Climbing Mt. Organic: The Role of Cover Crops

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Presentation Overview

- Phases of Climbing Mt. Organic
- Functions of Cover Crops
- Roles of Cover Crops in Climbing Mt. Organic

Logic for the Change

- Research Reporting Session Abstract
- Mid-West Cover Crops Council Workshop
- Climbing Mt. Organic: Role of Cover Crops

Phases of Climbing Mt. Organic

- Exploring the Foot Hills
  - Three Year Organic Transition Process
- Mastering the Slippery Slopes
  - Years Four Through Seven
    - Hopefully?
- Life at the Summit
  - Year Eight and Beyond
    - Dynamic Equilibrium: Maybe?

Cover Crop Functions

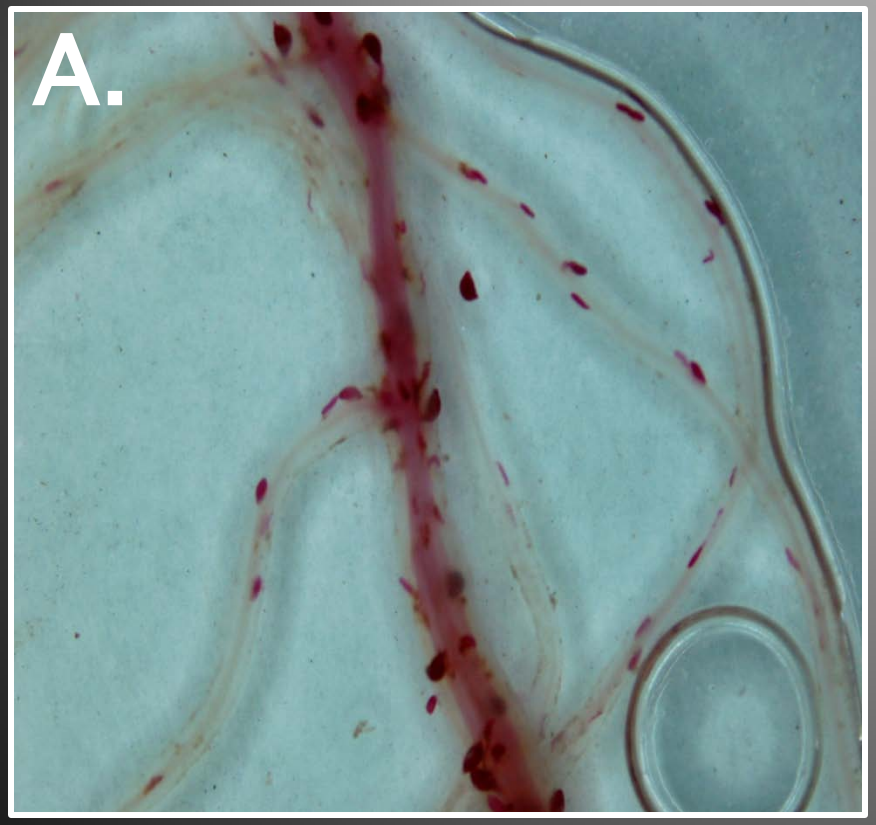
- Soil Quality Builders
  - Physical structure
    - Tilth
    - SOM
    - Water Stable Aggregates
  - Chemistry
    - 21 Elements
  - Biology
    - Three Trophic Levels
- Soil Quality Maintainers
- Soil Drillers
- Water Conservers
  - SOM
- Pest Managers
  - Weed Fighters
  - Habitat for Friends
  - Non-Host Crops
    Trap Crops
  - Bio-Fumigation

