



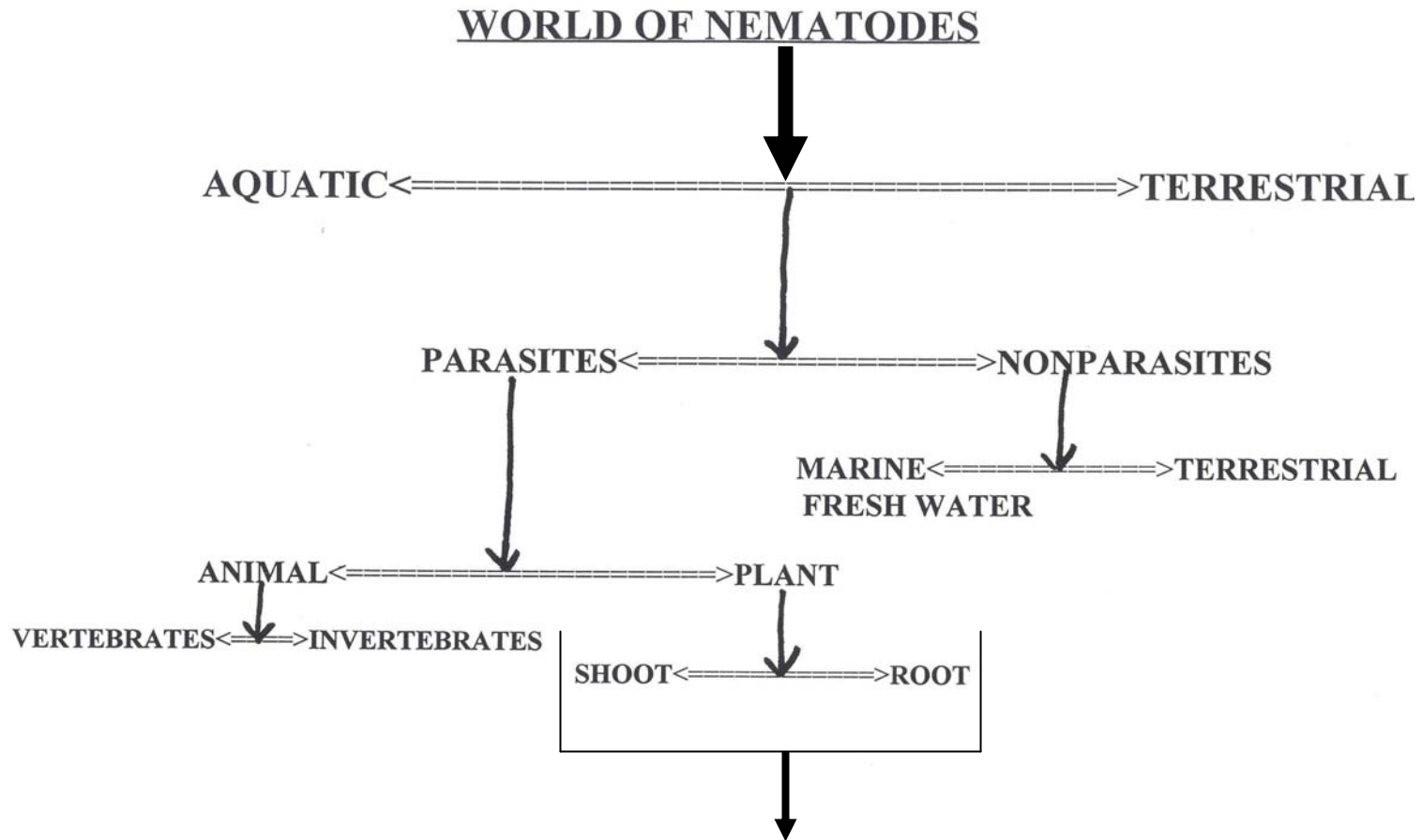
# Soil Health With Specific Emphasis on Nematodes

Dr. Haddish Melakeberhan  
Agricultural Nematology Laboratory  
College of Agriculture and Natural Resources  
102 Agriculture Hall  
Michigan State University  
East Lansing, MI 48824  
**melakebe@msu.edu**

**[http://www. agriculturalnematology.anr.msu.edu/](http://www.agriculturalnematology.anr.msu.edu/)**

**Presentation to:**  
**Michigan Food & Farming Systems (MIFFS) Cooperative**  
**(01/19/2008)**

# 80% of multi-cellular animals on the planet are nematodes.



How damaging are these?

