Green Seeker Basics

Bernie Paulson

McPherson Crop Management

Janesville, MN 56048

Green Seeker Basics

After five years of annually applied N (56 – 112 kg N ha^{-1}) in winter wheat produced under conventional tillage, only 27 to 33% of the fertilizer N had been recovered in the grain (Olson and Swallow, 1984). Results like these are common, consistent with worldwide NUE and cause for initiating a collaborative global effort to increase NUE.

Green Seeker Basics

Excess nitrogen flowing down the Mississippi each year is estimated to be worth $750,000,000 (Malakoff, 1998). At an average value of $490 per ton of actual N, the $750,000,000 would comprise over 13.6% of the total value of N fertilizer ($5,480,356,000) applied in 1996 in the entire United States.

There must be a better way…

…The GreenSeeker Alternative

What is GreenSeeker?

Variable rate application & mapping equipment designed for use throughout a growing season.

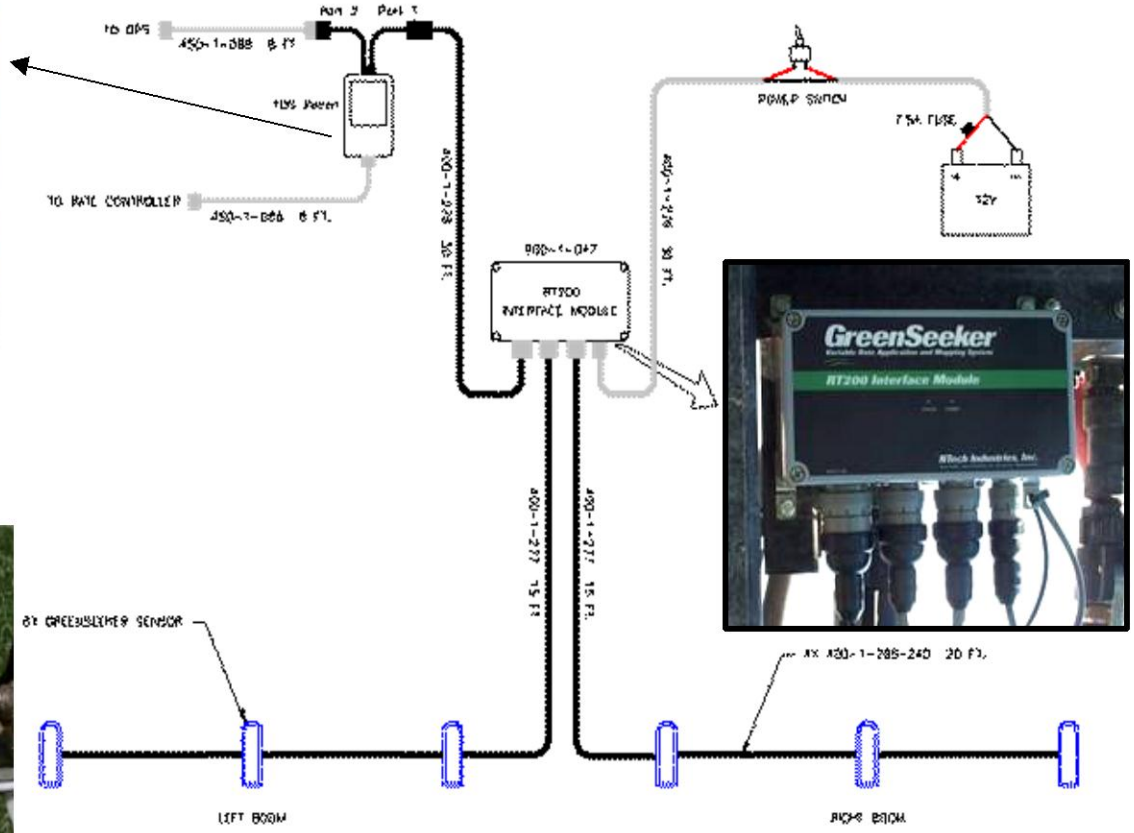
- Boom/Toolbar mounted sensors to instantly measure & map Crop Vigor.
- Crop Vigor (NDVI)values are used to as the basis for nitrogen prescription rates.
- Turns standard applicators into real-time on the go Variable Rate Applicators,

GreenSeeker RT200

- Measures differences in crop health and vigor in ***real time***, not a service provider.
- Facilitates ***real time*** variable rate application.
- Maps crop condition, targeted prescriptions and as-applied data.
- Available for repetitive use throughout the year.