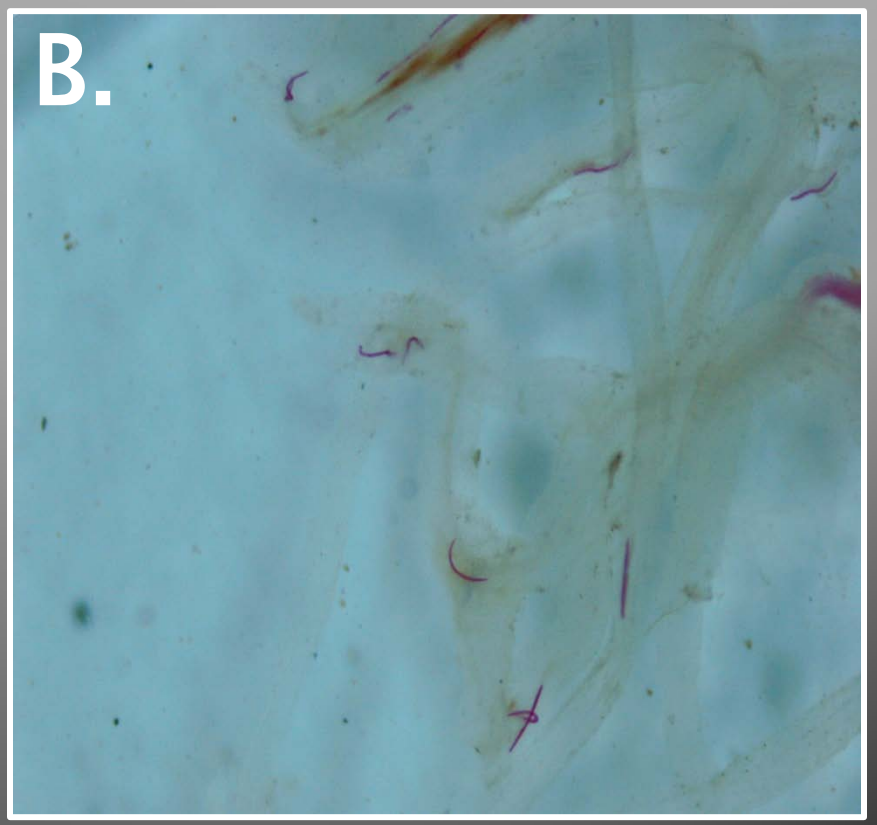
Exploring the Foot Hills

Cover Crops and Transition

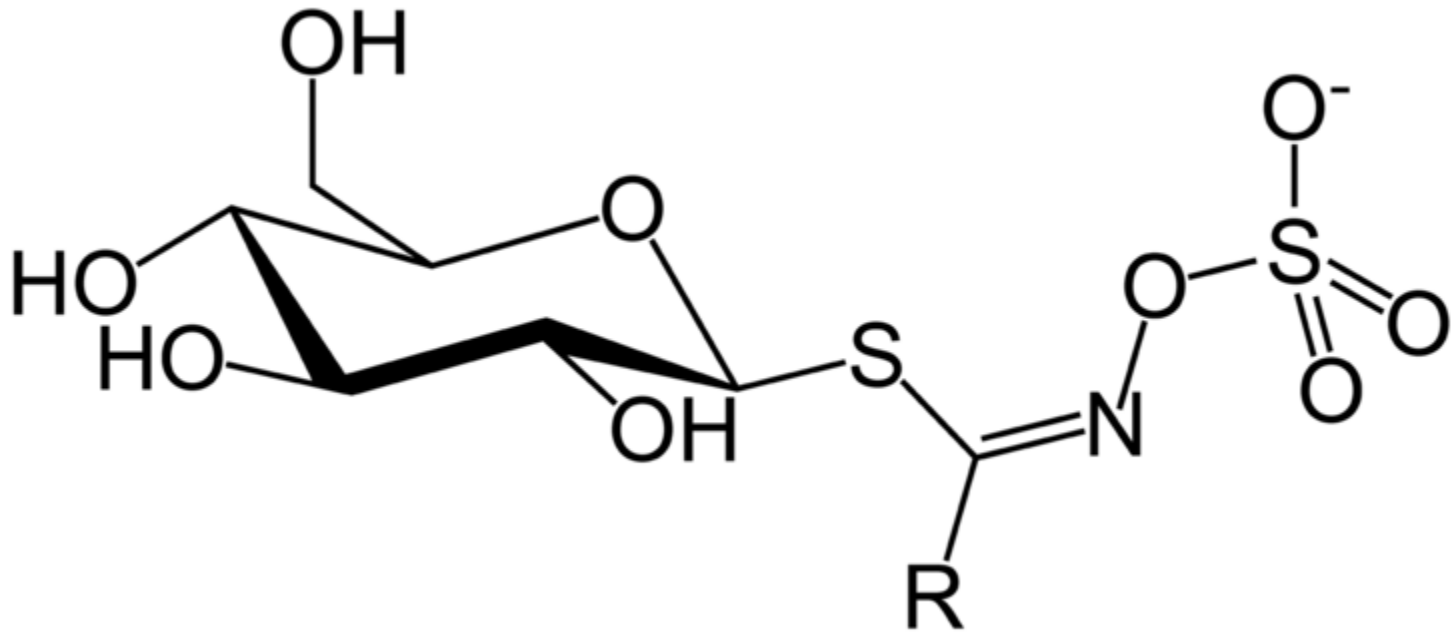
- Soil Builders (Water Stable Aggregates)
- Soil Drillers (Oilseed Radish Story)
- Water Conservers (SOM)
- Erosion Fighters (General Soil Cover)
- Pest Managers
  - Weed Fighters (Oil Seed Radish Example)
  - Habitat for Friends (Biological Control)
  - Non-Host Crops (Cultivar Specific)
  - Trap Crops (28-Day Radish Story)
  - Bio-Fumigation Crop (Mustards)

