2000

# Characterization of Root Exudates From Crested Wheatgrass (Agropyron cristatum)

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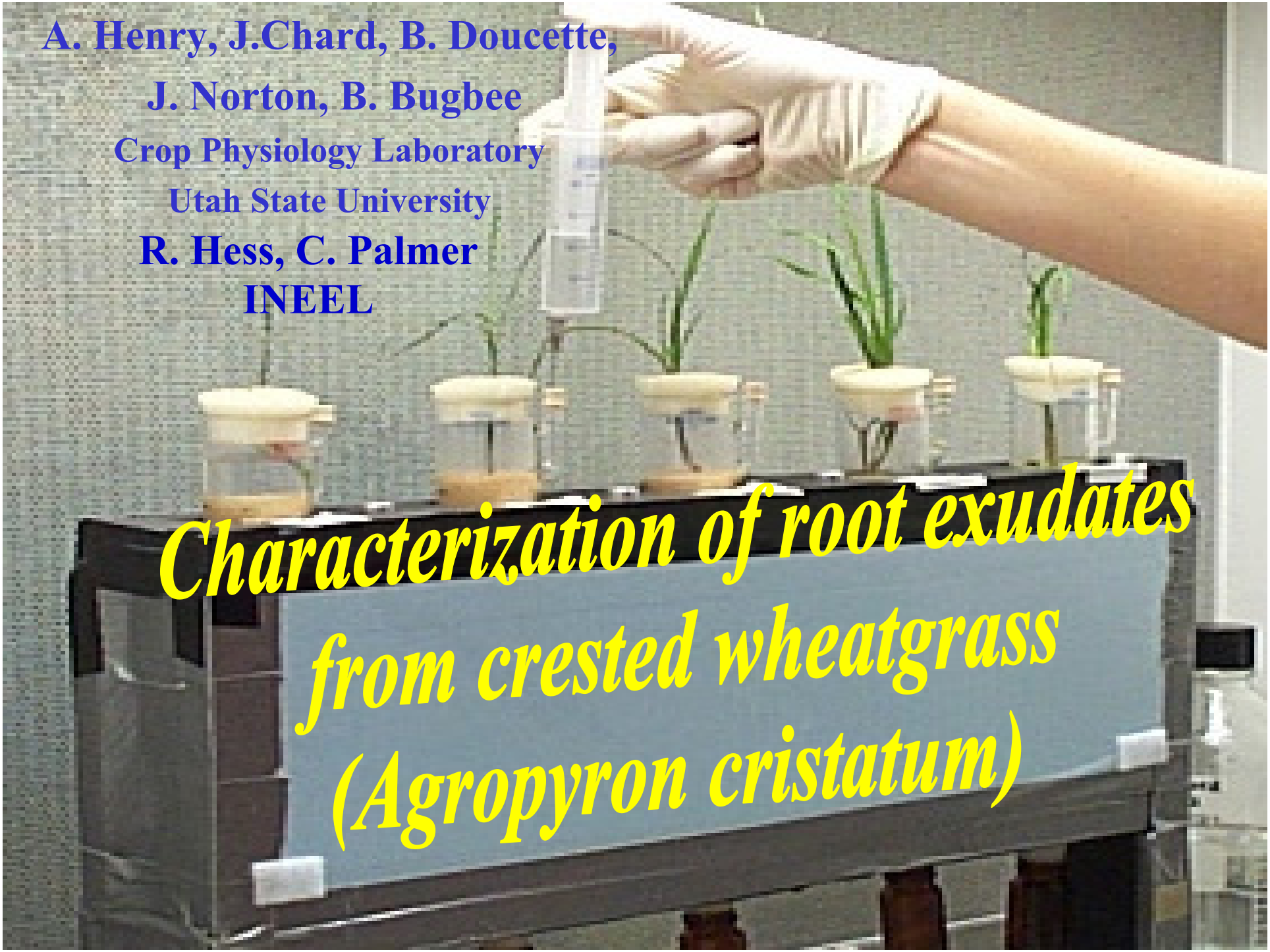
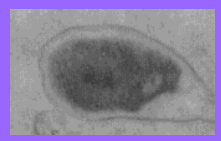


