Data Analyst Training

For Fieldprint Platform Data

Field to Market

12/10/2021

Recap

- We have reviewed the basics of the Fieldprint Platform, what's behind the metrics, and how project data are aggregated
- We took the time to conduct data quality analysis to be confident in our results
- Now we want to create reports, summaries, and understand what we can communicate for this project

Session 3 Objectives

1. Discuss ideas about creating reports for project participants
2. Identifying trends and calculating project summaries
3. Interpreting results
4. Building a narrative from the data

Session Three: Building A Narrative

Creating reports

- Developing reports is one way to provide value to project participants
- Case study from Illinois: Precision Conservation Management
  https://fieldtomarket.org/case-studies-series/2020-collaboration/

> 💬 "It was the first time I had looked at that binder, and I was impressed", recalls Tim. “The little amount of data that I'd put in, and the amount of data that Clay was already putting back out, right off the bat I knew it was something that I wanted to stay a part of. I immediately saw the value.”

What to include in a report

Context

- Geographic distribution of fields
- Weather conditions (temperature, rainfall, growing degree days)
- Number of crops and fields, acreage by crop
- Acreage with cover crop, irrigation, or rainfed conditions

What to include in a report

Descriptive statistics

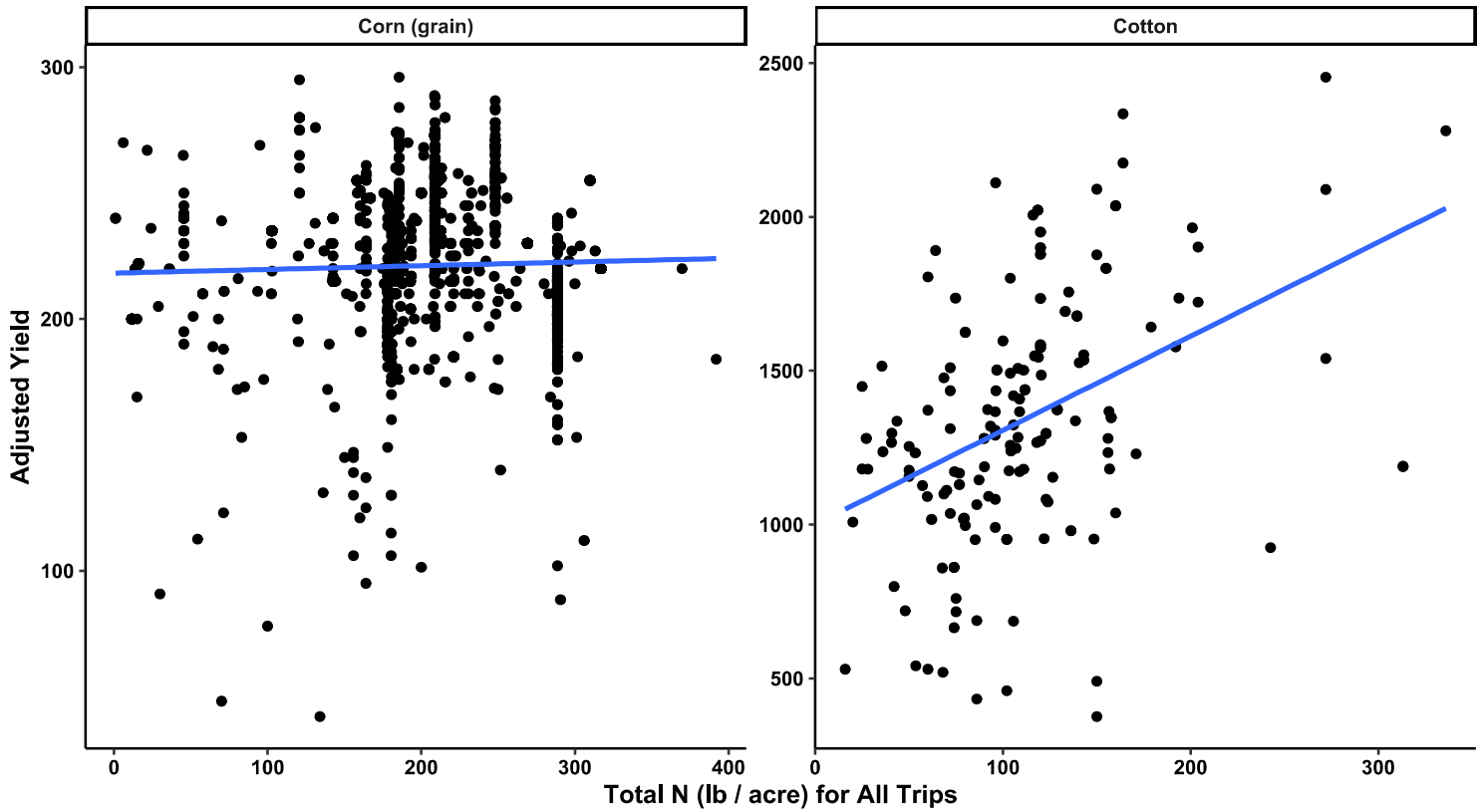
- Average or weighted average for yield and metric scores
- Average fertilizer and crop protectant rates, irrigation rates, other inputs

Exploring outcomes

- What drove the variability in yield or metric scores?
- Are there any significant trends for metrics of interest?
- How are growers advancing toward project goals?

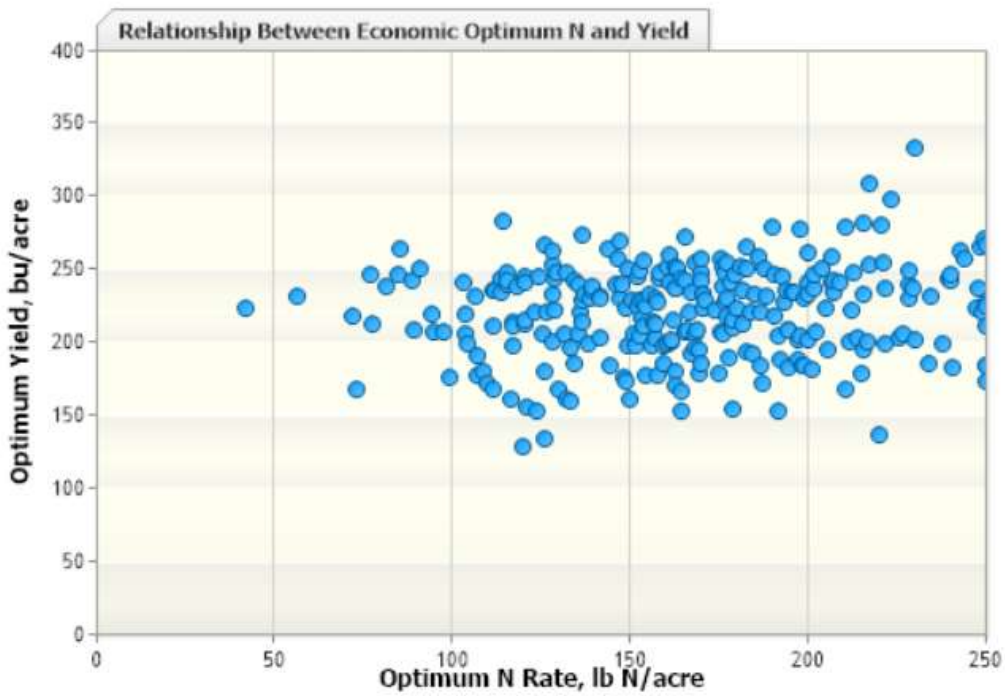
Data summaries and comparisons

- Many growers like to see how their inputs/outputs compare to the rest of the cohort