Trap Crop Example: (A) Diakon Oilseed Radish, (B) Adagio Oilseed Radish.





Bio-Fumigation Key Chemical: Glucosinolate structure.



Glucosinolate types and concentrations, management is the key to make it work.

Moles/gram dry weight	White Mustard	Yellow Mustard
Propenyl	---	14.8
Hydroxy-butenyl	0.8	---
Benzyl	4.1	---
Phenylethyl	---	0.8
Hydroxybenzyl	10.9	---
Total	**15.8**	**15.7**

Potato Yield Response and Root-Lesion Nematode Control Associated Bio-Fumigation.

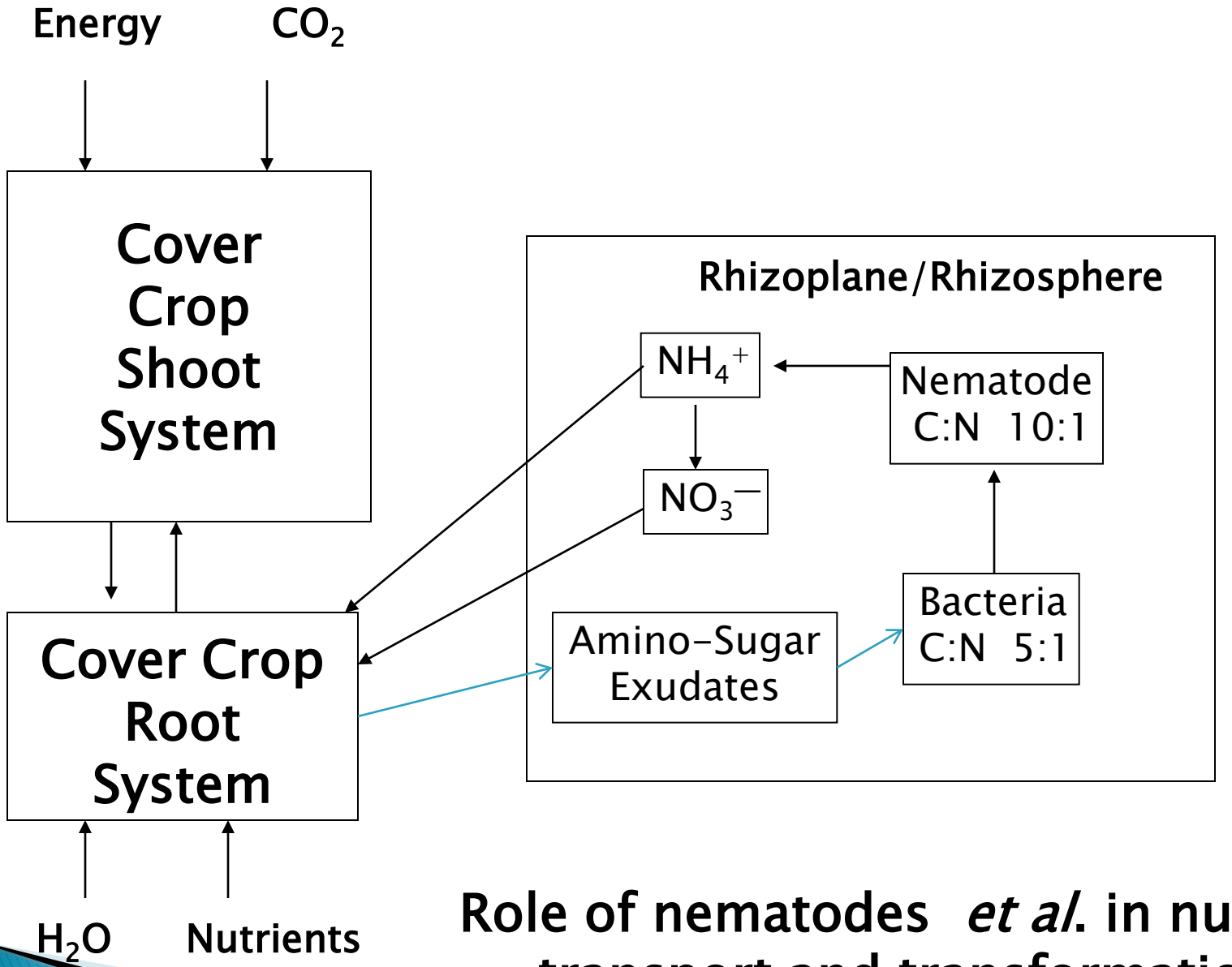
Management Practice	Crop Yield	Nematode Control
Bio-Fumigation Incorporation	-1%	39%
Bio-Fumigation Inc.+ Sealing	+11%	69%
Bio-Fumigation Inc. + Tarping	+12%	51%