Ready to install

GreenSeeker RT200 System



The Sensors

The Sensors

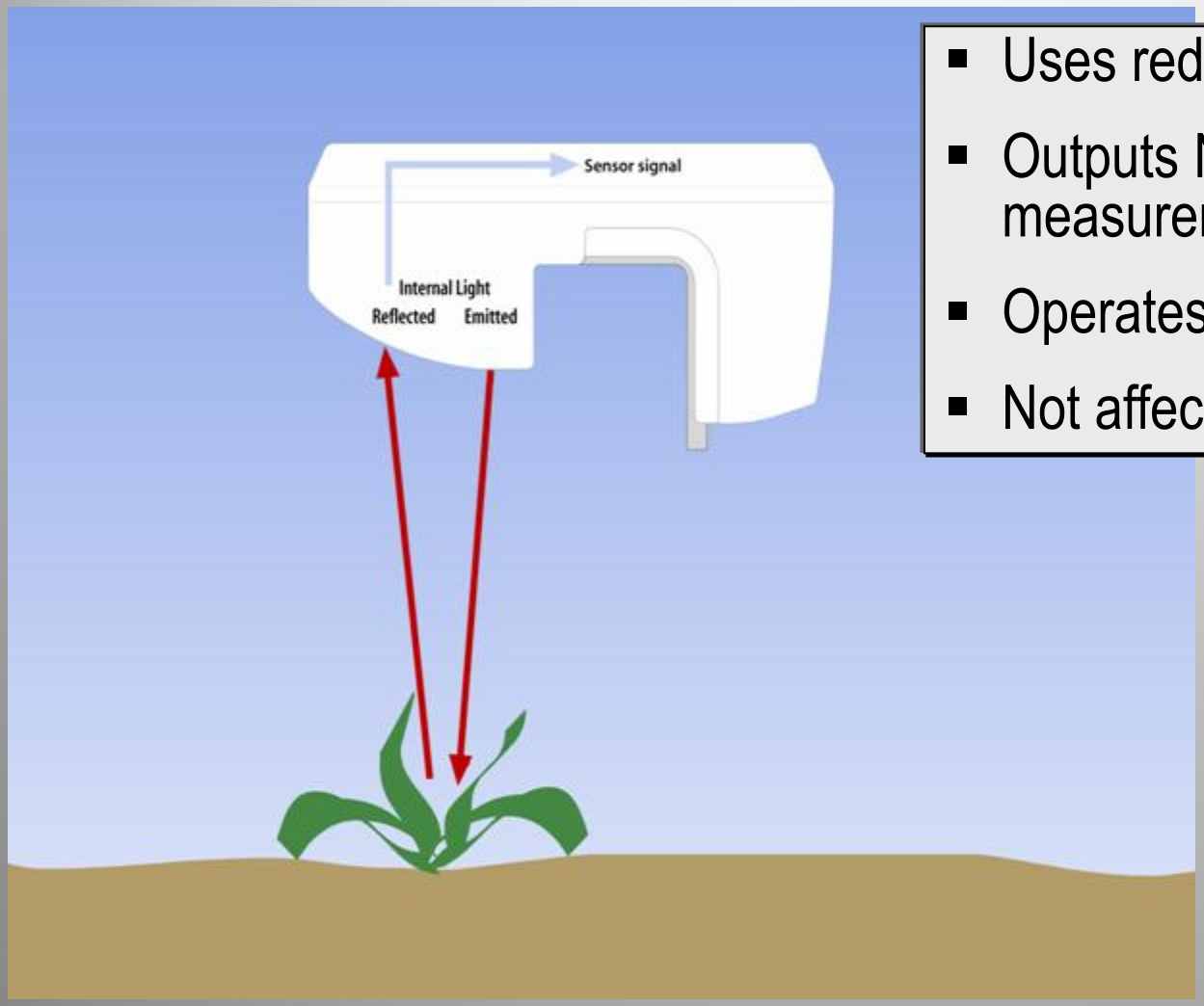
- During 1993 and 1994, the first sensor readings were taken from ongoing N rate experiments in bermudagrass conducted at Oklahoma State University, Stillwater, OK,