# *Characterization of root exudates from crested wheatgrass (Agropyron cristatum)*

# Exudates are important to phytoremediation



Co-metabolism

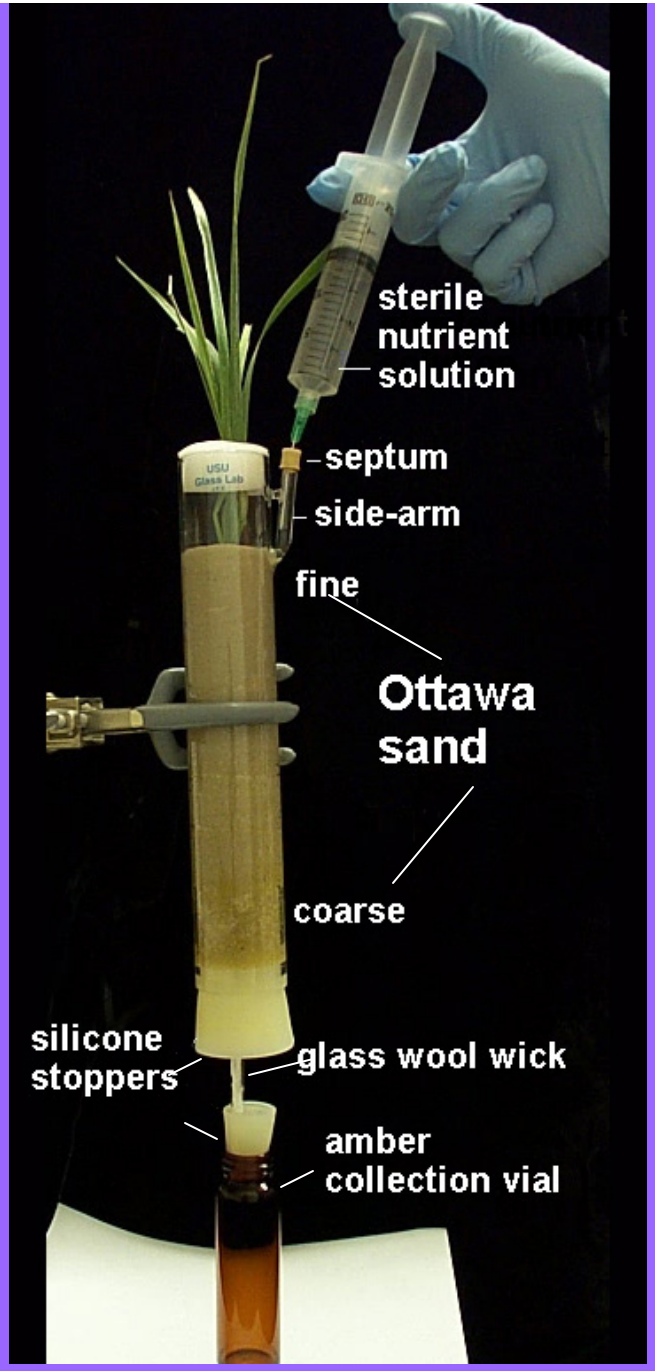
Increased plant uptake

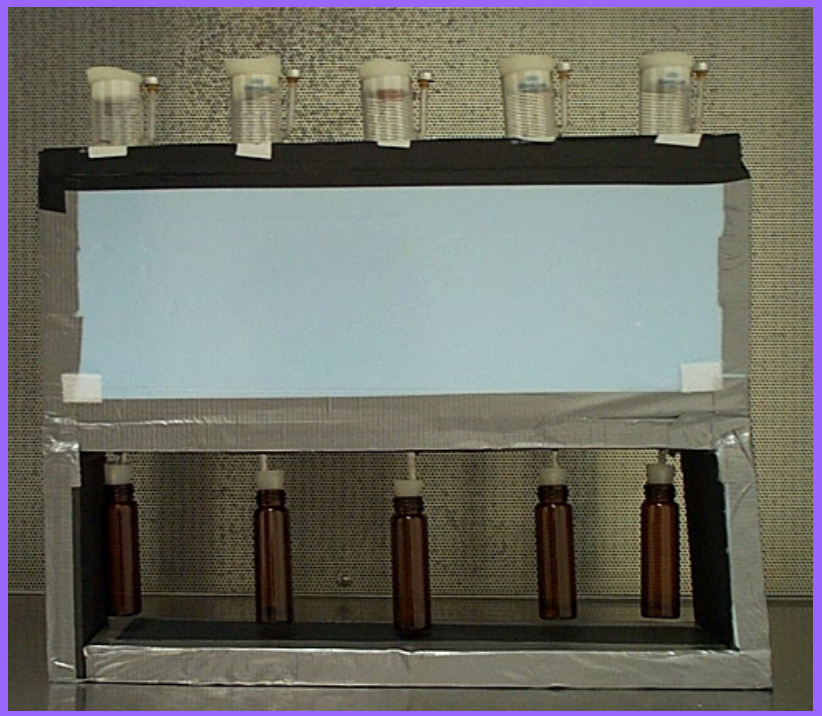
Altered soil mobility

# Objectives

1. Develop cultural system to grow healthy plants
2. Develop procedures for aseptic culture of:
    a. Seeds
    b. Plants
