

Utilizing On-Farm Trials to Evaluate 4R Practices (and Beyond)

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Defining On-Farm Trials

- Applied research executed on private farm** or in partnership with a farmer
 - **Not a University managed research and education center (REC)
- Range of farmer participation
 - Farmer may provide researcher with space in a field that is managed solely by the researcher and their personnel and equipment
 - Farmer may plant, harvest, and apply treatments using their equipment and personnel and even host field days or otherwise showcase the study



REC Research vs. On-Farm Trials

- Some assistance of University personnel
 - Complicated field design and treatment structure
 - Performed on small plot scale due to field size restrictions
- “Security” of less variability and more control
 - Small, uniform fields
 - Field variability is characterized
 - Assistance from personnel trained to perform research
 - Less data lost due to treatment application errors





REC Research vs. On-Farm Trials

- Performed on private farm with farmer involved
- Utilize farmer equipment (commercial sized)
- Fewer treatments applied in large strips the width of combine or planter and length of field
- Large field = more variability
- May be timing challenges for treatment application during busy season
- Greater likelihood of lost data from missing or no treatments applied or missed harvest, etc.





<https://u.osu.edu/pauldingag/2020/05/20/choosing-the-right-nitrogen-rate-for-corn-is-important-to-profitability/>



Resources Needed for On-Farm Trials

- Farmer participants
- Personnel dedicated to managing on-farm trials
- Farmer payments
 - Especially if yield loss is anticipated or trial is complicated or time consuming for farmer
- “Plan B” (and C and D)
 - Back up equipment
 - Change in treatment structure or layout in field on the fly
- Solid understanding of statistics and experimental design
- Patience



Modifying Research for On-Farm Trials

- Small plot scale does not translate well to on-farm trials





Unless small plot scale research is too large for REC

Image courtesy of Gene Hahn



Modifying Research for On-Farm Trials

- Small plot scale does not translate well to on-farm trials
- Studies can complement one another or achieve similar goals but experimental design must be thoughtfully crafted for on-farm execution
 - Fewer treatments can be managed well by farmers in large fields
 - Fewer data will be collected due to large plot size and variability



Modifying Research for On-Farm Trials

- Statistically-sound experimental design principles must not be compromised with shift to on-farm trials*
- Randomization and replication must be included to allow for the potential to draw statistically significant conclusions*
 - *Unless the goal is a demonstration vs. an applied research study



Utility of On-Farm Results

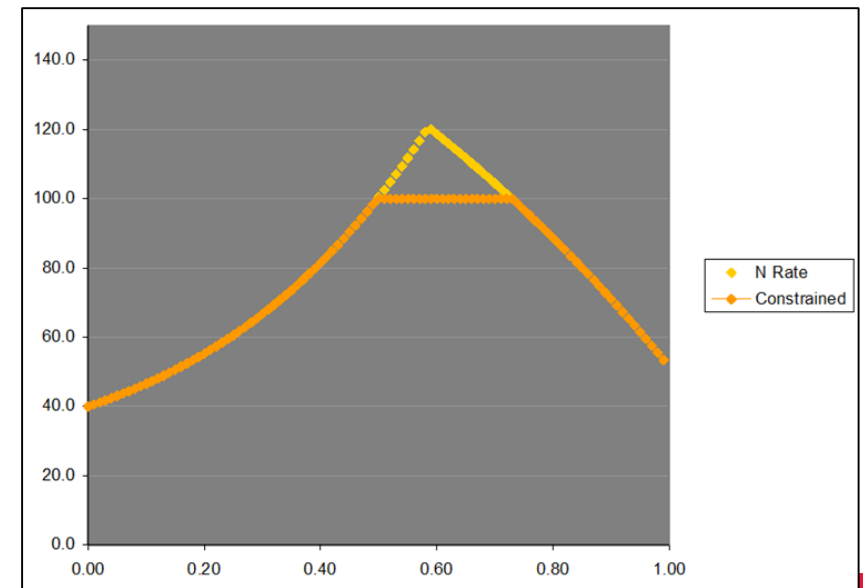
Why Might Researchers Perform On-Farm Trials

- Gather data across a broad geographical region
 - Especially if data may have regulatory implications