# Plant-parasitic nematodes may be hidden and very light, but not on your wallets!



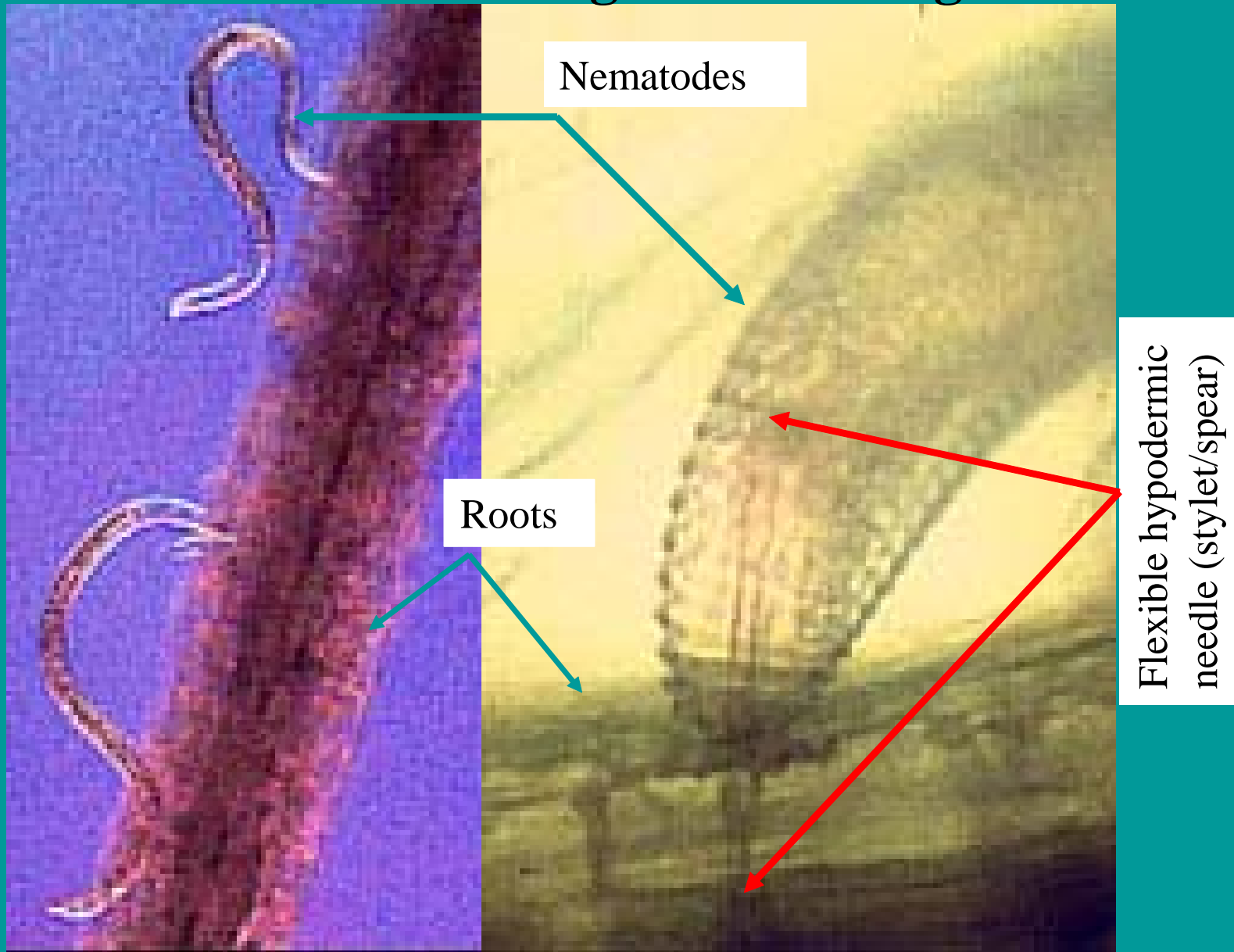
R.H. Hussey, U of G.

**Globally \$100 Billion (1987)**

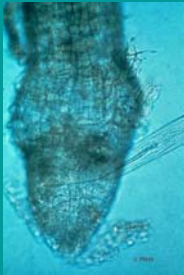
**Soybean cyst \$1.4 Billion in the USA**

**Michigan vegetables 1-2% loss (out \$300 million)**

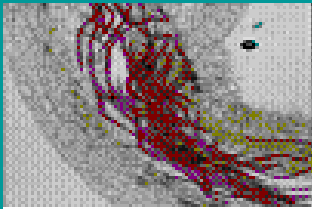
# Below Ground Breaking and Entering in Action!



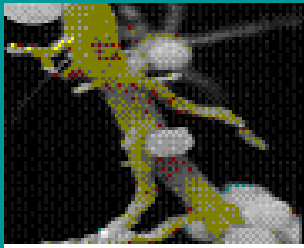
# Skillful Robbery Types After Breaking and Entering!



