Wallace Center
AT WINROCK INTERNATIONAL

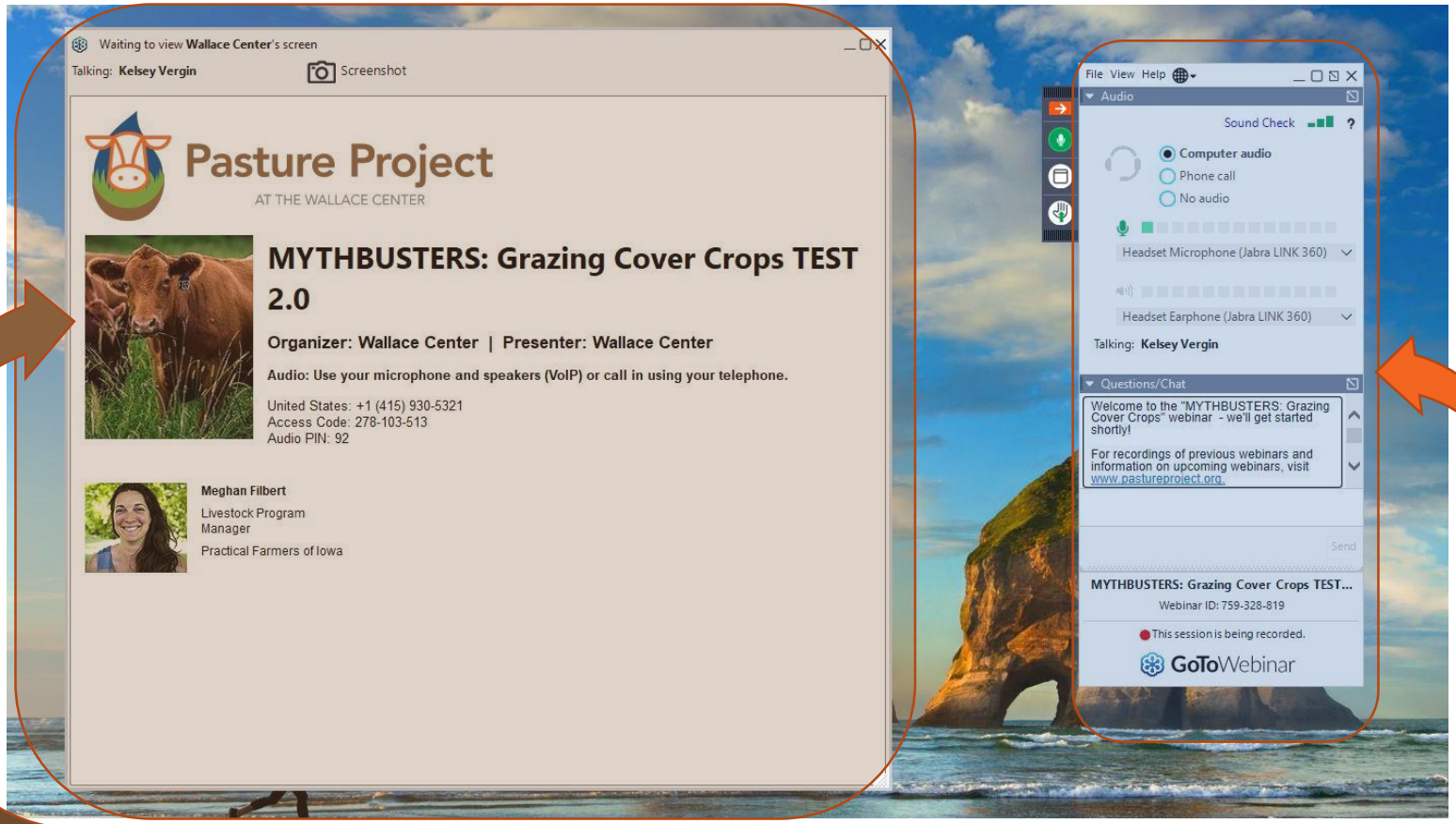
Pasture Project
AT THE WALLACE CENTER

GRAZING COVER CROPS FOR RESILIENCE

HOW GRAZING COVER CROPS BUILDS RESILIENCE THROUGH SOIL BIOLOGY WITH DR. KRIS NICHOLS

- Tech Orientation
- Welcome & Introductions
- Presentation
- Q&A

Your Starting Screen

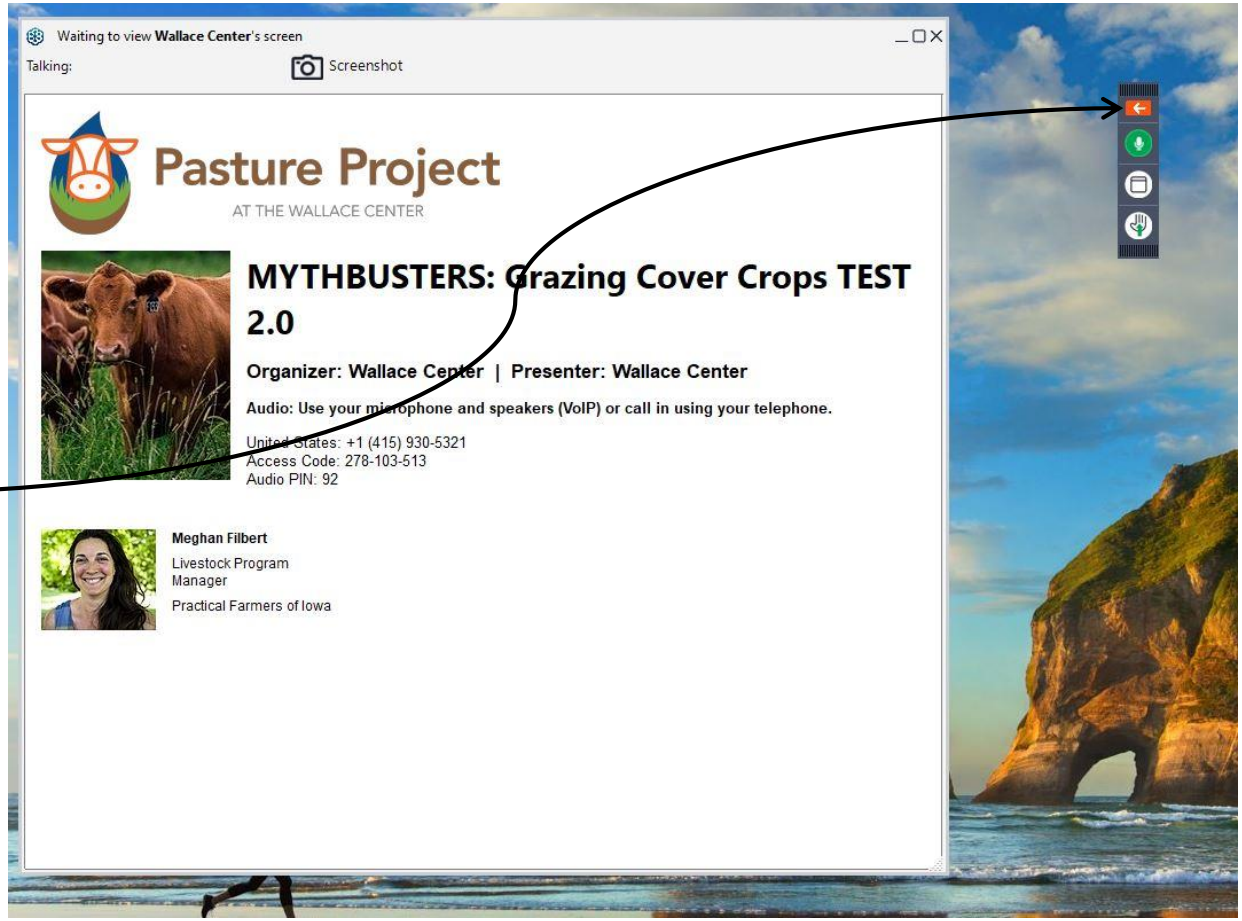


Presentation

Control Panel

To Display Minimized Control Panel

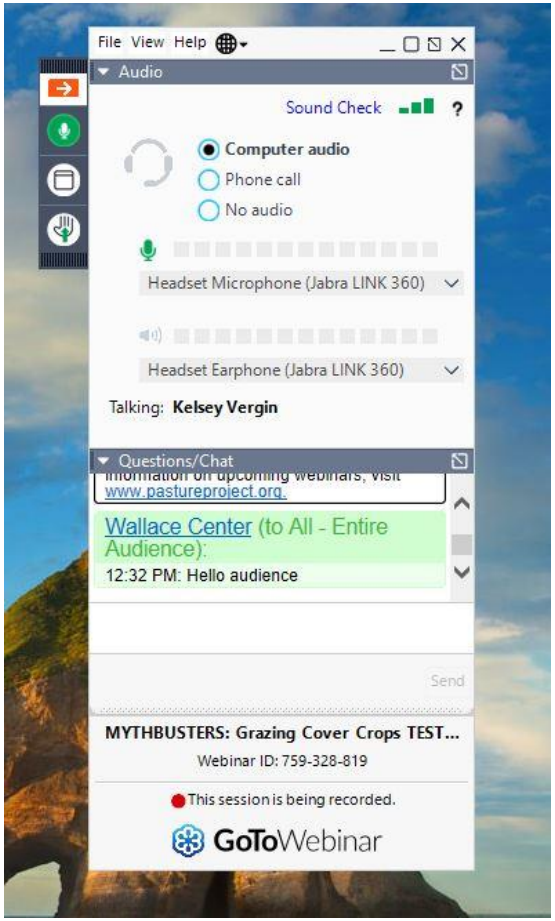
Click the orange arrow button



To Ask a Question

Type your question in the small box at the bottom of the Questions box.

