

# GK12 Workshop

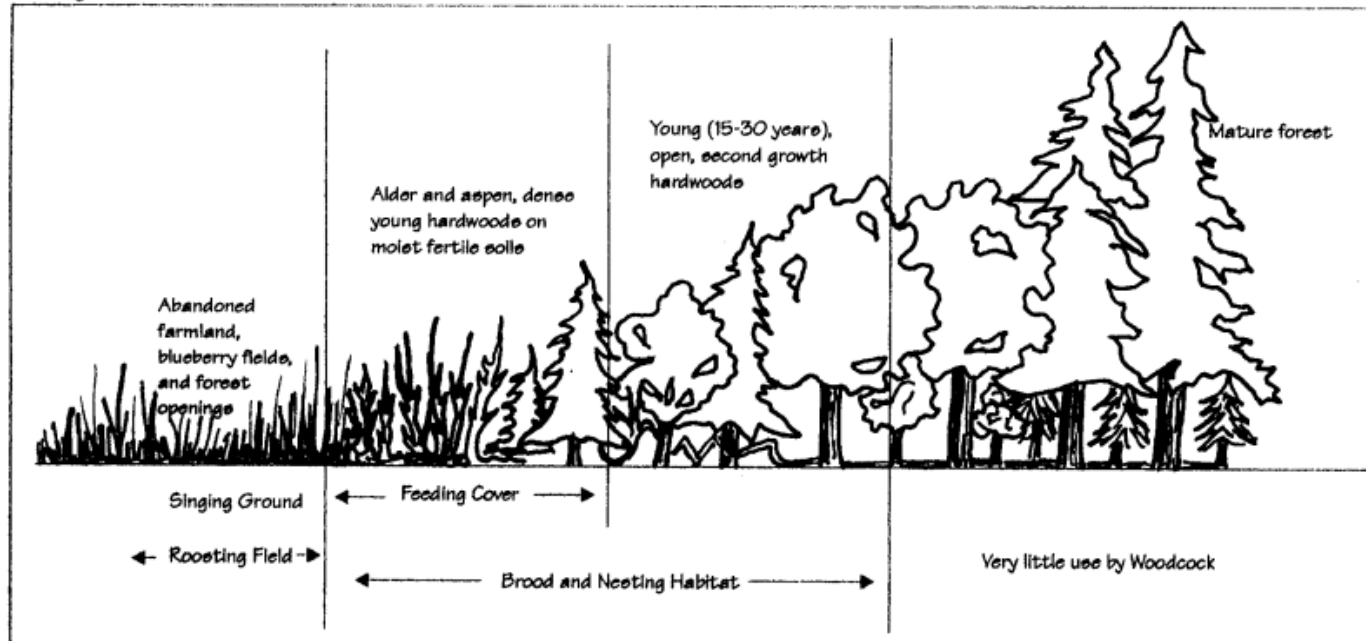
## Study Succession like a KBS Scientist



# What is Succession?

- Changes in the composition or structure of an ecological community
- Can begin from arrival of new habitat or through disturbance of existing habitat

Stages of forest succession





# 2004 KBS LTER Main Site

## Treatment Key

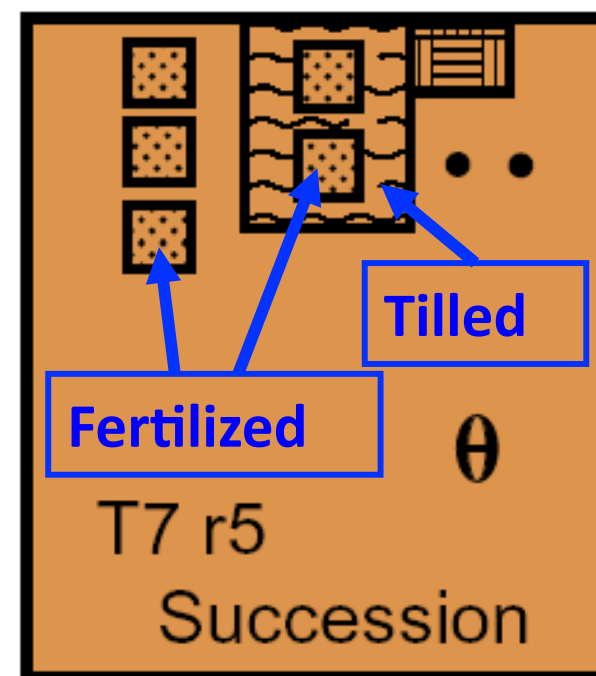
- T1 Conventional corn/soybean/wheat conventional till
- T2 No-till corn/soybean/wheat no till
- T3 Reduced-input corn/soybean/wheat + clover
- T4 Reduced-Input organic corn/soybean/wheat + clover
- T5 Poplar trees
- T6 Alfalfa
- T7 Early Successional community
- T8 Mid-Successional community - Never tilled
- r = replicate number

