

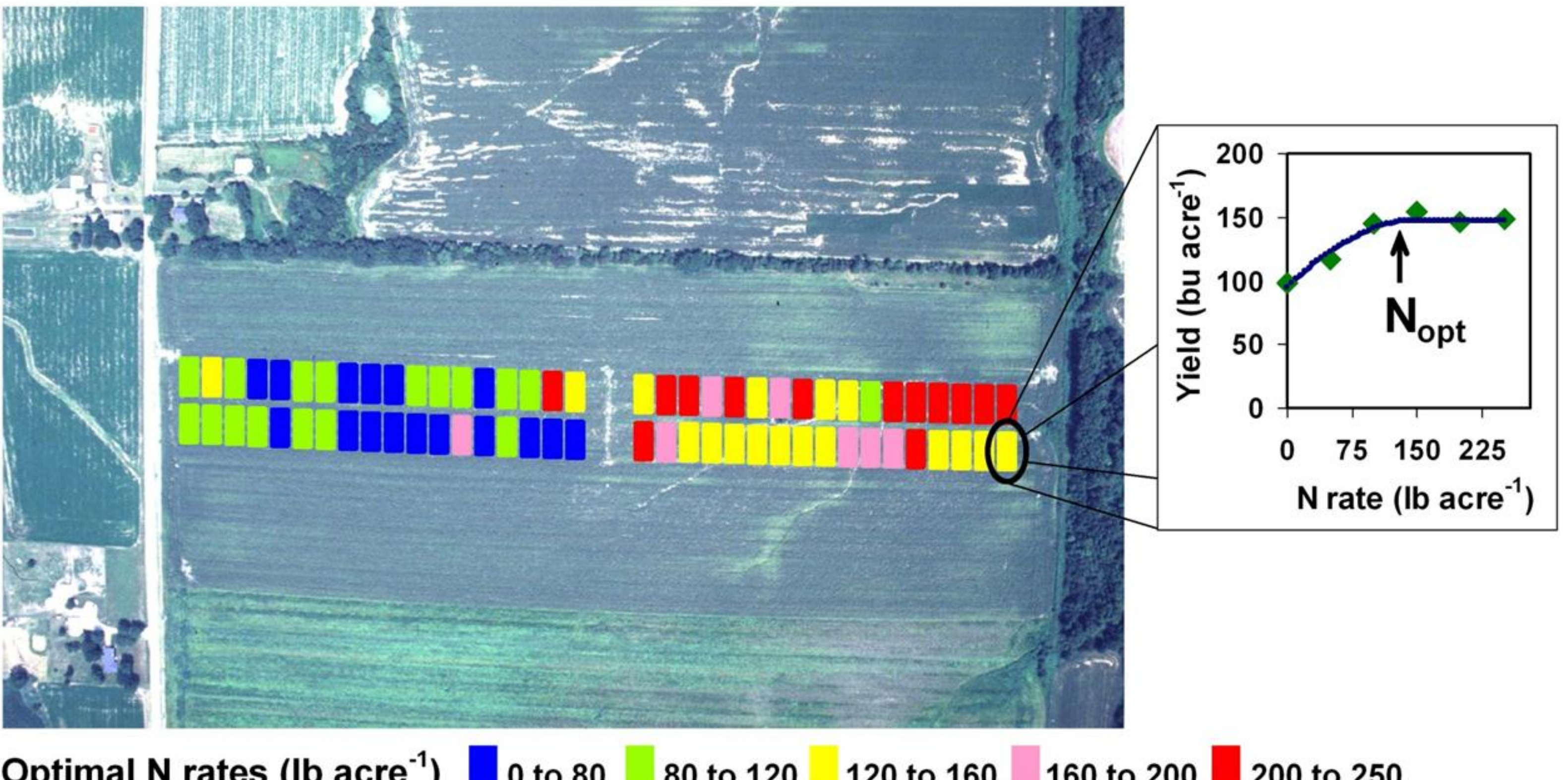
Canopy Sensors to Match N Rate to Crop Need and Reduce the Pool of Vulnerable Nitrate