Greenseeker Research at UMD 2009-2012

- Greenseeker tool makes on-the-go sidedress nitrogen application through reflectance reading translated by an algorithm developed by Virginia Tech researchers



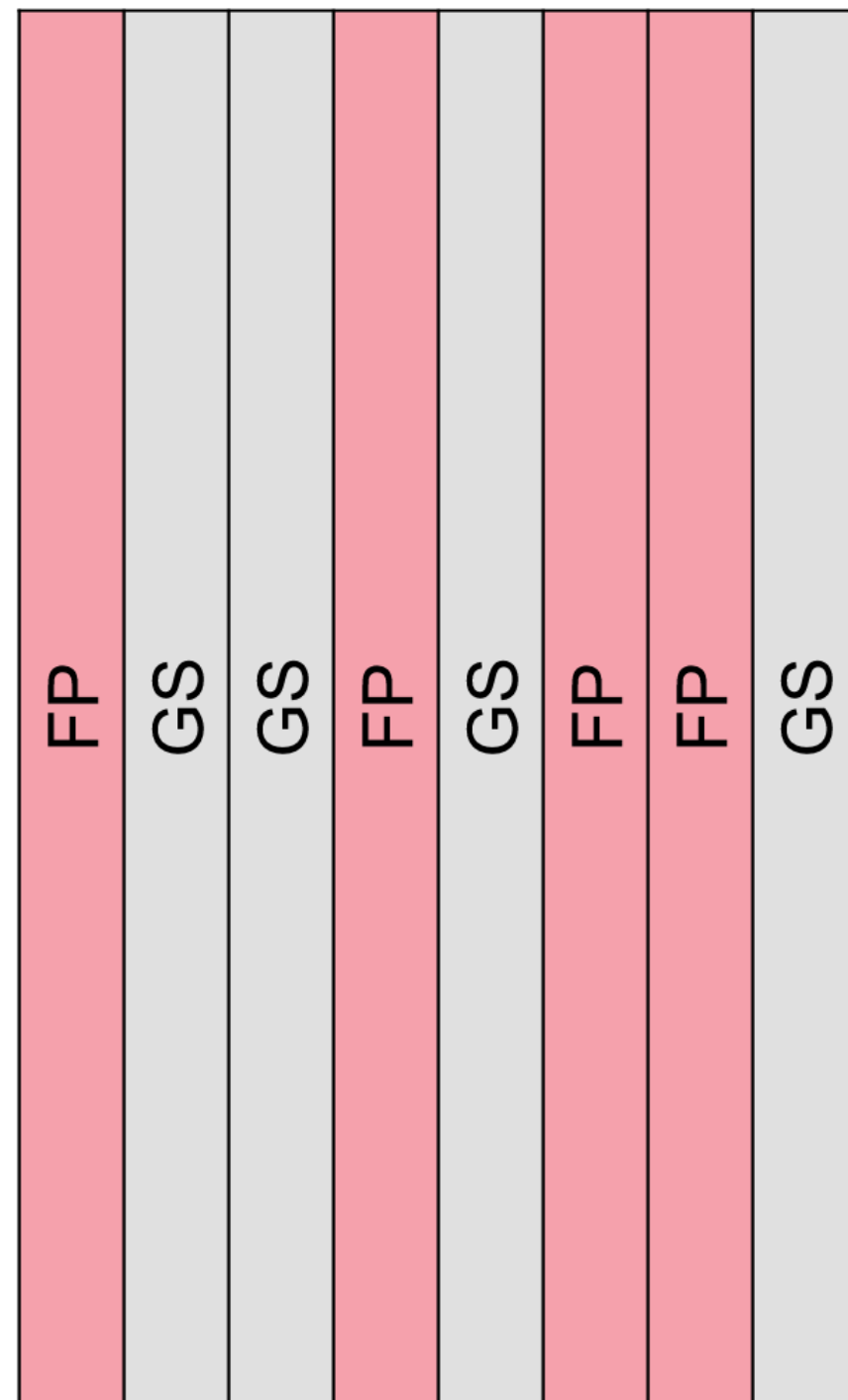
Greenseeker Research at UMD 2009-2012

- Technology was proven and algorithm developed locally
- Goal of the research partially to test VT algorithm in MD
- Main goal to demonstrate less nitrogen applied using technology while maintaining corn yield when compared to farmer standard practice
 - Incorporate technology into MD Nutrient Planning process
- Lended itself to multi-year, multi-location on-farm trial