Consume and move on (Ecto-parasites)



Run-sack the house (Migratory endo-parasites)

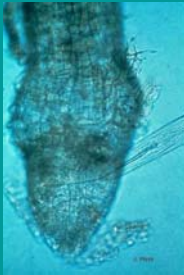


Find a comfortable spot and keep sucking (Sedentary endo-parasites)



Find a comfortable spot, induce galls (tumors), and keep sucking (Sedentary endo-parasites)

# Skillful Robberies and Robbers After Breaking and Entering!



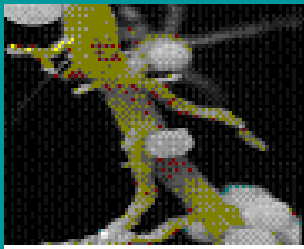
Consume and move on (Ecto-parasites)

**Dagger nematodes (*Xiphinema* spp.)**



Run-sack the house (Migratory endo-parasites)

**Root-lesion nematodes (*Pratylenchus* spp.)**



Find a comfortable spot and keep sucking

(Sedentary endo-parasites)

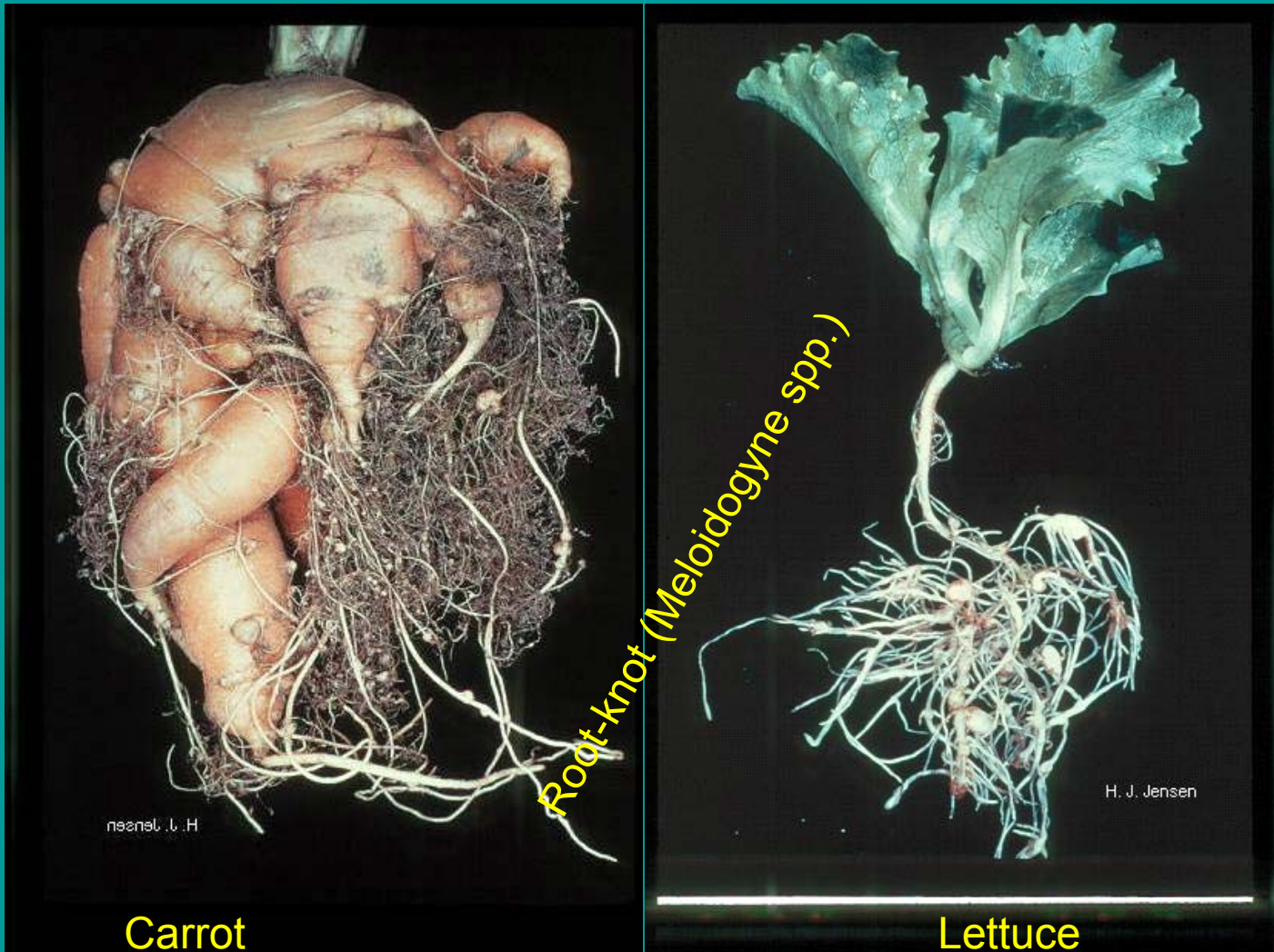
**Cyst nematodes (*Heterodera* spp.)**



Find a comfortable spot, induce galls (tumors),  
and keep sucking (Sedentary endo-parasites)