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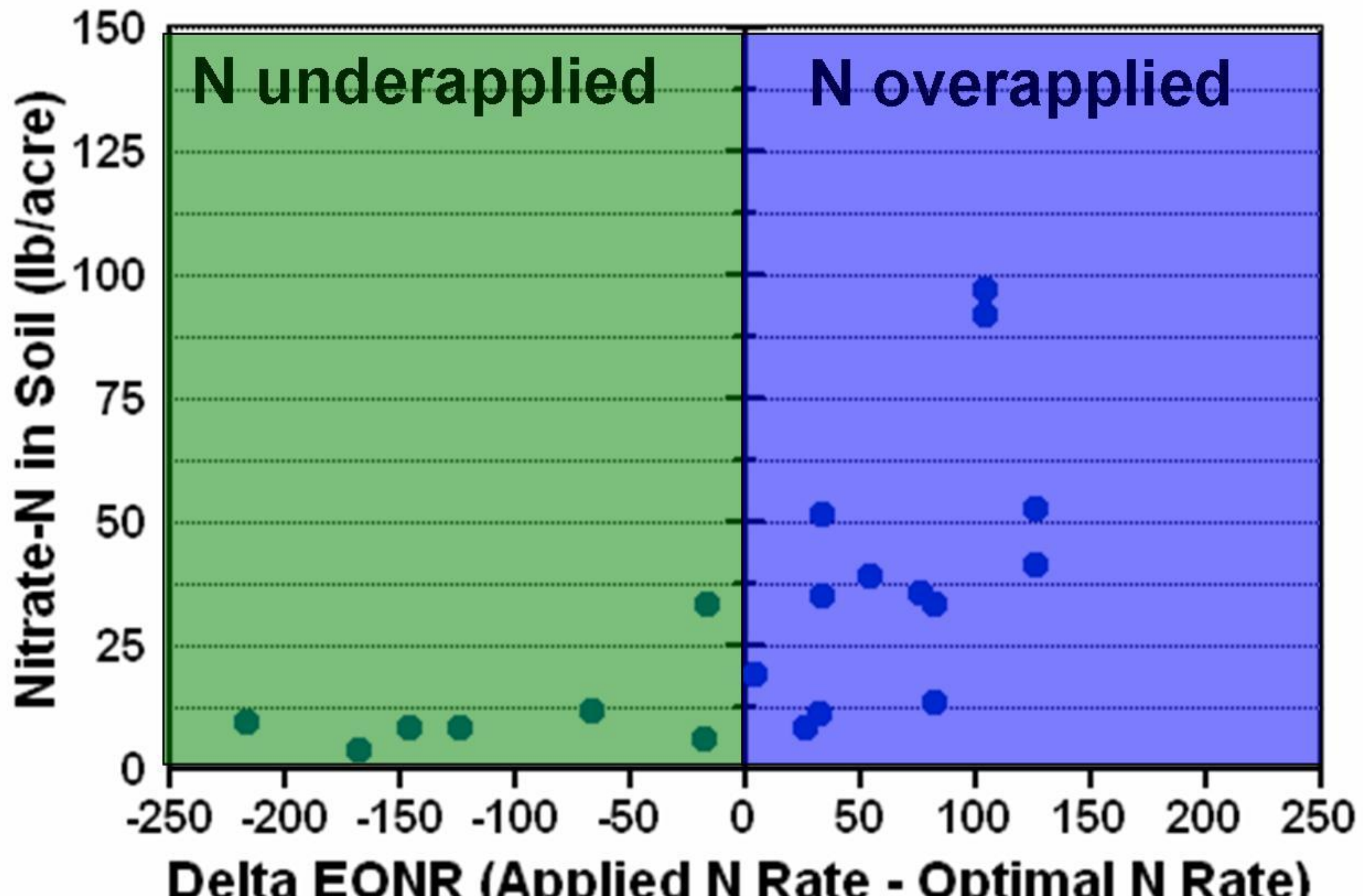
Crop N need varies widely

Optimal N fertilizer rate in this field varied from 0 to 250 lb N/acre. Current N management practices do not address this variability.