Data summaries and comparisons

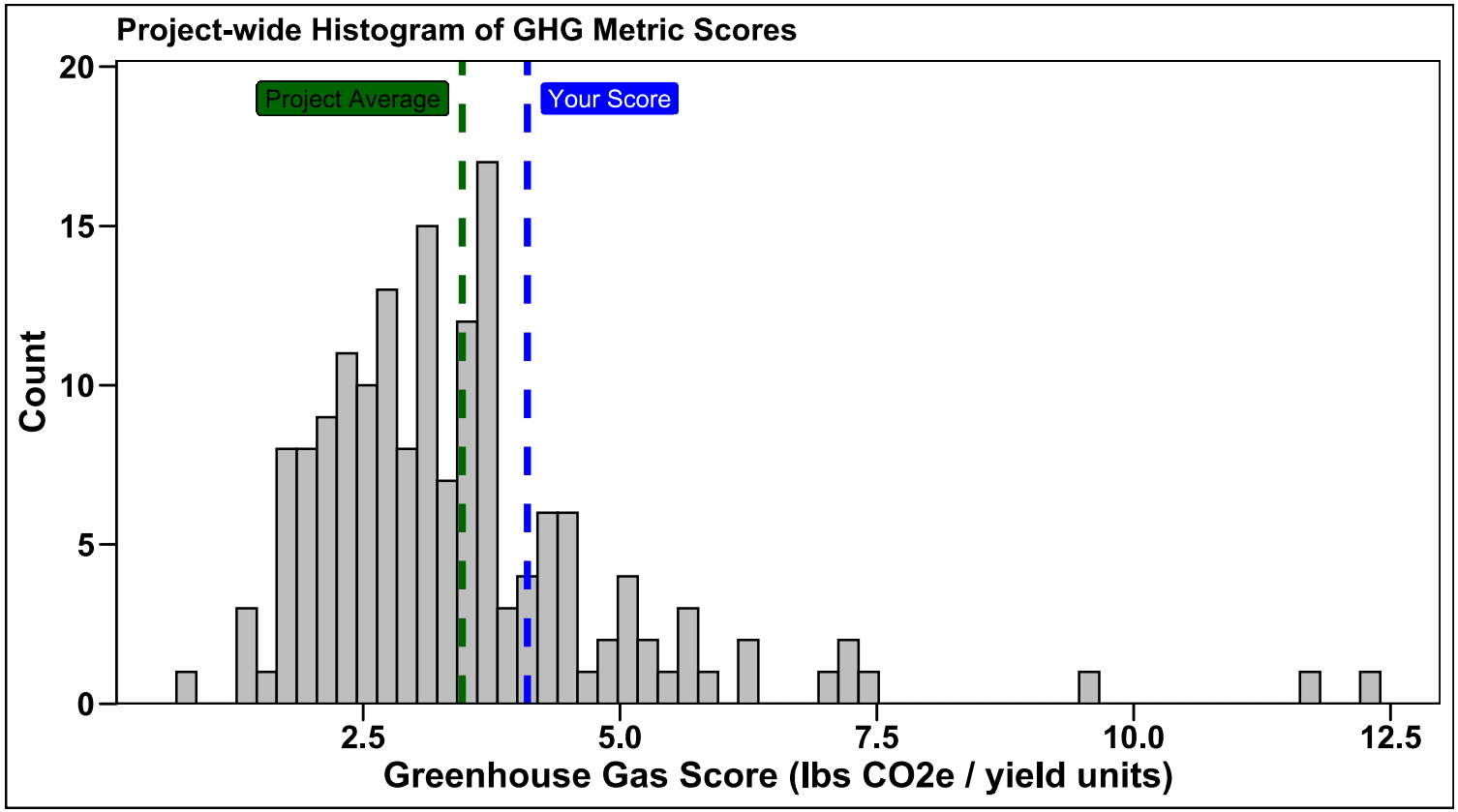
- Citing and inserting resources from local Extension efforts are also valuable:



- Data from Corn Nitrogen Rate Calculator, Iowa State University.

