



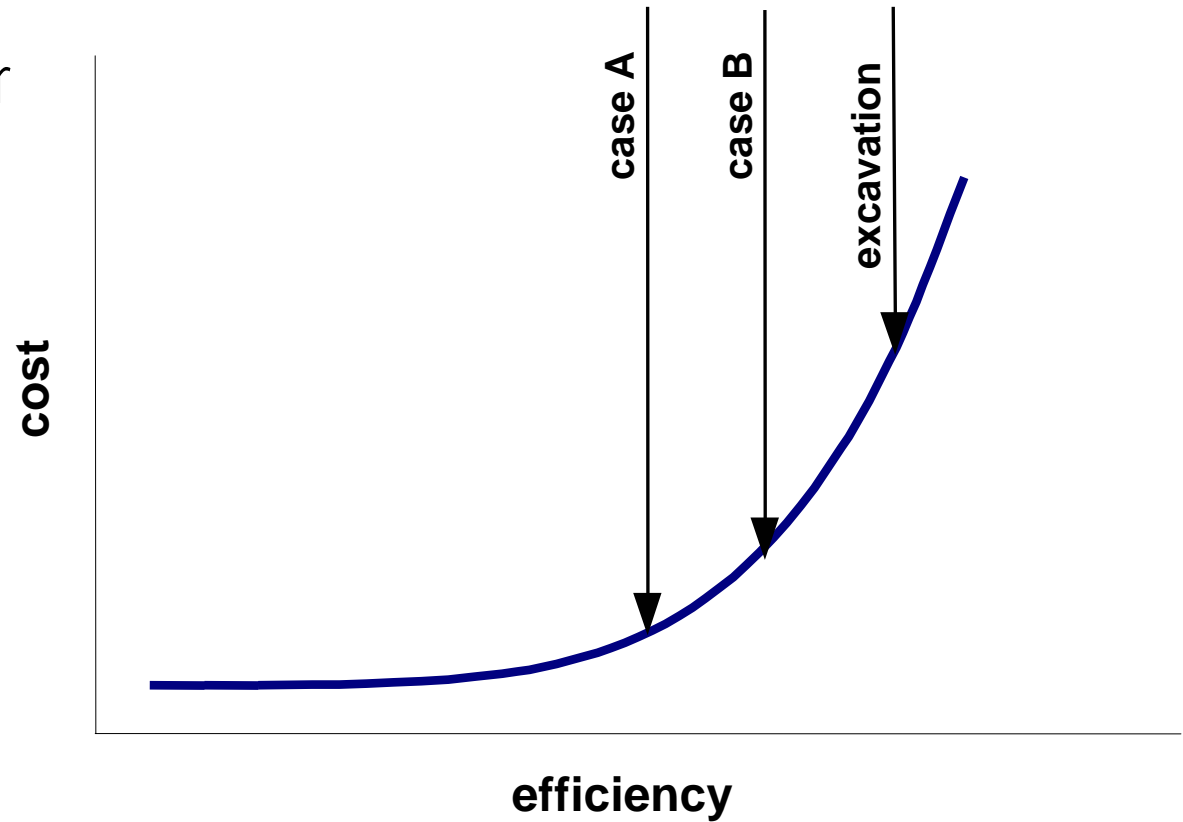
Innovative TEchnologies for Remediation of LANDfills and Contaminated Soils INTERLAND

interland.arcs.ac.at



Motivation for INTERLAND

Cost-Efficiency Relation for Containment/Remediation methods





Investigation of methods in INTERLAND

Content

- Innovative in-situ methods for remediation
- Innovative investigation methods for risk assessment

Aims

- State of the art of methods
- Generation of data to form the basis for application of these methods

Target groups

- authorities
- planners
- SMEs (problem owners and problem solvers)



INTERLAND

- Duration 2002 to 2005
- Estimated project costs: ca. 3.7 Mio €
- Ministry of Agriculture, Forestry, Environment and Water management
- Co-ordination: ARC Seibersdorf research



Partners in INTERLAND

Scientific Partners

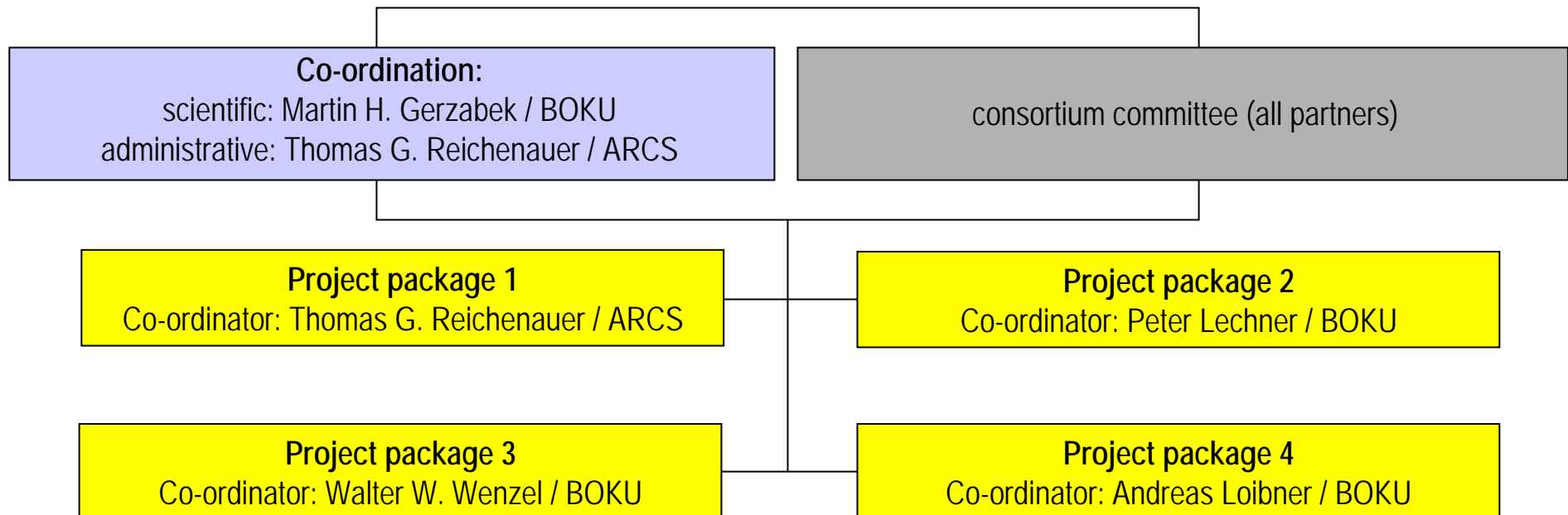
- ARC Seibersdorf research
Dept. of Environm. Research
- University of Natural Resources
and Applied Life Sciences
Inst. of Soil Research
Inst. of Waste Management
Inst. of Environmental
Biotechnology

Industrial Partners

- OMV-Proterra
- Ökotechna-Universale
- NUA
- RingConsult
- Innsbrucker Kommunalbetriebe AG
- Saubermacher
- H. Burgstaller GmbH



Project structure INTERLAND





Project structure INTERLAND

Project package 1: Development of **landfill covers** and investigation of their influence on the **water balance** of old landfill sites