Application of a uniform rate of N usually results in both under- and over-application

Zones of over-application will have high post-harvest nitrate



- Nitrate left in soil after harvest is vulnerable to loss
- Precip exceeds evapotransp, water moves
- Better diagnosis of spatially variable N need will reduce the size of this vulnerable pool

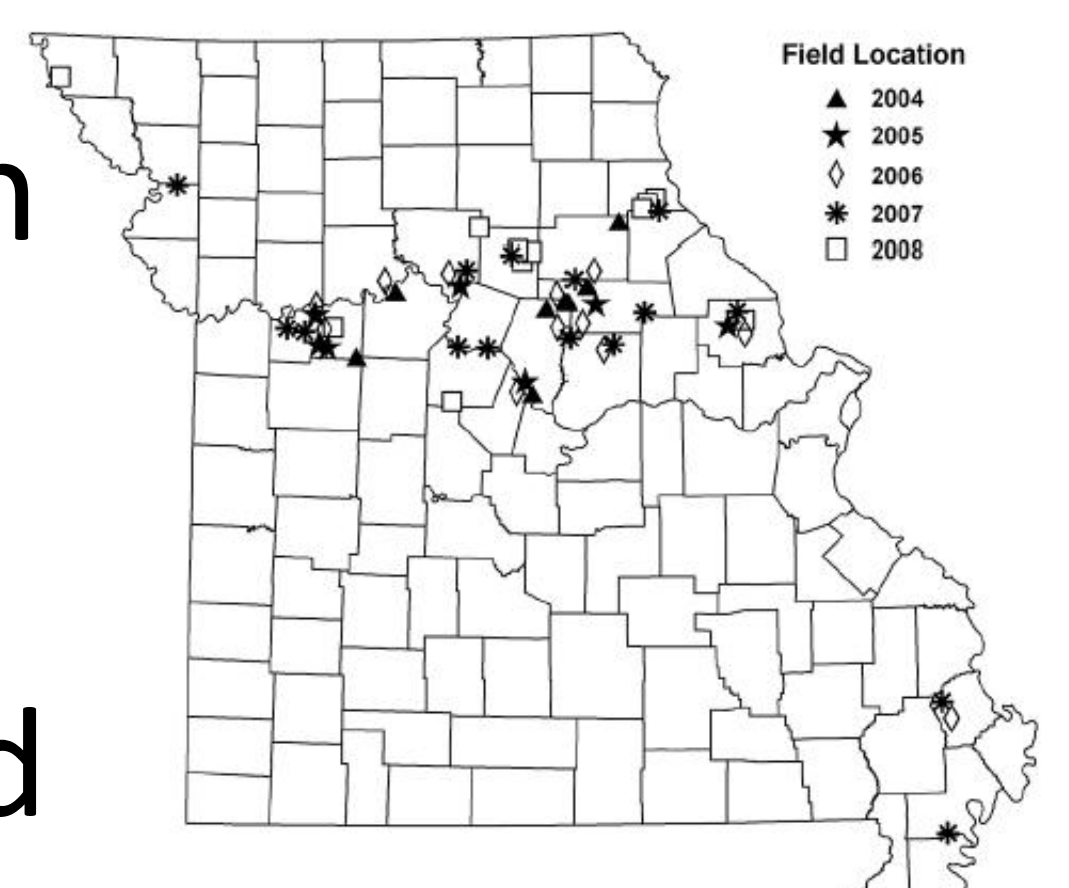
Canopy Sensors Match N Rate to Crop Need

- Canopy sensors on N fertilizer applicators:
 - Sense color, control N rate
 - Dark green = low rate, light green = high rate
- Can manage within-field variability in crop N need
- My experience with large data sets: color much better than yield or soil tests to predict N need