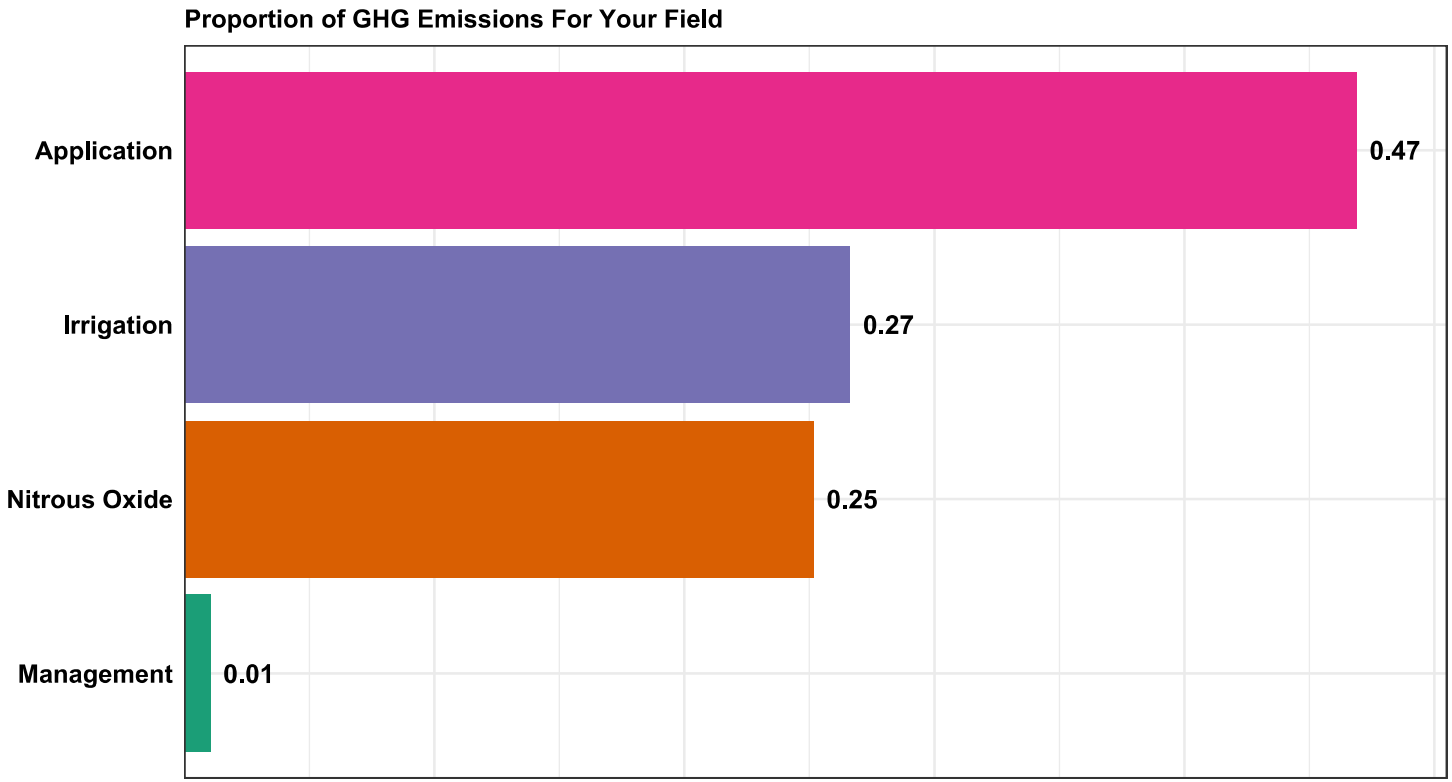
Data summaries and comparisons

- Showing growers where they stand within a metric or input distribution can also be helpful:



Data summaries and comparisons

- Growers also typically ask to see the main contributors to their metric scores:



Continuous improvement plan

- Each project has time-bound objectives and plans for grower engagement to meet the project goals
- Use the information in the Continuous Improvement Plan to guide your analysis
- If your project is just starting or ongoing, it is important to conduct interim analysis to measure if your project is advancing towards meeting project objectives
- If the project metrics are not on track to meeting objectives, adjustments are needed

Our case study

- The GHG Emissions Reduction Initiative had the following main goal:

Reduce GHG emissions 25% over three years

- Grower engagement plan
  - Project agronomists meet one-on-one with farmers to discuss their yield goals and normal amount of inputs
  - Project agronomists collaborate with state extension agronomists and economists to identify areas of improvement and which inputs could be reduced without hurting profitability, based on local research

Calculating baselines

- Data from first year provides the baseline against which progress and success will be evaluated
- Let's look at the N-P-K baseline (just a simple average)

Crop	Total N (lb / acre) for All Trips	Total P2O5 (lb / acre) for All Trips	Total K2O (lb / acre) for All Trips
Corn (grain)	267	33	27
Cotton	150	27	1
Soybeans	7	25	57

Calculating baselines

- Many projects prefer to calculate area-weighted averages rather than simple averages
- Let's calculate an area-weighted average for nitrogen rate for 2008
  - Multiply **Field Size (ac)** by **Total N (lb / acre) for All Trips** to obtain **Total Field N**
  - Sum **Total Field N** for the entire project and divide by the sum of total field acreage
  - We obtain the following area-weighted average for nitrogen rate:

Crop	Crop Year	Total Pounds Of Nitrogen	Total Acreage	N Per Acre
Corn (grain)	2008	23563390.3	94012	250.6
Cotton	2008	527619.4	3391	155.6
Soybeans	2008	361628.5	55673	6.5

Let's compare the nitrogen rates

Simple Average

Crop	N Per Acre
Corn (grain)	267
Cotton	150
Soybeans	7

Weighted Average

Crop	N Per Acre
Corn (grain)	250.6
Cotton	155.6
Soybeans	6.5

Calculating baselines

- Let's look at the crop protectants baseline (simple average). This is not going to be a large contributor.

Crop	Total Herbicides for All Trips	Total Insecticides for All Trips	Total Fungicides for All Trips
Corn (grain)	1.6	0.3	0.3
Cotton	3.5	0.2	0.0
Soybeans	2.4	0.2	0.6

GHG emissions baseline

- For GHG emissions, let's calculate a baseline from 2008 data, using a simple average and a production-weighted average:

Simple Average

Crop	GHG Emissions Per Yield Unit
Corn (grain)	26.6
Cotton	5.6
Soybeans	13.6

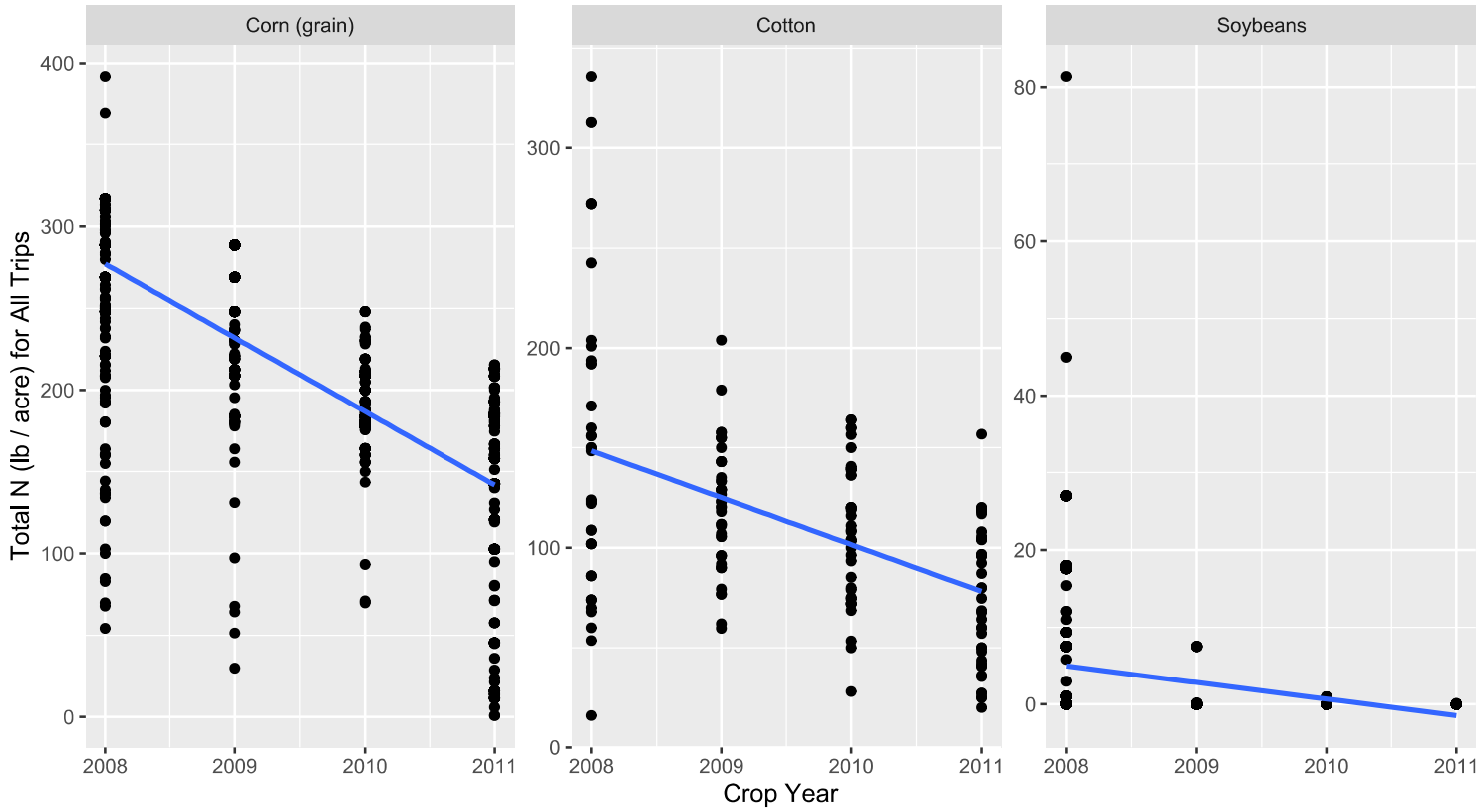
Weighted Average

Crop	GHG Emissions Per Yield Unit
Corn (grain)	24.8
Cotton	5.2
Soybeans	13.2

- For the weighted average, for each field we need total production (field size X yield) and total GHG emissions (total production x GHG score). Then we sum values for all fields, and divide GHG emissions by total production.

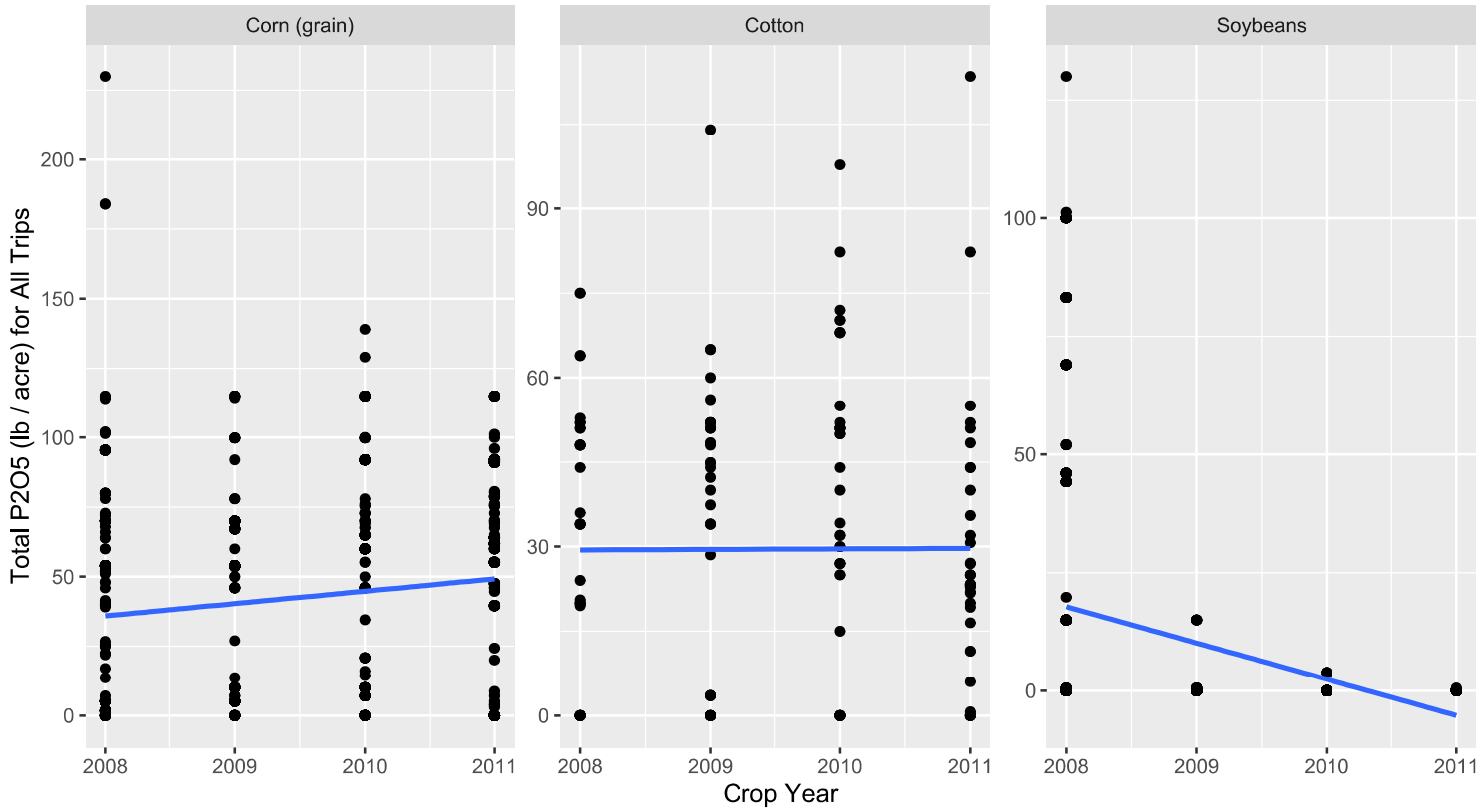
So what's the story?

