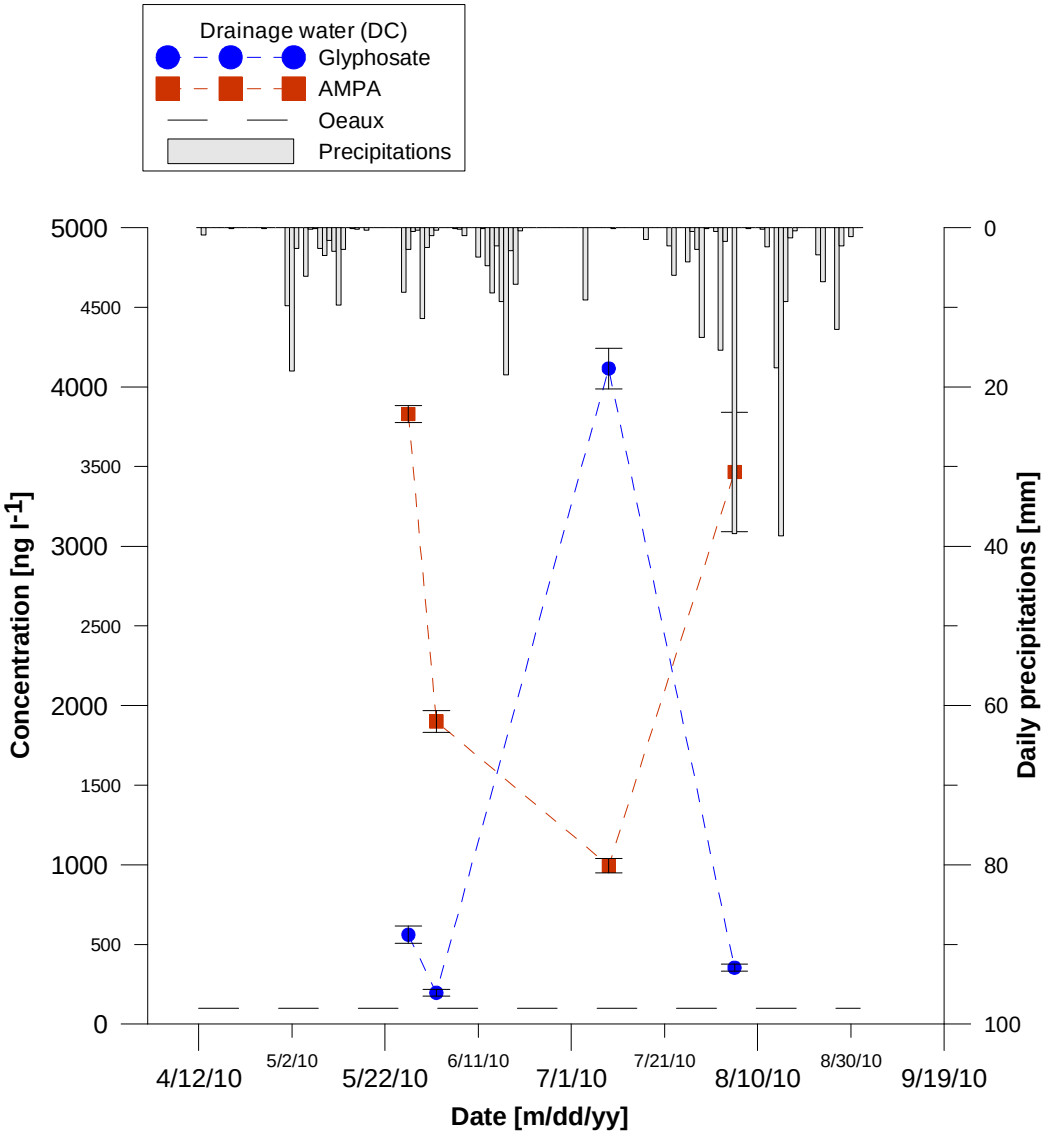