3. Develop procedures to manipulate exudation with: $K^+$, $NH_4^+$, $O_2$, $H_2O$
4. Develop procedures to quantify exudates
    a. TOC
    b. GC-MS, HPLC, ion chromatography

# Plant Growth Containers



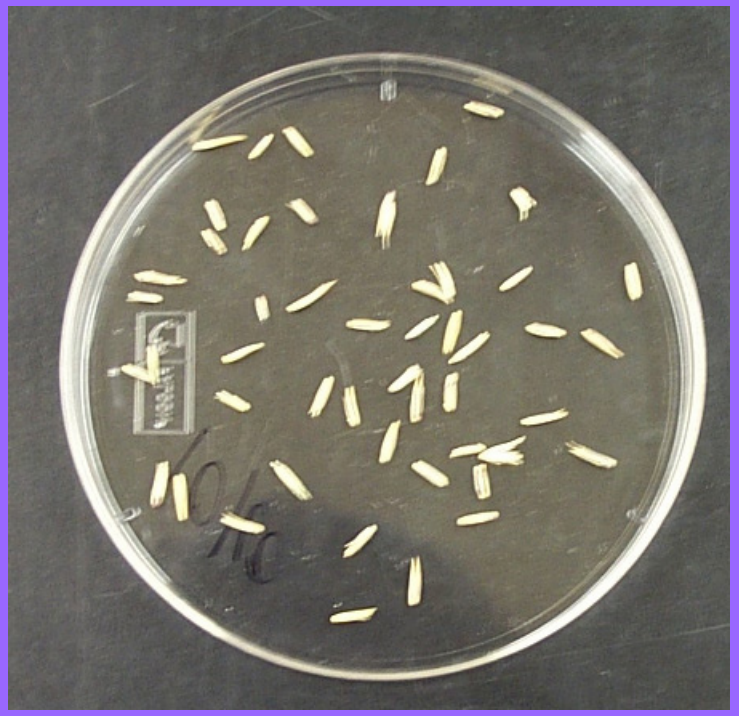



# Growing healthy plants: Materials and Methods

- Nutrient solution: standard hydroponic solution, no chelate
- Growth medium: Ottawa sand
- Photoperiod: 16 hours