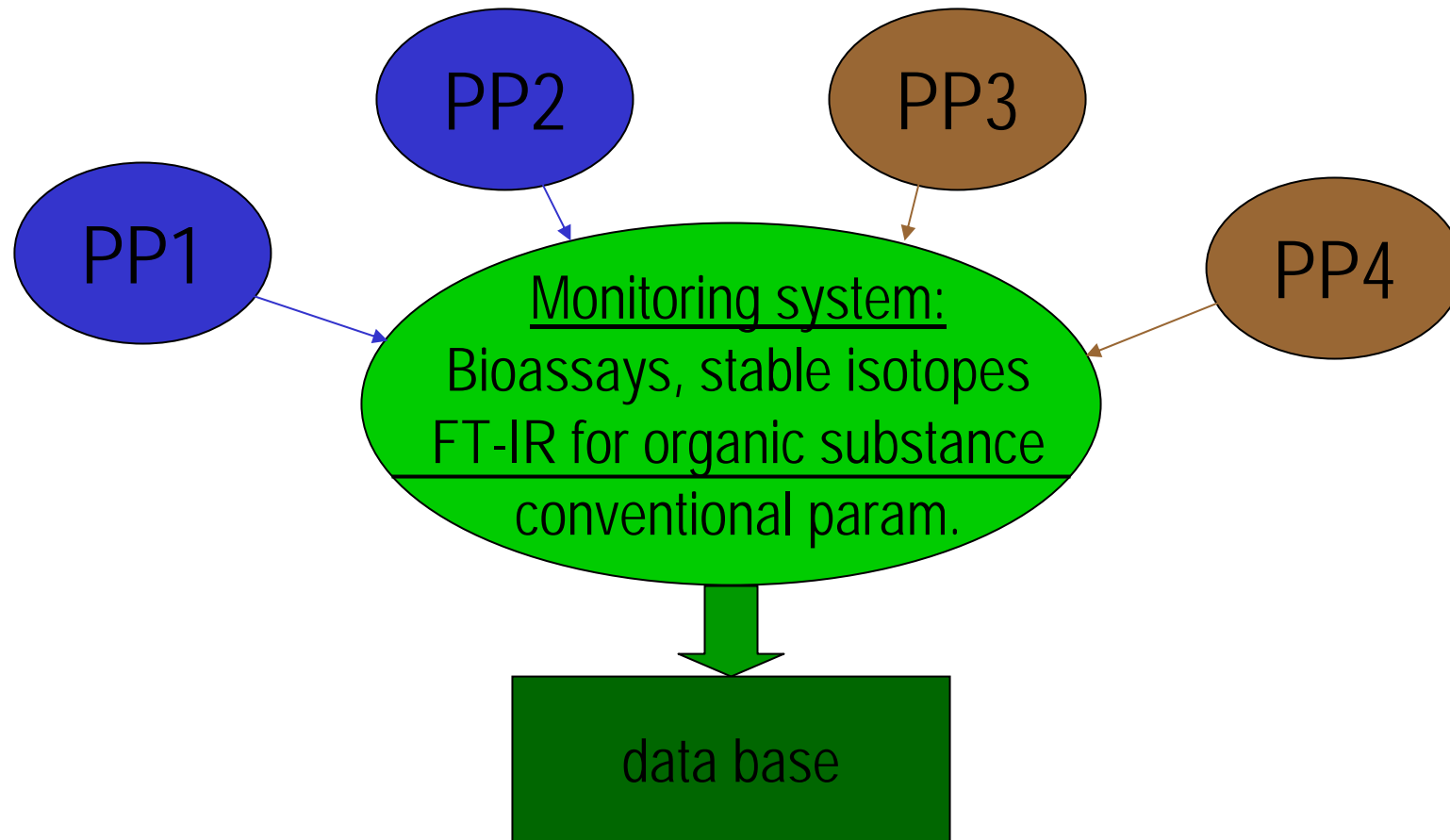
Project package 2: Development of **Monitoring-Systems** for characterisation of the **organic substance** in old landfill sites considering possible treatment methods

Project package 3: Pilot project for **in situ - treatment of heavy metal** contaminated soils (containment, remediation)

Project package 4: "Brownfields" - **Organic contaminants**



Cross topic - Monitoring system





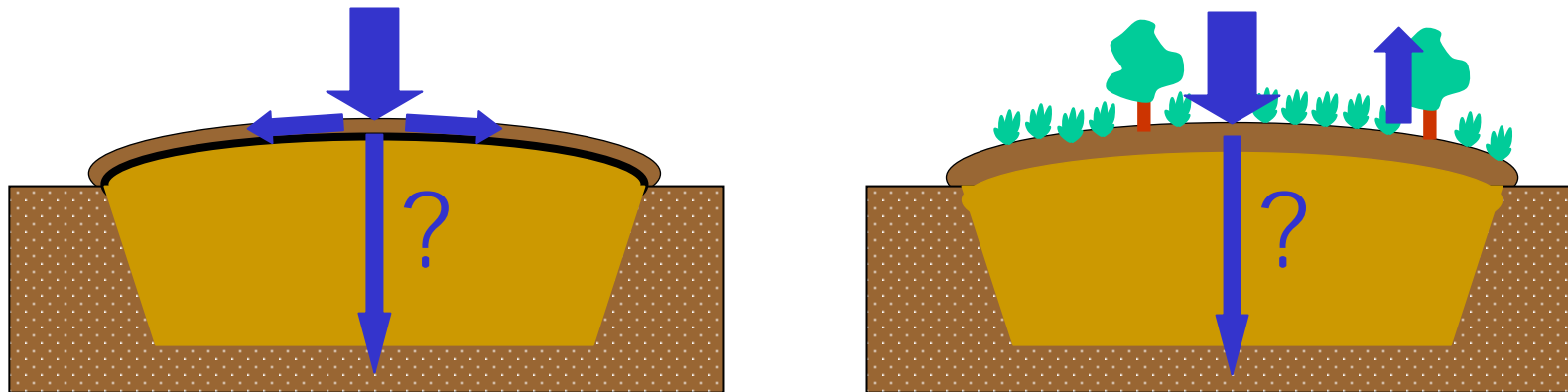
Project package 1:

Development of landfill covers and investigation of their influence on the water balance of old landfill sites



Objectives of Project package 1

- How “tight” are covers of old landfills in Austria ?
- How do vegetation and substrate influence amount and quality of seepage water ?
- What is the relation between landfill cover and risk-development ?