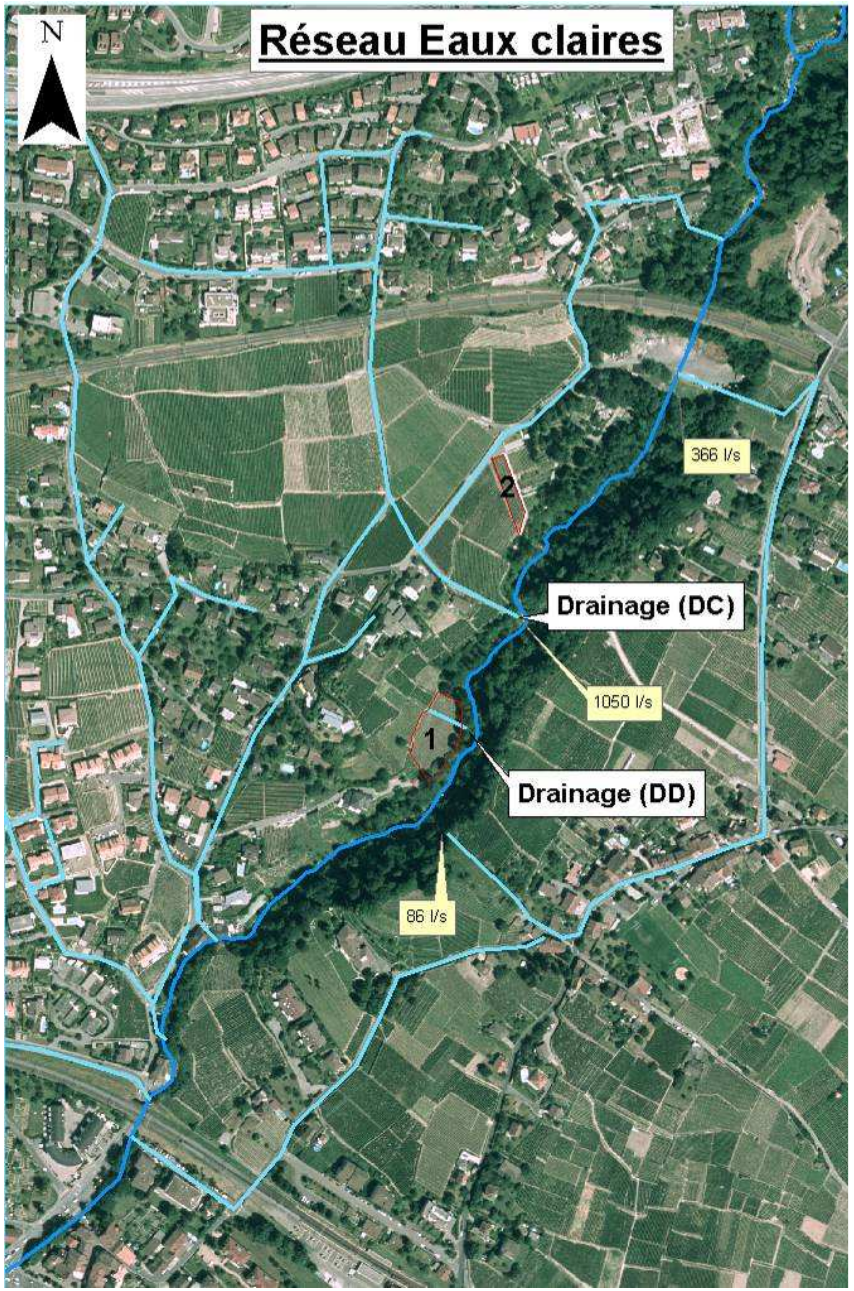
Drainage:

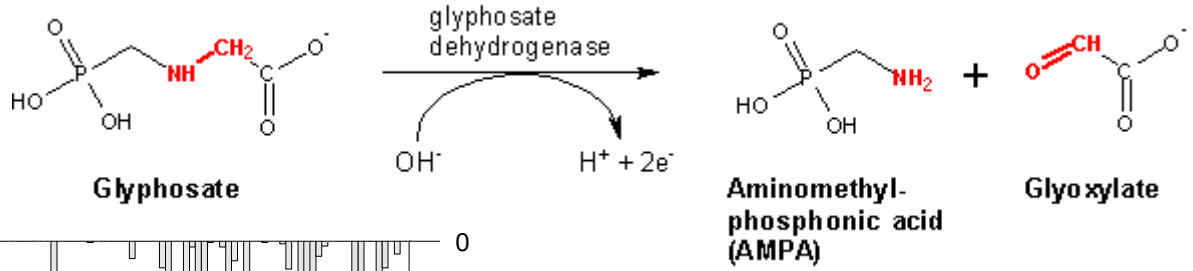




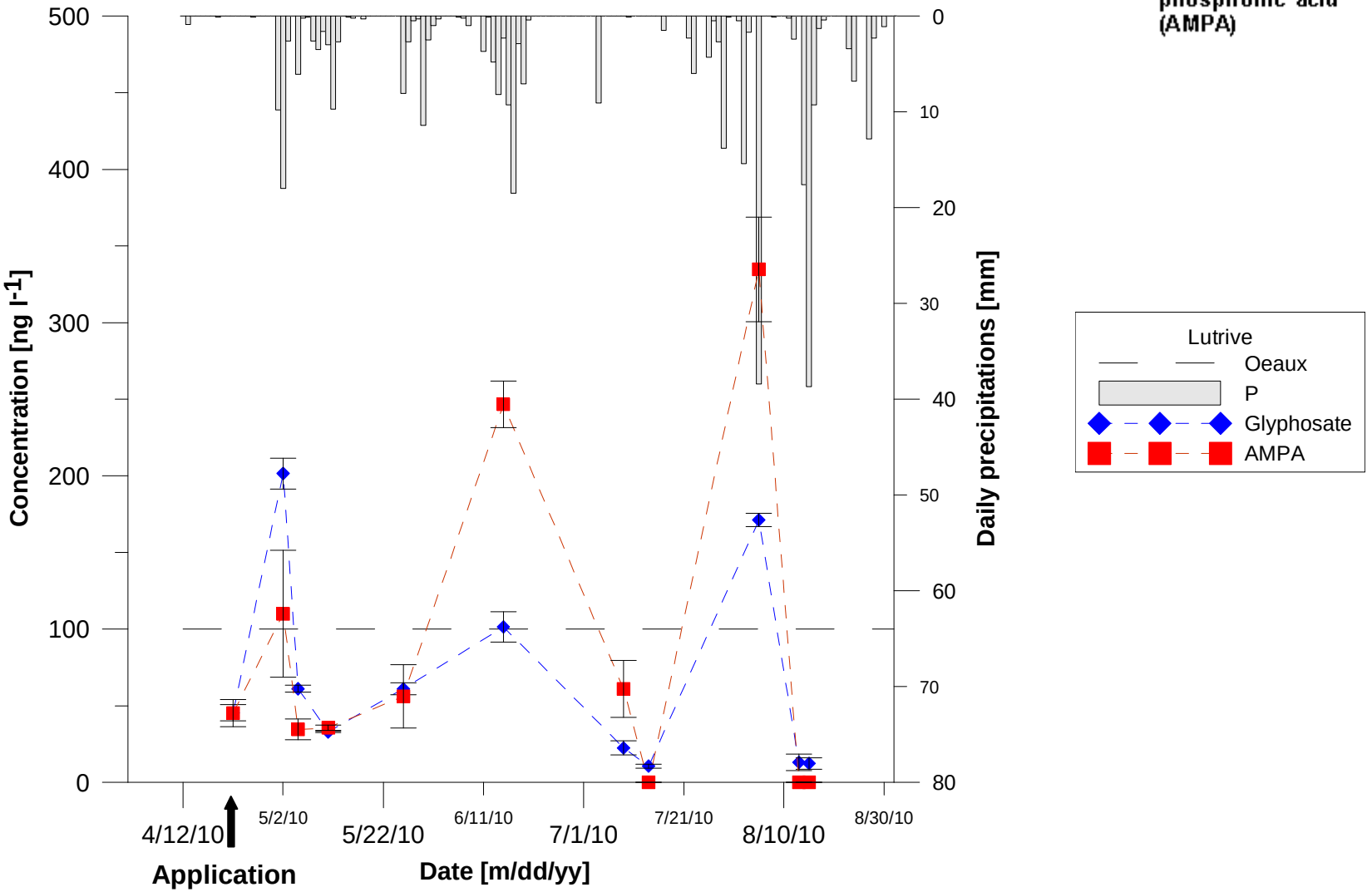
III. Résultats

Silwan Daouk

Lutrive:



Glyphosate | **Aminomethyl-phosphonic acid (AMPA)** | **Glyoxylate**



Effets sur les organismes aquatiques:

SETAC PRESS

Environmental Toxicology and Chemistry, Vol. 29, No. 9, pp. 2016–2025, 2010

Printed in the USA
DOI: 10.1002/etc.240

ROUNDUP® AND AMPHIBIANS: THE IMPORTANCE OF CONCENTRATION, APPLICATION TIME, AND STRATIFICATION

DEVIN K. JONES, JOHN I. HAMMOND, and RICK A. RELYEA*
101 Clapp Hall, Department of Biological Sciences, University of Pittsburgh, Pittsburgh, Pennsylvania 15260, USA

(*Submitted* 28 *January* 2010; *Returned for Revision* 13 *March* 2010; *Accepted* 19 *March* 2010)

SCIENCE OF THE TOTAL ENVIRONMENT 407 (2009) 1065–1071

Toxicity of a glufosinate- and several glyphosate-based herbicides to juvenile amphibians from the Southern High Plains, USA

Simon K. Dinehart[a,*], *Loren M. Smith*[a], *Scott T. McMurry*[a], *Todd A. Anderson*[b], *Philip N. Smith*[b], *David A. Haukos*[c]

[*]Postal address: Department of Zoology, Oklahoma State University, Stillwater, OK 74078, USA
[b]The Institute of Environmental and Human Health, Texas Tech University, Box 41163, Lubbock, TX 79409, USA
[c]U.S. Fish and Wildlife Service, MS 2125, Texas Tech University, Lubbock, TX 79409, USA

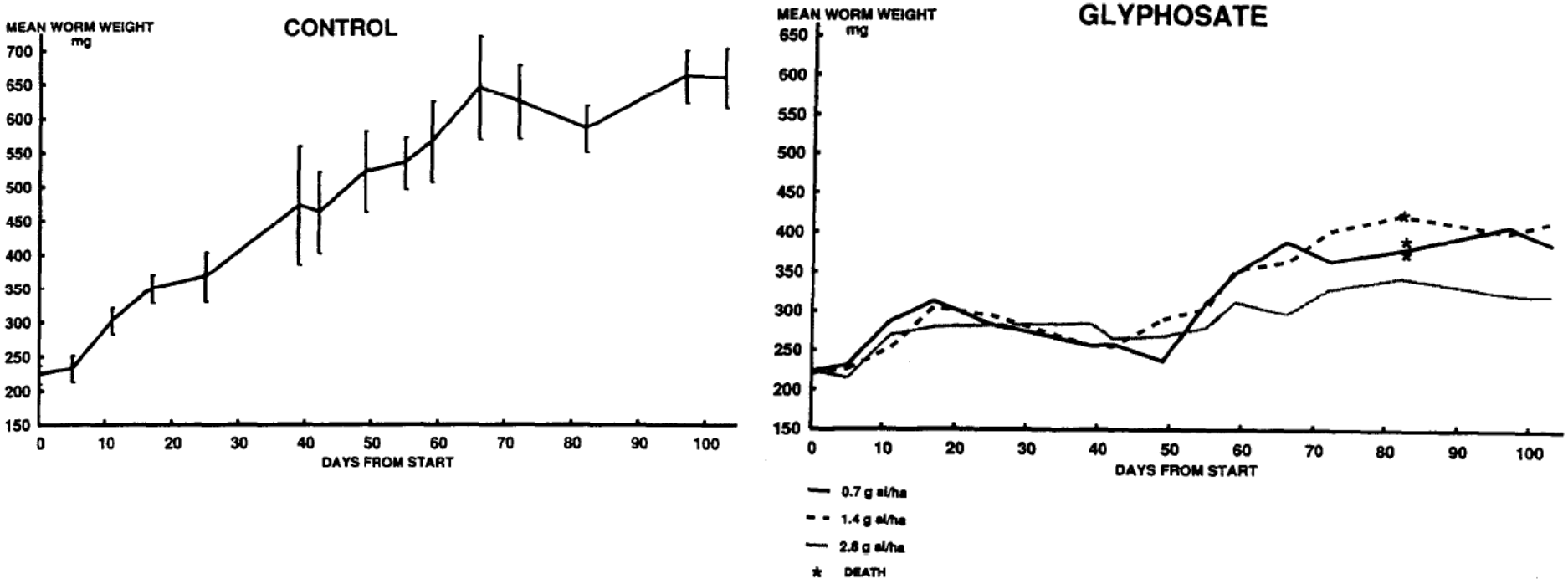
Effets sur les organismes du sol:

Soil Biol. Biochem. Vol. 24, No. 12, pp. 1739–1744, 1992
Printed in Great Britain.