Press “Send”!



What is the Pasture Project?

The Pasture Project works to advance and integrate regenerative grazing as a scalable, market-driven solution for building healthy soil, viable farms, and resilient communities in the Upper Midwest. Pasture Project is part of the Resilient Agriculture and Ecosystems initiative of the Wallace center at Winrock International.

www.pastureproject.org

Pasture Project
AT THE WALLACE CENTER

Register for upcoming webinars

How to Treat Your Cover Crop Like a Cash Crop

Wednesday, June 10 (2:00pm-3:00pm CT)

Fix your Mix: Using Management Goals to Create Diverse Cover Crop Seed Mixes

Thursday, July 23 (2:00pm-3:00pm CT)

Register: www.pastureproject.org/events

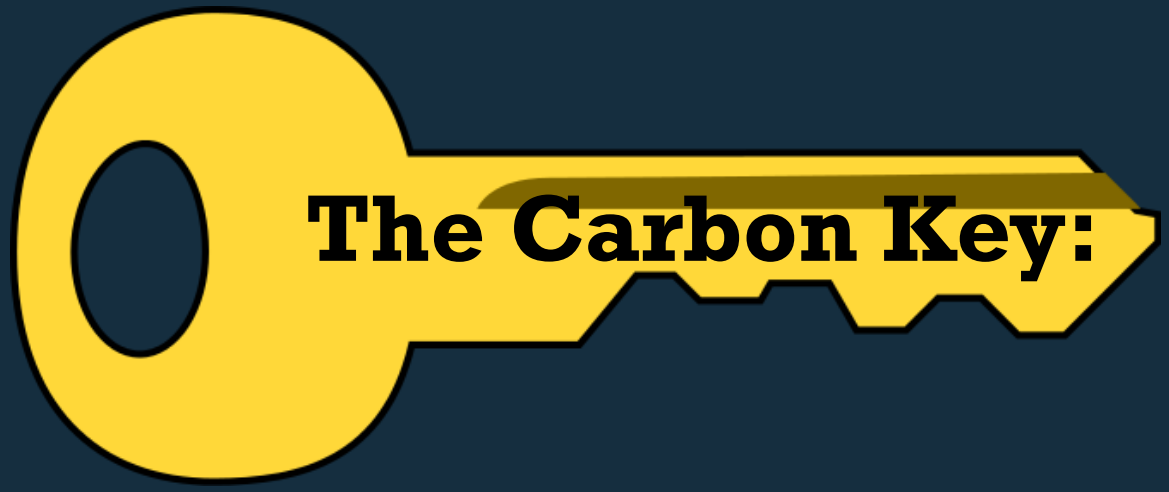
Audience Poll

Help us frame this webinar to address your particular needs by answering the following questions. Only available to those joining by computer – use your mouse to click answers on screen.

Your responses will be confidential – the Pasture Project never shares personal information.

Today's Presenter

Dr. Kris Nichols
KRIS Systems Education & Consultation



Grazing Cover Crops for Resilience

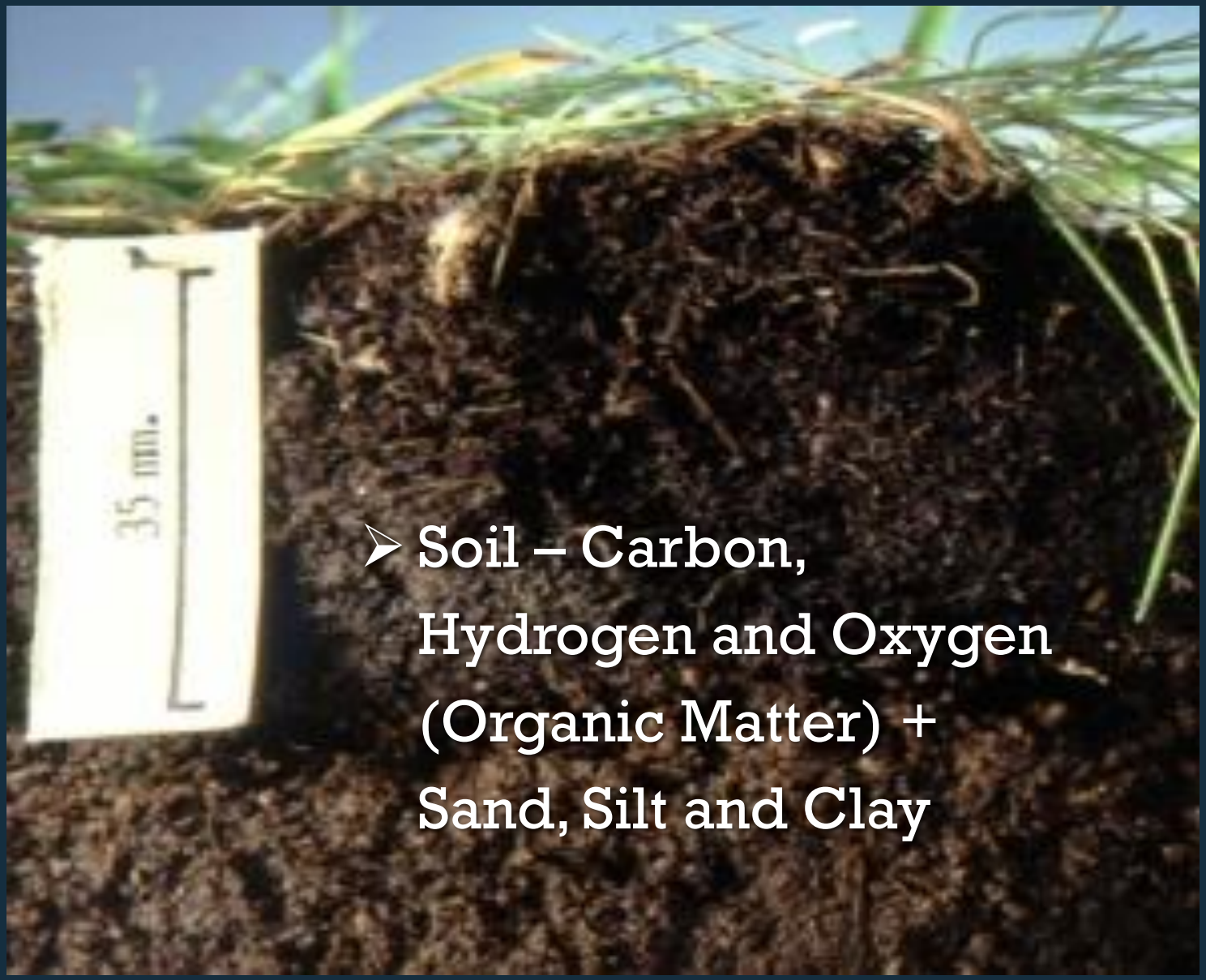
How Grazing Cover Crops Builds Resilience through Stimulating Soil Biology

Dr. Kris Nichols
KRIS Systems Education and Consultation
Kris@KRIS-systems.com

REGENERATIVE AGRICULTURE

- Innovative, Integrated, and Dynamic System
- Holistic Farming and Grazing Practices
- Focus on Problem Not Issues
- Enhance Resilience and Nutritive Quality
- Use the Power of Photosynthesis
  - sub-atomic and atomic level of energy flow from the sun through carbon into plants, microbes, and animals
  - interwoven into a complex, yet elegantly simple, repeated patterns

REGENERATING SOILS



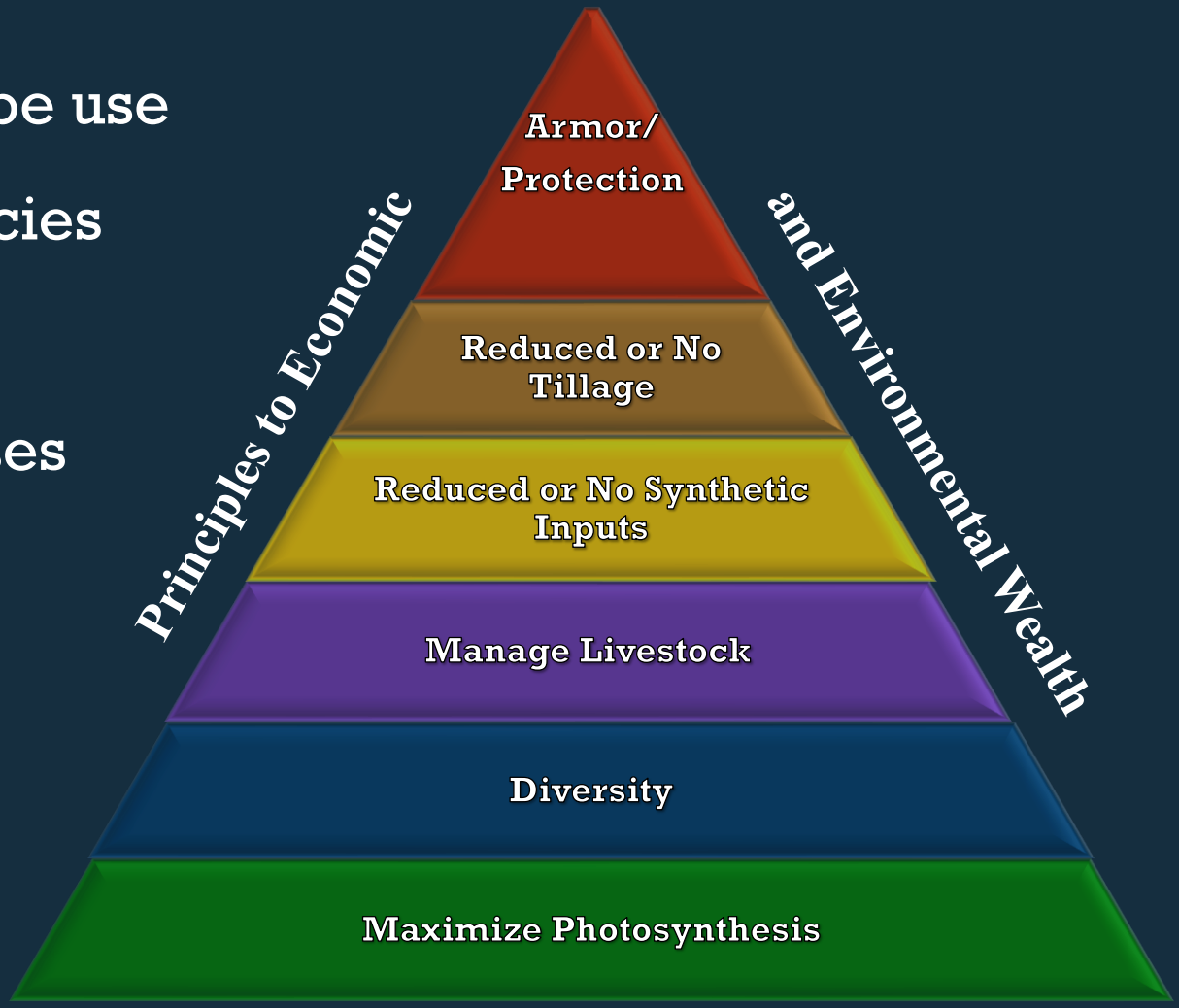
- Soil – Carbon, Hydrogen and Oxygen (Organic Matter) + Sand, Silt and Clay