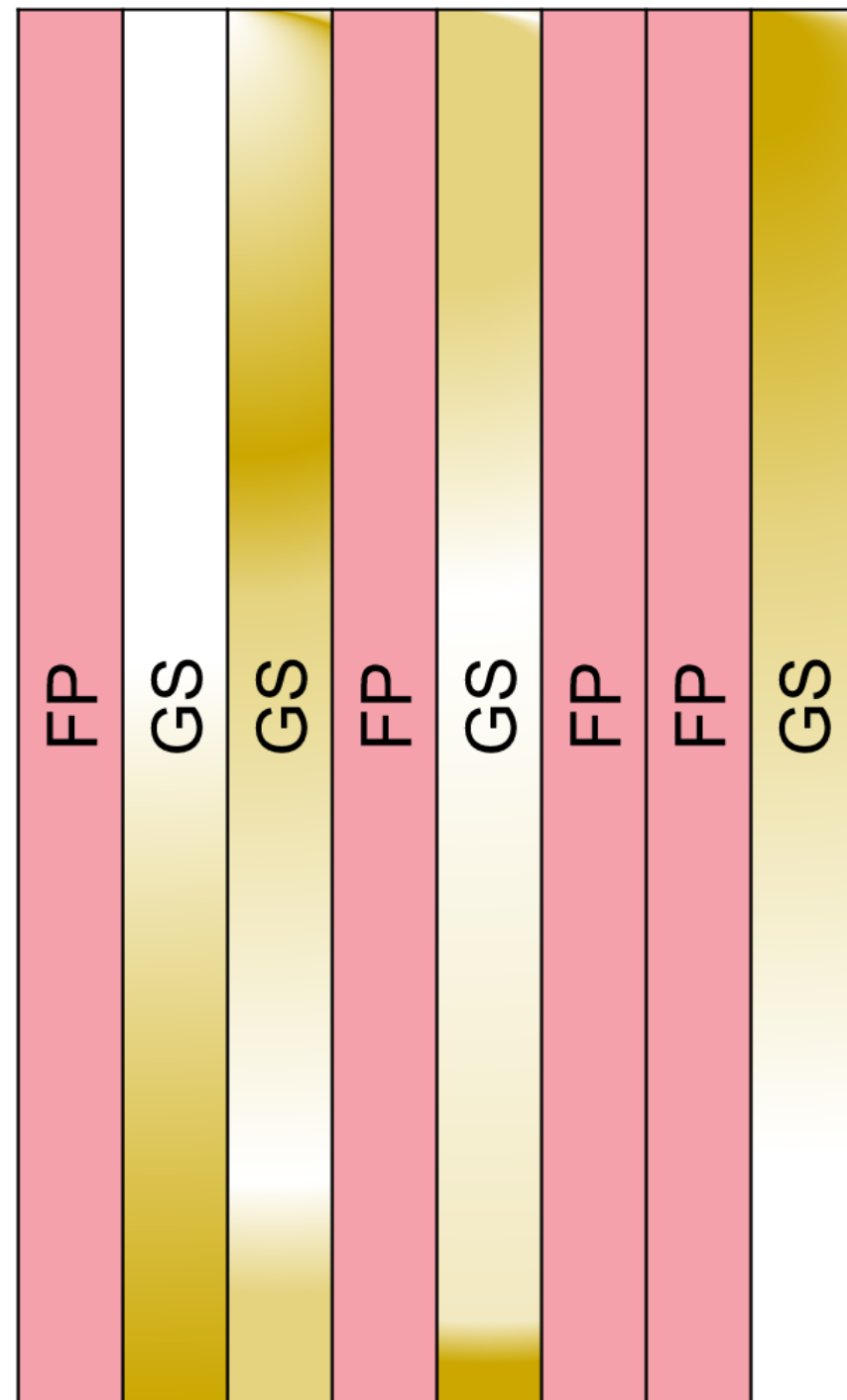
Example Plot Design

- Two treatments, N applied at sidedress
 - Farmer practice (FP)
 - Greenseeker (GS)
- Four replications
- 8 total strips