## Microplot key

- Nitrogen fertilizer microplot
- Tilled microplot
- Leaf Litter Traps
- 2m x 1m Poplar trees, no fescue cover
- Plant competition microplots (3 density x 2 herbicide)
- Nematode disturbance study

## Instrumentation key

- Minirhizotrons
- Trace gas flux chambers
- TDR Rods
- Low tension suction lysimeters
- Weather station & weighing lysimeter
- Trace gas shed



<http://lter.kbs.msu.edu/>

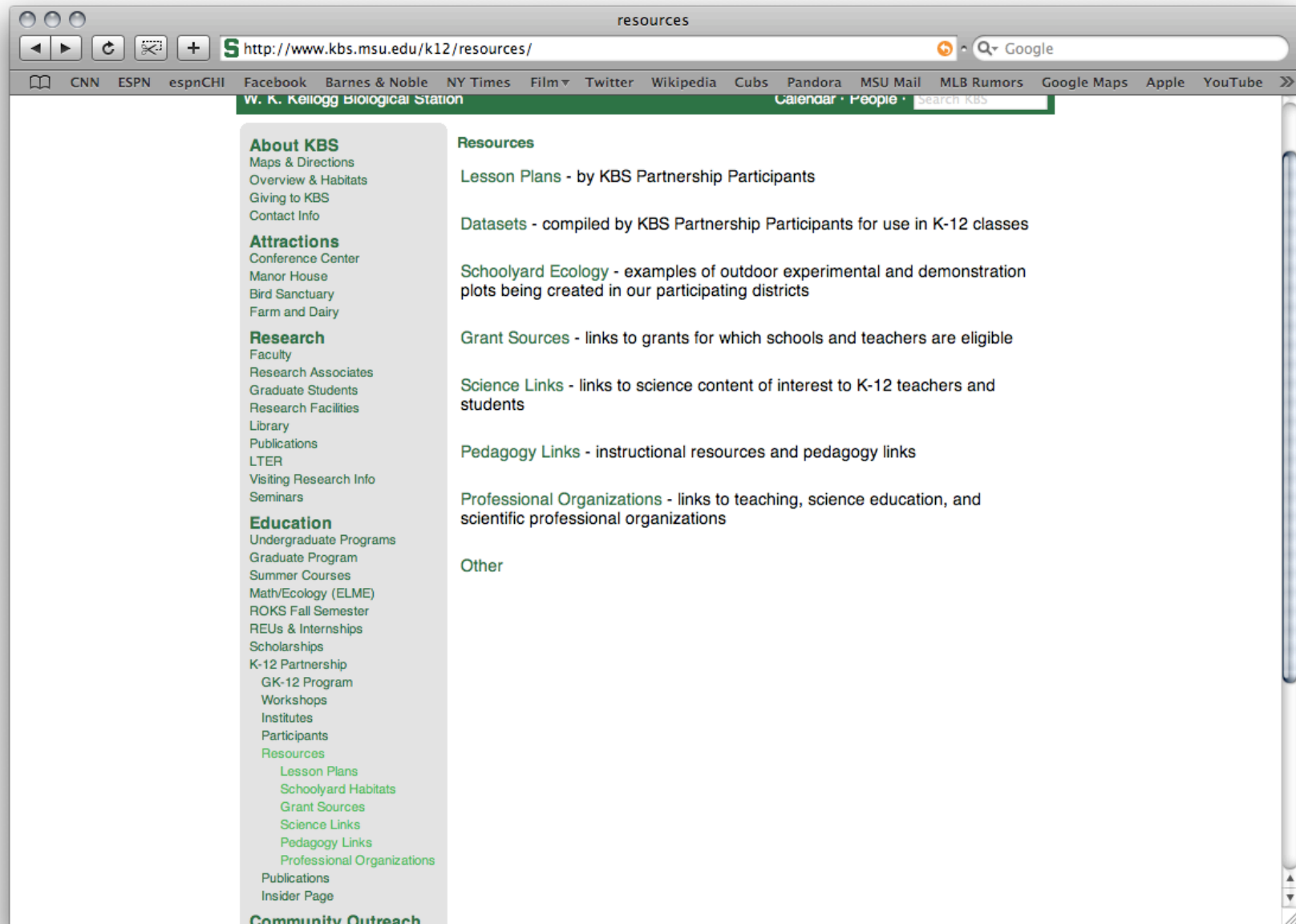
# Tillage

- Every spring, the tilled “microplots” within each replicate get tilled and disked with a tractor.
- Why study this?
  - Basic understanding of how communities function
  - Humans are disturbing large pieces of the planet
- What effect do you think this will have on the plant community?
  - Number of species (species richness)?
  - Abundance of community (aboveground biomass)?
  - Traits of the species (e.g., dispersal, annual/perennial, N fixer, height)?