- We will look closely at fertilizer rates over time, starting with nitrogen



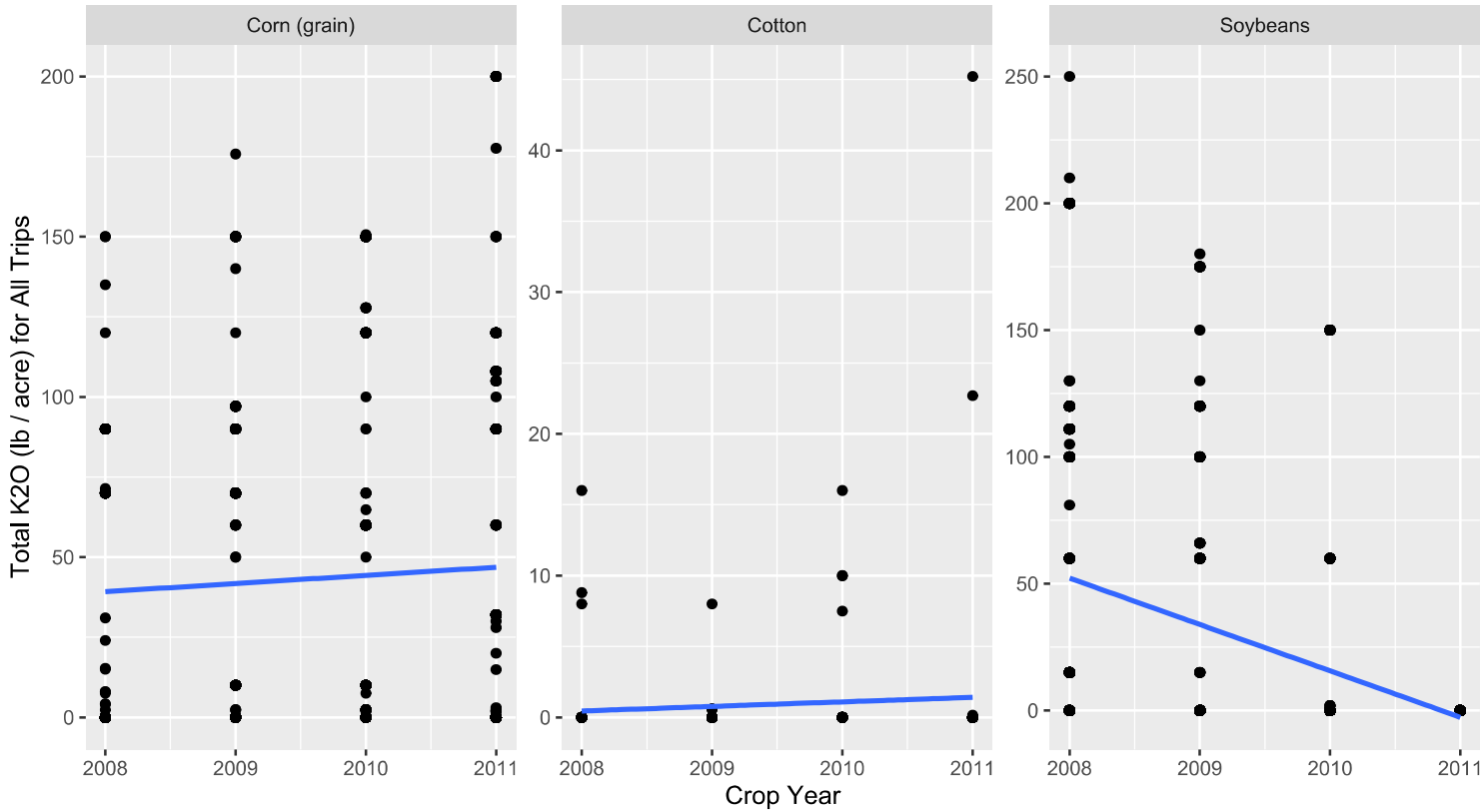
So what's the story?

- Phosphorus



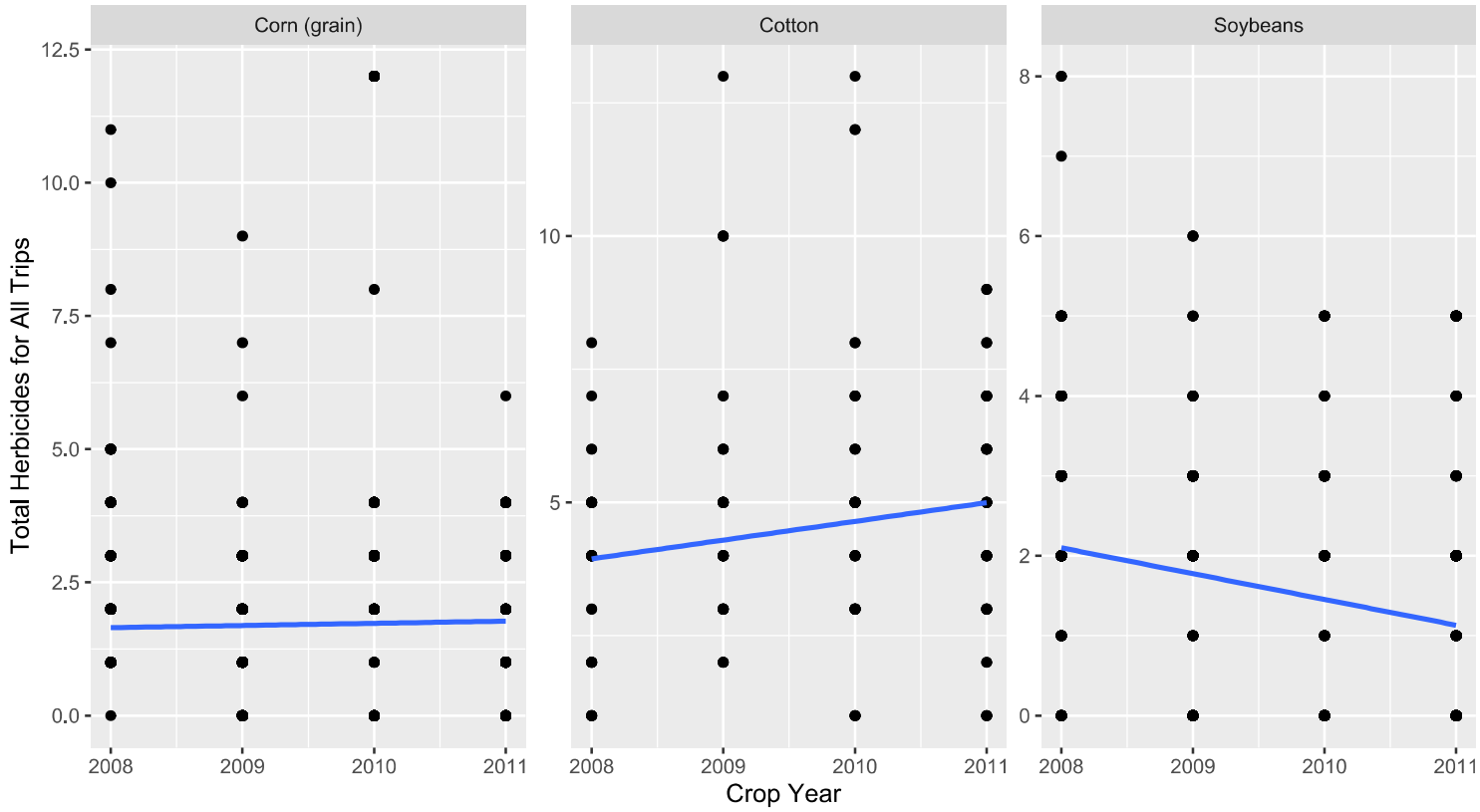
So what's the story?