The Sensors

- In 1994, graduate students collected sensor readings and later applied N fertilizer rates in wheat based on an algorithm developed by Team-VRT. Their first algorithm applied N rates using an inverse N-rate, NDVI scale. As NDVI increased (biomass increased), N fertilizer rates were reduced.

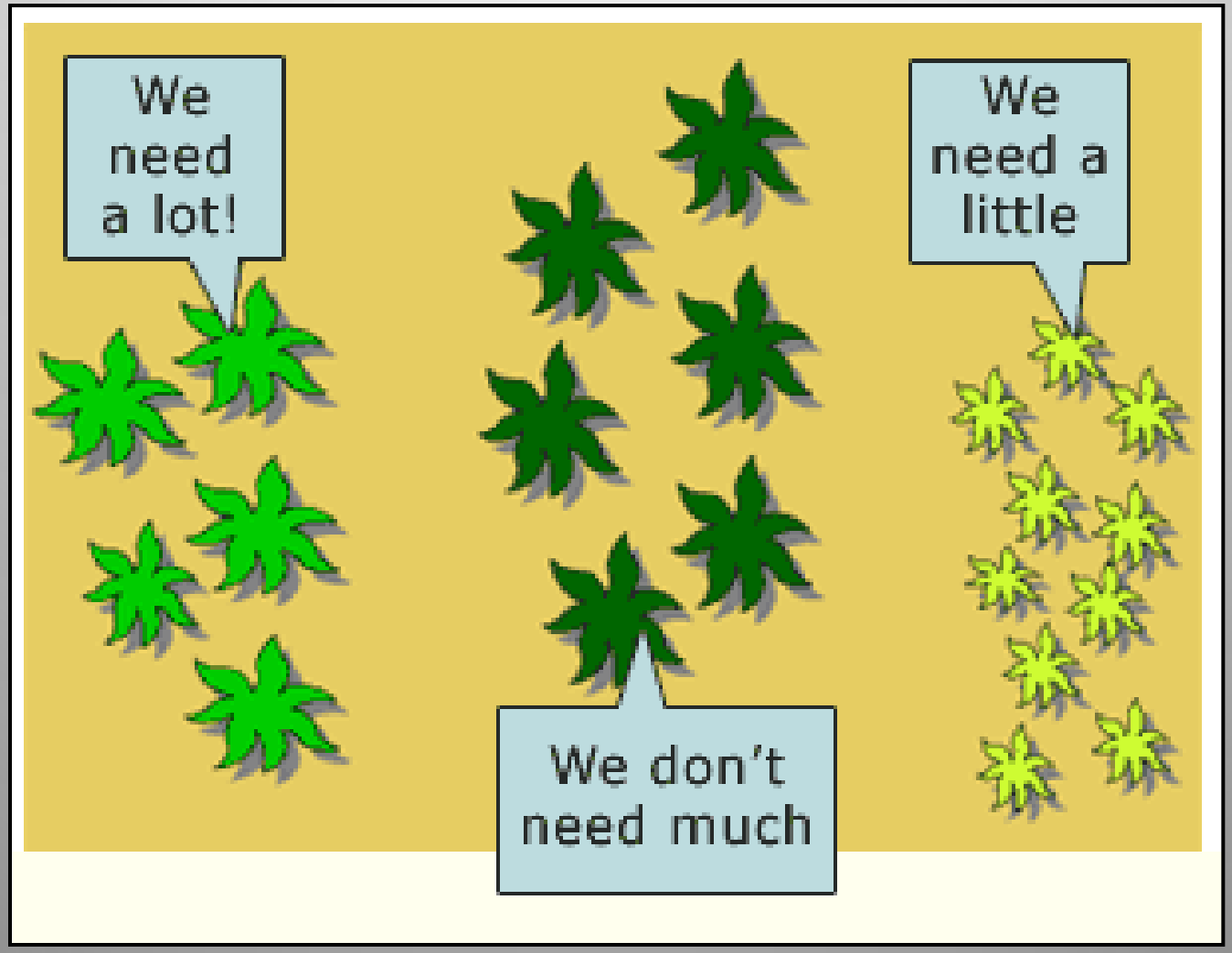
First VR Application 1994 at Oklahoma State