0038-0717/92 $5.00 + 0.00

EFFECT OF REPEATED LOW DOSES OF BIOCIDES ON THE EARTHWORM *APORRECTODEA CALIGINOSA* IN LABORATORY CULTURE

J. A. SPRINGETT and R. A. J. GRAY
AgResearch, Grasslands Research Centre, Fitzherbert West, Private Bag 11008, Palmerston North, New Zealand



Effets sur l'être humain:

VOLUME 113 | NUMBER 6 | June 2005 • Environmental Health Perspectives

Differential Effects of Glyphosate and Roundup on Human Placental Cells and Aromatase

Sophie Richard, Safa Moslemi, Herbert Sipahutar, Nora Benachour, and Gilles-Eric Seralini

Chem. Res. Toxicol. **2009,** *22,* 97–105

Glyphosate Formulations Induce Apoptosis and Necrosis in Human Umbilical, Embryonic, and Placental Cells

Nora Benachour and Gilles-Eric Séralini*

Toxicology 262 (2009) 184–191

Contents lists available at ScienceDirect

Toxicology

journal homepage: www.elsevier.com/locate/toxicol

Glyphosate-based herbicides are toxic and endocrine disruptors in human cell lines

Céline Gasnier[a], Coralie Dumont[b], Nora Benachour[a], Emilie Clair[a], Marie-Christine Chagnon[b], Gilles-Eric Séralini[a,*]

Effets sur l'être humain:

1472 Case Reports/Journal of Clinical Neuroscience 17 (2010) 1472–1473

Glyphosate–surfactant herbicide-induced reversible encephalopathy

R.C. Malhotra [a,b], D.K. Ghia [a,b,*], D.J. Cordato [a,b], R.G. Beran [a,b,c]

Journal of Occupational Medicine and Toxicology

BioMed Central

Case report

Open Access

Refractory cardiopulmonary failure after glyphosate surfactant intoxication: a case report

Chirn-Bin Chang[1] and Chia-Chu Chang*[1,2]

Toxicology 262 (2009) 184–191

Contents lists available at ScienceDirect

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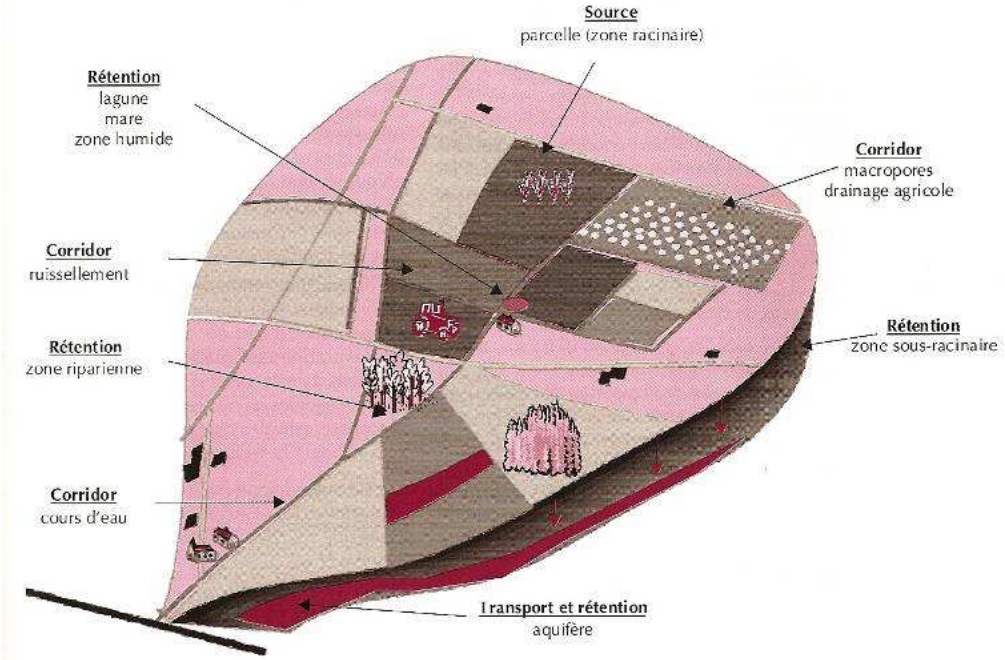
V. Conclusions