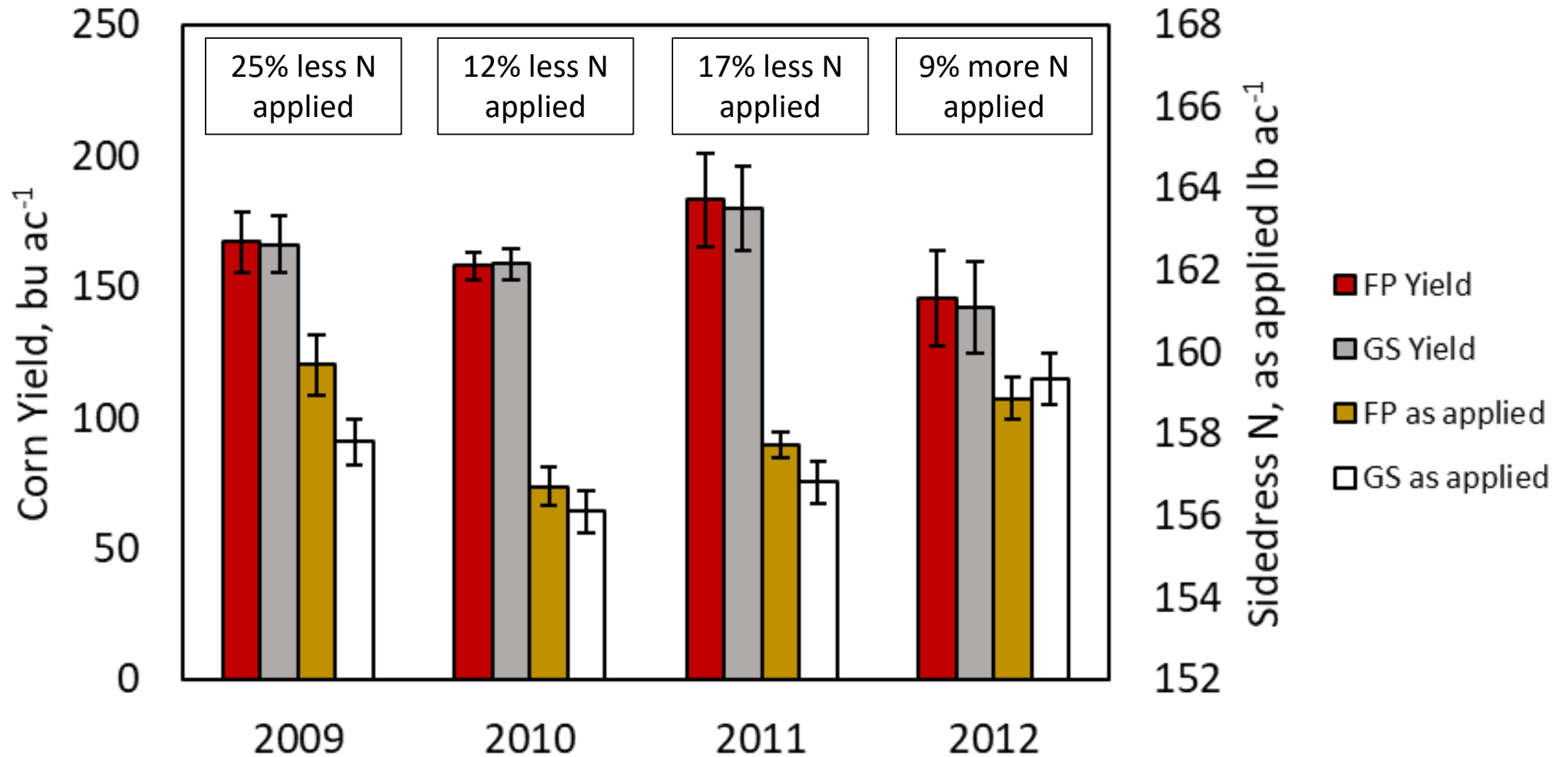


Example Plot Design

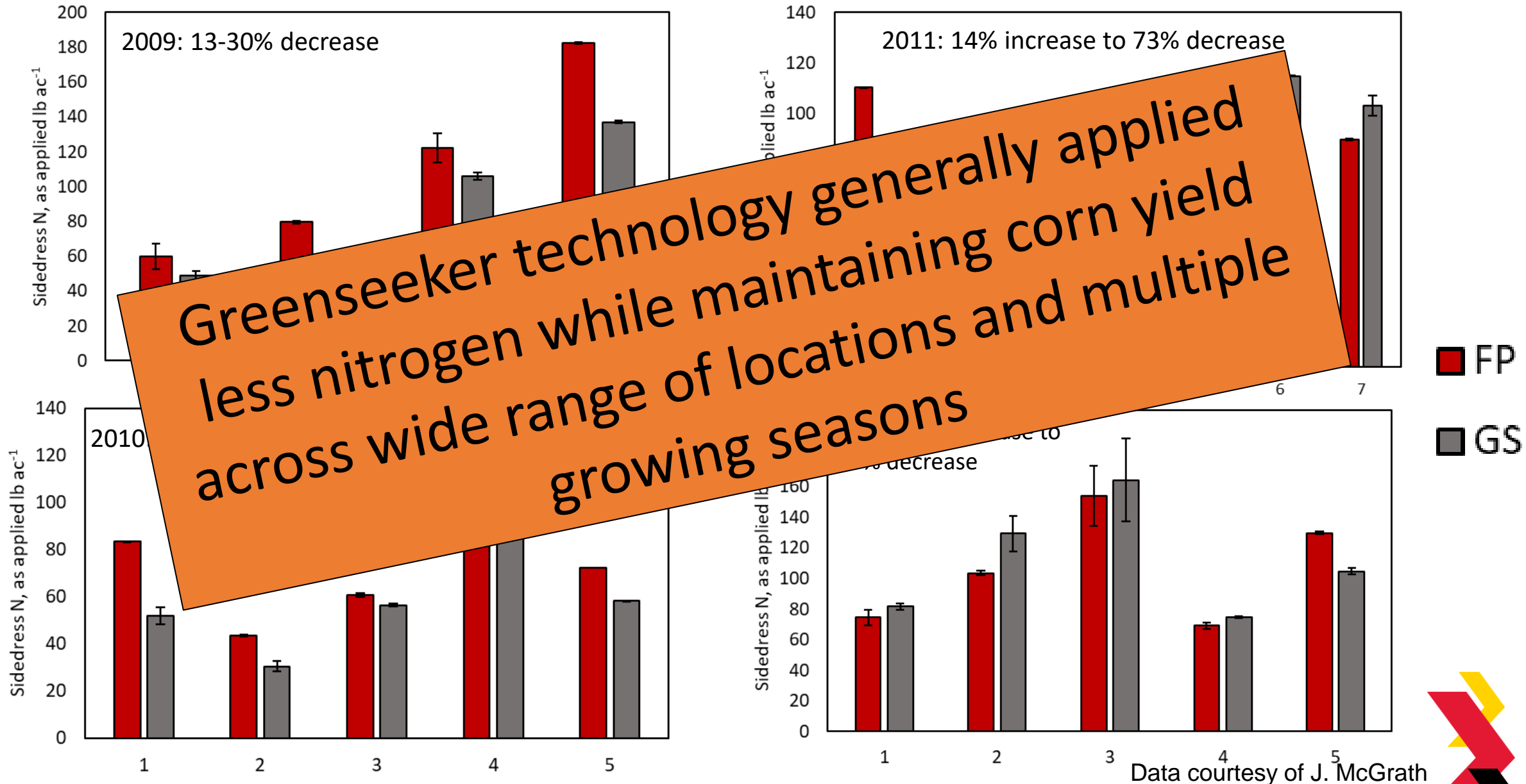
- Farmer Practice
 - Flat N rate across strip
 - UMD rec'd sidedress rate
- Greenseeker
 - Variable N rate applied across the strip based on sensor reading



Farmer Practice vs. Greenseeker



Farmer Practice vs. Greenseeker



Utility of On-Farm Results

Why Might Researchers Perform On-Farm Trials

- Gather data across a broad geographical region
 - Especially if data may have regulatory implications
- More rapidly and simply address producer questions
 - Testing claims of commercially-available products