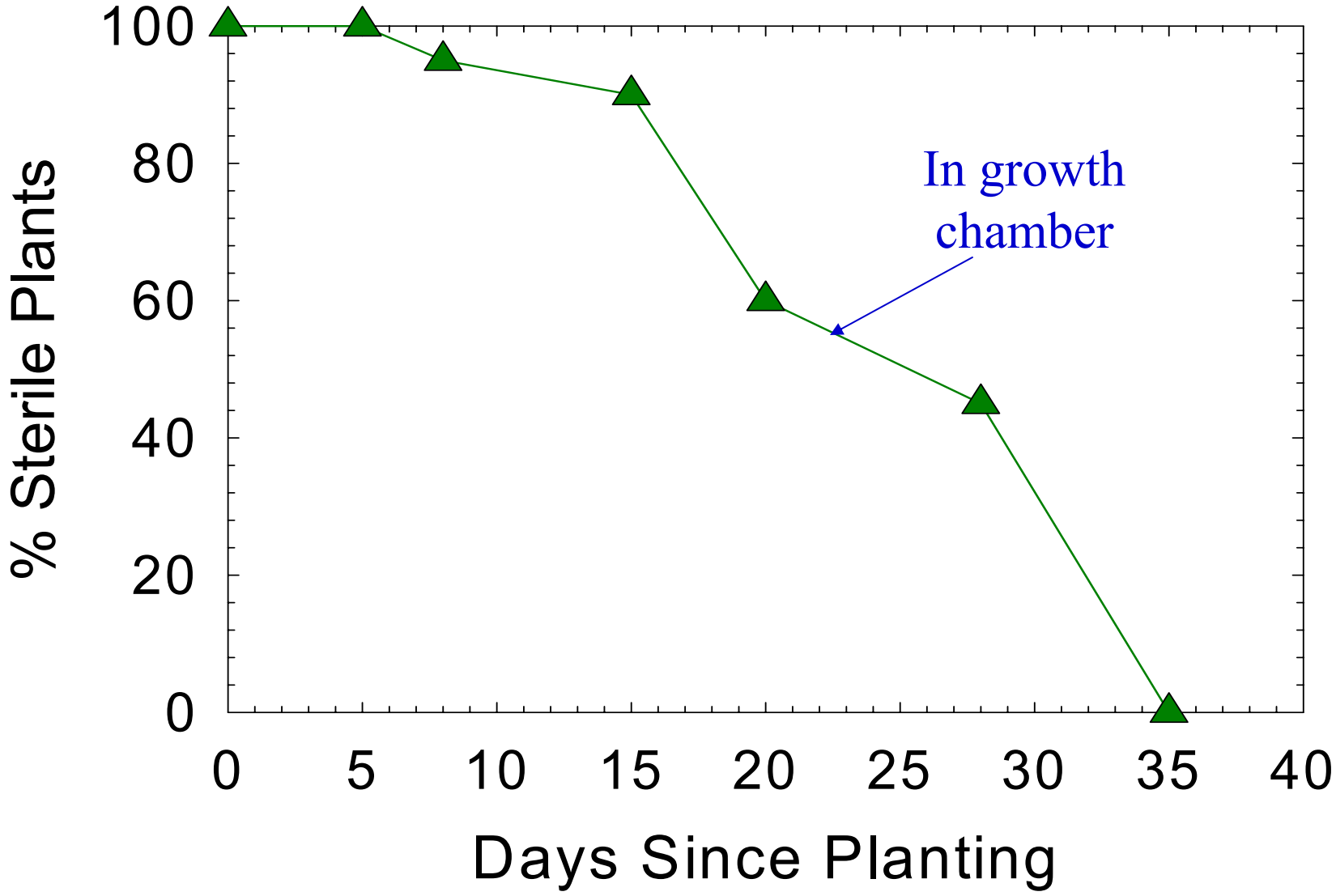
# Techniques for sterilizing seeds


20% Clorox for 60 minutes



Rinse and plate on media for 3-5 days


Assessing microbial contamination in the columns