The Carbon Problem
Soils Deficient in Carbon
Dave Brandt Farm
Carroll, Ohio
10.15.2013

BROWN REVOLUTION

Eco-Functional Intensification

- Optimize landscape use
- Maximize efficiencies
- Not more but less
- Multiple enterprises
- Everything costs
- Redistribute risk
- Nutrient density



TREAT SOIL LIKE YOU'RE SUPPOSED TO TREAT YOURSELF

- Eat small meals throughout the day (be a grazer).
- Eat a diverse diet.
- Exercise but don't over exercise – FIST (Frequency, Intensity, Scale, Timing).
- Protect your body from injury, radiation, temperature extremes, etc. (armor).

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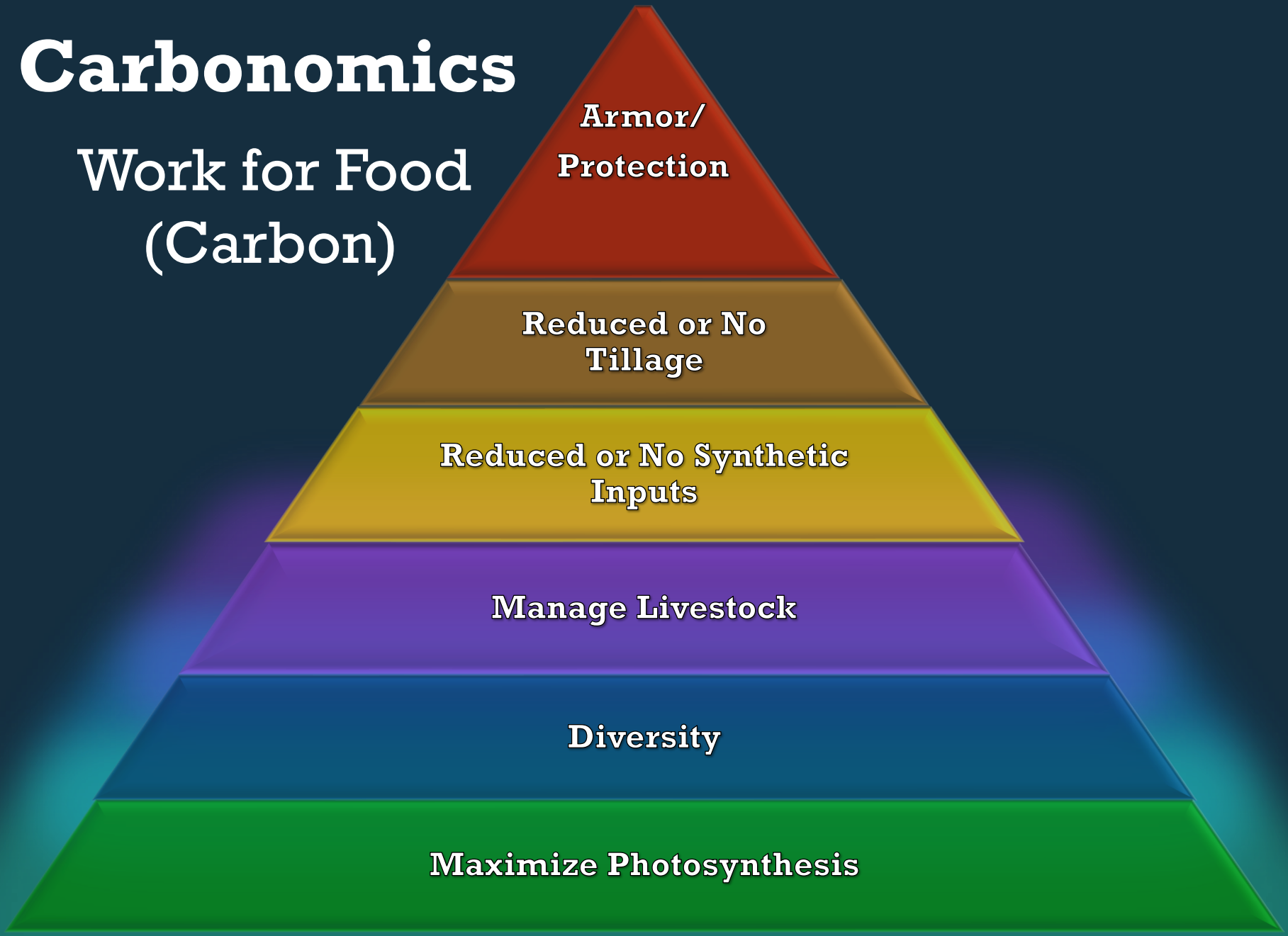
Education & Consultation
Knowledge for Regeneration & Innovation in Soil

Carbonomics

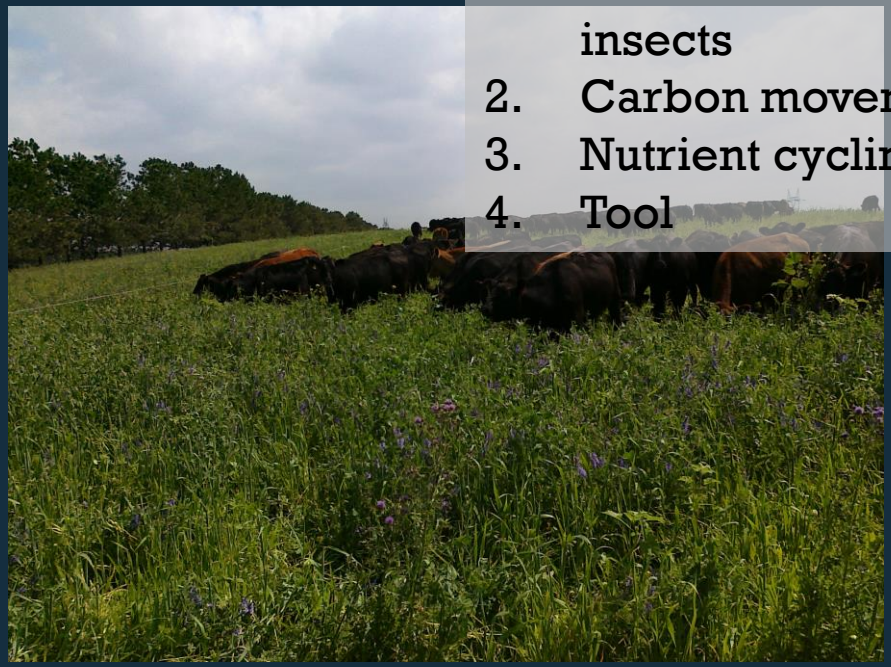
Work for Food (Carbon)



ANIMALS

Manage Livestock:

1. Livestock of all sizes including insects
2. Carbon movement
3. Nutrient cycling
4. Tool



ANIMALS

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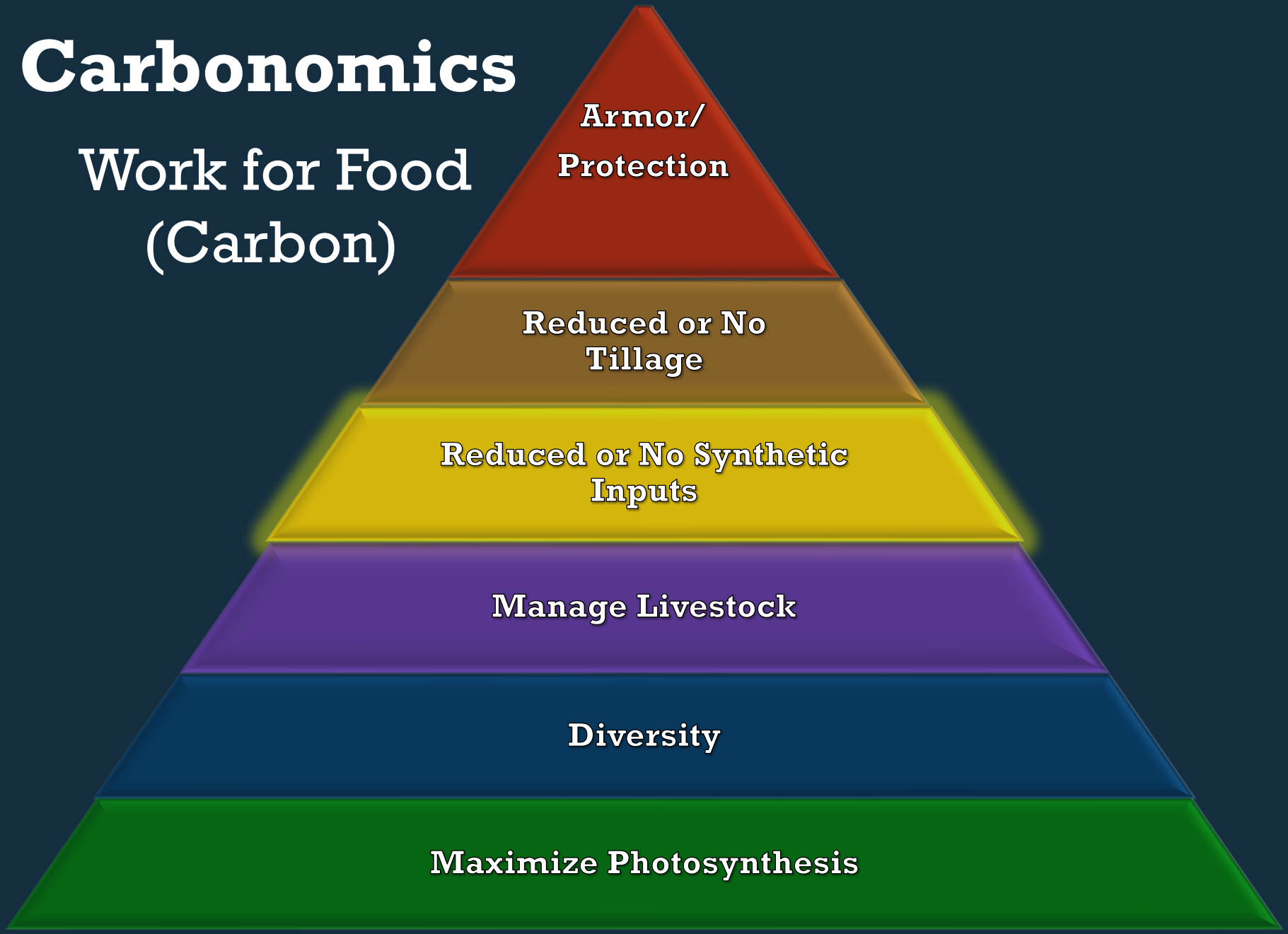
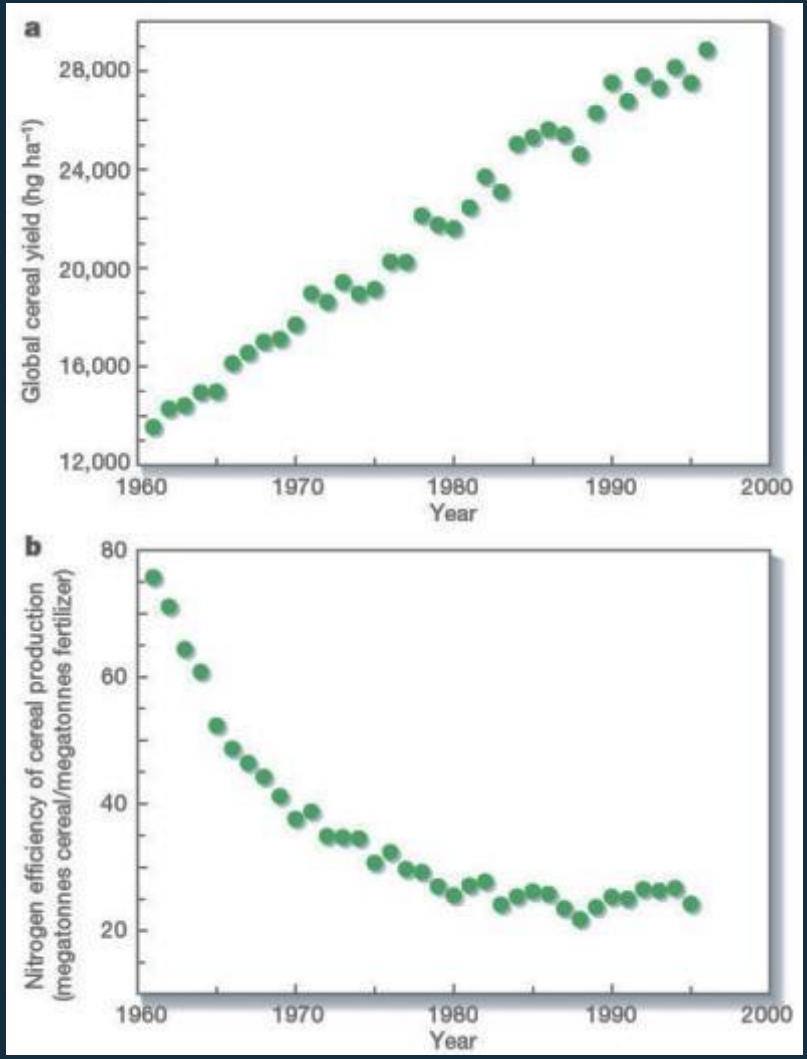


Nutrient Use Efficiency

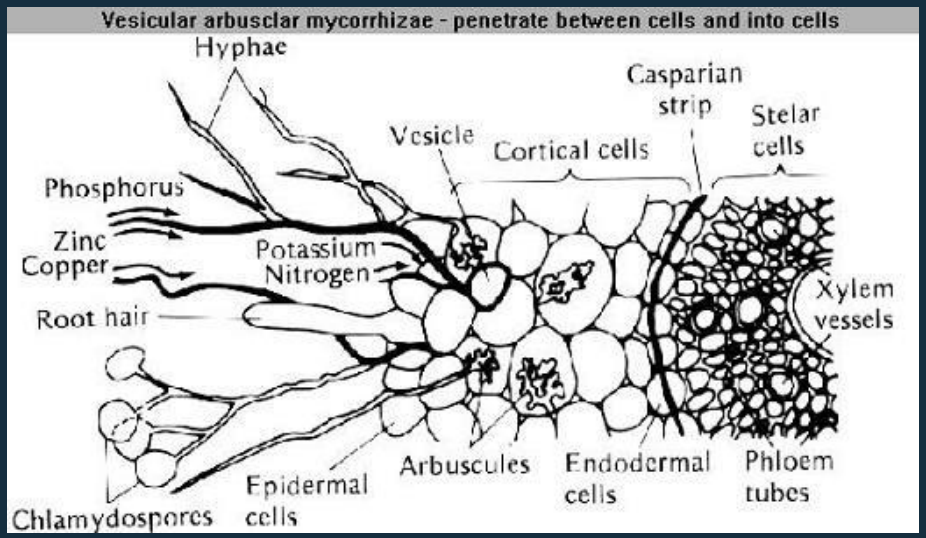
- Plant available – synthetic vs. biologic
- 30-50% of nitrogen fertilizer is used by the plant (Hirel et al 2011)
- 30% of phosphorus is used by the plant
- Availability, timing, water, and pH



- Tilman et al., 2002

ARBUSCULAR MYCORRHIZAL FUNGI

- Obtain nutrients (up to 90% of N and P) – Smith and Read, 2008
  - Phosphate-solubilizing bacteria – Toro and Barea, 1996
  - Mixed cultures more efficient, but this was also AMF species dependent – Walder et al 2012
  - Non-legume trades P for N via AMF and rhizobia activity – Chalk et al, 2014
- Transfer water
- Induce antioxidants (Garcia-Sanchez et al., 2014)