Current UMD On-Farm Trials Program

- Partnership with MGPUB that started in 2023
- To address farmer concerns or questions:
 - Quicker time frame
 - Across a wide range of geographic conditions



Current UMD On-Farm Trials Program

- MGPUB supporting On-Farm Trials Coordinator
- MGPUB decides which priority areas will be executed through on-farm trials
 - In partnership with researchers who submit research proposals



Research Question and Study Design

- In 2023, evaluate potential for corn yield increase with use of commercially-available biological products marketed to supply additional nitrogen
- Simple evaluation of yield increase with and without use of the product, at full nitrogen rate and at decreased nitrogen rate
 - Rates determined based on farmer's current corn N management



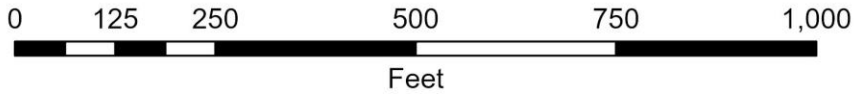
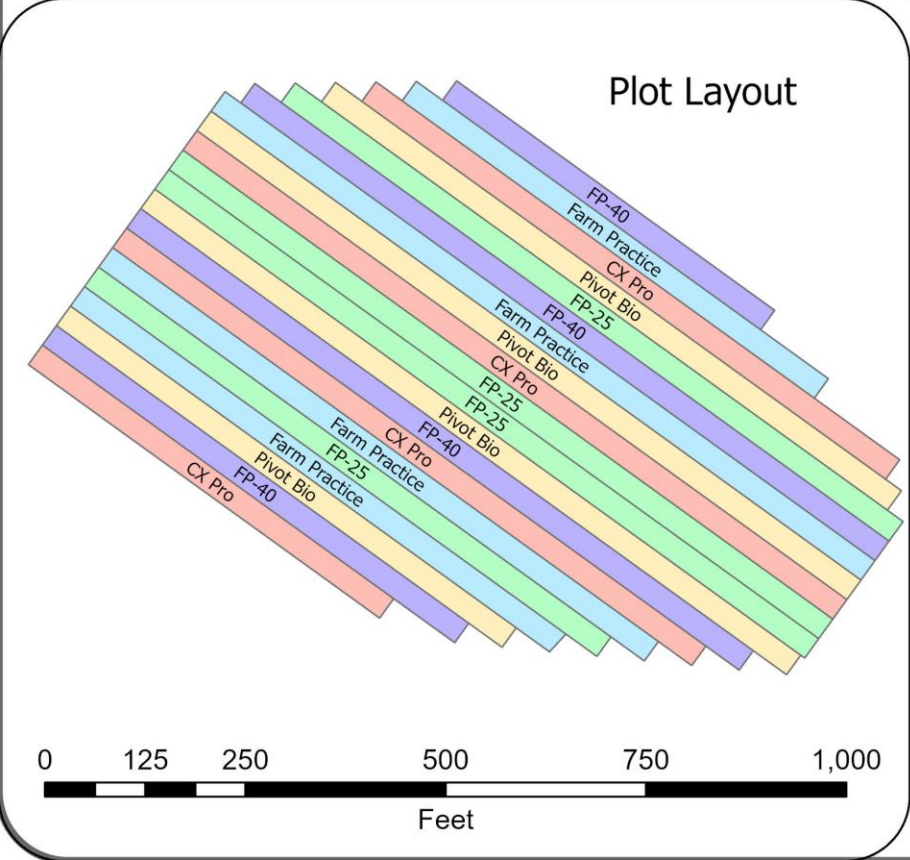
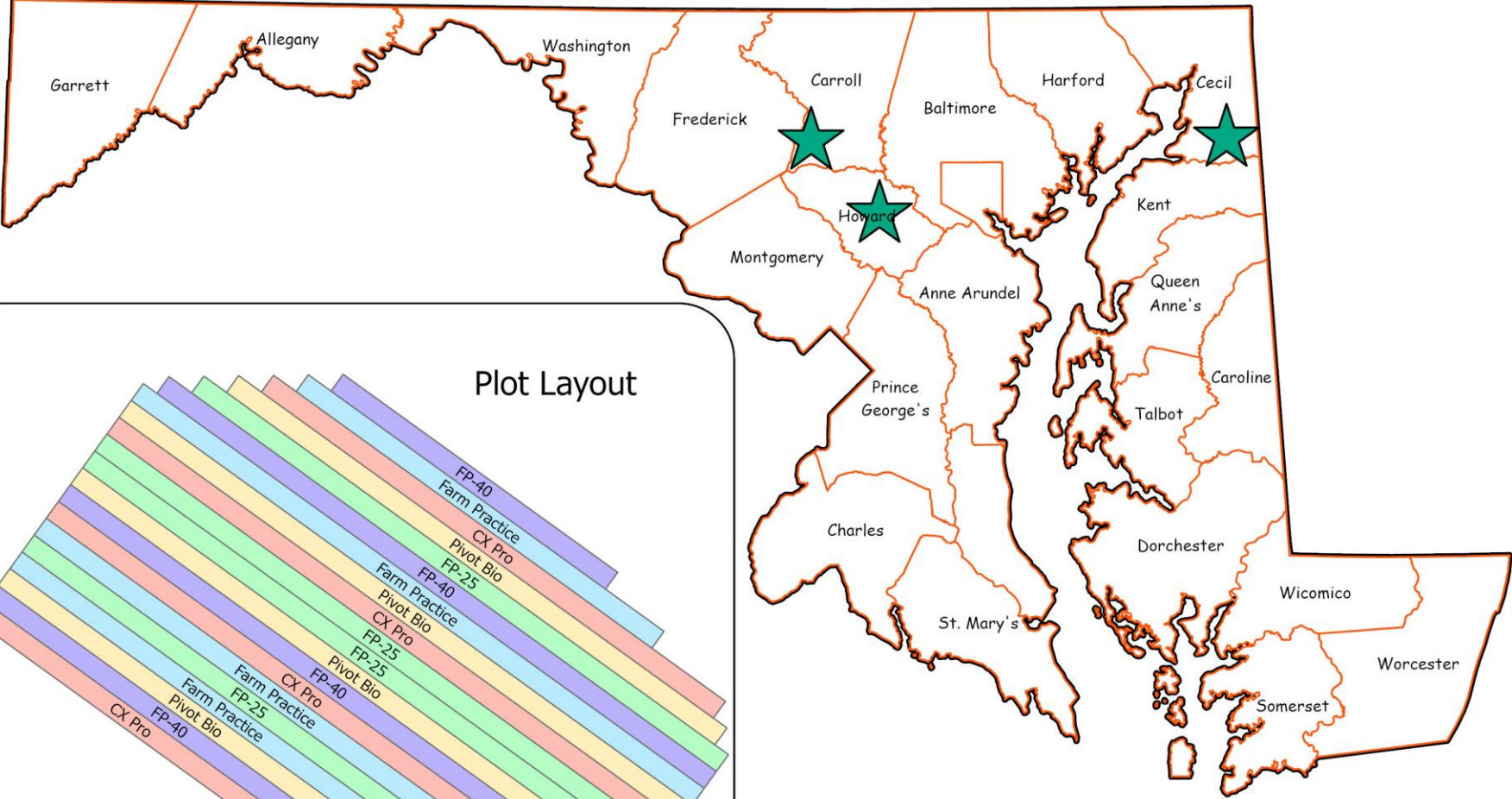
Treatments