# Fertilization

- Every spring, the fertilized “microplots” get N fertilizer (12 g N/m<sup>2</sup> as ammonium nitrate)
- Why study this?
  - Basic understanding of how communities function
  - Humans are altering global N cycle
- What effect do you think this will have on the plant community?
  - Number of species (species richness)?
  - Abundance of community (aboveground biomass)?
  - Traits of the species (e.g., dispersal, annual/perennial, N fixer, height)?

# LTER Dataset



<http://www.kbs.msu.edu/k12/resources/>

# Using Excel

- [http://spreadsheets.about.com/od/excel101/a/Excel\\_beg\\_guide.htm](http://spreadsheets.about.com/od/excel101/a/Excel_beg_guide.htm)
- <http://www.ncsu.edu/labwrite/res/gt/gt-menu.html>
- <http://serc.carleton.edu/introgeo/mathstatmodels/xlhowto.html>
- [http://serc.carleton.edu/files/introgeo/mathstatmodels/excel\\_cheat\\_she.pdf](http://serc.carleton.edu/files/introgeo/mathstatmodels/excel_cheat_she.pdf)

# Questions

Figure 1

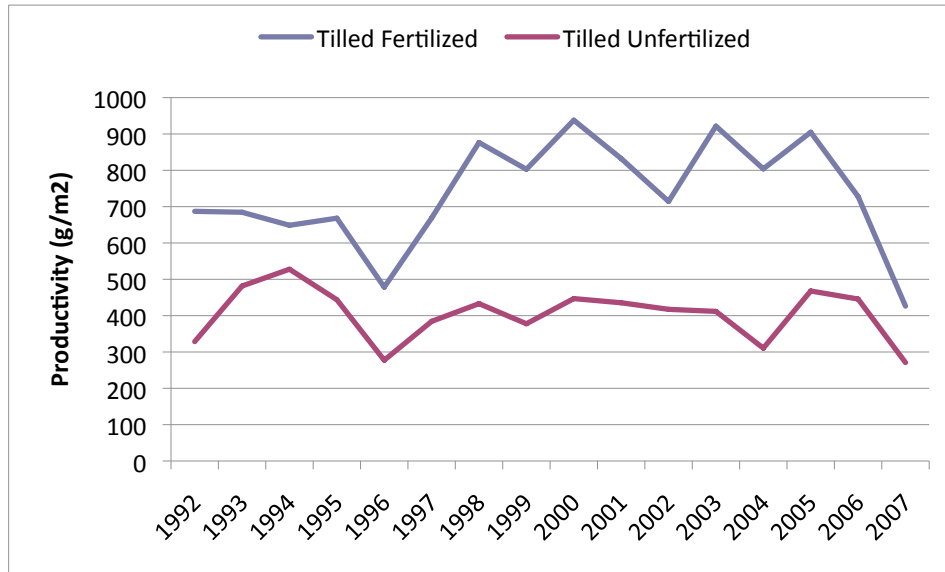
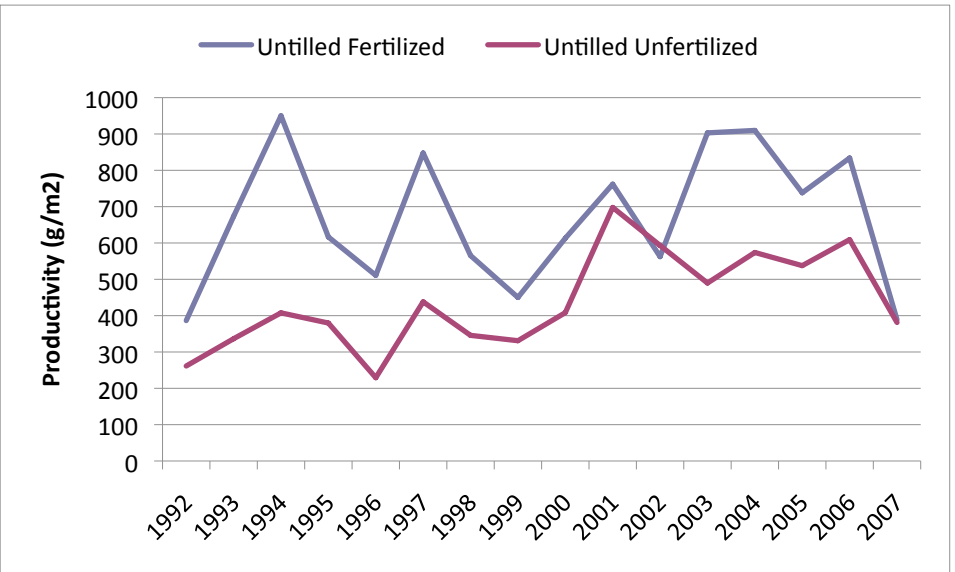