**Root-knot nematodes (*Meloidogyne* spp.)**

# Nematodes Eat Healthy!

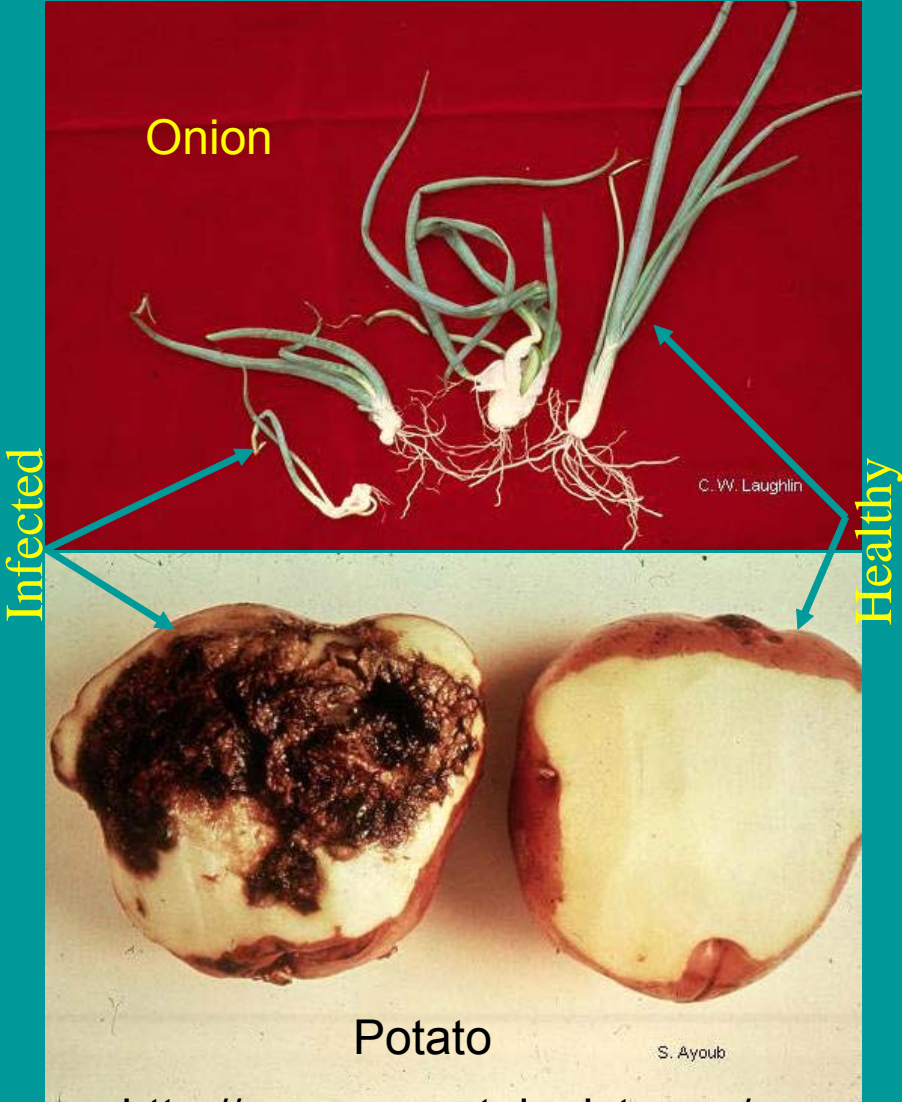


<<http://www.nematologists.org/>>



# Nematodes Like Spicy and Starchy Foods!

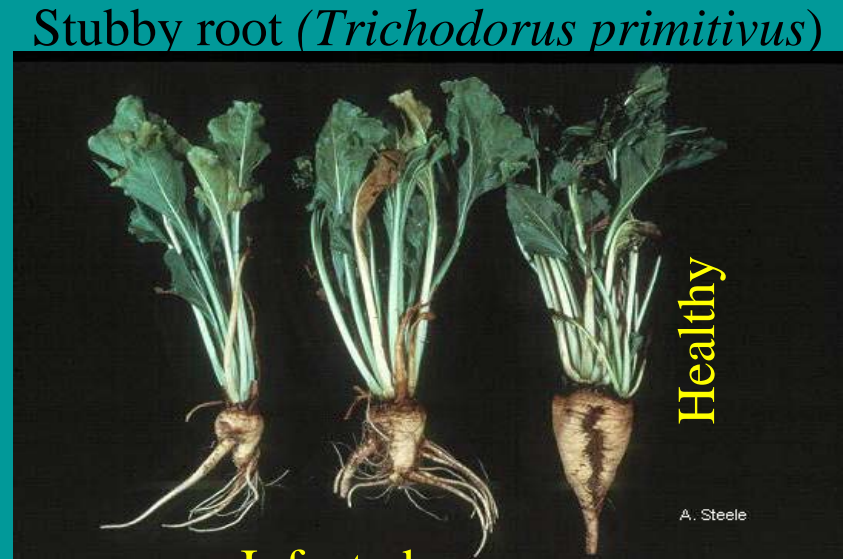
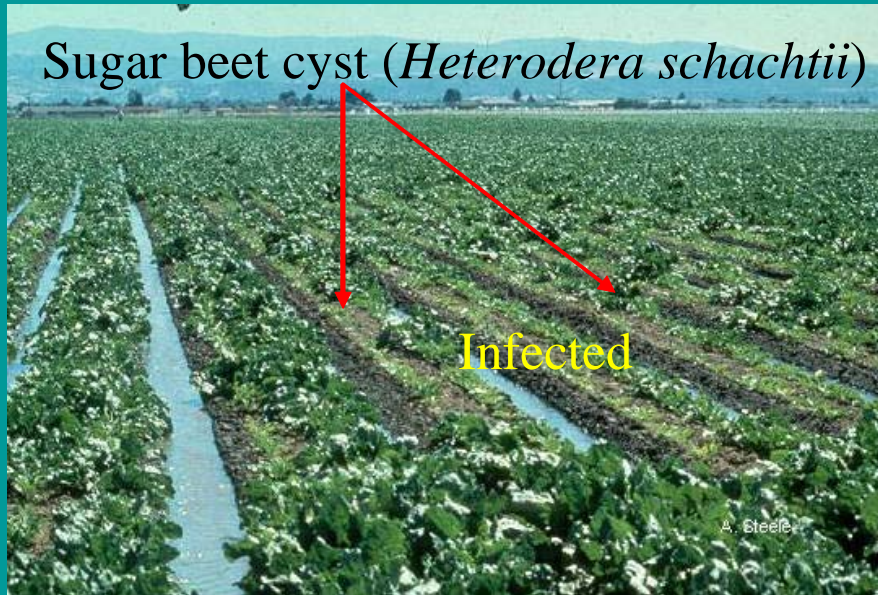
Bulb and Stem (*Ditylenchus* spp.)