*Source product label states it can provide 25 lb N
**Pivot Bio product label states it can provide 40 lb N

1. Farmer Practice (FP): total N applied to corn based on realistic yield goal; status quo management
2. FP + Source: farmer practice, plus Source @ V4, minus 25 lb N at sidedress*
3. FP + Pivot Bio: farmer practice, plus Pivot Bio @ planting, minus 40 lb N at sidedress**
4. FP – 25: 25 lb less N applied at sidedress*
5. FP – 40: 40 lb less N applied at sidedress**



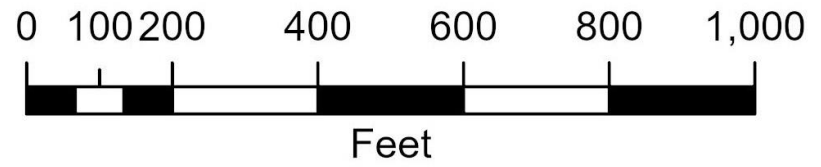
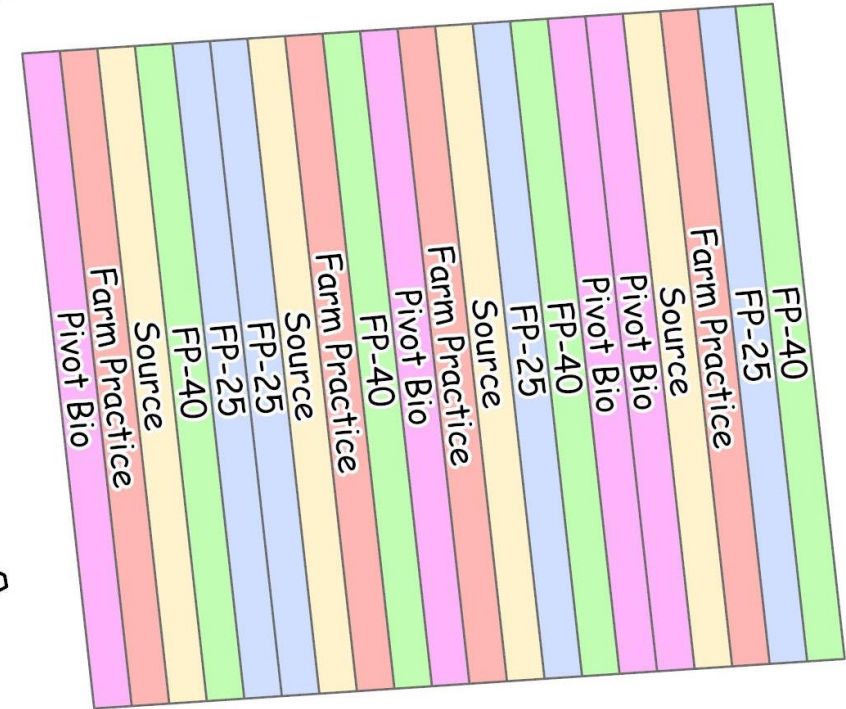
Locations in Carroll, Cecil, & Howard Counties



Map courtesy of Gene Hahn



- Five treatments
- Four replications (20 strips)
- Randomized within block
- Width of one planter pass
- Length of field (avg: 600')



Utility of On-Farm Results

Why Might Researchers Perform On-Farm Trials

- Gather data across a broad geographical region
 - Especially if data may have regulatory implications
- More rapidly and simply address producer questions
 - Testing claims of commercially-available products
- Providing a low risk, hands-on experience to farmers with novel ideas or management practices



On-Farm Trials to Encourage Management Change

- Goal of on-farm trial may be providing farmers a low-risk experience with novel technology or practice
 - Provide cost share or extra support for practice implementation
 - Provide stipend for participation or anticipated yield loss



On-Farm Trials to Encourage Management Change

- Outcomes include:
- Farmer will share their experience with technology or practice with their peers (formally or informally)
- Farmer will provide researcher or agency with honest feedback about the experience



On-Farm Trials to Encourage Management Change – 4R Practices

- Research generally supports the benefits of 4R practices
- On-farm trials may be good fit for increasing adoption of 4R practices through farmer experience
- On-farm trials may be useful to match specific 4R practices to most effective region for implementation
 - Through both farmer experience and data collection



Value of On-Farm Trials

- Different goals than small plot research but can complement and enhance findings at small plot scale
 - Limited data collection or providing low-risk farmer experience
 - More focus on the experience or increased adoption of practice instead of data collection
- May be more suited to specific types of experiments
 - Data collection across broad geography, limited treatments, or short timeframe



Sign-Up for 2023 to 2024 On-Farm Trials Today!

Wheat N Rate

The objective of this study is to evaluate current nitrogen (N) fertilizer recommendations to high management wheat in Maryland.

Corn N Rate

The objective of this study is to evaluate corn yield response to a range of nitrogen application rates across Mid-Atlantic conditions.

Biological Eval

The objective of this study is to determine the impact of biological fertilizer enhancement products on corn yield. Aiming to identify if there are conditions in MD where these products are more likely to increase yield.



<https://bit.ly/UMDOnFarmTrials>



FEARLESSLY FORWARD

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