June AMT Office Hours

Tom Butler, EPA

6/13/2025

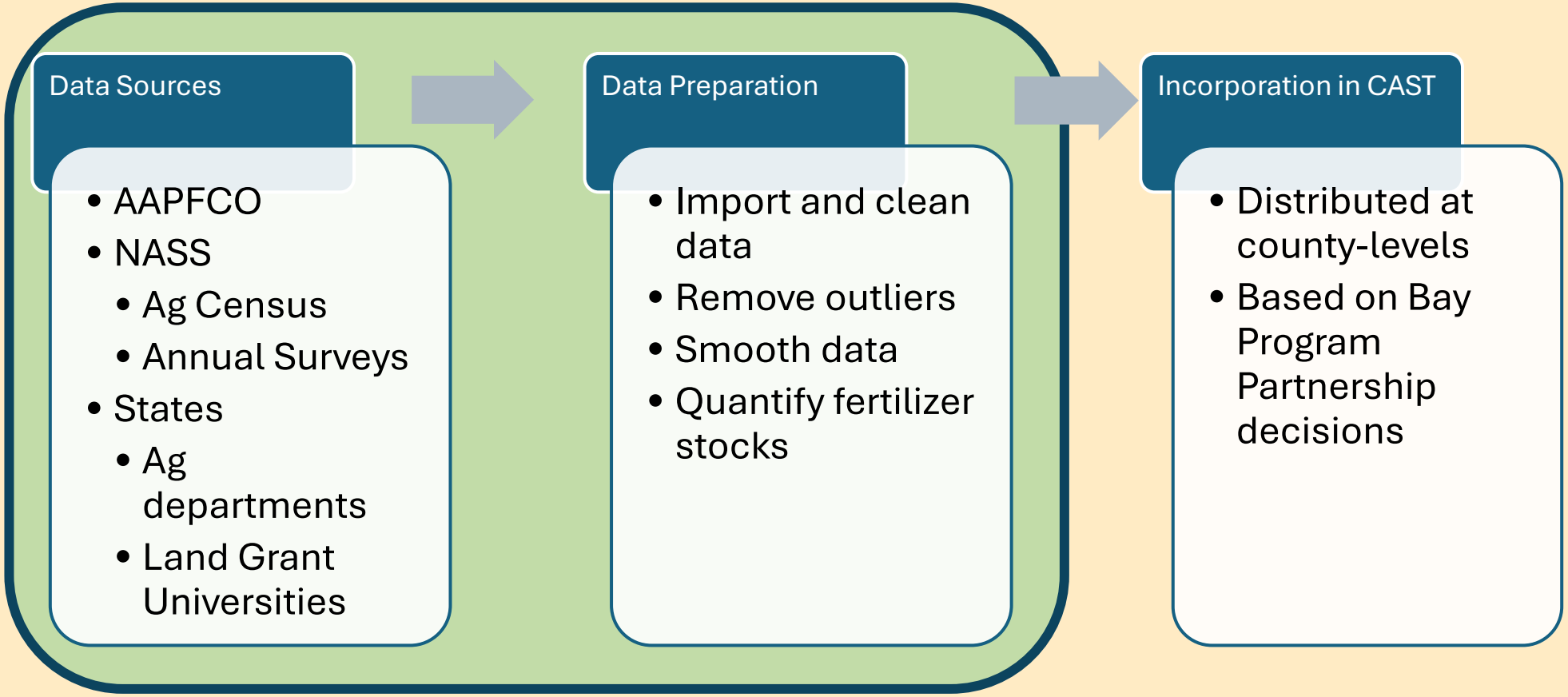
Today’s agenda

- Path forward
- **Inorganic fertilizer**
- **Nitrogen Fixation**
- BMP excess

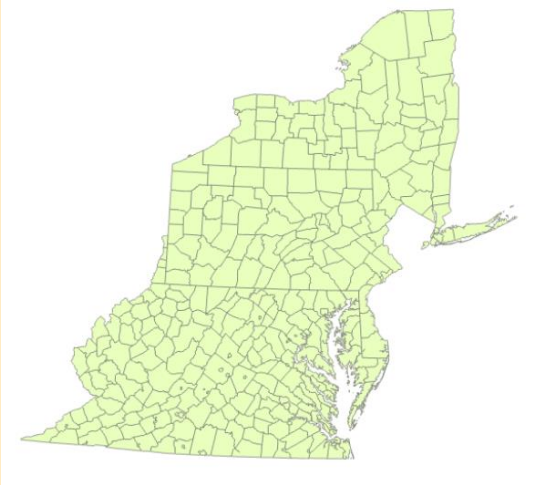
Inorganic fertilizer sources

- Compare overall tonnage of several data sets
- Possible data correlations
- Statistical comparisons and correlations
- More detail in main meeting