<<http://www.nematologists.org/>>

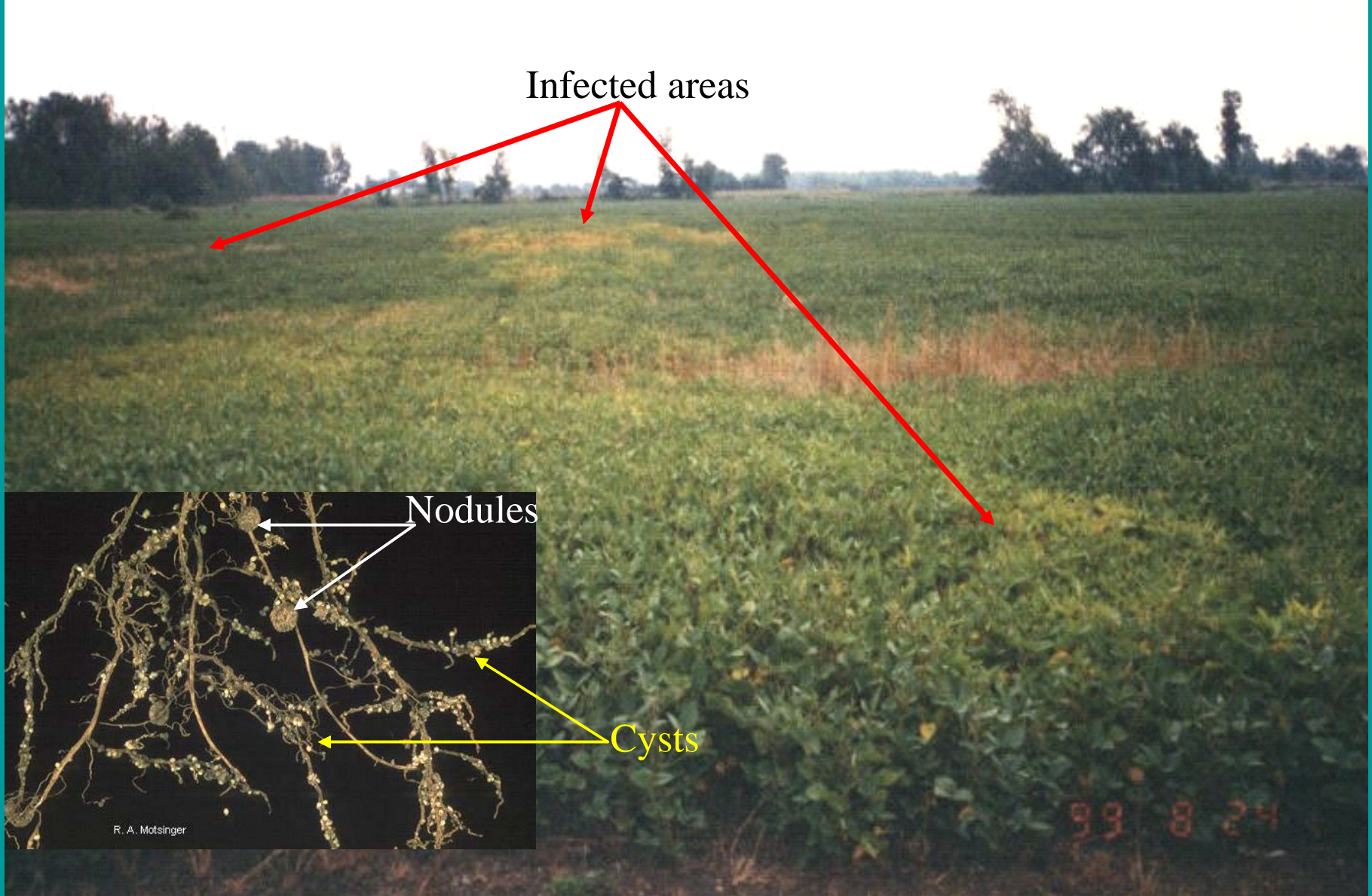


# Nematodes Like Sweet, But Natural Foods Too!



# High Protein/Oil Crops-Delicious!

## Soybean Cyst Nematode in Monroe County, MI



Infected areas

Nodules

Cysts

R. A. Mottsinger

99 8 24



# Important Plant-parasitic Nematodes Attacking Blueberry

Sheath Nematode  
(*Trichodorus* sp.)