- Potassium



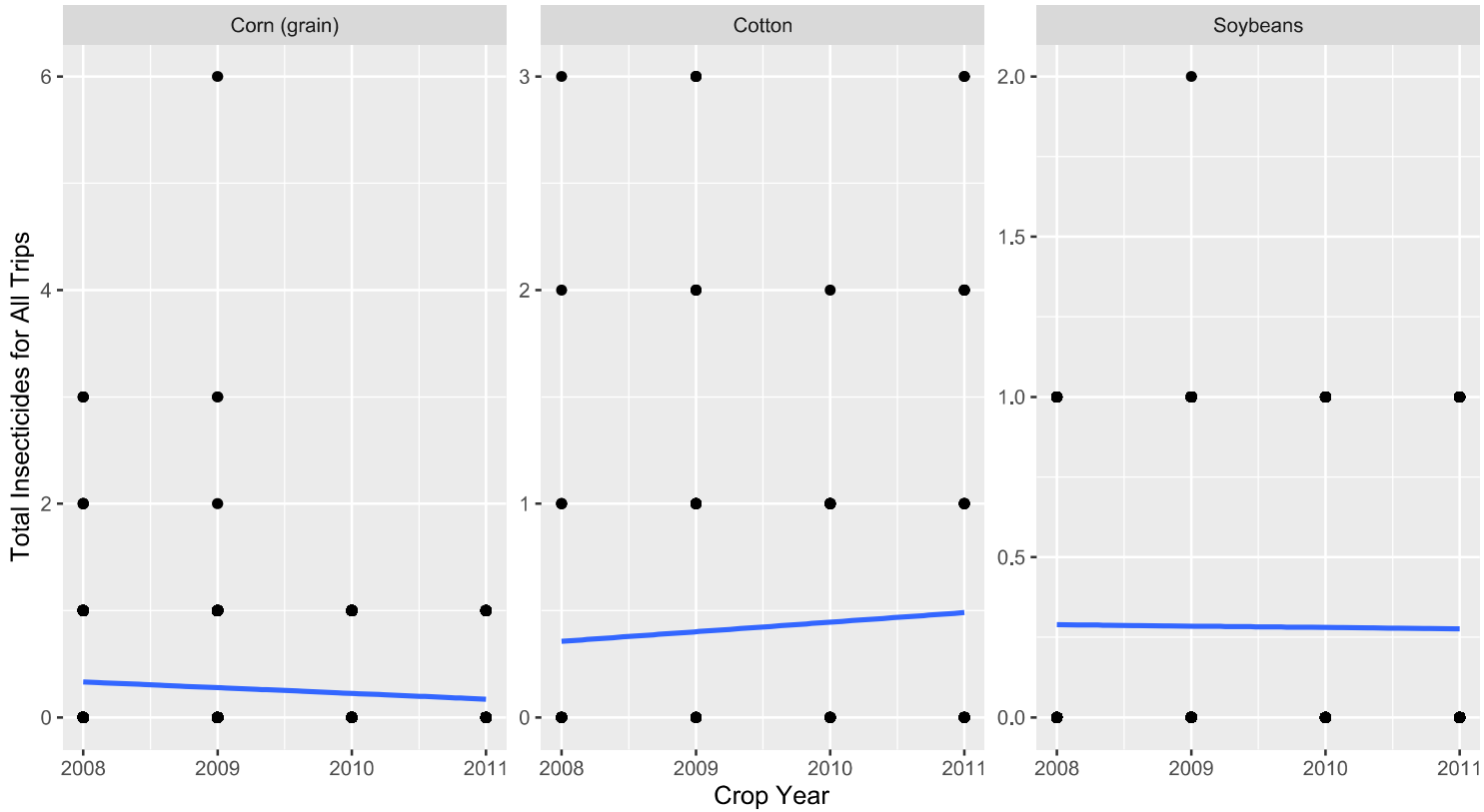
So what's the story?

- Herbicides



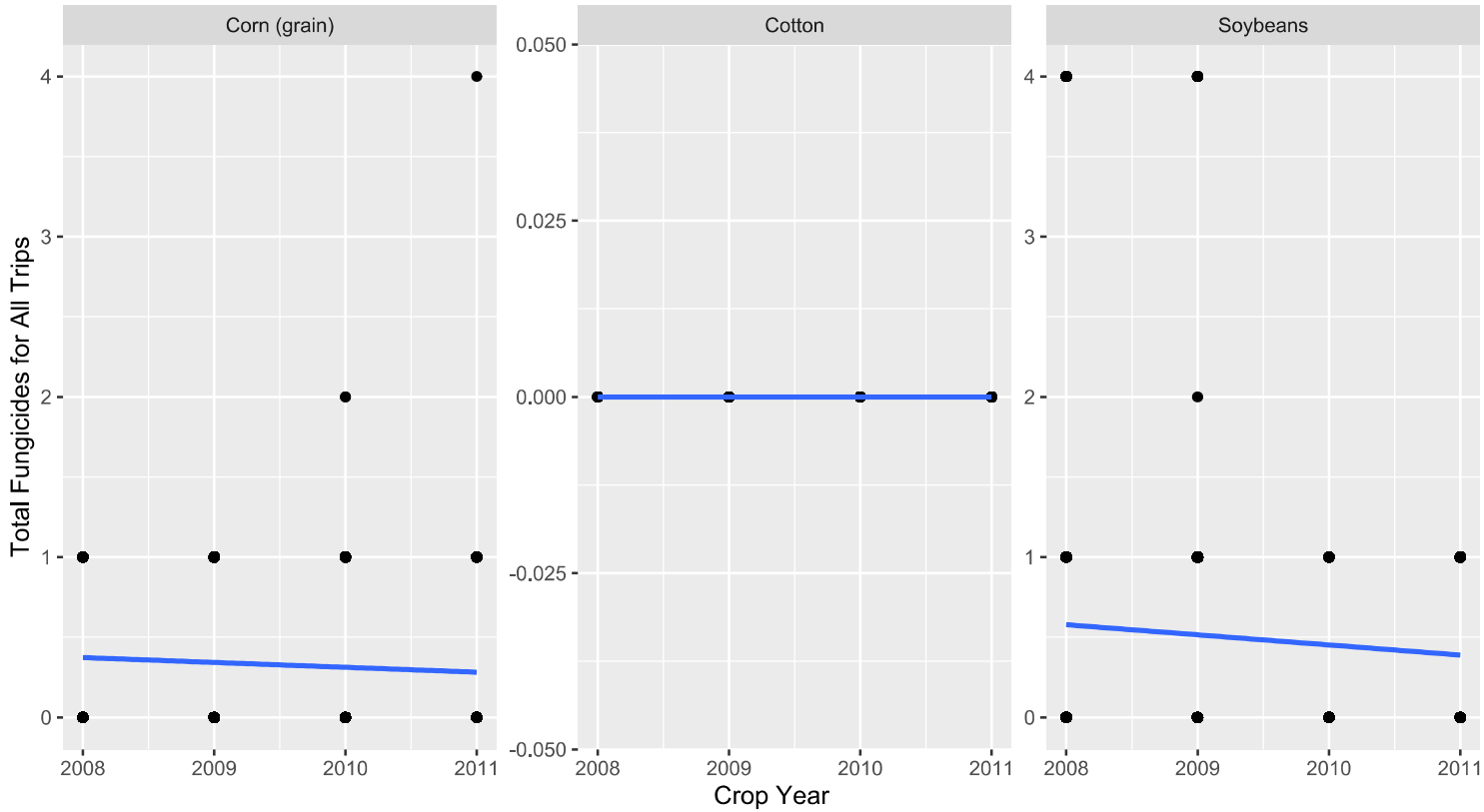
So what's the story?