How does it work?

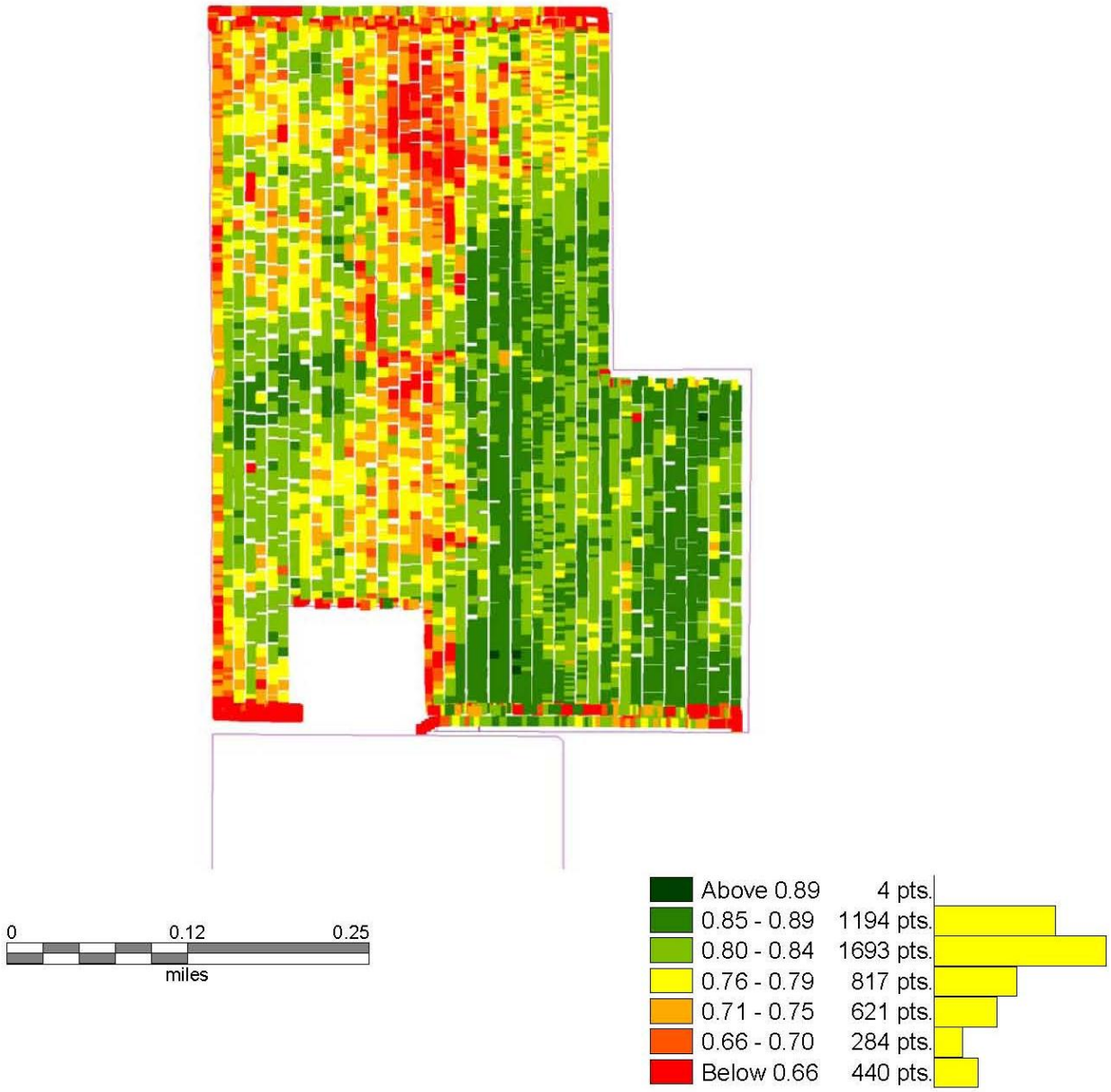


- Uses red and near-infrared light
- Outputs NDVI- A biomass/vigor measurement
