



Setting the Stage: The Evolution of Corn Production in Pennsylvania

4R NUTRIENT STEWARDSHIP



HEALTHY SOIL, HEALTHY PLANTS

Healthy soil is strong, balanced, and able to feed crops all season long. It holds water when it's needed, drains well after a rain, and cycles nutrients in a form plants can easily use. When the soil thrives, the plants do too. Corn yields have steadily improved by 1–2 bushels per acre each year, thanks to better genetics, smarter equipment, good nutrient management, and healthier soils. Since 2000, the average corn yield in Pennsylvania has grown by 45 bu/A, and the most progressive farms have seen increases of up to 100 bu/A.

4Rs FOR SOIL, WATER, AND YIELD

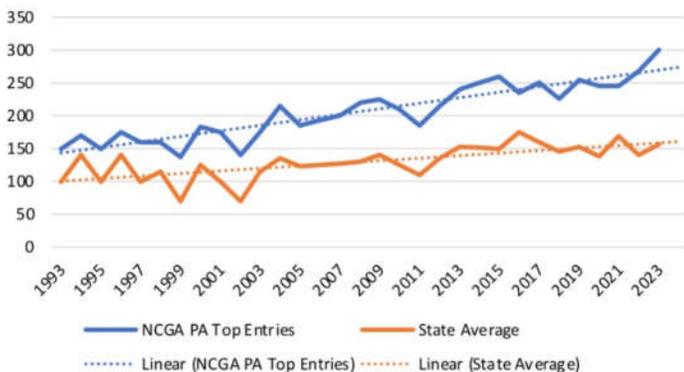
Today's soils are being asked to supply **30% more nutrients** than they did 20 years ago. That's not just a soil challenge — it's also a plant challenge.

Crops are under greater pressure from:

- Heat and water stress
- Late-season disease
- Water use efficiency demands
- Uneven emergence

To meet today's yield goals, farmers must manage the right rate, source, timing, and placement of nutrients.

Average Corn Yield 1993-2021



Building on 4R principles, Rosetree's CWIP project put nutrient stewardship into practice by encouraging the use of a more resilient nitrogen source that aligns with corn growth patterns, reduces crop stress, and improves overall efficiency.

Since 2000, PA corn yields have risen 45 bu/A — top farms have more than doubled that





Rosetree's Project: Incentivizing Pivot Bio PROVEN® 40 Usage to Optimize Nitrogen Applications

OVERVIEW

This project centered on using a more resilient nitrogen source that aligned with corn's growth stages to support both yield and environmental goals. Participating farms were asked to apply nutrient stewardship principles to improve efficiency, reduce stress on the crop, and protect water quality.

Key components of the project:

- Farmers targeted <1 lb of nitrogen per bushel of expected yield, including all N sources — manure, legumes, and fertilizer.
- Participants then reduced total nitrogen applications by up to 20 lbs per acre.

The reductions weren't random — **the goal was to remove the highest-risk nitrogen**, typically associated with:

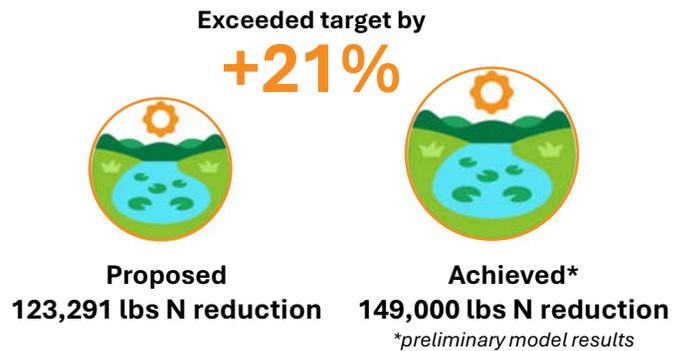
- Poor timing (applications made when plants couldn't use the N efficiently)
- Ineffective placement (where fertilizer was more prone to runoff or loss)

By improving rate, timing, and placement, farmers maintained yields while reducing nutrient losses and supporting water quality improvement goals.

REDUCTIONS & RESULTS

Many nutrient-reduction strategies focus on edge-of-field practices like buffers, wetlands, or filters that capture nutrients after they leave the field. In contrast, this project focused on *in-field management* — preventing losses at the source by improving how, when, and where nitrogen is applied.

Preliminary CAST results show the project exceeded its nutrient reduction targets, delivering greater water-quality benefits than projected in year one.



SCALABILITY & NEXT STEPS

In-field nutrient management practices are highly scalable. They integrate directly into existing farm operations, require no additional land, and can be expanded quickly across large acreages. Continued investment will allow this pilot to build on early success, refine data through additional CAST modeling, and expand participation to deliver broader, measurable nutrient reductions across the watershed.

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