Years Four Through Seven

- Soil Builders (Continuing Process)
  - Soil Chemistry (Balanced for 21 Elements)
  - Soil Biology (Balanced for Three Trophic Levels)
    - Bacterial Channel of Decomposers
    - Fungal Channel of Decomposers
- Soil Drillers (May be Necessary?)
- Soil Water (Continue Building SOM)
- Pest Managers
  - Weed Fighters (Oil Seed Radish Example)
  - Habitat for Friends (Biological Control)

Life at the Summit: A Challenge

- **Soil Quality Maintenance**
  - Physical Properties (SOM, WSA, Tillth)
  - Soil Chemistry (Balanced for 21 Elements)
  - Soil Biology (Balanced for Three Trophic Levels)
    - Bacterial Channel of Decomposers
    - Fungal Channel of Decomposers
- **An Ecologically-Based System**
  - Words that do not exist in the language of ecology
    - Pest
    - Weed
    - Pathogen/Disease



Role of nematodes *et al.* in nutrient transport and transformation.

	Flagellates	Amoebae	Ciliates
Surface litter	139,799 a	39,380 a	2,334 a
0 to 6” depth	5,758 b	9,321 b	266 b
6 to 12” depth	2,634 b	1,515 b	112 b

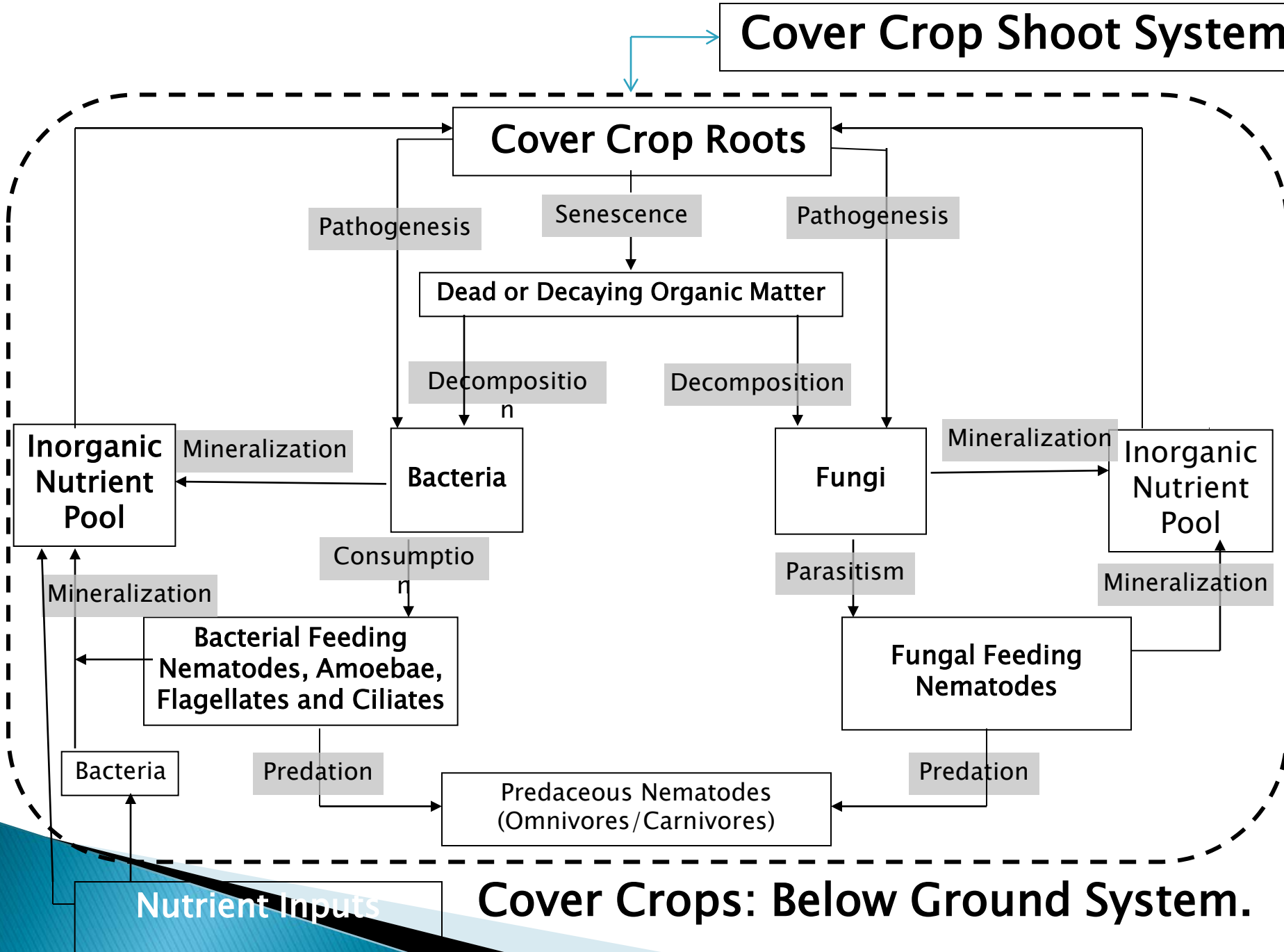
Vertical distribution and population density of soil organisms associated with eight cherry orchards in northern Michigan.

Vertical Distribution of Flagellates Associated with Organic and Conventional Cherry Orchards in Northern Michigan

	Organic	Conventional
Surface litter	258,344	21,235
0 to 6” depth	6,991	4,524
6 to 12” depth	2,342	2,928

Influence of management on active carbon and nitrogen in cherry production.

Management	Carbon (lbs/A)	Nitrogen (lbs/A)
Conventional	1054	59
Cover crop	1350	96
Organic	1680	110



Cover Crops: Below Ground System.

Bottom Line for Cover Crops

- Essential Component of Organic Agriculture.
- Climbing Mt. Organic Phase Specific.
- Crop system **objective** specific.
- Plant Species Specific.
- Species Cultivar Specific.
- Management Practice Specific.


For Successful Farming at the Summit of Mt. Organic:
Listen to the Worms!
Thank you.
George Bird