P. Oudemans, Rutgers, NJ

Stunt Nematode  
(*Tylenchorynchus* sp.)



Stunting of blueberry  
nursery plants caused by  
nematodes

Spiral  
Nematode  
(*Helicotylenchus*  
sp.)

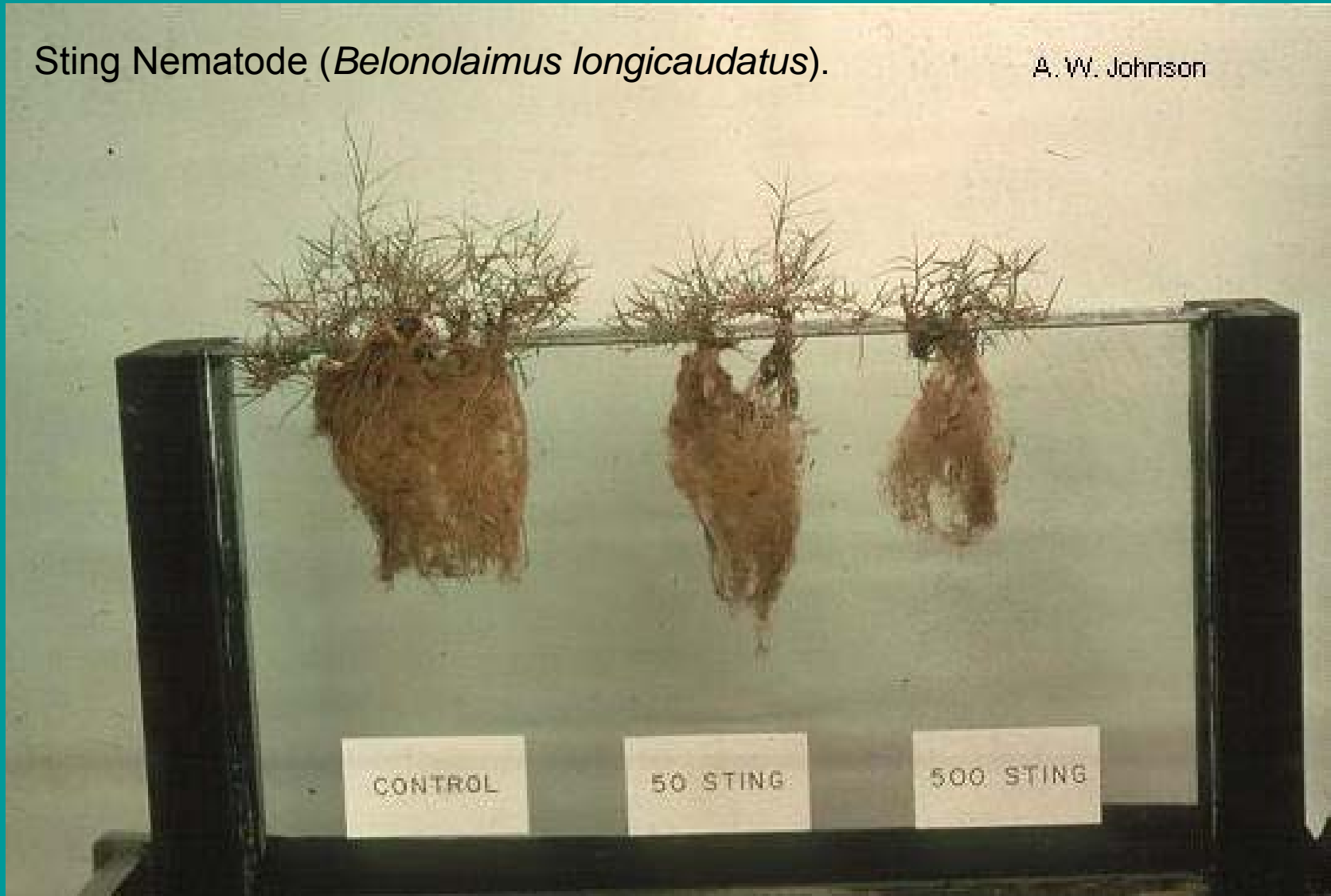




# What is Wrong With My Bermuda Grass Lawn?

Sting Nematode (*Belonolaimus longicaudatus*).