36
#37
38
39

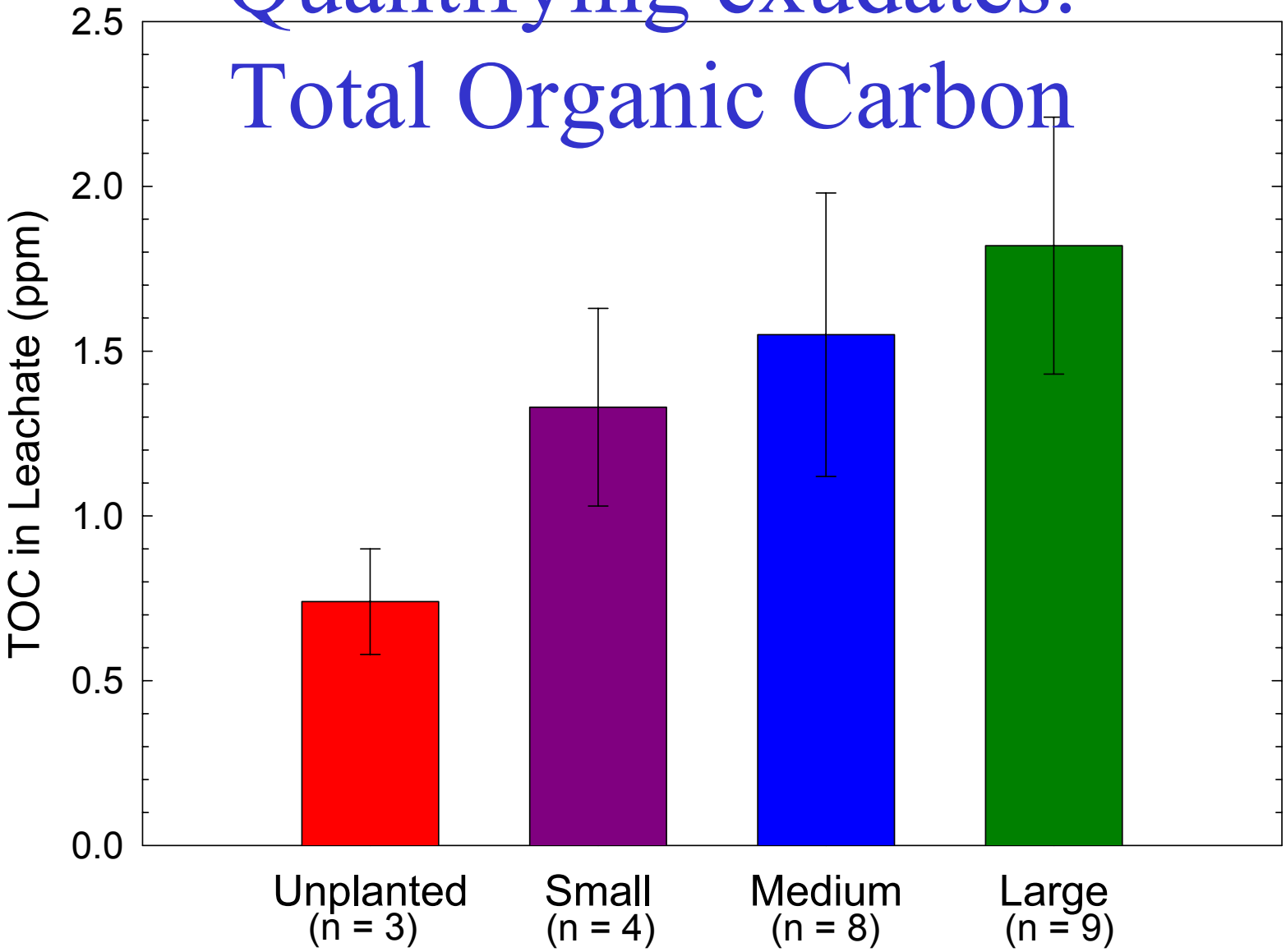

100
80
60
40
20
0
% Sterile Plants
0
5
10
15
20
25
30
35
40
Days Since Planting
In growth
chamber