Field-scale demonstrations

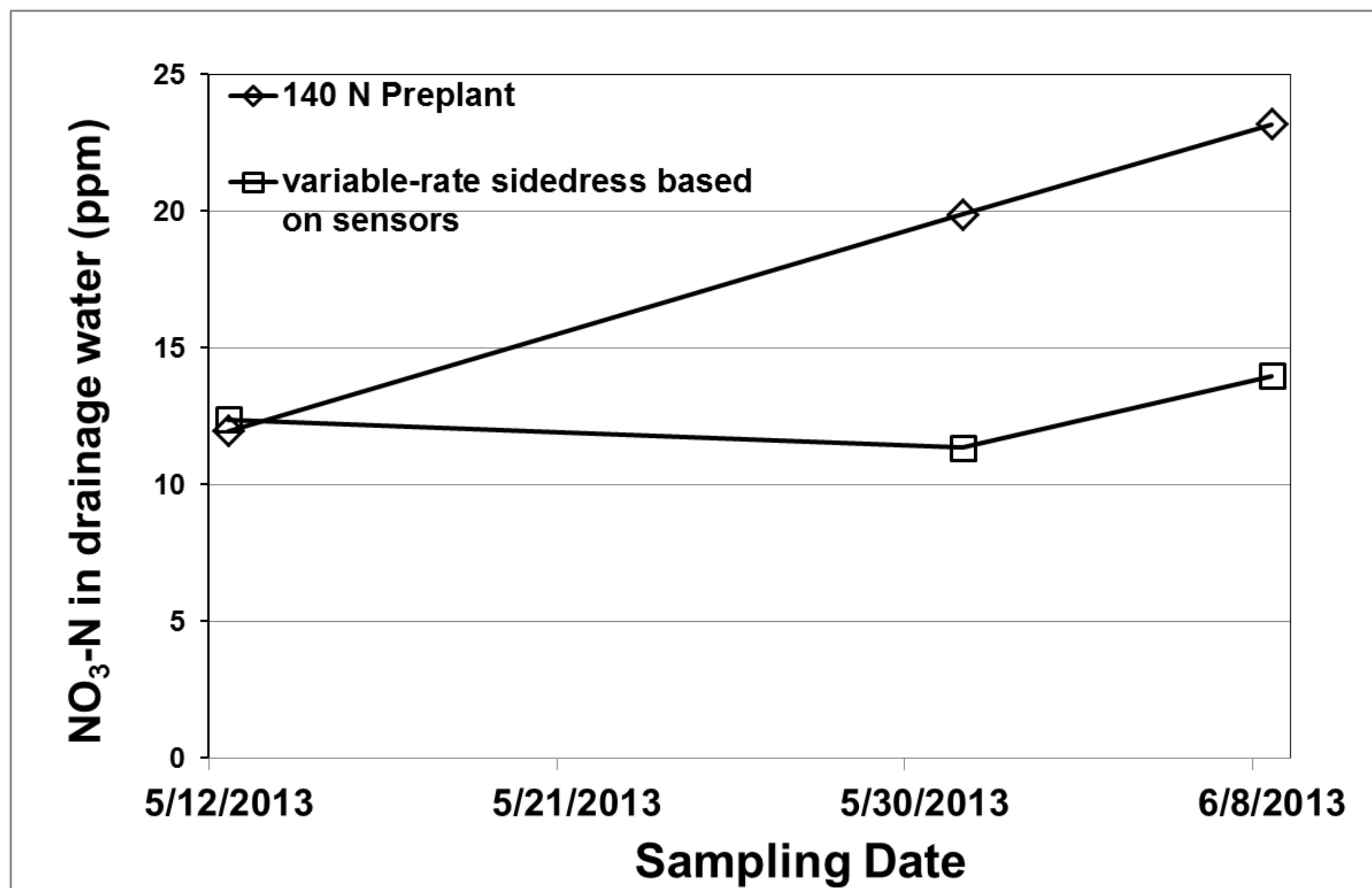
- 55 replicated on-farm demonstrations in corn, 9 in cotton
- Sensor-based vs producer-chosen N rates (producer's equipment)
- All major N sources and application methods represented



Crop	Change relative to the producer's N rate in:			
	N rate	Surplus N [†]	Yield	Profit
Corn	-14 lb N/ac	-25%	+2 bu/ac	+\$17/ac
Cotton	-5 lb N/ac	NA [‡]	+29 lb/ac	+\$23/ac

[†](N applied – N removed in grain)—this unused N can move to water; [‡]Not Available

Our results confirm that sensors can vary N rates across landscapes in a way that out-performs rates chosen by producers.



Canopy Sensors Reduced Nitrate Concentration in Drainage Water in 2013

Work on sensor-based N effects on drainage water nitrate supported by USDA-NIFA grant 'Climate Change, Mitigation, and Adaptation in Corn-Based Cropping Systems.'

Why are there only three posters in this session on 'Controlling Nutrient Losses From The Mississippi River Valley', and only one on nitrogen? One reason is that the USDA Water Quality research program has not funded a single project on nitrogen management over the past ten years.