Ag Fertilizer Data Processing Overview



1. County Level



AAPFCO/State

1. AAPFCO/State data are obtained by the Chesapeake Bay Program at the **county level**.
    a. These data contain the annual mass (tons) of fertilizer sold (% TN and P205).

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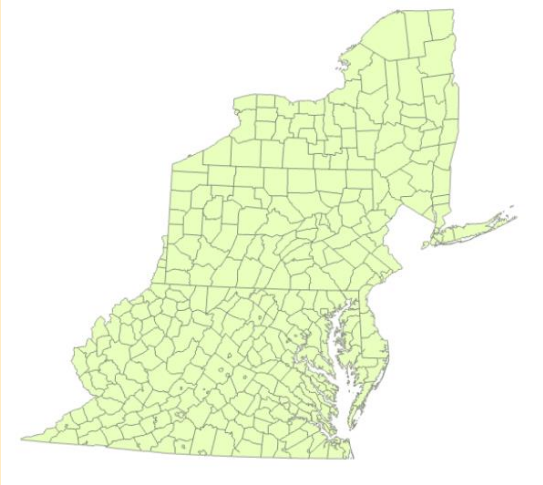

AAPFCO/State

2. State Level

AAPFCO/State

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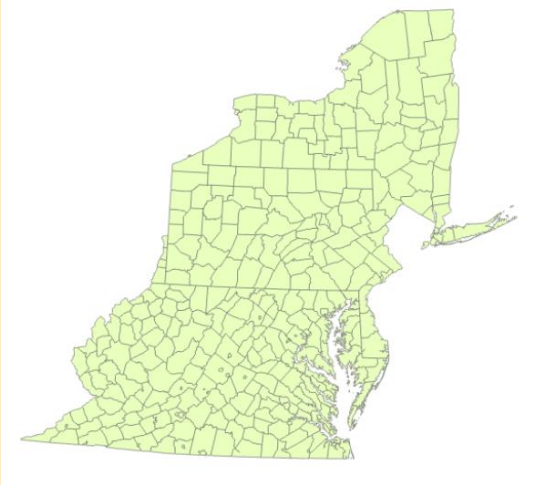
2. These data are converted to pounds of fertilizer sold then summed at the **state level**.
    a. Outlier removal occurs.
    b. Farm fertilizer fraction is determined.
    c. Smoothing with a 3-year rolling averge.

1. County Level



AAPFCO/State

2. State Level

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3. Six State Level

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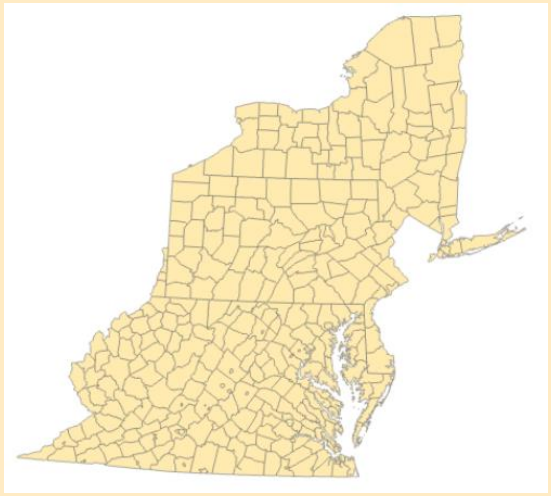
    b. Farm fertilizer fraction is determined.
    c. Smoothing with a 3-year rolling averge.
3. Summed for the **six state level** per year for TN and P205.

Notes on State data *

- The same information is gathered from states as AAPFCO.
- Data after 2016 and up to 2020 were provided directly by states.
  - DE, PA, MD, VA
- Remaining states used the trend of fertilizer increase from those who reported.
  - Trend was applied from last reported data.