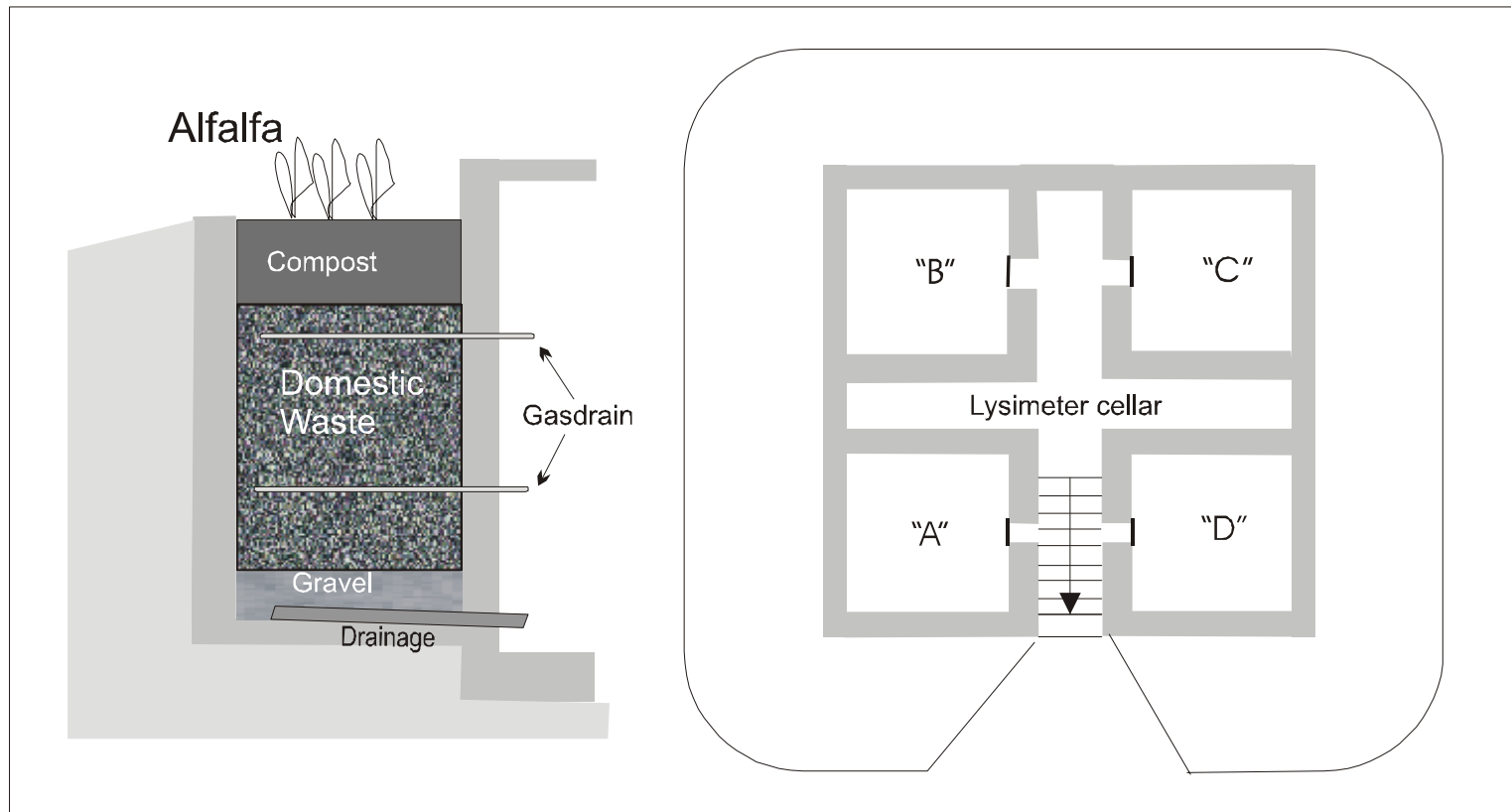


Landfill lysimeter











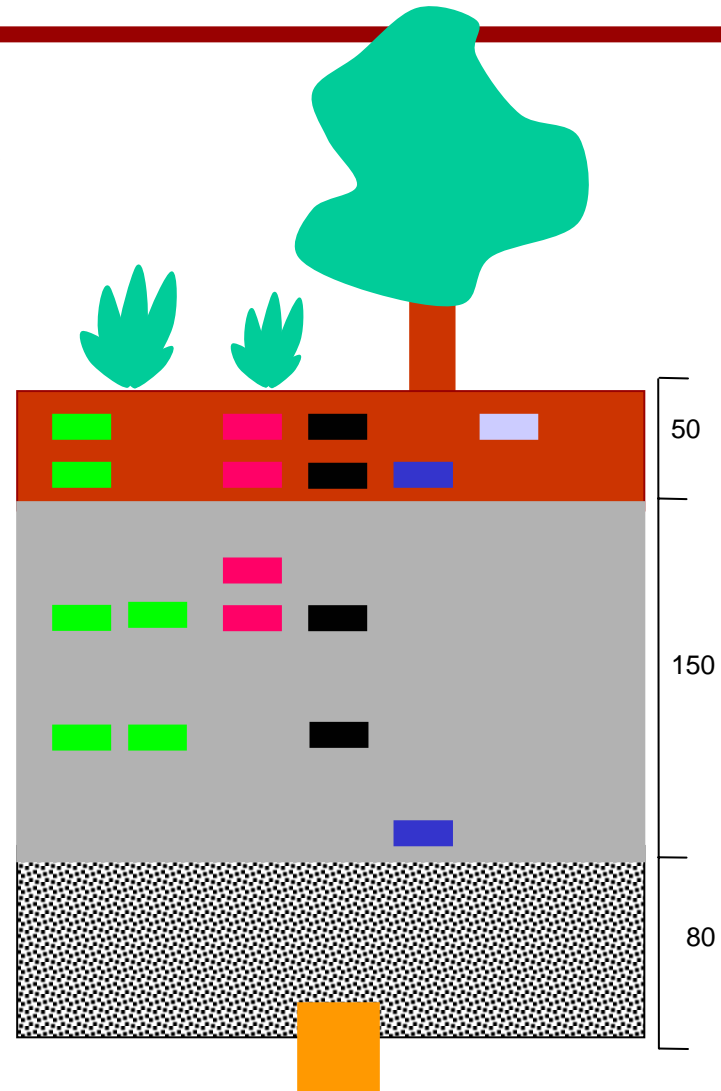
Landfill lysimeter





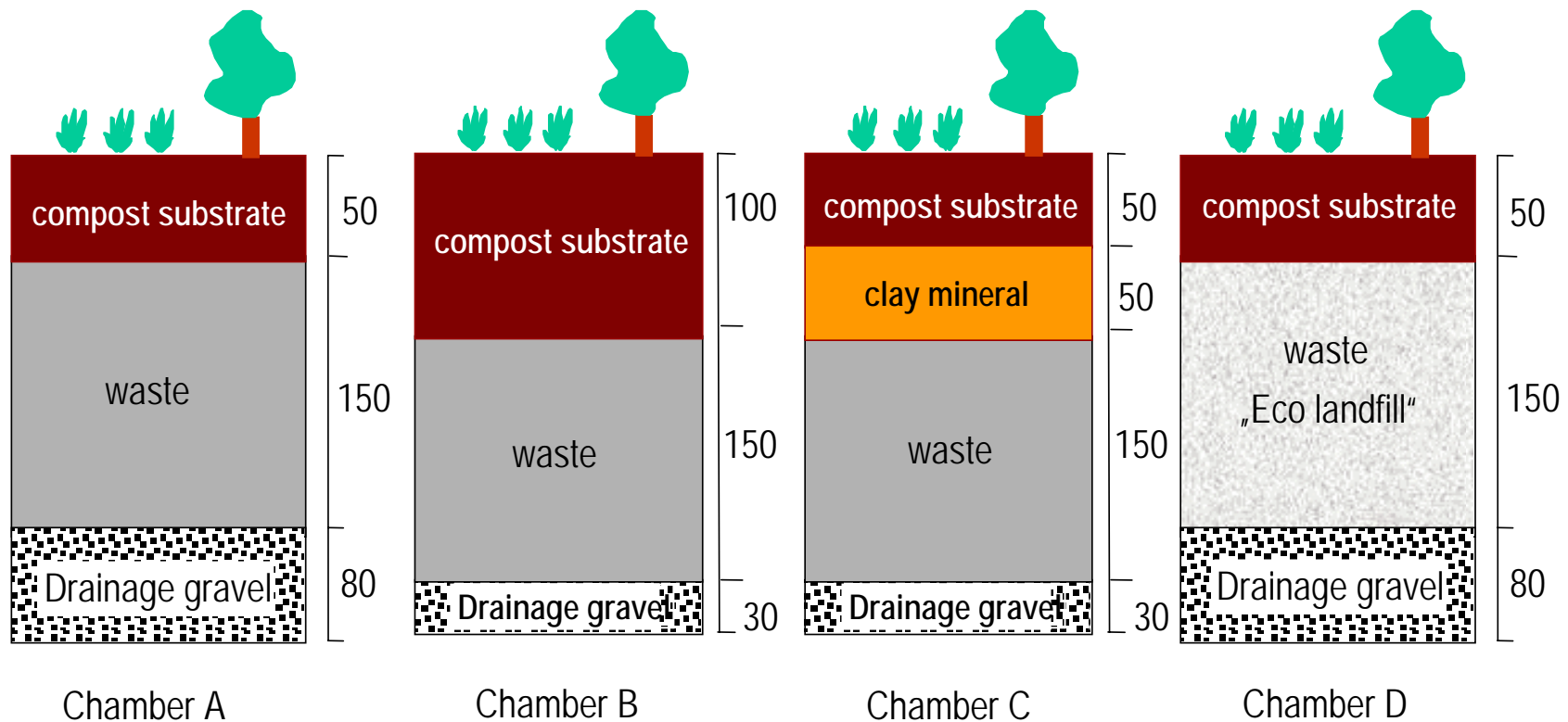
Landfill lysimeter - sensors

-  Temperature
-  Water potential
-  Amount of seepage water
-  Suction cups
-  Hydrogel-sensor
-  Gas drainage