A. W. Johnson



<http://www.nematologists.org/>

# Plant Size Matters Little to Below Ground Robbers!



Bananas and  
burrowing nematode  
(*Radopholus similis*)



Infected roots

<<http://www.nematologists.org/>>

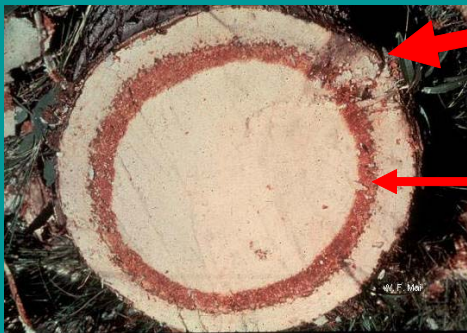


# Plant Size/Distance Matter Little to Hitch-hiking Robbers!



Coconut trees infected with red ring  
(*Rhadinaphelenchus cocophilus*)

Transport vehicle:  
Coconut palm weevil



Entry ports

Ring of infection

<<http://www.nematologists.org/>>



# Managing plant-parasitic nematodes

*“YOU CANNOT TREAT WHAT YOU DON’T KNOW”*

**Prevention (soil, equipment, infected material)**

**Nematicides**

**Rotation**

**Resistant crops**

**Combination of cultural practices**

## **iii) Monitoring soil health**

### **Physical analysis**

**Texture and nutrients**

### **Chemical analysis**

**pH, contaminants and pesticide injuries**

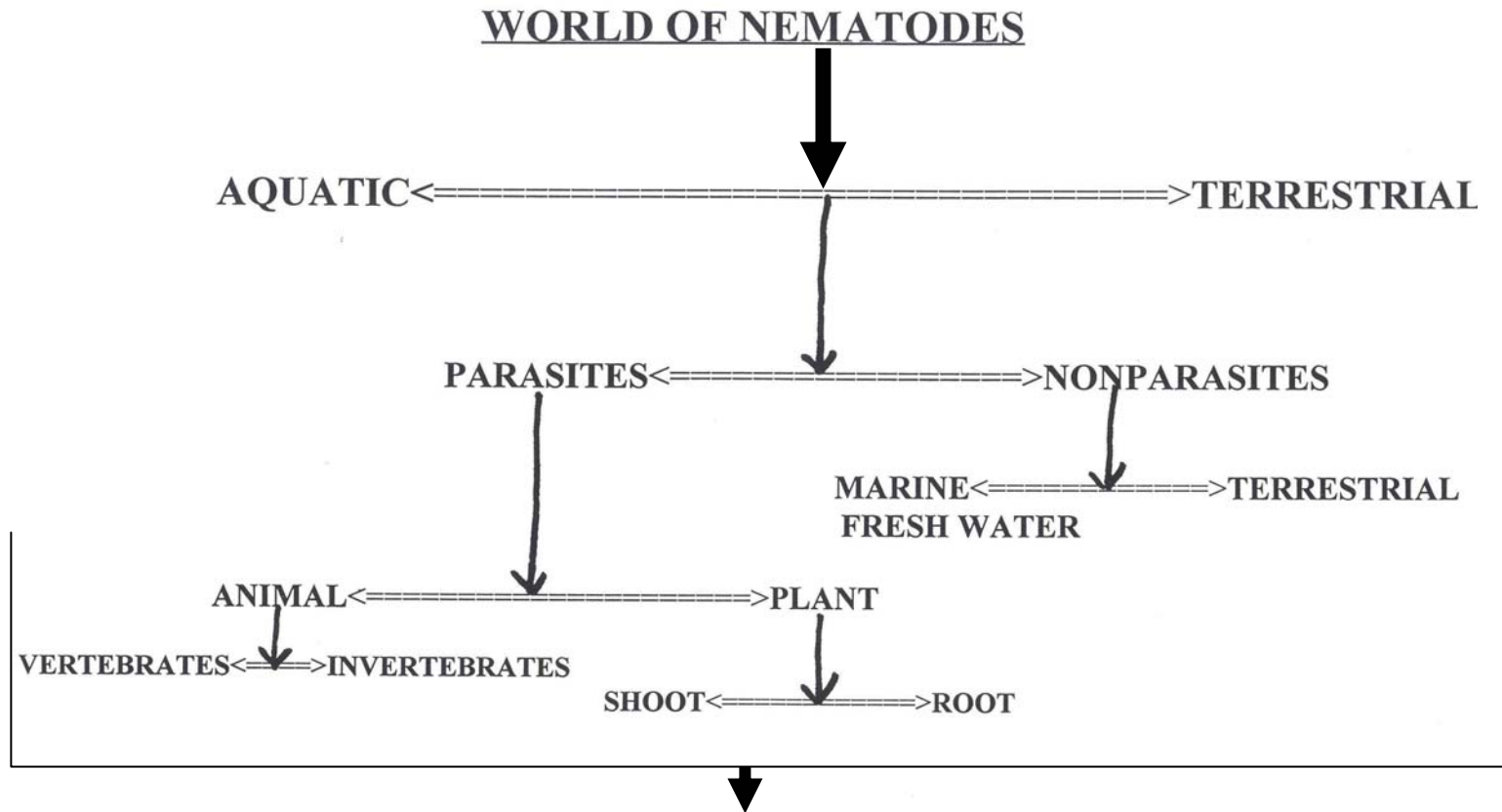