4. County Level



Ag Census

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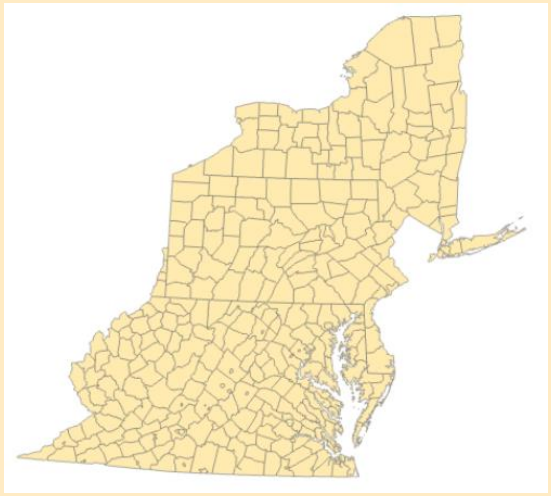
    a. These data contain soil amendments expenditures (US Dollars), which include annual fertilizer purchases; Reference point for state fertilizer applications.

4. County Level



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5. Six State Level

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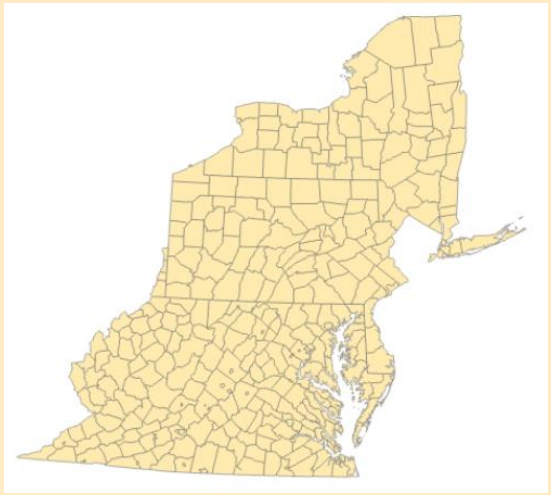
5. These data are then summed to the **six state level**.

4. County Level



Ag Census

5. Six State Level

Ag Census

5a. CBW Counties

Ag Census

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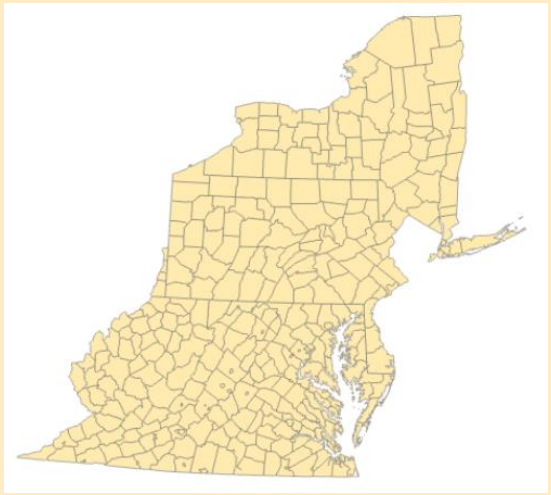
5. These data are then summed to the **six state level**.
    a. Soil amendment expenditures are summed for **CBW counties**.