- Operates day or night
- Not affected by clouds or sun

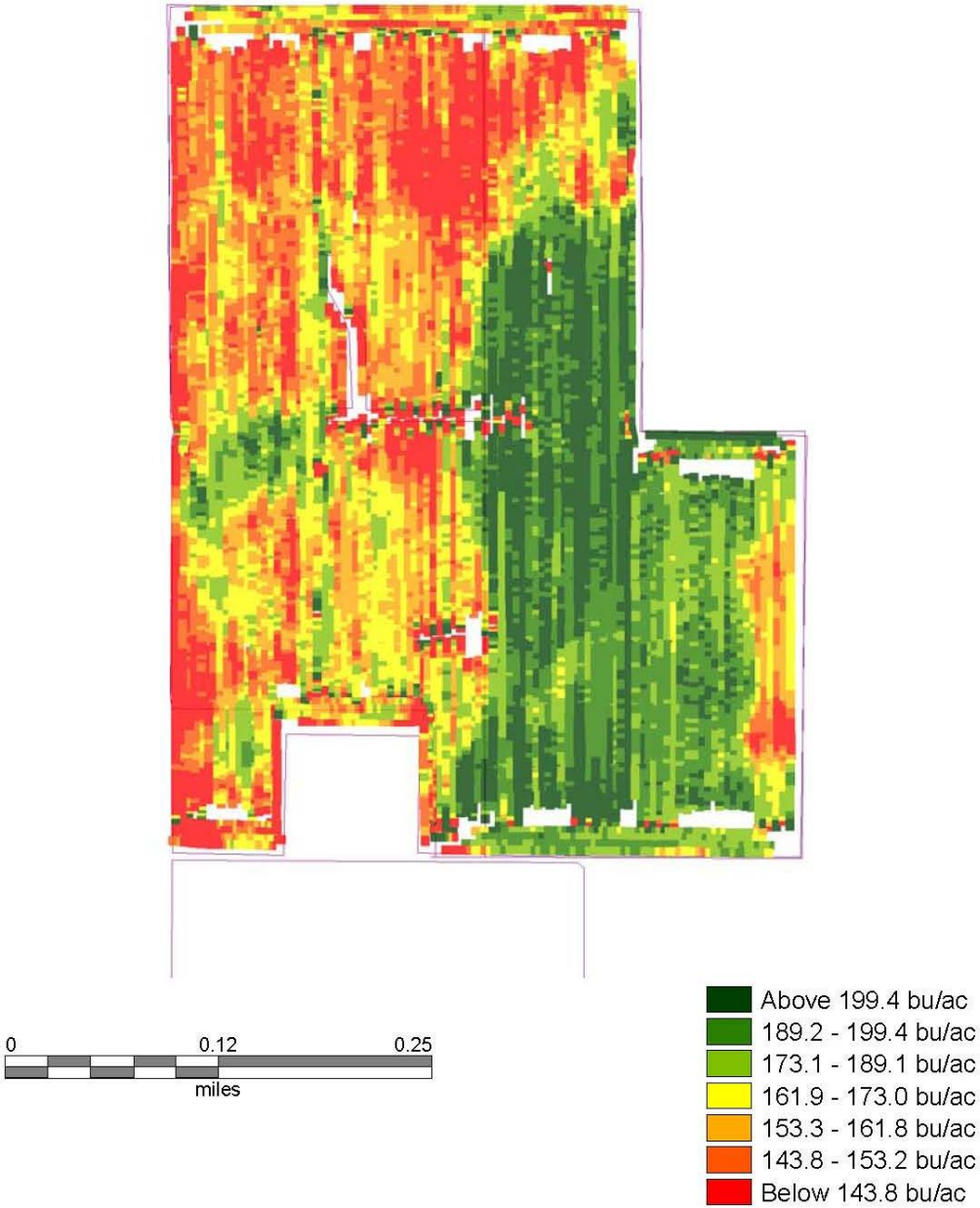
NDVI = Normalized Difference Vegetative Index