Figure 2



- How does fertilization change the productivity of the plots? What are some possible reasons?
- As present in these figures, productivity changes over time.
  - Explain at least two reasons this may be happening.
  - Design an experiment, or use further data collection, to figure out whether your reasons are right. Write this on a separate sheet of paper.



# Questions

Figure 3

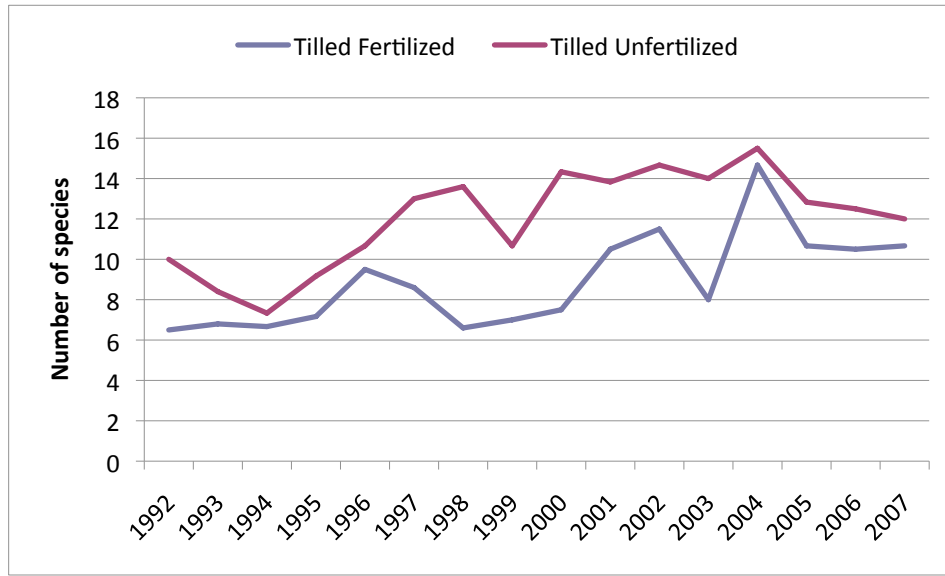
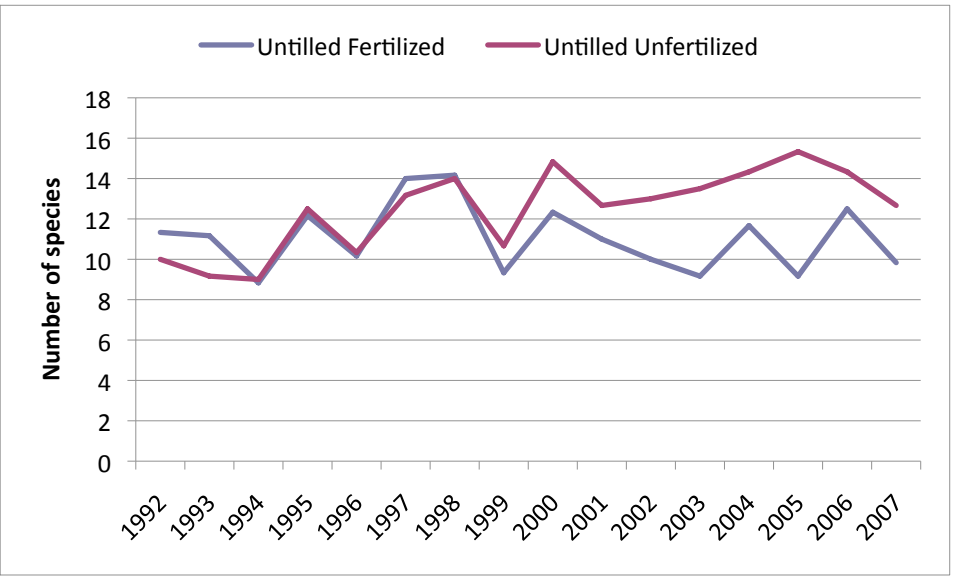


Figure 4



- How does fertilization alter the diversity of these plots (species richness)? Possible reasons?
- These figures illustrates the change in species richness over time.
  - Explain at least two reasons this could be occurring here.
  - Now use more data or design an experiment to figure out whether your reasons can explain this trend.