4. County Level



Ag Census

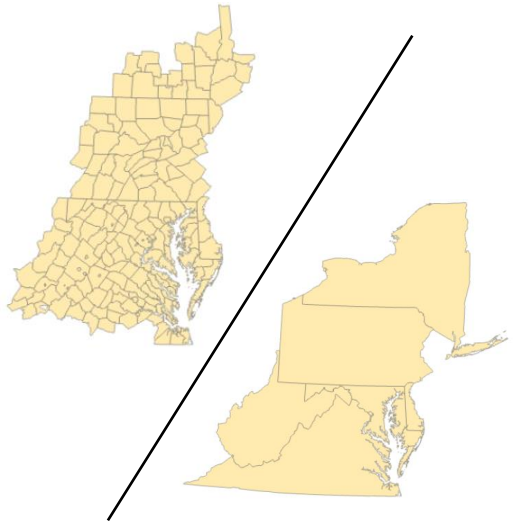
5. Six-State Level

Ag Census

5a. CBW Counties

Ag Census

6. Expenditures Fraction



Ag Census

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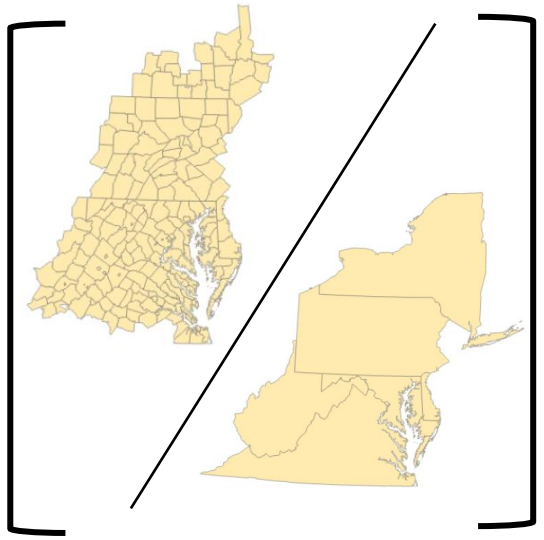
    a. These data contain soil amendments expenditures (US Dollars), which include annual fertilizer purchases; Reference point for state fertilizer applications.
5. These data are then summed to the **six-state level**.
    a. Soil amendment expenditures are summed for **CBW counties**.
6. The **expenditures fraction** spent on agricultural fertilizer within the CBW is determined.
    a. Ratio of CBW Counties to the Six-State Level (unitless) per year.

3. Six State Level

AAPFCO/State

X

6. Expenditures Fraction



Ag Census

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7. Counties & CBW Levels

AAPFCO/State & Ag Census

7. Quantify the pounds of agricultural fertilizer used annually in the **CBW**.

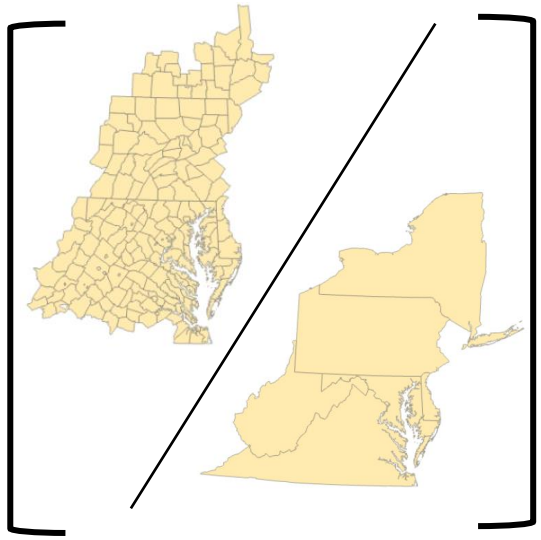
    a. Six state agricultural fertilizer mass (pounds; AAPFCO) is multiplied by the CBW expenditures fraction (unitless; Ag Census).

3. Six State Level

AAPFCO/State

X

6. Expenditures Fraction



Ag Census

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7. Counties & CBW Levels

AAPFCO/State & Ag Census

7. Quantify the pounds of agricultural fertilizer used annually in the **CBW**.

a. Six state agricultural fertilizer mass (pounds; AAPFCO) is multiplied by the CBW expenditures fraction (unitless; Ag Census).

b. Results in annual fertilizer mass *available for application* (pounds of TN and P205 [multiplied by 0.4362 for farm fertilizer]), which is a calculated fertilizer stock for the entirety of CBW **counties.**

Things to think about:

- Scale:
  - State keeps coming up
  - Where in the process do we start using state level?
- Are we still on board to use this method?
  - Where might people want to streamline?

Questions?

Nitrogen Fixation

How does fixation work in CAST?

- Fixation depends on nitrogen:
  - Plant available soil organic matter per acre = 45 lbs./acre (Agriculture Workgroup decision)
  - Applied to the crop

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- The higher the amount of nitrogen available from these two sources, the lower nitrogen fixation will be.