- Insecticides

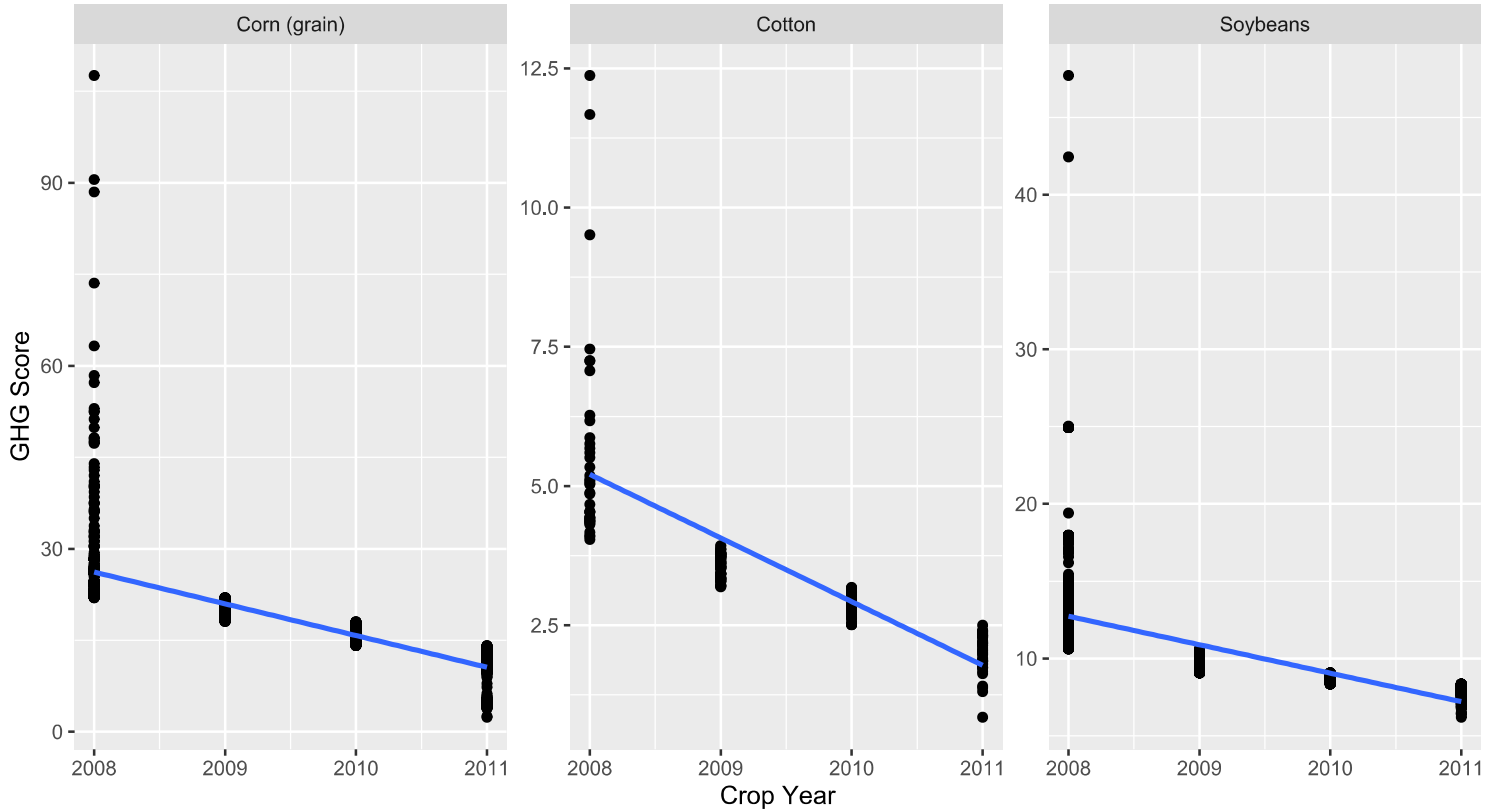


So what's the story?

- Fungicides



Main goal: GHG emissions reduction



Highlights

- The project surpassed expectations and was able to meet its GHG emissions reductions goal
- Main contributor was nitrogen reduction for corn and cotton, while soybeans showed moderate reduction in phosphorus usage
- Potassium rates were highly variable and there wasn't a targeted effort to help producers reduce potassium rates
- The project struggled to help farmers reduce herbicide rates. Many farmers indicated having trouble controlling herbicide-resistant weeds. There are opportunities for future collaborations!

Highlights

- Comparing weighted averages of GHG Score in 2008 and 2011:

Crop	GHG Emissions Per Yield Unit - 2008	GHG Emissions Per Yield Unit - 2011	Percent Change
Corn (grain)	24.8	10.7	-56.9
Cotton	5.2	2.0	-61.5
Soybeans	13.2	7.8	-40.9

Ideas about sharing the project story

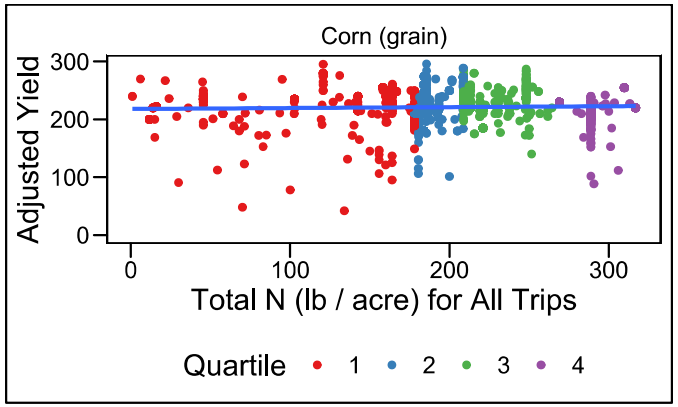
Field to Market

- Farmers should always be at the heart of the narrative. Let farmers tell their perception of the project, why they joined (and stayed), and what results they saw. Farmers like learning from other farmers.

> 💬 "I was attracted to the project because of all the professional advisors they had to answer my agronomic questions, at no cost to me", recalls one farmer. “Over the course of the project I must have asked hundreds of questions.”