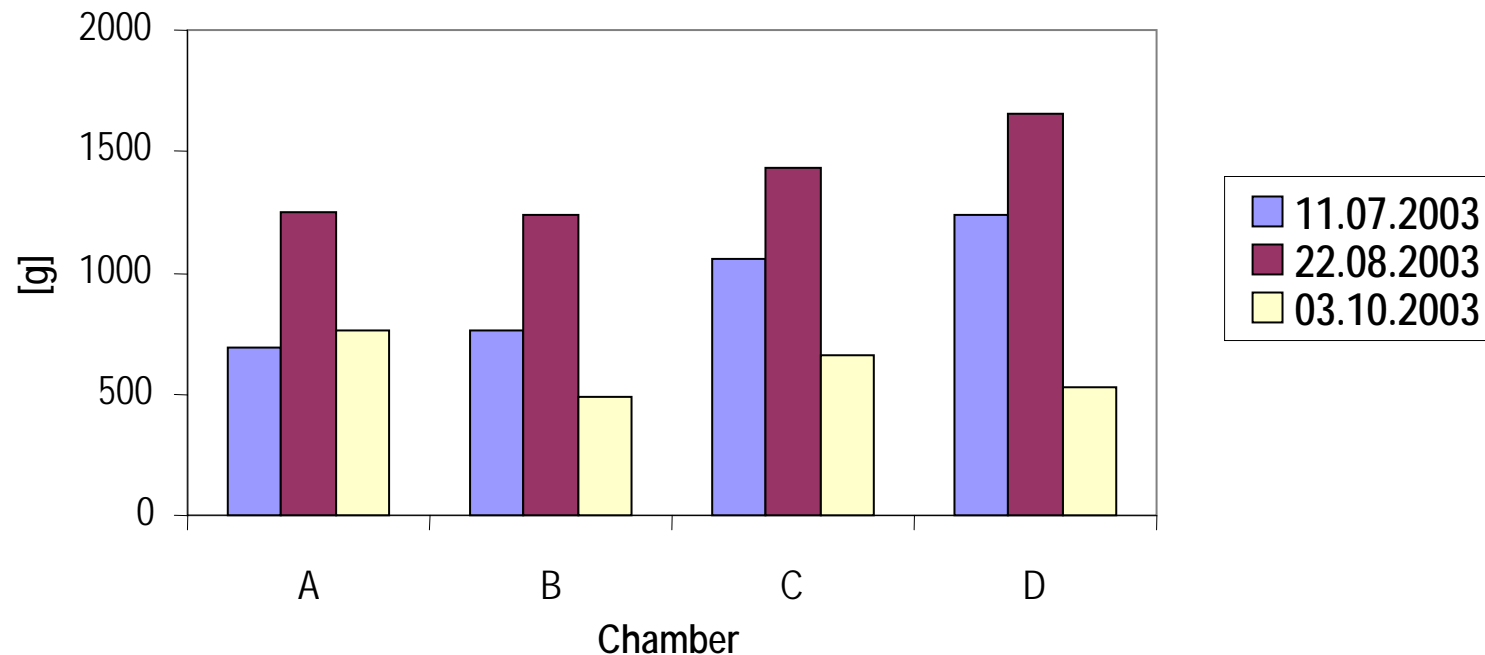


Landfill lysimeter



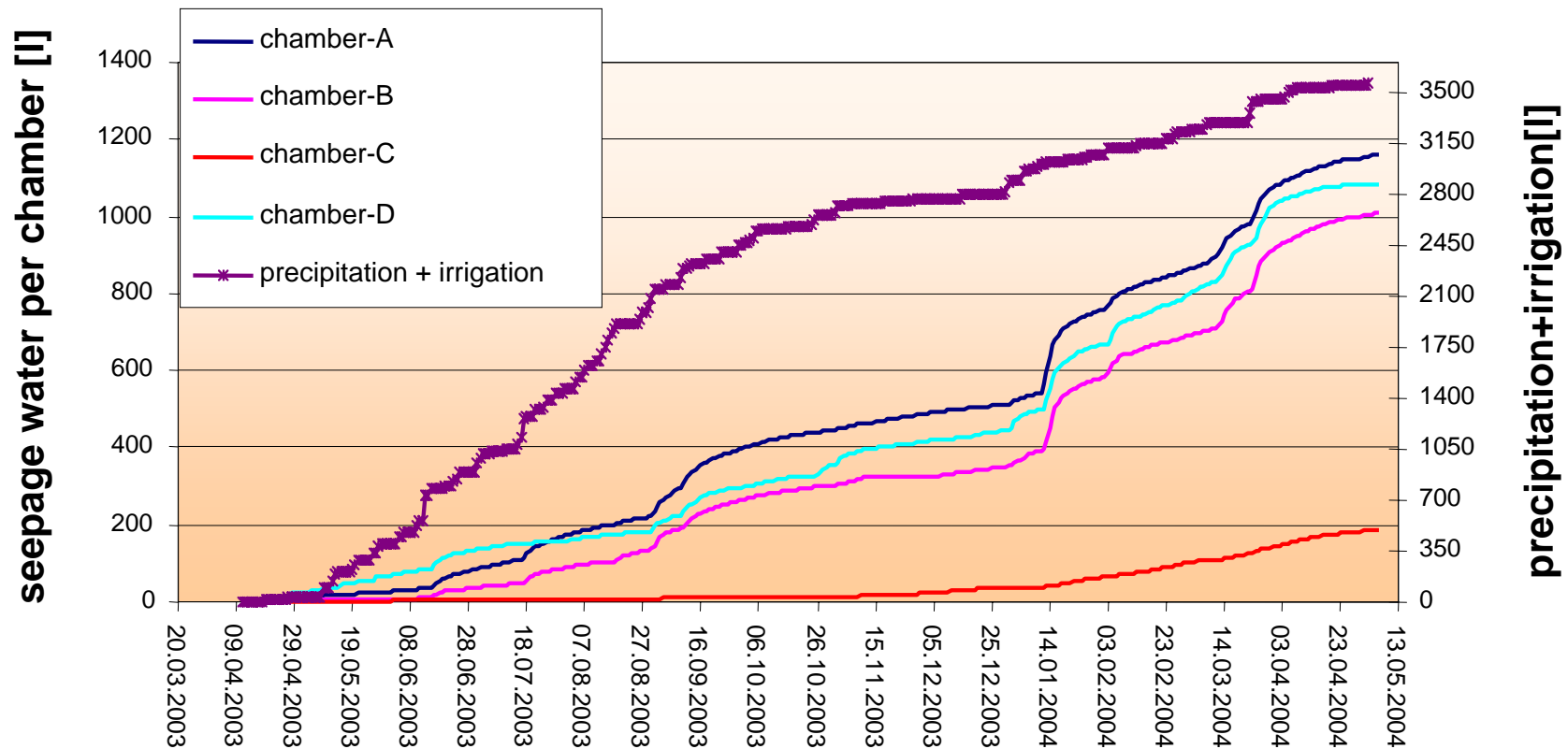


Landfill lysimeter - dry matter of alfalfa (*Medicago sativa*)