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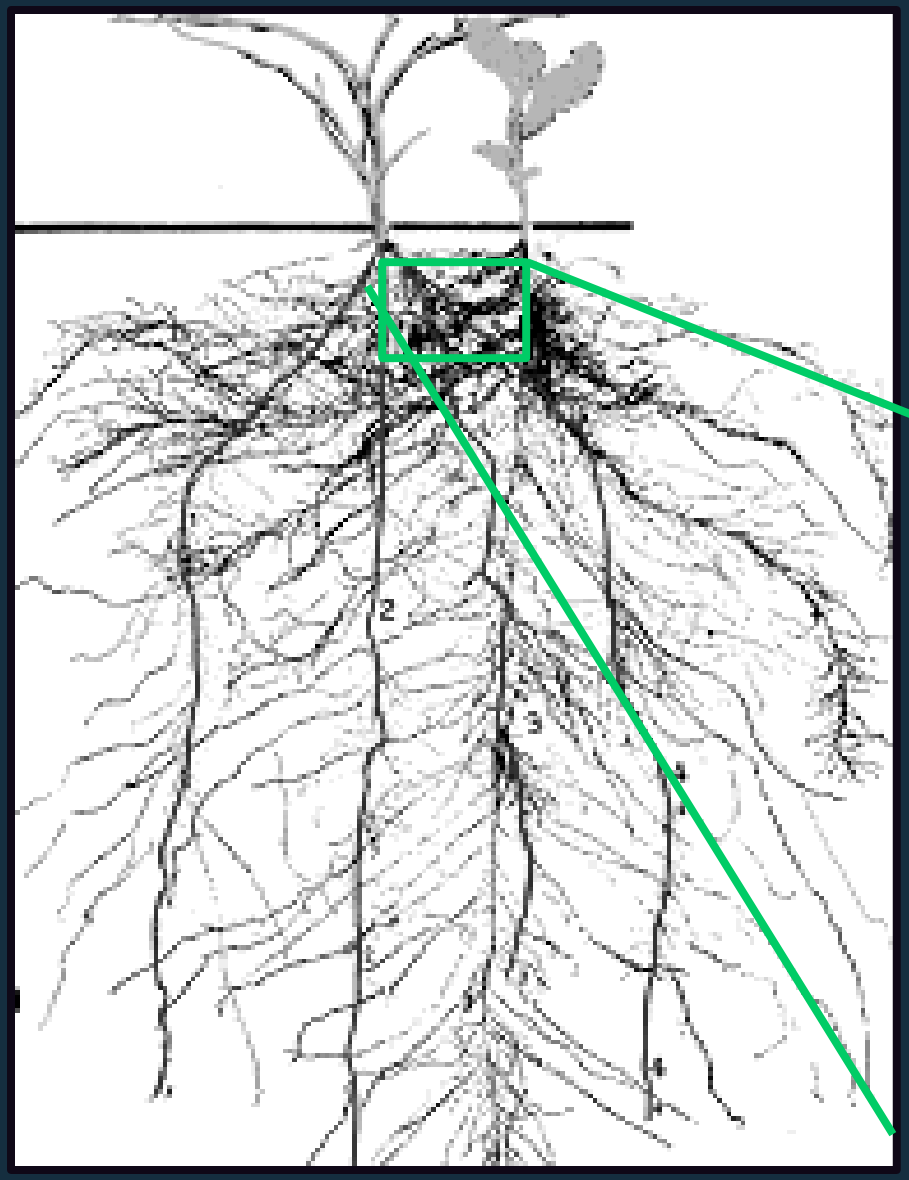
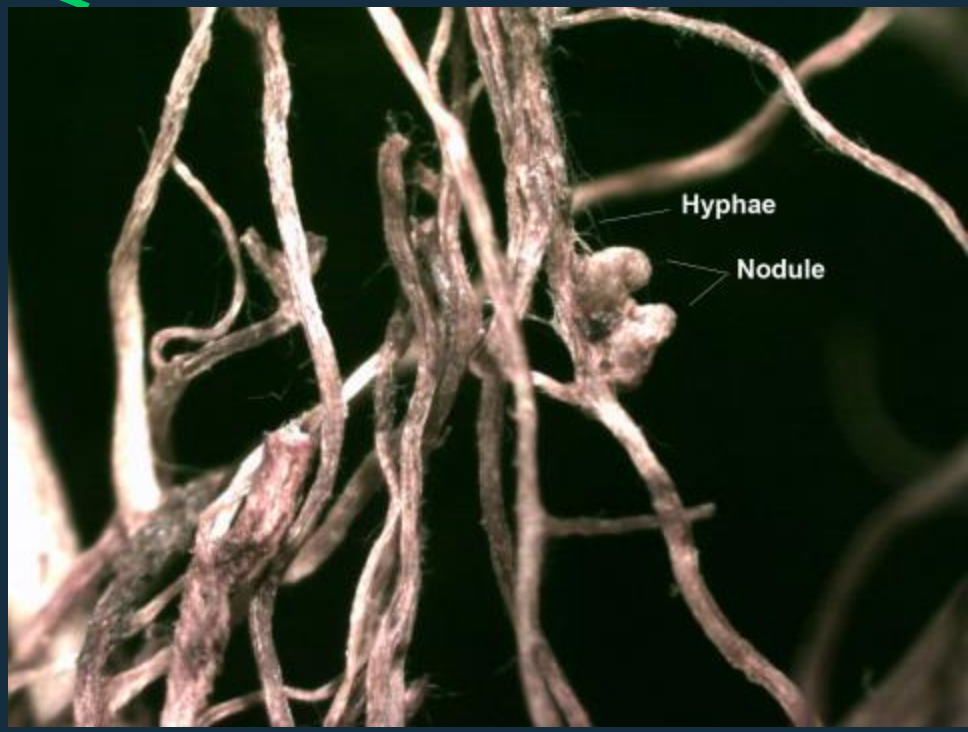
Plant to Plant Nutrient Exchange



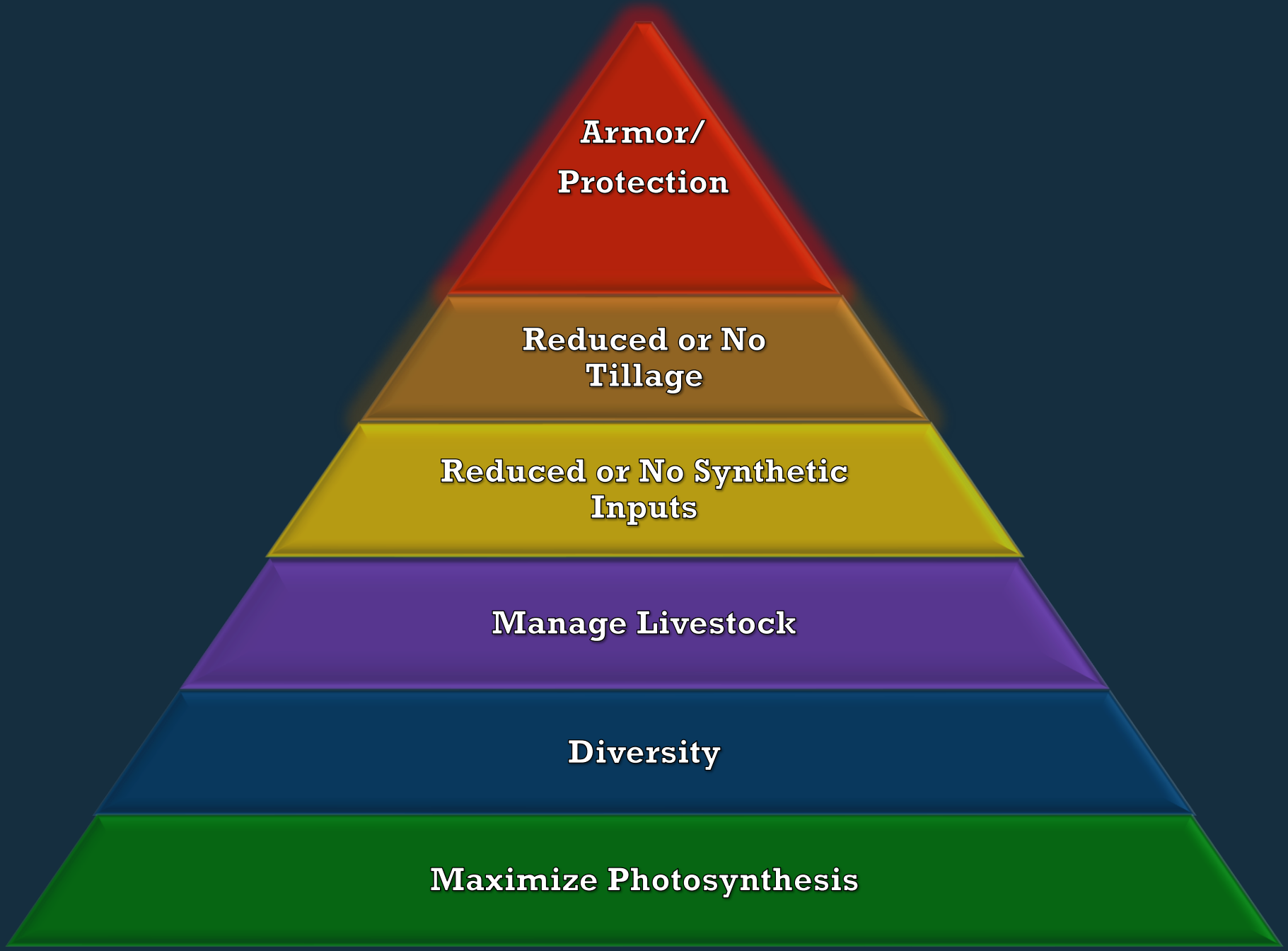
Interplant transfer N for P and C – Chalk et al., 2014

N fixation: N_2 via 32 ATP (needs 128 P and 320 C)

