Study of Process Chemicals and Hydrocarbons in Wetland Plants

Laboratory and Field Study 2000-2001

Previous plant related studies

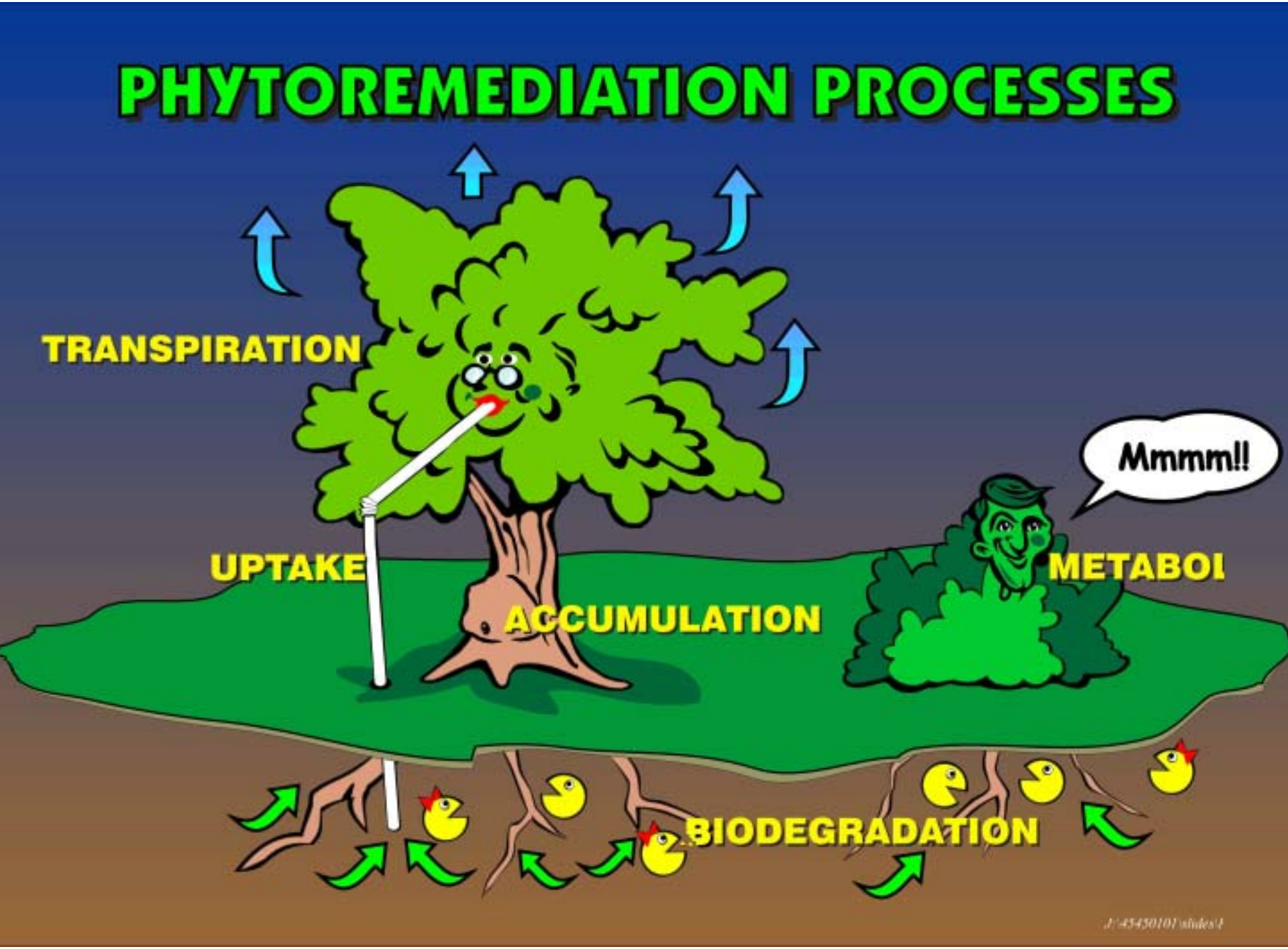
- Plants have shown promise for soil and groundwater remediation of various contaminants
- Little data exists, particularly on processes within the plants

Study Goals

- Understand interactive processes between plants and contaminants
- Assess potential benefit of plants for contaminated sites

Scope of Work

- Field monitoring to assess contaminant distribution in plants, soil and water at two impacted wetlands
- Laboratory study to understand fate of contaminants in plants


PHYTOREMEDIATION PROCESSES
TRANSPIRATION
UPTAKE
ACCUMULATION
METABOI
Mmmm!!
BIODEGRADATION

Plant Study Funding

- **Cost Estimate: $250,000 over two years**
- **Funding**
  - *CAPP*
  - *Environment Canada (PERD)*
  - *Gulf Canada*
  - *COURSE University Funding*
  - *Utah State University*
  - *Komex*

Researchers

- National Water Research Institute (Env. Can.)
- Utah State University
- University of Alberta
- Komex

1999 Plant Uptake Work

- Measurable uptake of process chemicals (sulfolane and di-isopropanolamine (DIPA))
- Variable results between plants; plant parts

2000 Sulfolane and DIPA Uptake

- **Sampled plants, soil, and water for sulfolane and DIPA to quantify:**
  - ***variability between adjacent cattails***
  - ***correlation between plants, soil, and water***
- **data in progress**

Hydrocarbon uptake by trees

- Cored black spruce trees at Strachan wetland
- Analyzed benzene, toluene, ethylbenz., xylenes

Tree Uptake Results

- Consistent TEX uptake by all black spruce
- Good correlation between different trees
- Minimal benzene uptake - unexpected due to high concentrations in the water, and relatively high solubility
- Important because benzene is most toxic

Laboratory Evaluation of Plant Processes

- Work done in 2000 to design and set up laboratory systems, and grow plants

2001 work

- **Implementation of laboratory plant work**
  - ***Utah State - DIPA***
  - ***University of Alberta - Phenanthrene***
- **Additional field sampling to assess contaminant distribution**

Success Measures

- Quantification of the processes occurring between plants and studied contaminants
- Determination of the importance of plants as a natural attenuation mechanism
- Assessment of the need for ecological risk evaluation
- Evaluation of the applicability of plants for remediation