### **Biological analysis**

**Visible and invisible pests and diseases**

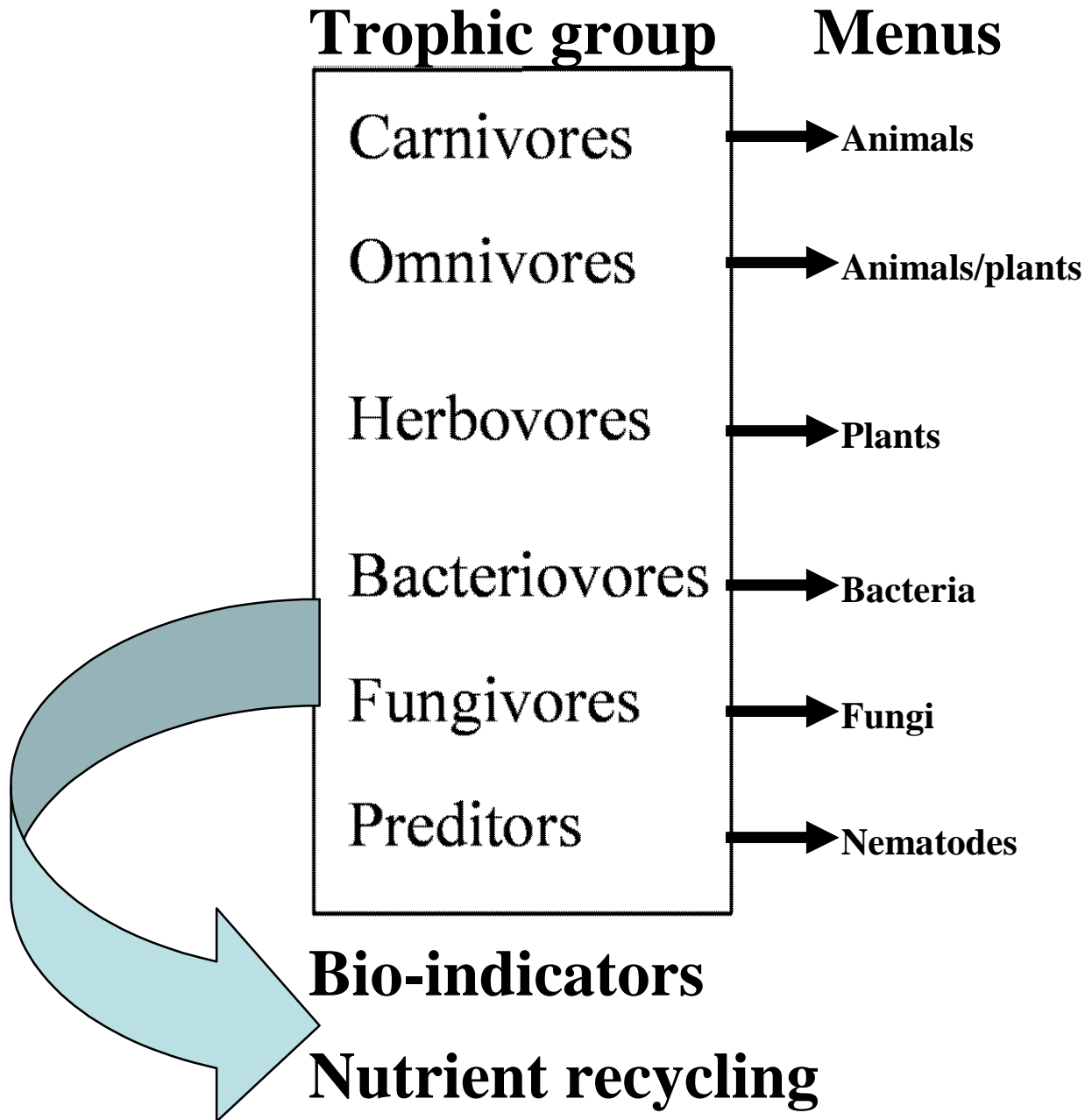
**Underground biological beats and barometers**

**(NEMATODES)**

# 80% of multi-cellular animals on the planet are nematodes.



► Biological change indicators ► Food web and nutrient cycling



## **iii) Monitoring soil health**

### **Physical analysis**

**Texture and nutrients**

### **Chemical analysis**

**pH, contaminants and pesticide injuries**

### **Biological analysis**

**Visible and invisible pests and diseases**

**Underground biological beats and barometers**

**(NEMATODES)**

**Where do you send for analysis?**

# Where do you send for analysis?

MSU Diagnostic Services

101 Center for Integrated Plant Systems

East Lansing, MI 48824-1311

Phone: 517-355-4536

Fax: 517-432-0899

<http://www.pestid.msu.edu/>

For accurate sample collection, contact diagnosticians before sending samples.