# Plants are now grown in a laminar flow hood

# Increasing Exudation

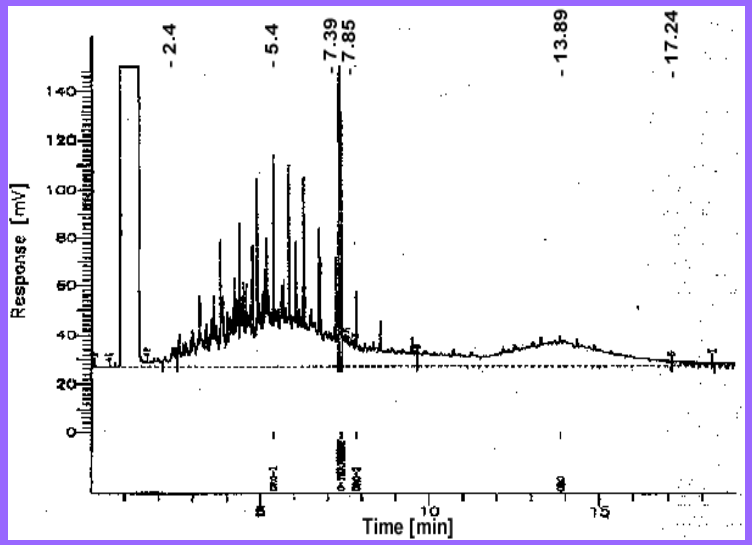
- Changing $NH_4^+$:$NO_3^-$ ratio
- $K^+$ stress: 5→ 1 mM $K^+$
- Drought stress
- Hypoxia: flooding