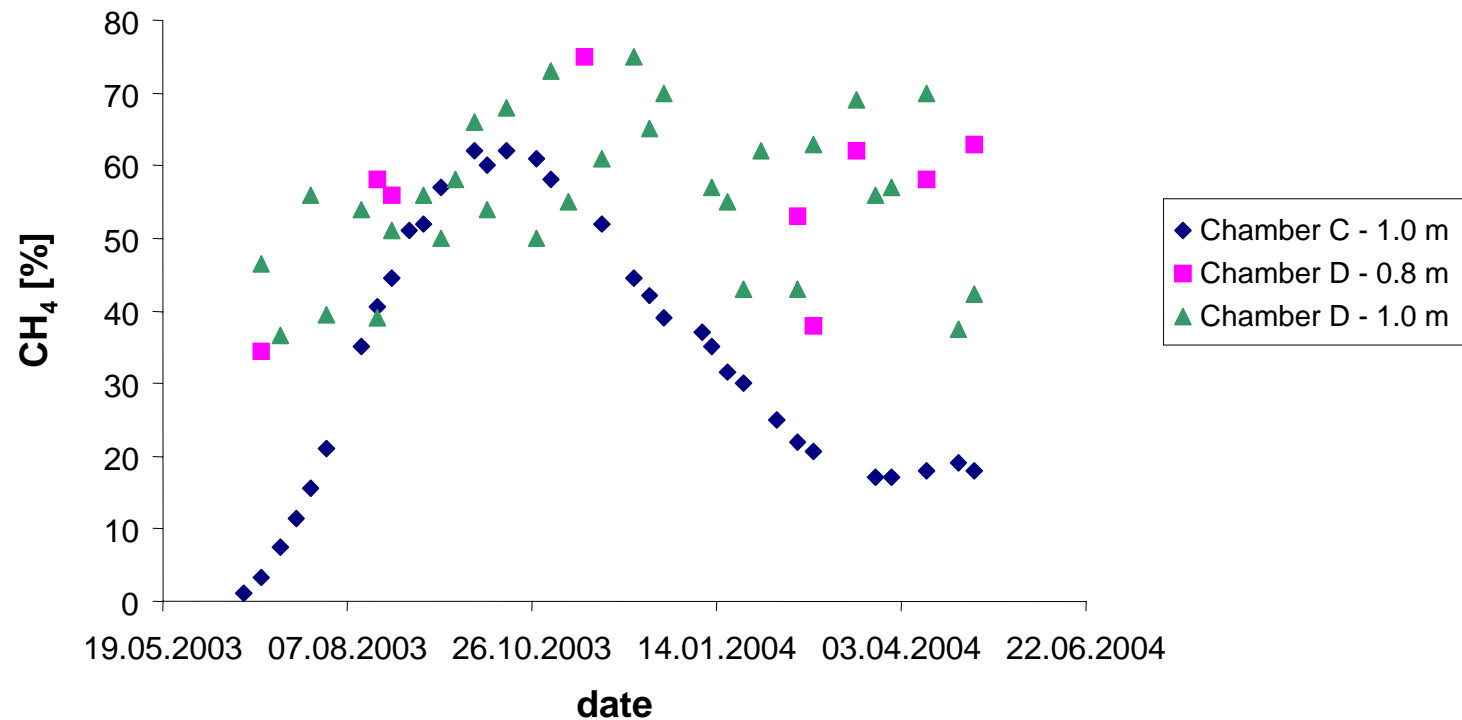


Landfill lysimeter - Seepage water





Landfill lysimeter - Methane production



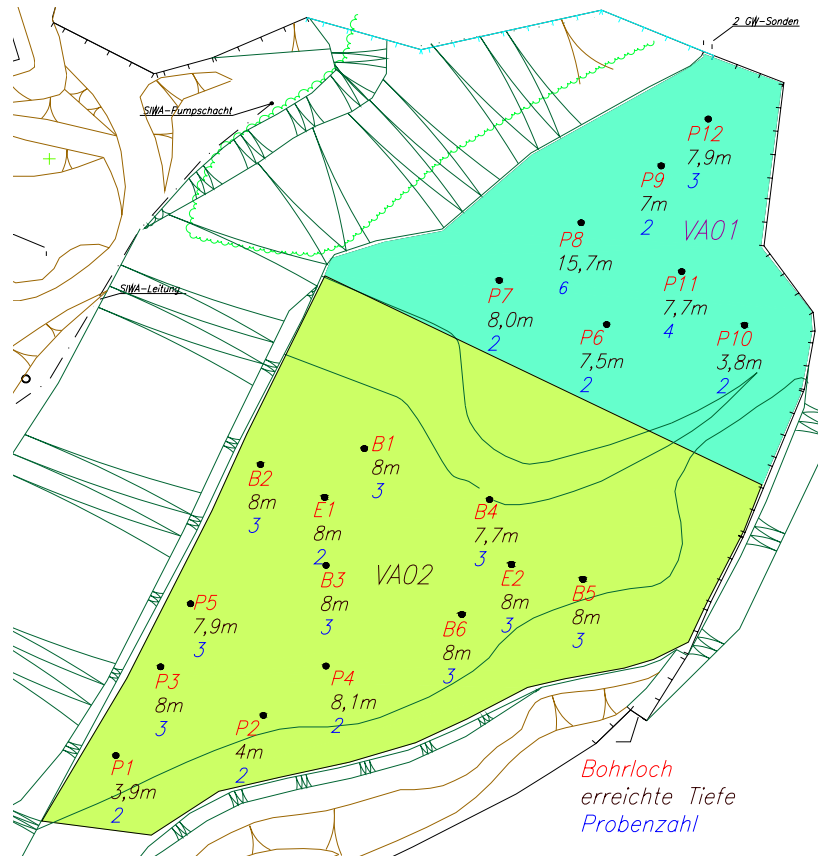


Field experiment



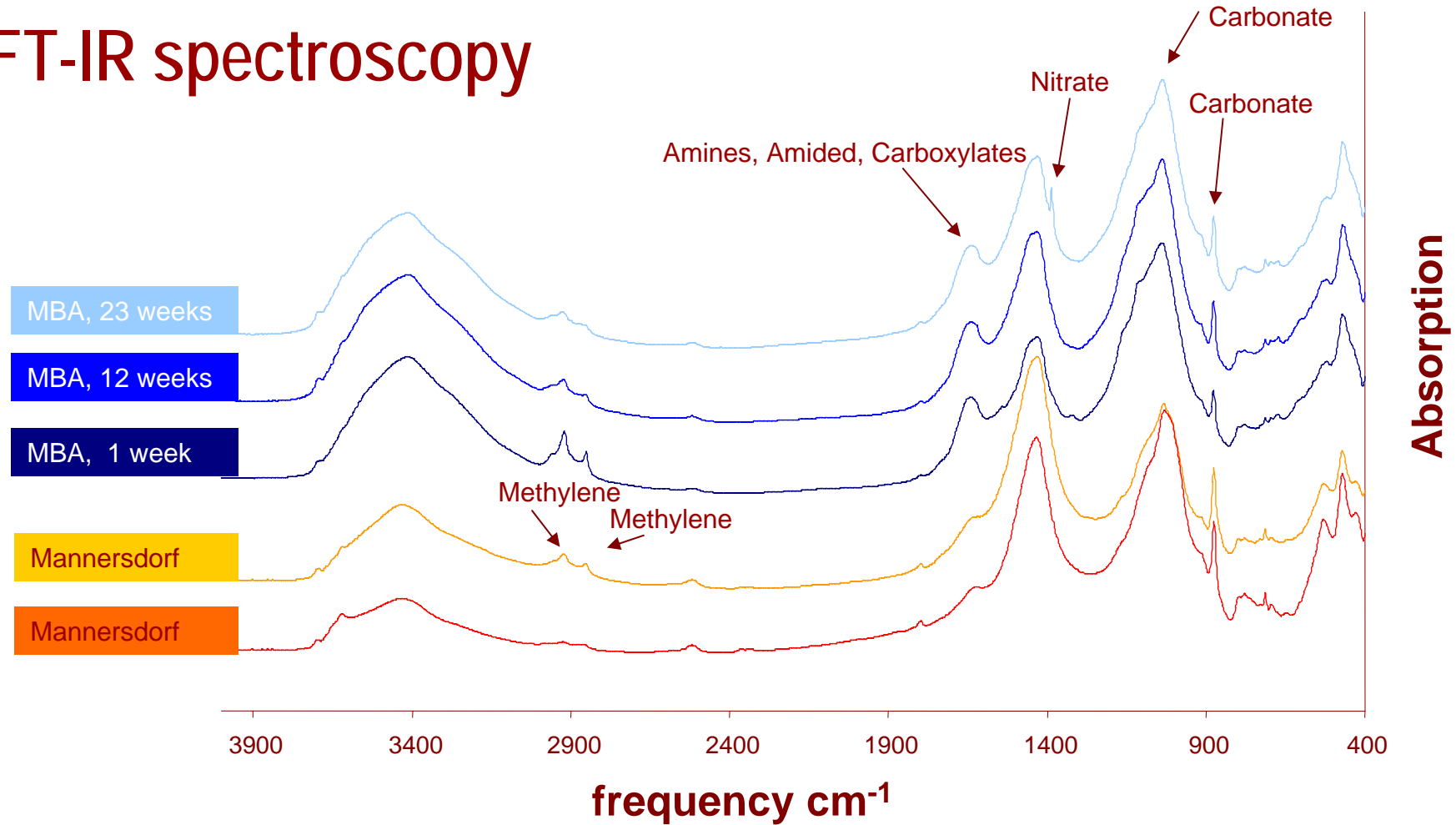


