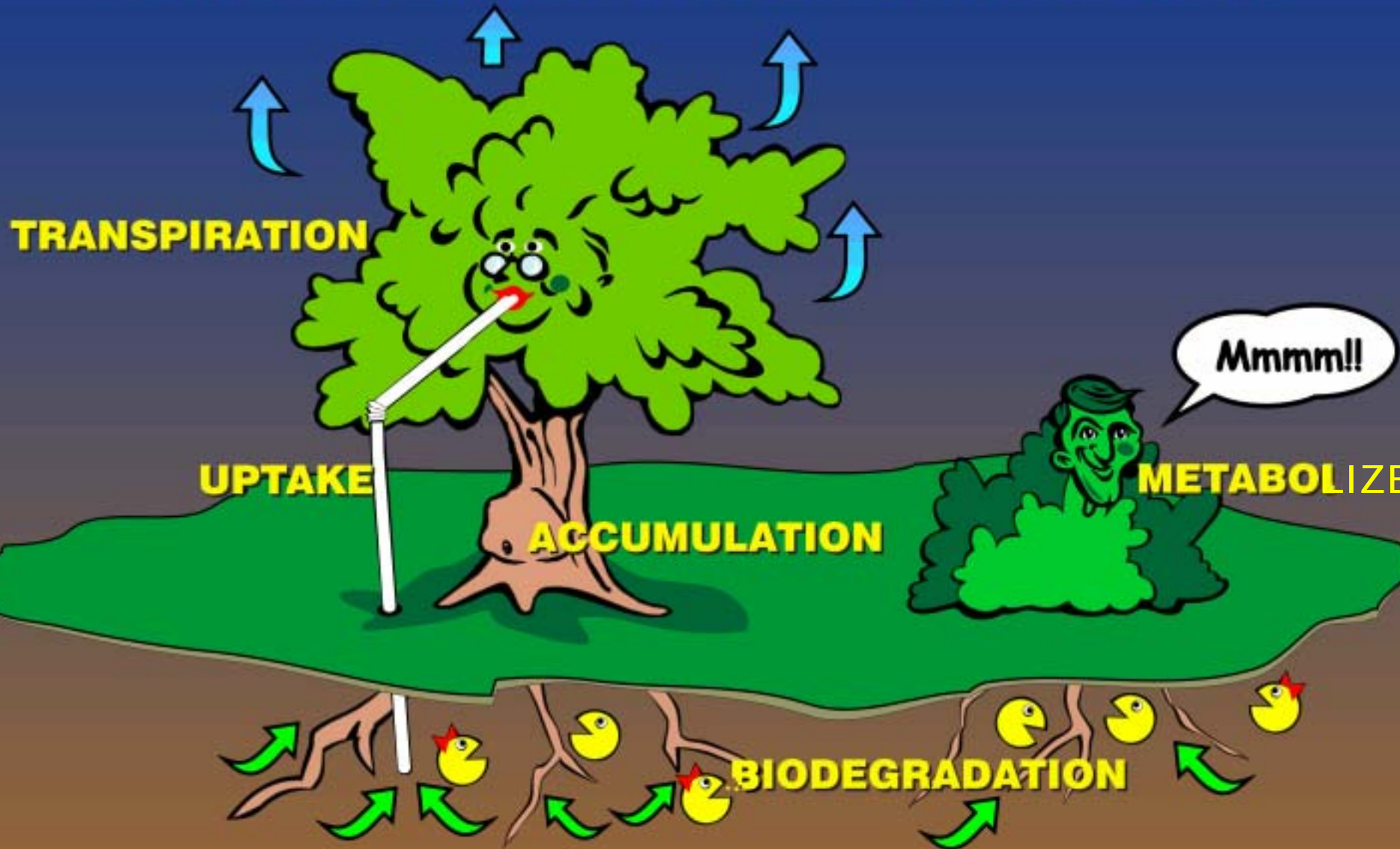


*Degradation and Uptake of
Process Chemicals and
Hydrocarbons
by Wetland Plants*

**Field and Laboratory Study
2000-2002**

PHYTOREMEDIATION PROCESSES



Previous plant related studies

- **Work mainly done on pesticides and metals**
- **Current work shows TCE, MTBE uptake**
- **Little published data, particularly hydrocarbons**

Other Canadian Plant Studies

■ **U of Saskatchewan**

- ◆ *working with agricultural plants and soil*

■ **Environment Canada**

- ◆ *literature review on metal tolerant plants*
- ◆ *future work in planning stages*

■ **CAPP/Env. Canada/Keyspan**

- ◆ *constructed wetlands for condensate removal*
- ◆ *sulfolane and amine uptake in natural wetlands*

Research Goals

- **Quantify fate of process chemicals and hydrocarbons in plants**
- **Assess attenuation/remediation potential of plants**
- **Evaluate potential ecological risk by plant uptake**

Program

Field: Two Wetland sites

- **Sulfolane and DIPA in Cattails (Waterton)**
- **BTEX in Black Spruce Trees (Strachan)**

Laboratory:

- **Sulfolane and DIPA in Cattails**

Sulfolane/DIPA in Cattails



- *Sampled cattail roots, shoots, leaves, heads*
- *Plants in close proximity*
- *High variability from plant to plant, and within parts of same plant*
- *Implication: large number of samples required for representative value*

BTEX Uptake by Spruce Trees



-Tree cores in plume and background

-Toluene, ethylbenzene, and xylene uptake

-No benzene uptake occurs

Ongoing Work

- **Laboratory experiment underway to assess**
 - ◆ *processes (uptake, biodegradation, etc)*
 - ◆ *sulfolane and DIPA variability*
 - ◆ *correlation between plant and water*
- **Data evaluation to assess**
 - ◆ *attenuation significance, based on evapotranspiration*
 - ◆ *need for environmental risk assessment*
- **Sampling to assess benzene fate in trees**

Summary

- **Plant uptake of hydrocarbons and chemicals is occurring**
- **Results are variable between plants, and between sites**
- **2002 work will determine the importance of plants at contaminated wetlands**
- **Pending results, further study may be required**

Plant Study Funding

- **Cost Estimate: \$250,000**
- **Funding**
 - ◆ **CAPP**
 - ◆ **Environment Canada (PERD)**
 - ◆ **Keyspan Energy Canada**
 - ◆ **COURSE University Funding**
 - ◆ **Utah State University**
 - ◆ **Komex**

Researchers

- **Environment Canada (NWRI)**
- **University of Alberta**
- **Utah State University**
- **Komex**