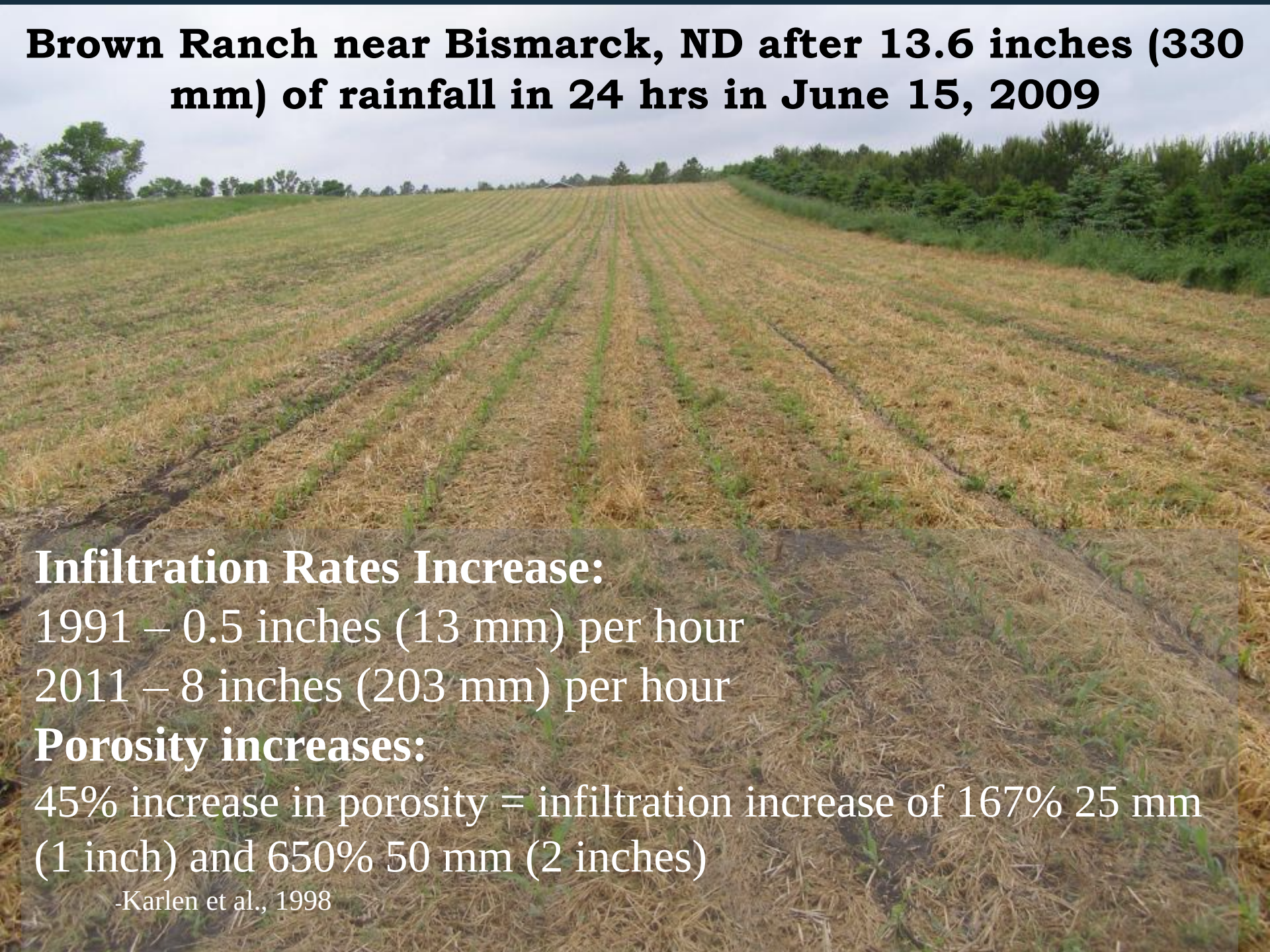


Water Use Efficiency

- The Drought Myth - a case of plant hunger rather than thirst - unfertilized corn required 26,000 gallons of water per bushel yielded 4X less than a fertilized field receiving only 5,600 gallons of water per bushel. – W.A. Albrecht, 2000
- Seven-way cover crop mix yield almost 3 times higher than of single crop on 7 in of soil moisture. Field with manure and no commercial fertilizer yielded the same as a fertilized field and plant tissues tested sufficient or high for N, P, K, and S – North Dakota, 2006
- 45% greater porosity increases infiltration rate by 167% for the first inch and 650% for the second inch - Karlen et al., 1998
- Loose soil has a slower rate of drying compared to packed soil, because the water films are discontinuous and moisture is not readily conducted to the surface.


Armor/
Protection
Reduced or No
Tillage
Reduced or No Synthetic
Inputs
Manage Livestock
Diversity
Maximize Photosynthesis

Brown Ranch near Bismarck, ND after 13.6 inches (330 mm) of rainfall in 24 hrs in June 15, 2009



Infiltration Rates Increase:

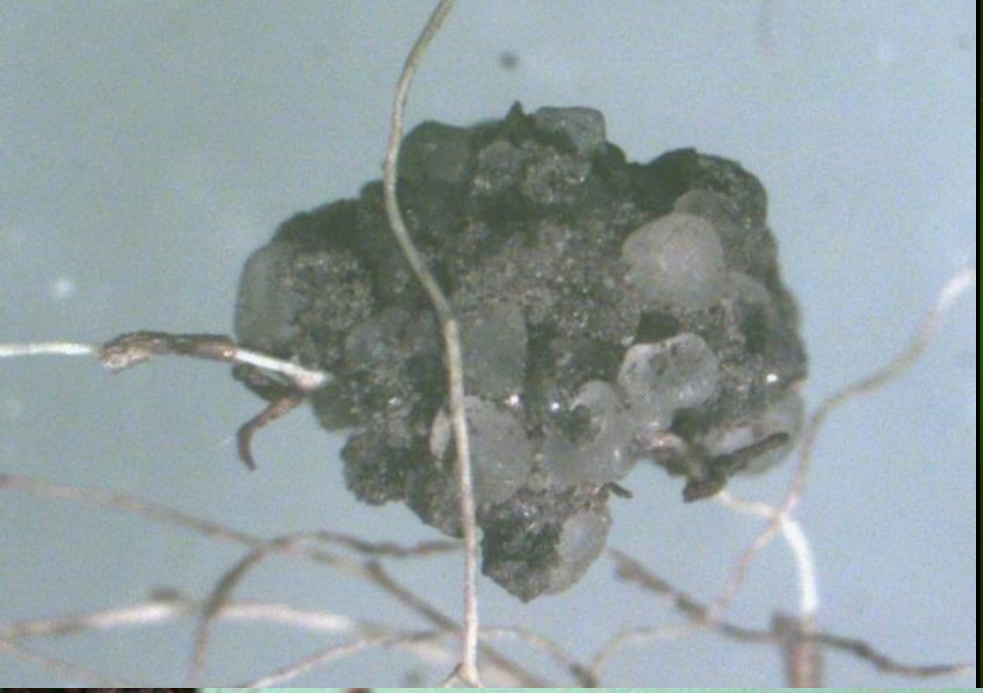
1991 – 0.5 inches (13 mm) per hour

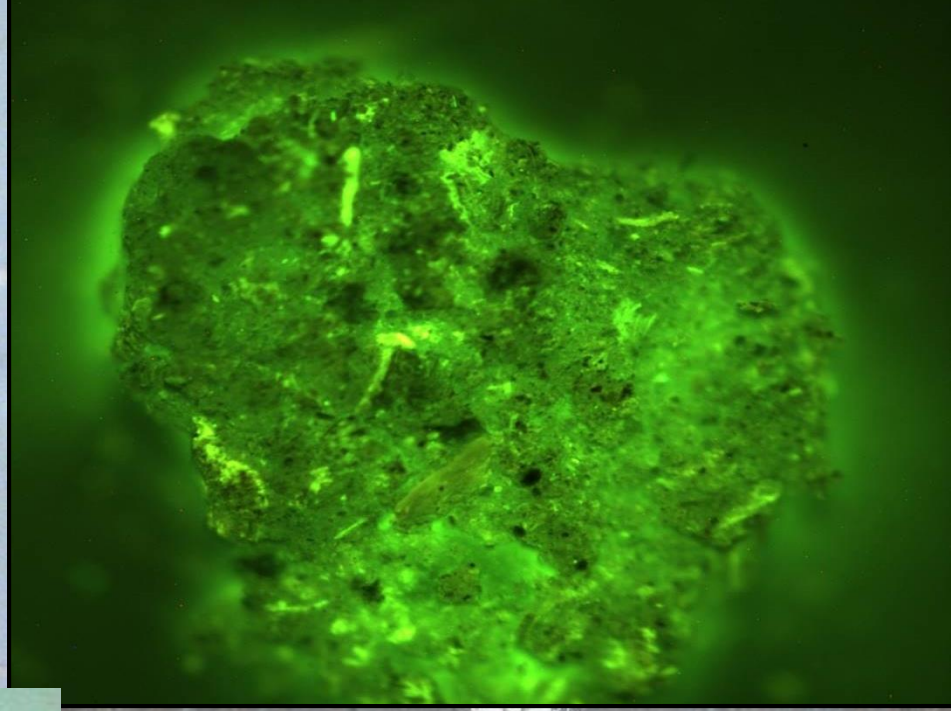
2011 – 8 inches (203 mm) per hour

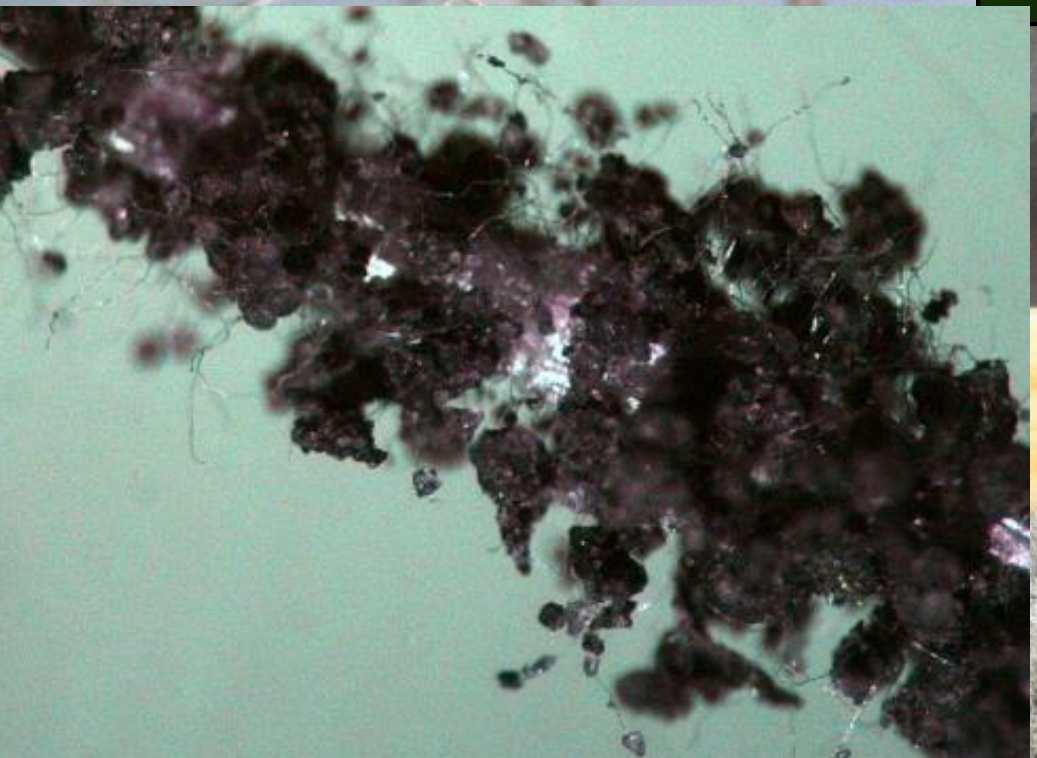
Porosity increases:

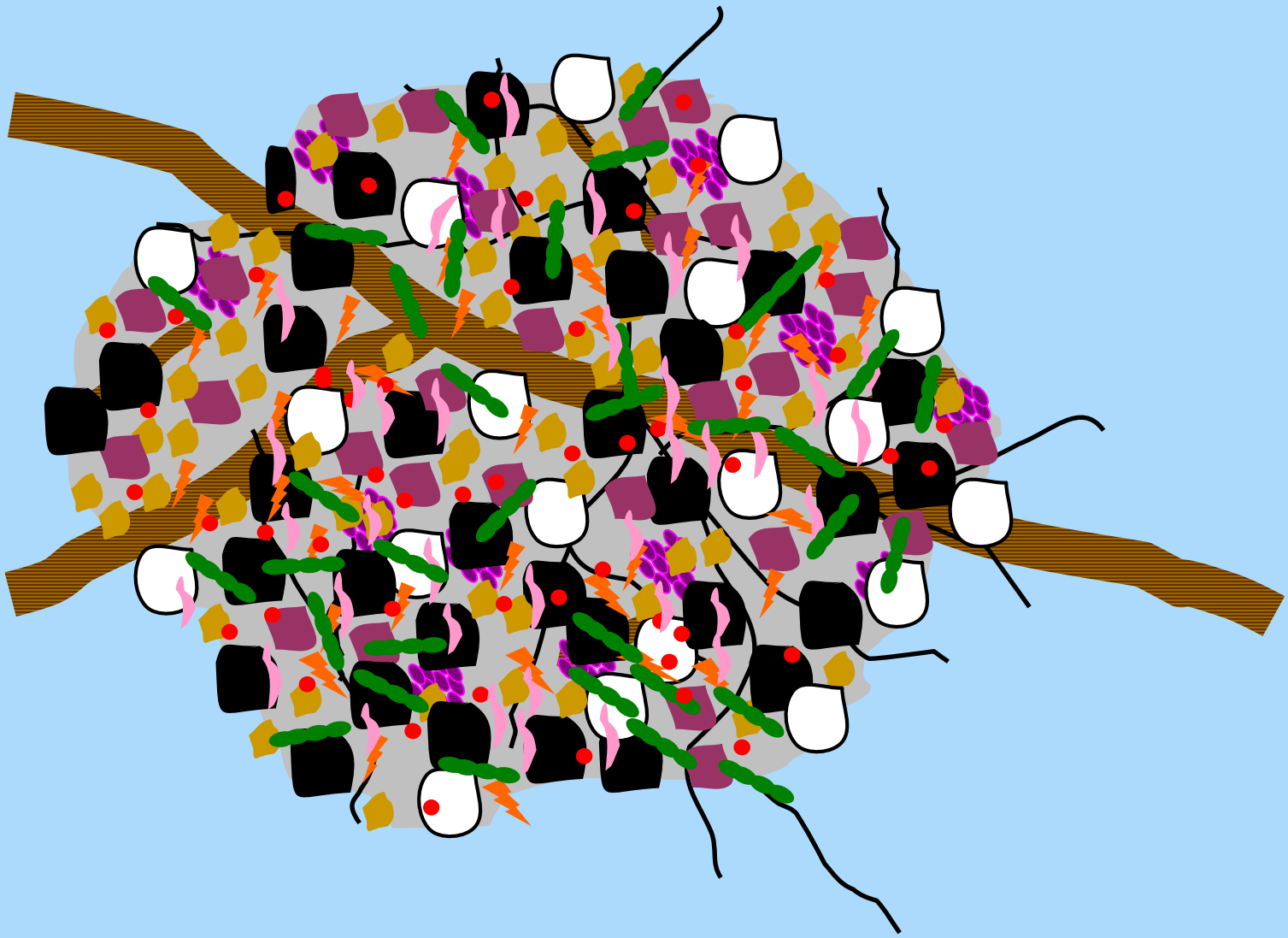
45% increase in porosity = infiltration increase of 167% 25 mm (1 inch) and 650% 50 mm (2 inches)