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  - Plant available soil organic matter per acre = 45 lbs./acre (Agriculture Workgroup decision)
  - Applied to the crop
- The higher the amount of nitrogen available from these two sources, the lower nitrogen fixation will be.
- The Phase 6 Model assumes leguminous plants will fix 77 percent of their entire uptake from the atmosphere if no additional pounds of nitrogen are applied to the land.

What is the science behind this?

- When additional pounds are applied, the fraction of uptake from nitrogen fixation amount will decrease

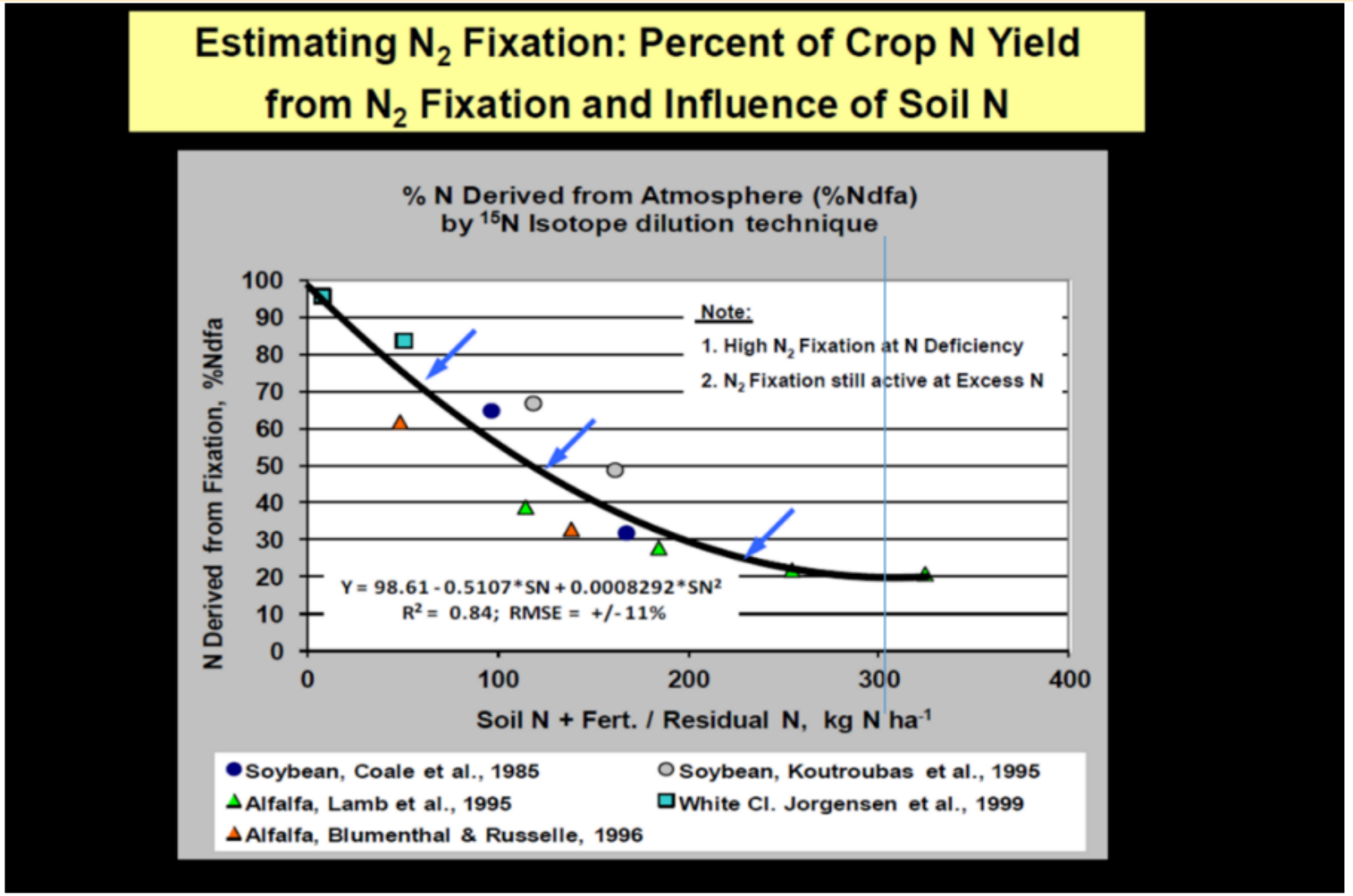


Figure 3-15: Nitrogen fixation as a percent of crop yield

An aside on fixation

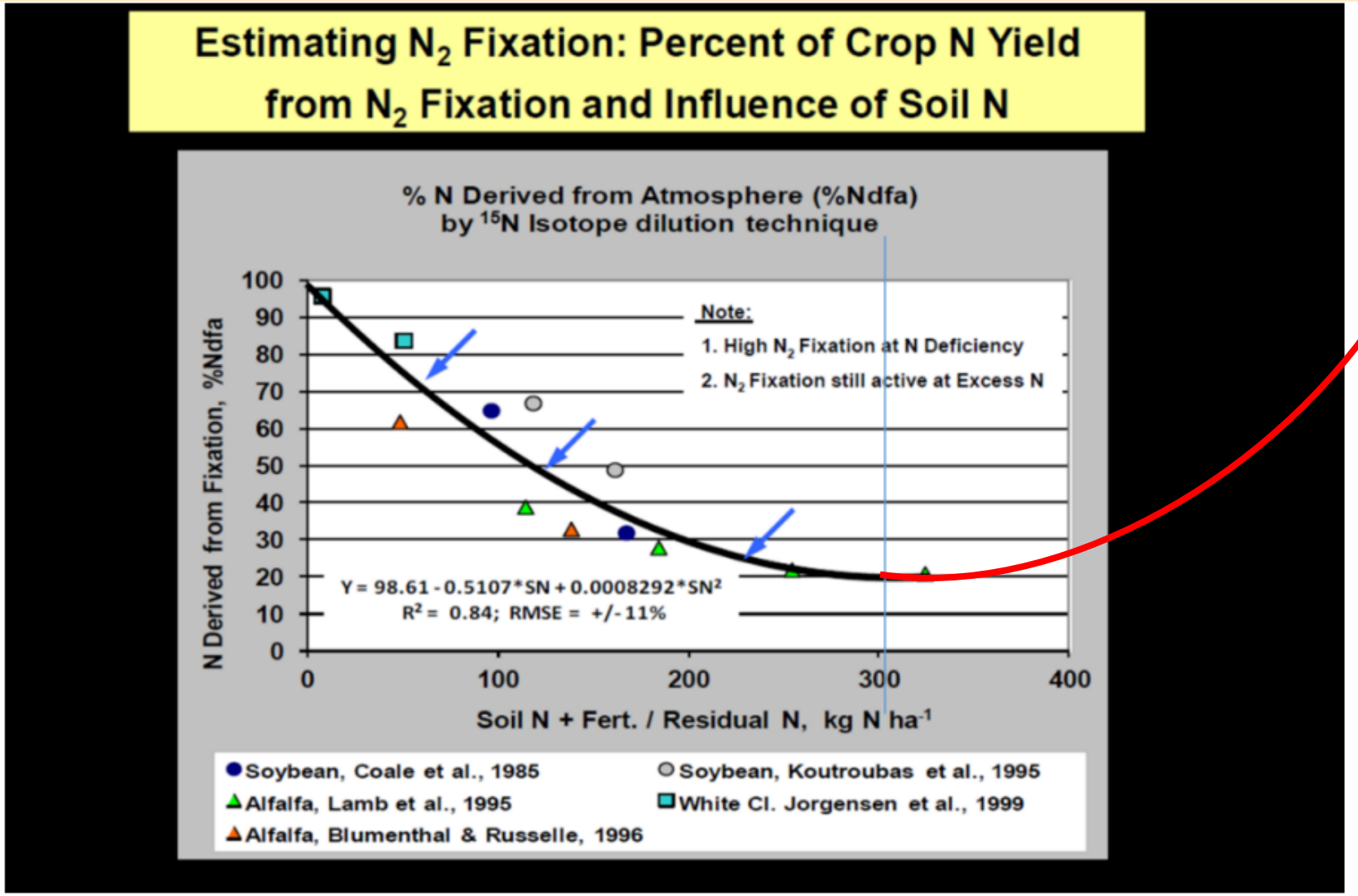
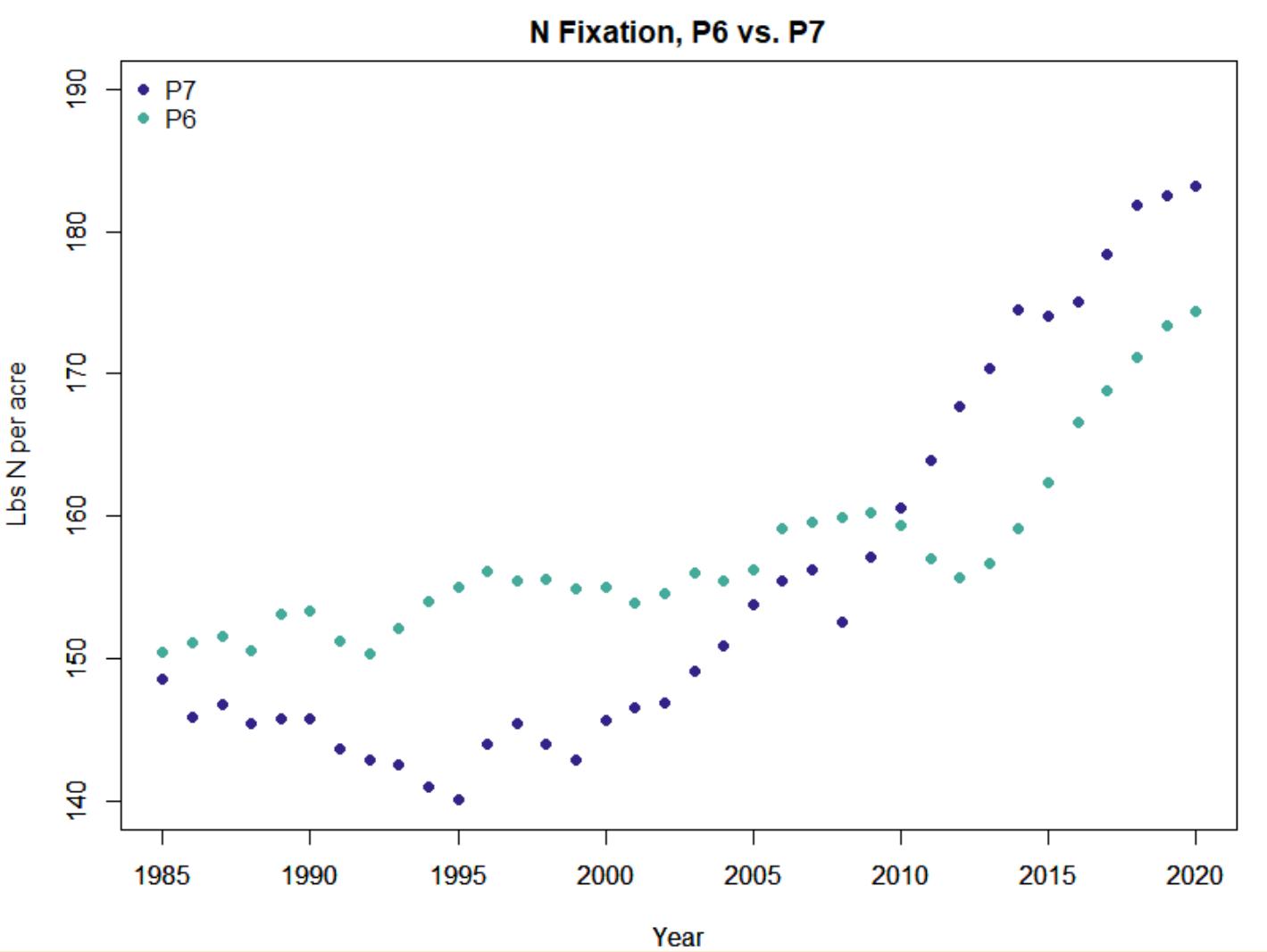


Figure 3-15: Nitrogen fixation as a percent of crop yield

- Parabolic function
- More than 308 kg N ha historically caused fixation to increase
- Doesn't happen with any regularity but it is possible
- It is now capped so that over 308kg N ha no additional fixation occurs

How do phases 6 and 7 compare? (Lbs./acre)



Questions?

Thank you for attending office hours!

We will begin our main meeting at 09:00.