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# PRECISION FERTILIZER TECHNOLOGY – GETTING THE RATE RIGHT

**Remote sensing-based precision fertilizer technologies (PFT) are gaining popularity.** Growers have long recognized that fields and areas within a field respond to fertilizer differently, but haven't always had the means to feasibly address these differences. The arrival of more affordable technologies along with the potential benefits being shown through university research studies have resulted in more growers moving toward site-specific, precision fertilization. There are several remote sensing systems available that use various strategies to collect information including, satellite imagery, aerial photography, and ground-based sensors. Regardless of information source, the end goal is the same for all PFTs – identifying the optimum fertilizer rate.

**Remotely-sensed information is correlated with variables commonly used to determine fertilizer rates.** In some PFTs, direct measurement of a soil or plant characteristic is involved, such as generating a variable-rate fertilizer map based on grid soil sampling. However in most remote sensing-based systems, the only thing "directly" measured is reflected light. The reflected light is correlated with plant characteristics like chlorophyll content, nutrient concentration, or yield potential to provide an "indirect" measurement of some variable that can be used to calculate fertilizer requirement.

**Optimum fertilizer rates are calculated using algorithms constructed to consider a variety of factors.** Many different algorithms (stepwise procedures for solving a problem) have been developed for PFTs to convert remotely-sensed data into fertilizer rates, but most will contain similar basic components:

- **Target measurements** that can be either directly or indirectly related to some variable that can be used to estimate plant nutrient requirement
- **In-field reference measurements** that are usually collected from "non-limiting" or "nutrient-rich" strips established earlier in the growing season to compare with the target measurements at the time of fertilization
- **Consideration of temporal (weather) conditions** that affect crop growth, soil nutrient availability, and overall yield potential
- **Estimates of crop responsiveness to applied fertilizer** that account for other nutrient sources such as manures or early-season mineral fertilizer applications
- **Estimate of nutrient use efficiency**

**No precision fertilizer technology is perfect** and improvements continue to be made. However, many PFTs are available that use reliable data collection methods and well-constructed, rigorously-tested algorithms to generate accurate fertilizer recommendations.

**Getting the right rate of fertilizer in the right place in the field at the right time of the growing season using PFT can improve nutrient use efficiency and profitability by optimizing crop yields and minimizing nutrient losses.**

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