Ideas about sharing the project story

- Graphs and tables can help to emphasize specific points



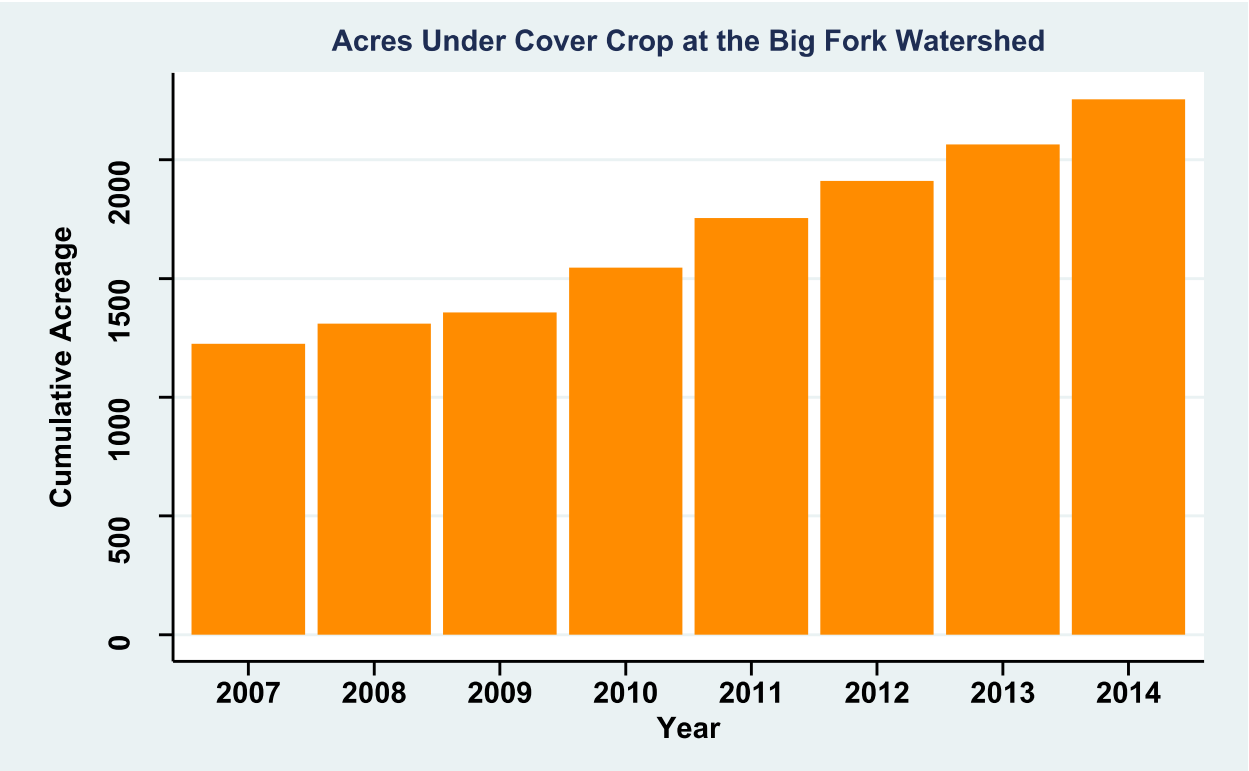
"I assumed that my neighbors applied as much N to corn as I did. Then I saw that my N rates were in the top 25% of the group, but my yields were not higher than others applying much less N", says a participant.

Ideas about sharing the project story

- All good stories have a pattern
- Beginning
  - What's the origin of the project? How did it develop until there was funding to move forward?
- Middle
  - How was the project implementation? Successes and challenges? Small victories along the way that made a difference?
- End
  - What was achieved? Final lessons? What goals changed over time? What never worked?

Think about your project

- Your project may have easier goals to meet, or a very compelling and easy-to-absorb narrative. Adjust as needed!
- Example: your project objective is to increase cover crop acreage in a specific watershed.



A few examples of equivalencies

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- If you are working to reduce soil erosion, you can compare avoided soil loss in terms of truckloads of sediment
    - Let's say your project helped reduce soil erosion from 7.5 to 5.5 tons/acre/year across 1,200 acres
    - You could say that you prevented soil loss equivalent to 219 truckloads of sediment (at 22,000 lb per truckload)
- For Energy use and GHG emissions, there are great resources from EPA
    - See **https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator**
    - Units of cars driven for a year, gasoline consumed, number of phones charged, dozens of others
- If you helped with fertilizer input reduction, stating the lb of nutrients not applied is common enough
    - "For this project, growers avoided applying 45,000 lb of phosphorus that it would have been applied in a business-as-usual approach"

A note about the Field to Market approach

- All eight metrics are calculated at once, there is no way to calculate the score for just one metric.
- It is possible that while you work to improve one metric you negatively affect another metric. For example:
  - Planting of cover crops increases energy use and GHG emissions for the application component (machinery use for planting and terminating, maybe also herbicide to terminate the cover crop)
  - Nutrient or water rate reduction may result in decrease yield
- It is important to be transparent about these environmental outcomes.

Claims

- Field to Market has enabled five categories for claims:

PROJECT PARTICIPATION CLAIM	ADOPTION CLAIM	MEASUREMENT CLAIM	TRENDS CLAIM	IMPACT CLAIM
Number of acres and growers	Uptake of a specific practice or intervention	One-year snapshot of aggregate environmental outcomes	Directional improvement in Field to Market's metrics	Sustained Improvement in Field to Market's metrics

Claims

Field to Market

Examples of Claims Statements

PROJECT PARTICIPATION CLAIM

"The Upstate Wheat Continuous Improvement Project enrolled **14 Growers** and **14,000 acres** in 2019."

"**400 growers** and **50,000 acres** were enrolled in the Upstate Wheat Project in 2018 and 2019."

Claims

Field to Market

Examples of Claims Statements

ADOPTION CLAIM

"40% of the 100 growers enrolled in the Upstate Wheat Project reported using cover crops in 2018."

"The Upstate Wheat Project increased cover crop adoption from 40% of 100 growers in 2018 to 60% of 110 growers in 2019."

Claims

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Examples of Claims Statements

MEASUREMENT CLAIM

"The weighted average BTU/acres of the 14,000 acres enrolled in the Upstate Wheat Project was **2000 BTU/acre in 2018.**"

"The weighted average CO2e/bushel for the Rice Project which enrolled 14,000 acres and 16 growers in 2018 was **104 lb. CO2e / cwt.**"

Claims

Field to Market

Examples of Claims Statements

TRENDS CLAIM

"In our project in the Fayetteville Watershed, 40% of enrolled farms had an improved HPI score from Year 1 to Year 3 of the Project."

Session 3 summary

- You have plenty of flexibility to tell your project's story
- There are storytelling resources in Field to Market's member portal
- For claims, approach Field to Market staff to get the process started
- **Farmers should always be at the center of the story**