-Karlen et al., 1998

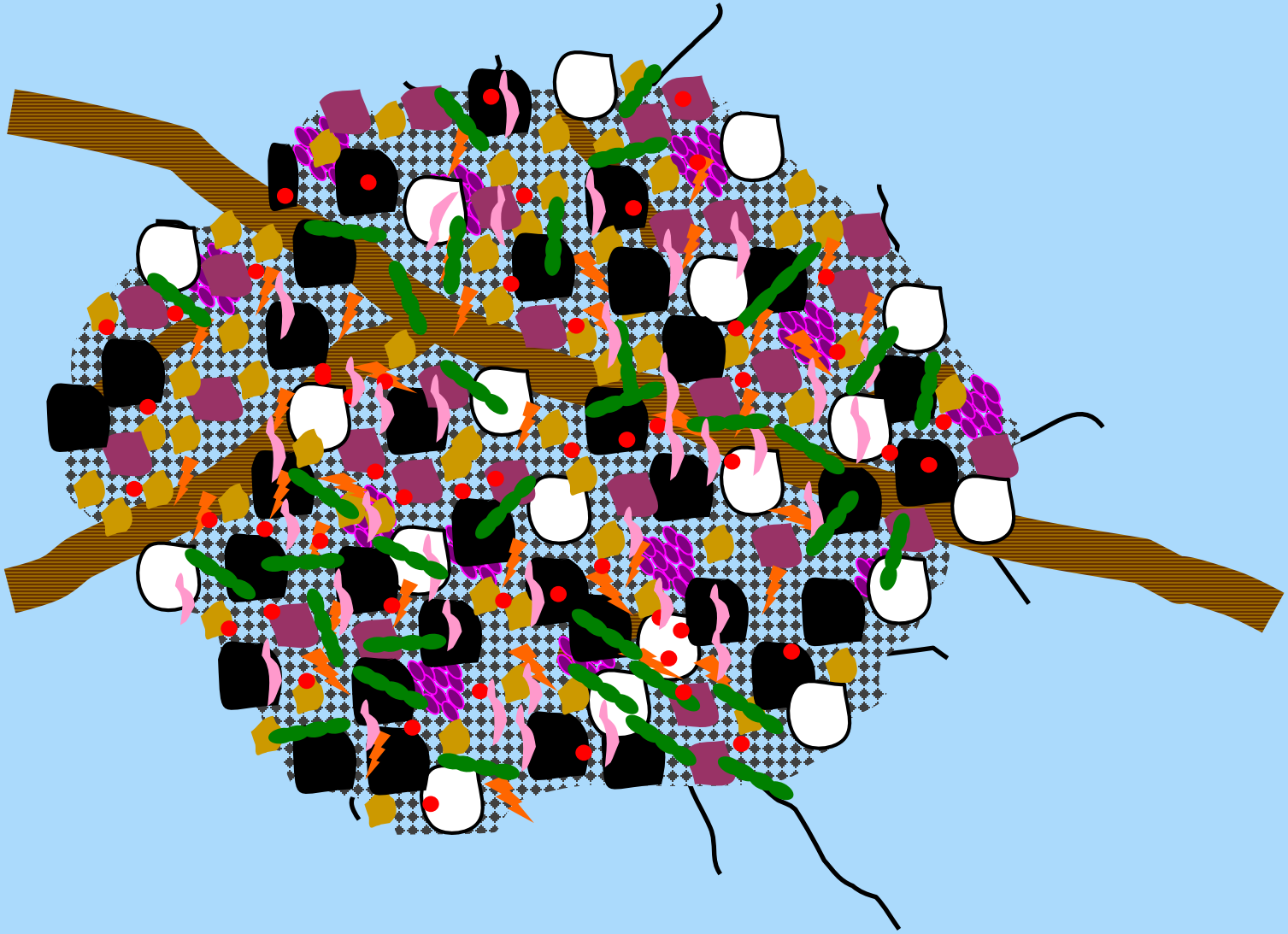




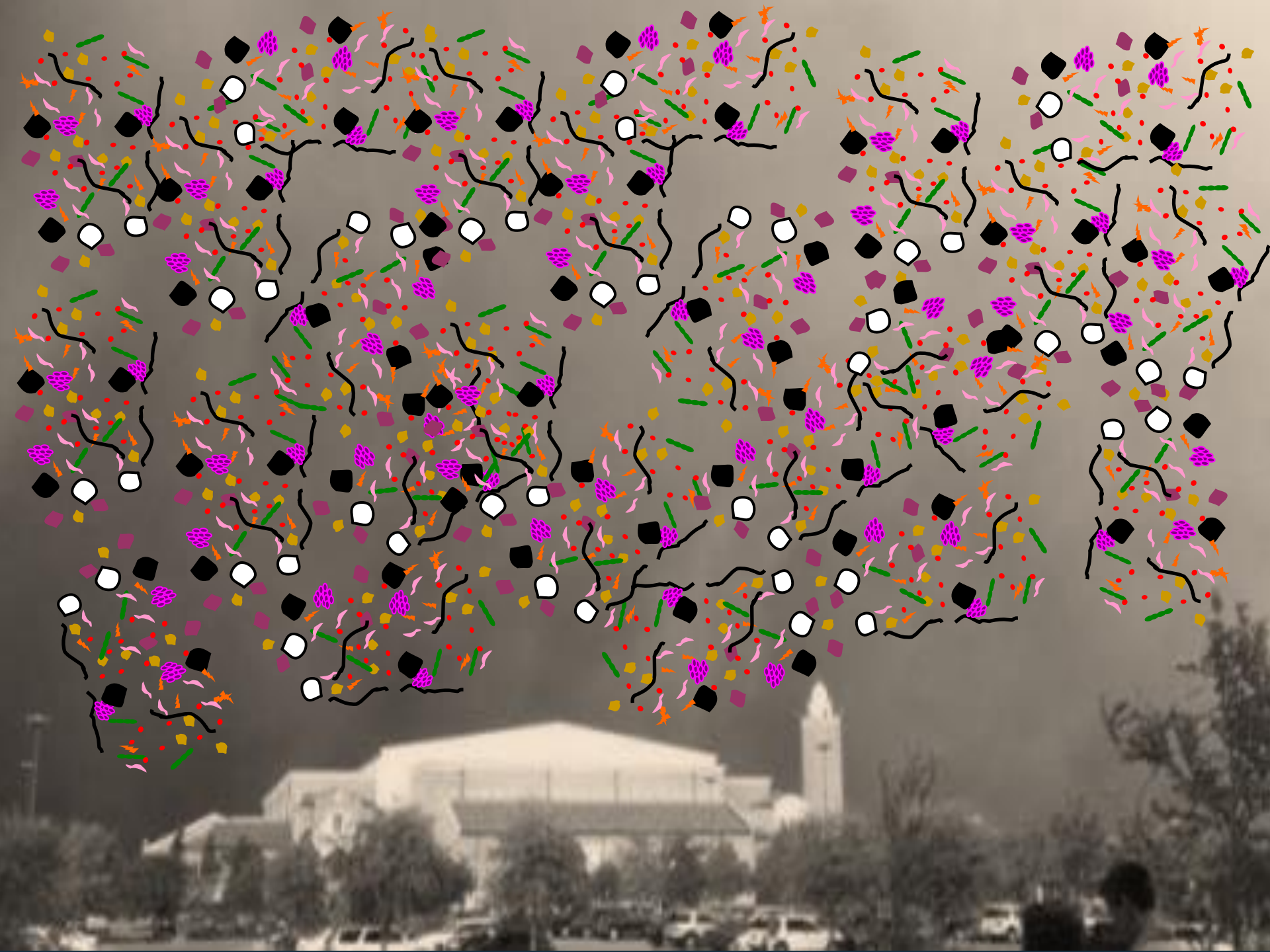



Water

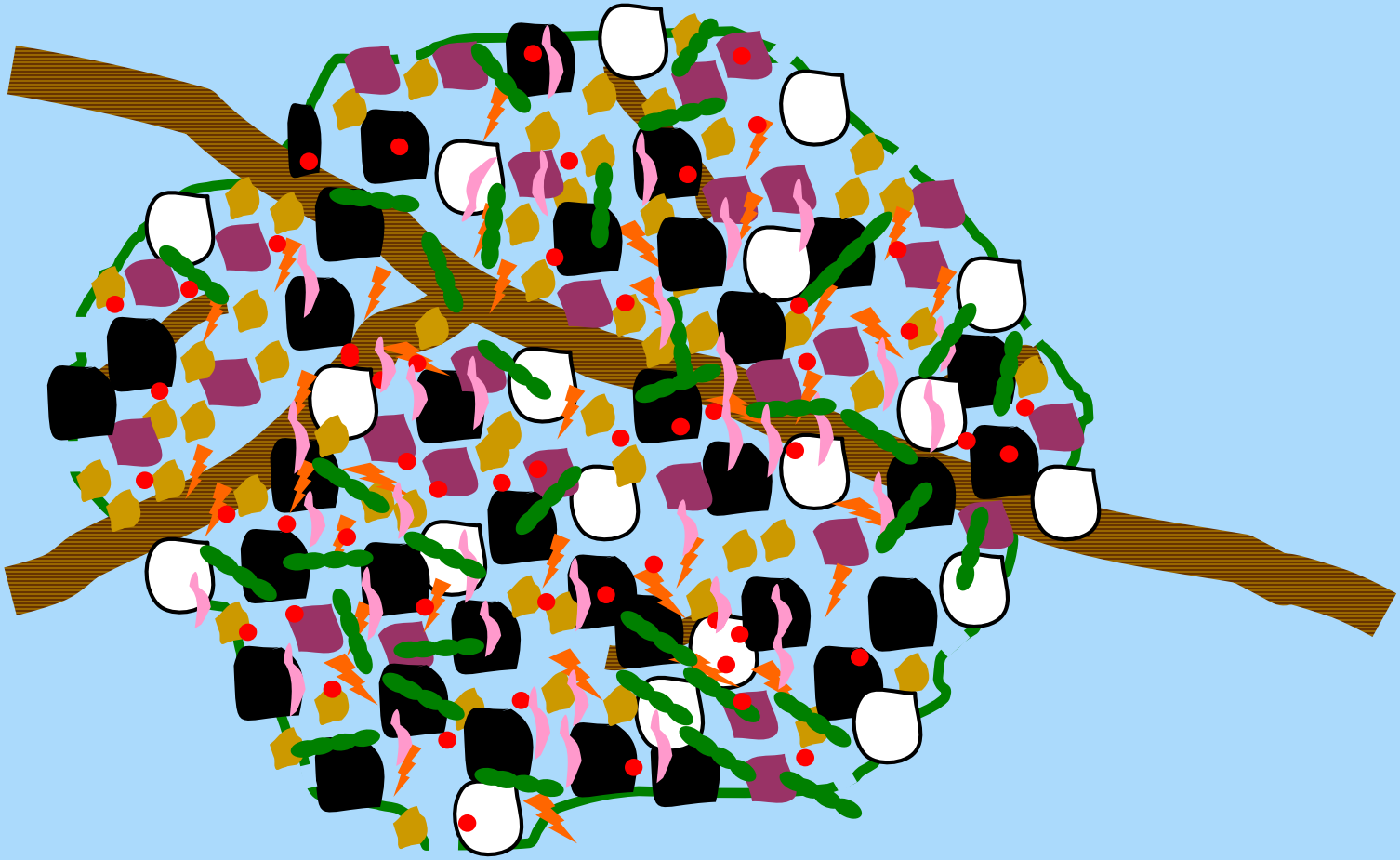
Water




Water



Water



Aggregate Stability

WSA = 14%

CT, SW-F

WSA = 47%

NT, SW-WW-SF

WSA = 93%

Moderately-grazed pasture

It really boils down to this: that all life is interrelated. We are all caught in an inescapable network of mutuality, tied into a single garment of destiny. Whatever affects one destiny, affects all indirectly.

Martin Luther King Jr., Christmas Eve Serman, 1967

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Q&A

Please submit your question by using the “Questions” box in the Control Panel on your screen. You may need to expand the “Questions” box by clicking the small arrow.

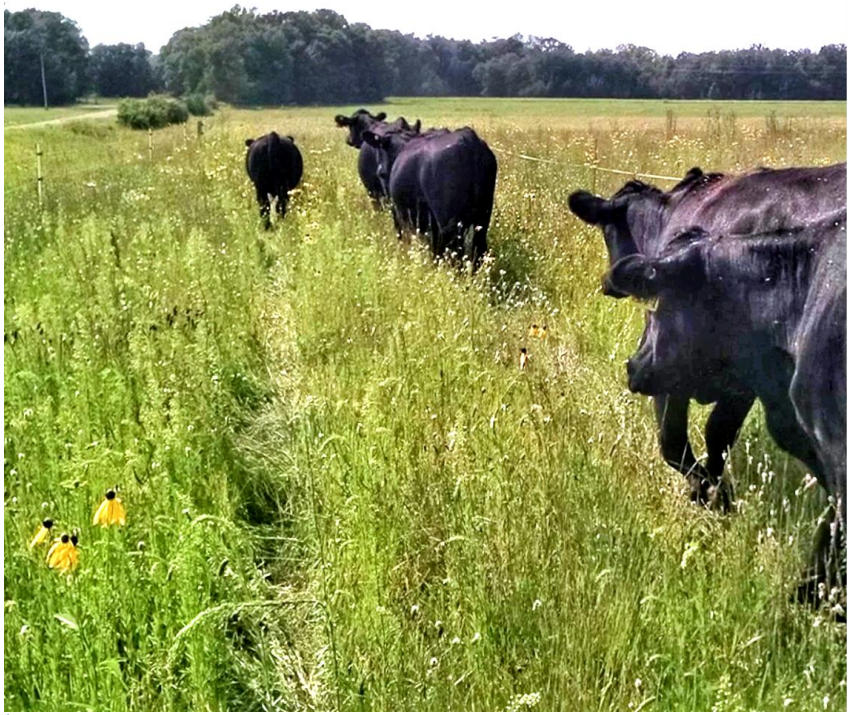
Questions will be combined to help us get through as many as we can in the time we have remaining.

REMINDERS!

- Register for upcoming webinars: www.pastureproject.org/events

- Complete the post-webinar survey – it's quick, confidential, and helps us offer more free webinars

CONTACT US!



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