Field experiment - site investigation





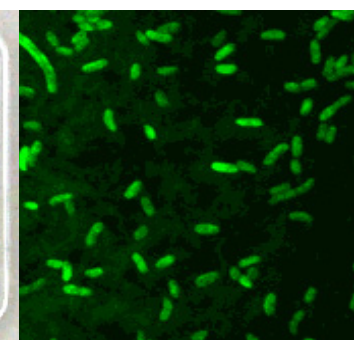
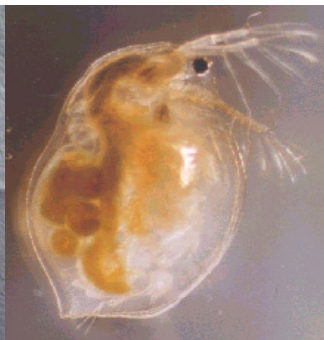
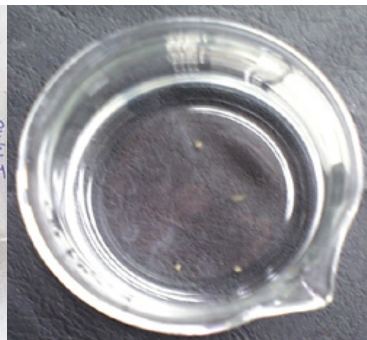
FT-IR spectroscopy