# Questions

Figure 5

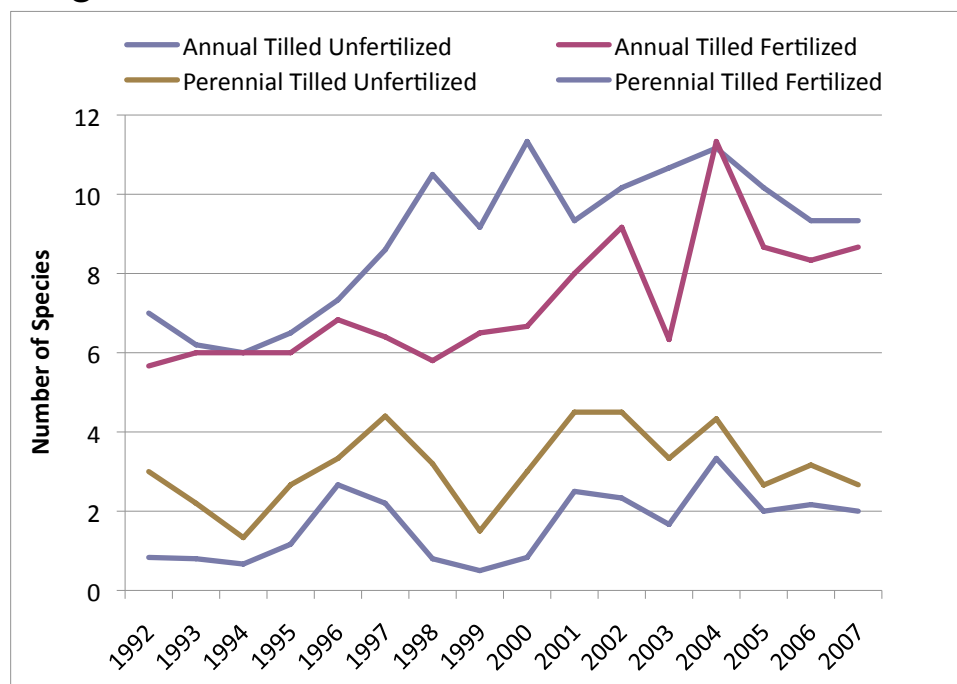
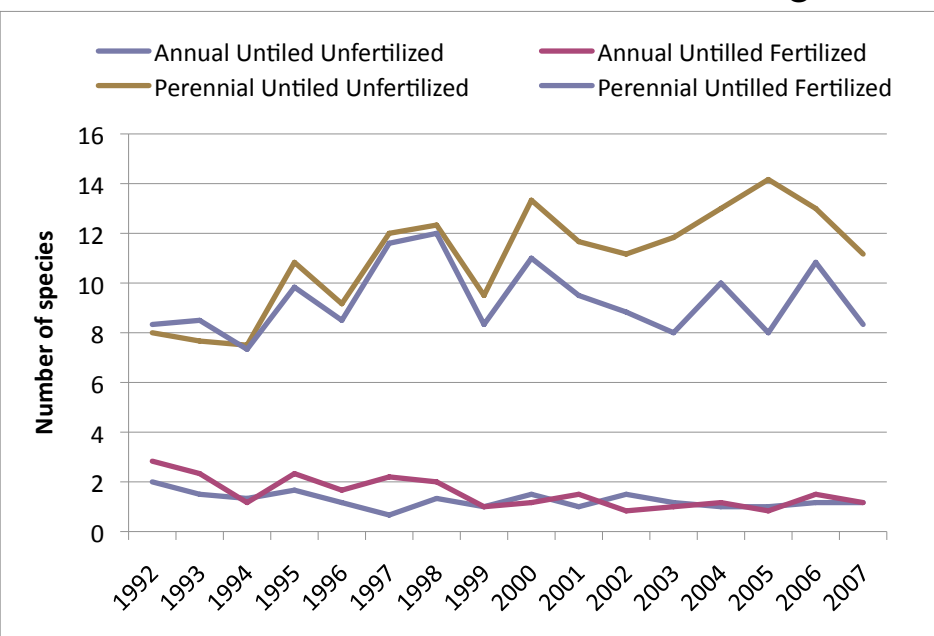


Figure 6



- Does tillage change the number of annual species present? In what way? Why?
- What happens to the number of annual species in the untilled plots over time? Why?