# Quantifying exudates: Total Organic Carbon



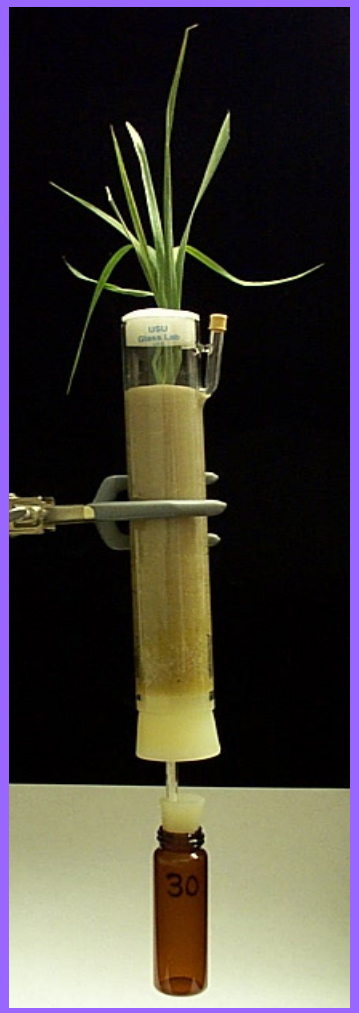
# Carbon Associated with glass wool

# Quantifying exudates: GC-MS, HPLC, ion chromatography

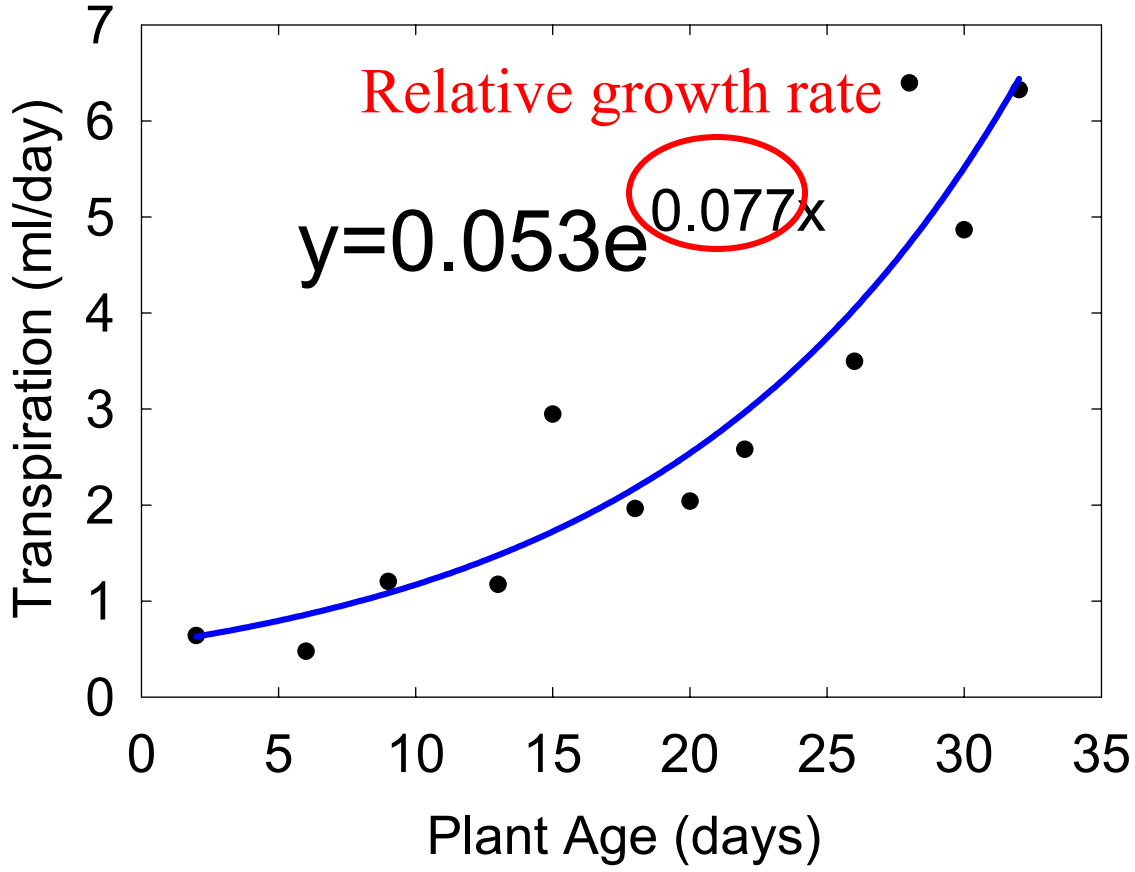



- Organic acids
- Amino Acids
- Sugars
- Phenolics
- Enzymes
- Flavonoids
- Vitamins

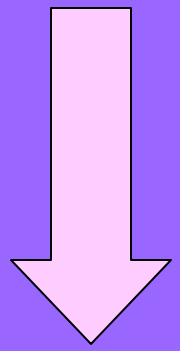
# Scaling to the field: Quantifying exudates in terms of growth rate



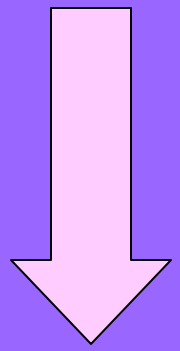

# Transpiration Data→ Growth Rate



RGR



μg C exuded * g new growth$^{-1}$ day$^{-1}$



Root: shoot

μg C exuded * g new root growth$^{-1}$ day$^{-1}$

# Acknowledgement


Bruce Bugbee

Julie Chard

Bill Doucette

Jenny Norton

Malinda Hamilton

Richard Hess

Carl Palmer