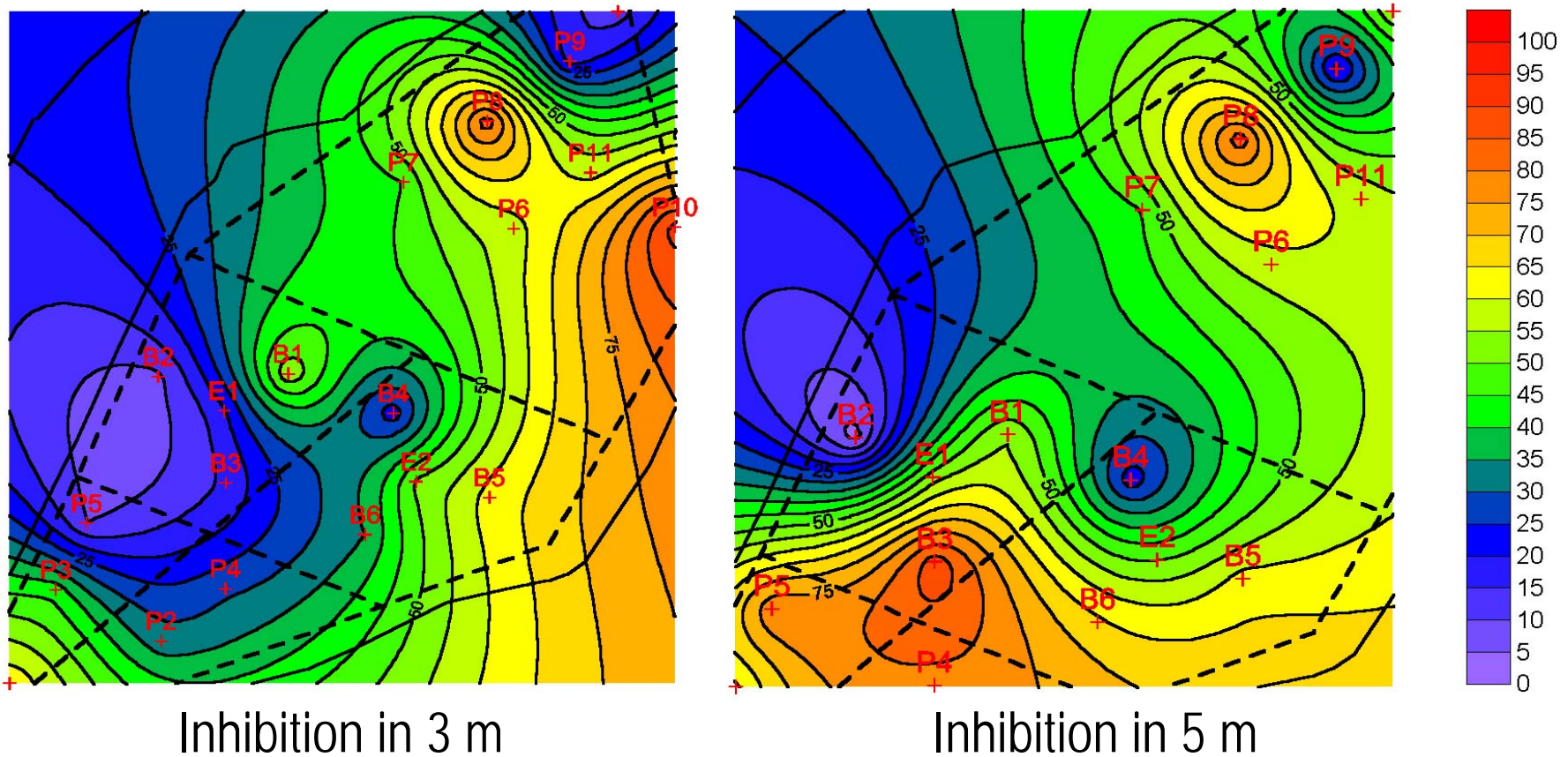
Bio-assays

- Germination and growth assays (OECD 208)
- Daphnia-Immobilisation assay (OECD 202)
- algae growth assay (OECD 201)
- Bioluminescence assay (LumisTox) (EN ISO 11348-3)





Field experiment - Inhibition of *L. sativum* (cress)





Field experiment





Field Experiment

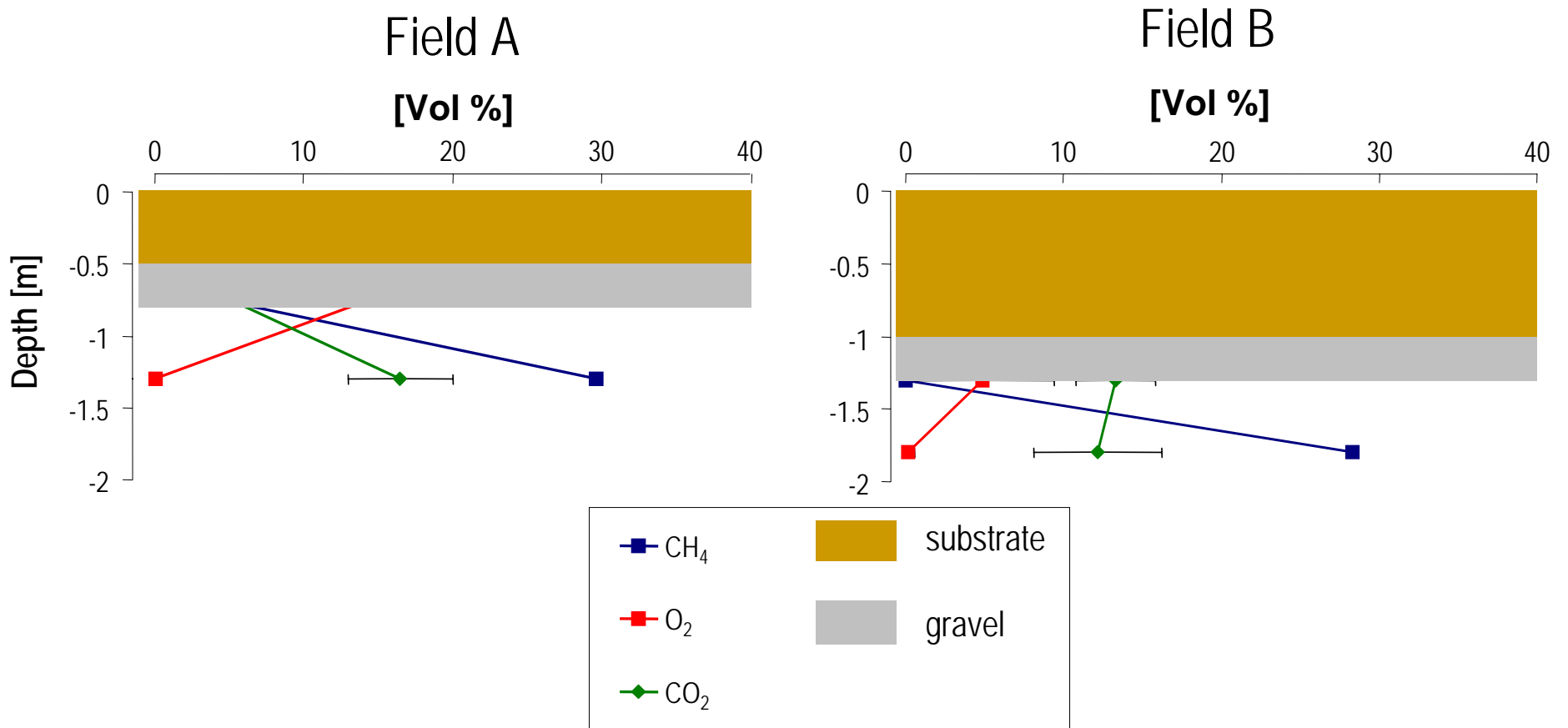
- wind speed and velocity
- air temperature
- solar radiation (global radiation and net radiation)
- precipitation (rain + snow)
- soil: temperature, heat flux, water potential, water content