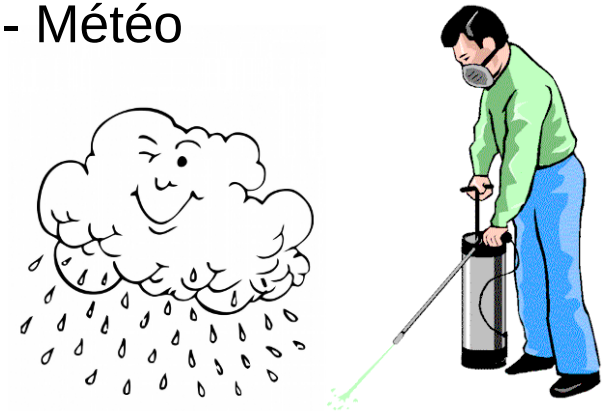
Silwan Daouk

- **Configuration du terrain**
  - Topographie
  - Drainage
  - Zones tampons

- **Voies d'écoulement**
  - macropores et flux préférentiels
  - conditions d'humidité et ruissellement

- **Dépassement de l'Oeaux**
  - Applications
  - Météo

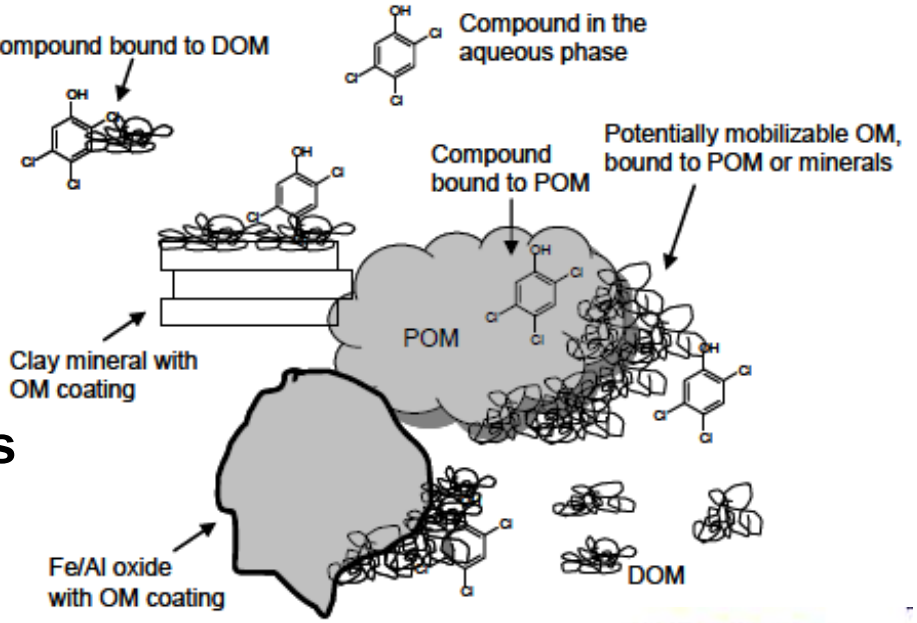




V. Perspectives

Silwan Daouk

- **Transport**
  - colloïdal
  - particulaire



Effets sur les organismes aquatiques
- exposition(s)
- concentrations

- **Concentrations dans les sols**
  A venir…

- **Effets sur les organismes du sol**
  - très peu de données !!


© Annick Aing/IRD

- **Effets sur l'être humain**
  - études très contrastées
  et très polémiques !!

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Faculté des géosciences
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LÉMAN21

Merci de votre attention !

Remerciements:
L.-F. De Alencastro, S. Coudret, S. Emch, D. Grandjean, L. Pitteloud et H.-R. Pfeifer