We need a lot!
We need a little
We don't need much

2006 Green Seeker NDVI

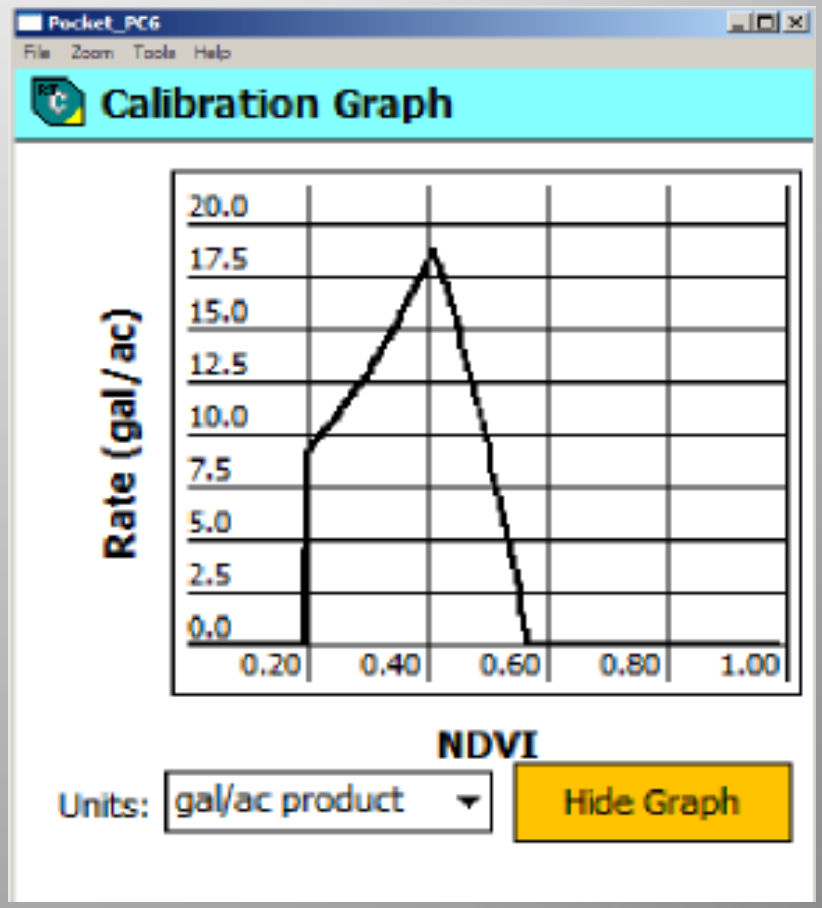


2006 Corn Yield



GreenSeeker Recon Monitor

- RT Commander Software.
- Crop Prescriptions.
- Exports target rate to Rate Controller.
- Performs all data logging (NDVI, Target, As Applied).
- Allows for custom Rx's.



How Does GreenSeeker Nitrogen Management Differ?

- Defensive strategy against N loss.
  - Reduces risk of leaching & de-nitrification.
- The plant itself dictates each season's optimal nitrogen needs.
  - Based on **yield potential** not yield goals.
- Accounts for **in-field spatial variation**.
  - Uses variable rate approach.
- Versatile with equipment, timing & forms of N.