→ potential evapotranspiration





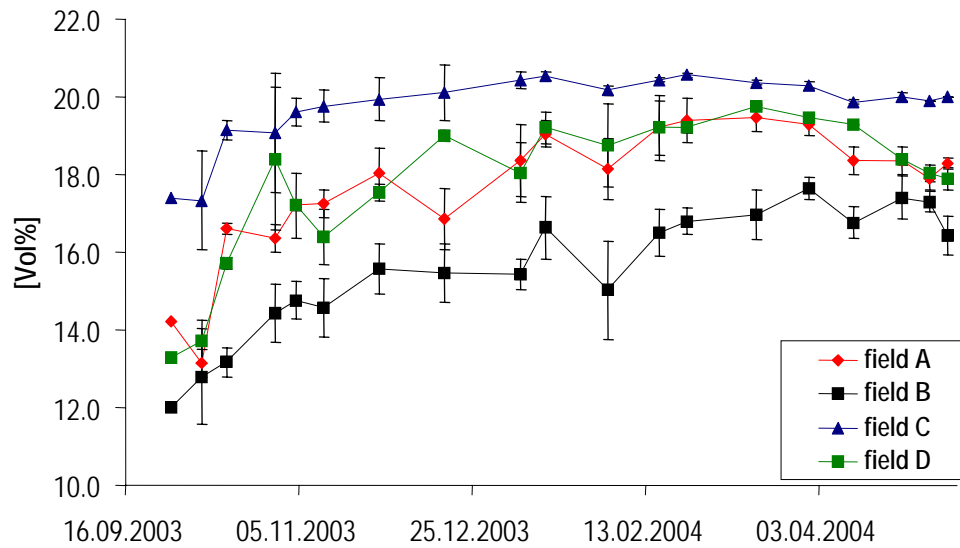
Field experiment - gas profile



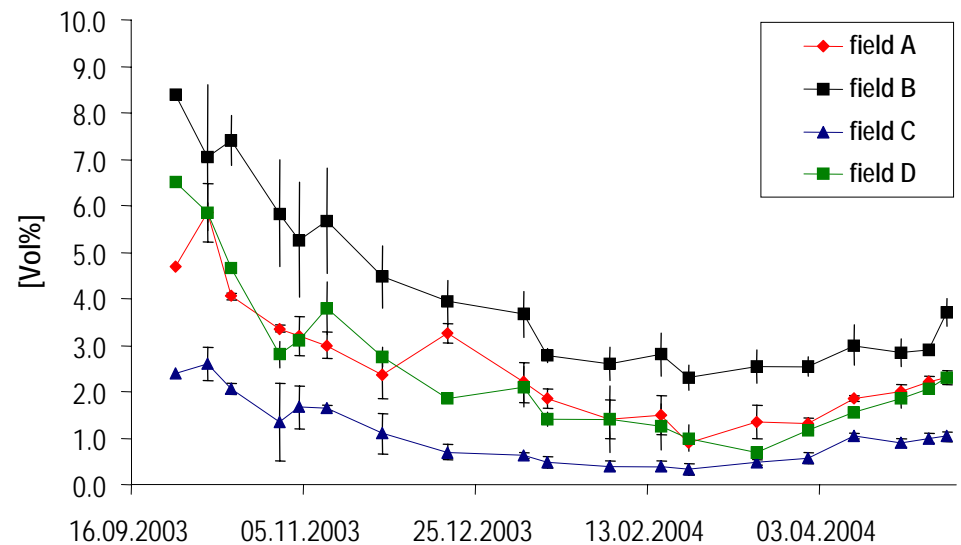


Field experiment

O₂ - 40 cm



CO₂ - 40 cm





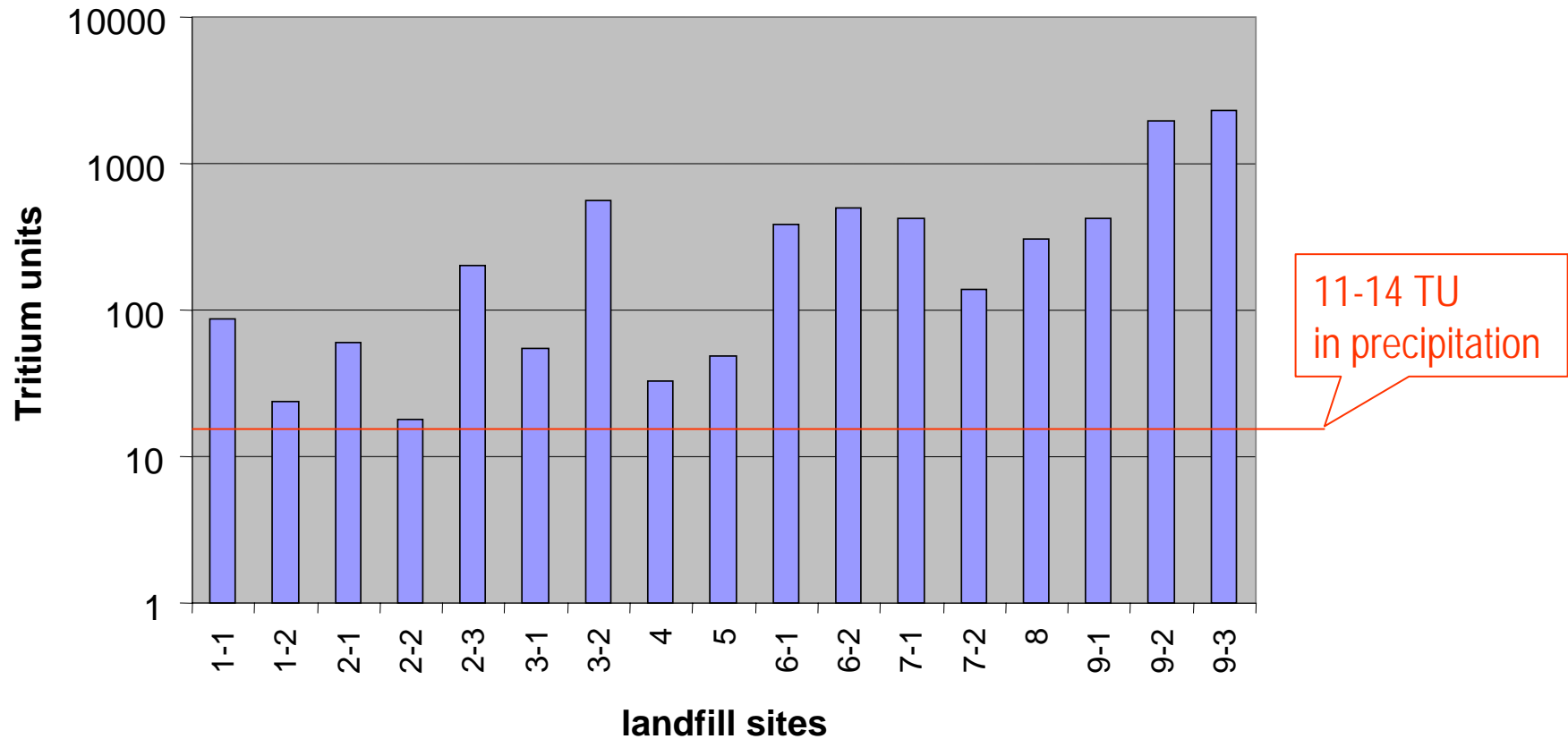
Monitoring of old landfill sites

Investigation of 9 sanitary landfills:

- analysis of seepage water
 - conventional parameters
 - bio assays
 - ^3H -measurements
- physical and chemical properties of the landfill cover
- modelling of water balance



Monitoring of old landfill sites





Acknowledgement

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