



Nitrogen Fertilization Optimization Algorithm (NFOA)

1. [Optical Sensor Based Algorithm for Crop Nitrogen Fertilization](#) 2005
2. [Independence of Yield Potential and Crop Nitrogen Response.](#) J. Prec. Agric. 2011
3. [Unpredictable Nature of Environment on Nitrogen Supply and Demand](#), Agron. J. 2019

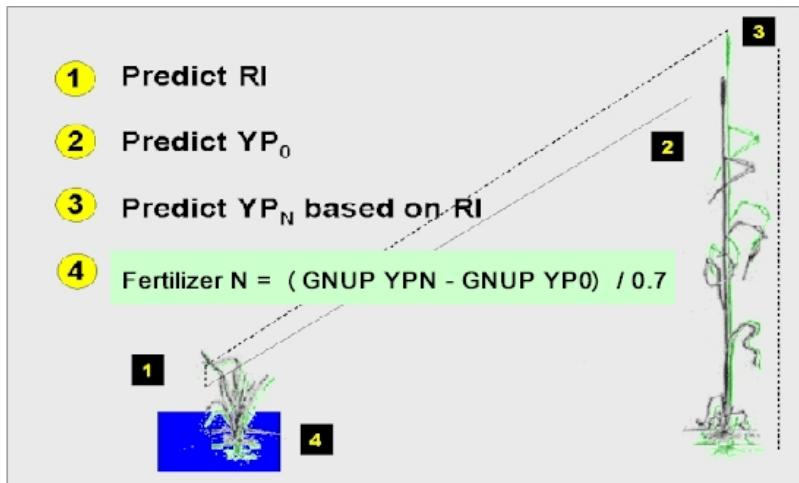
[Nitrogen Fertilizer Approaches](#) (Y_{P0}-RI vs Sufficiency)

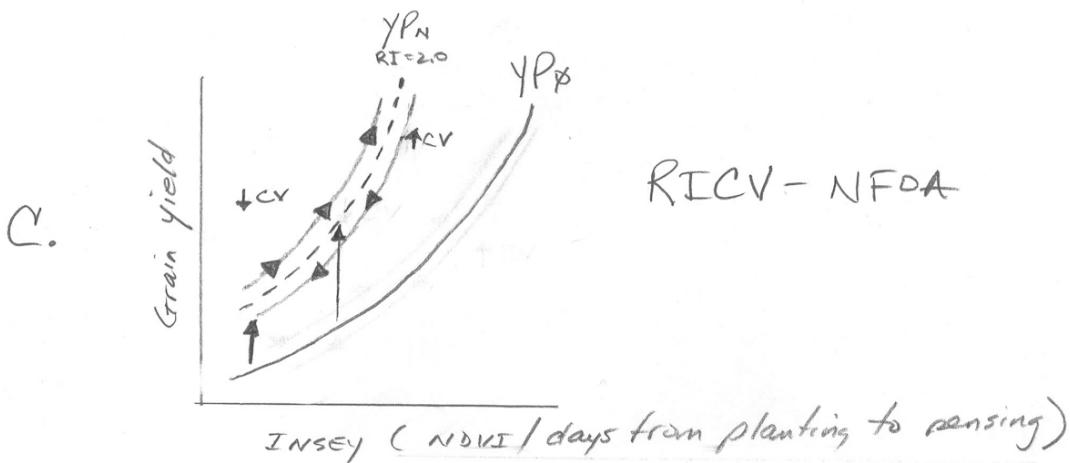
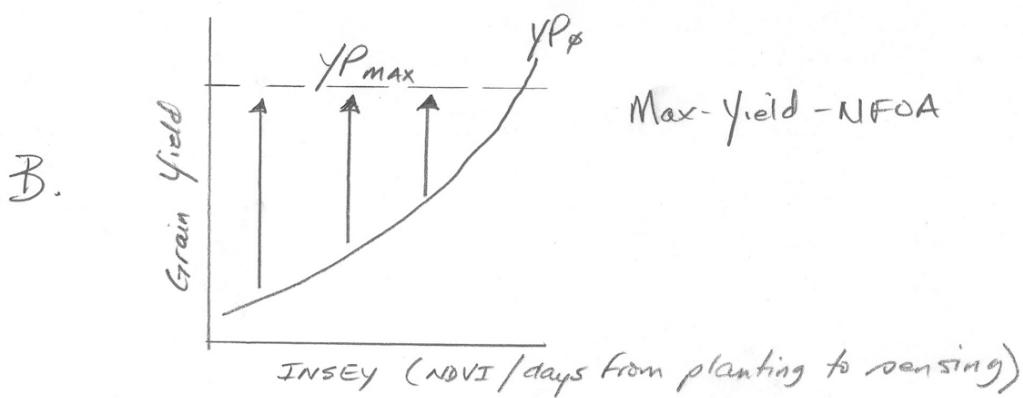
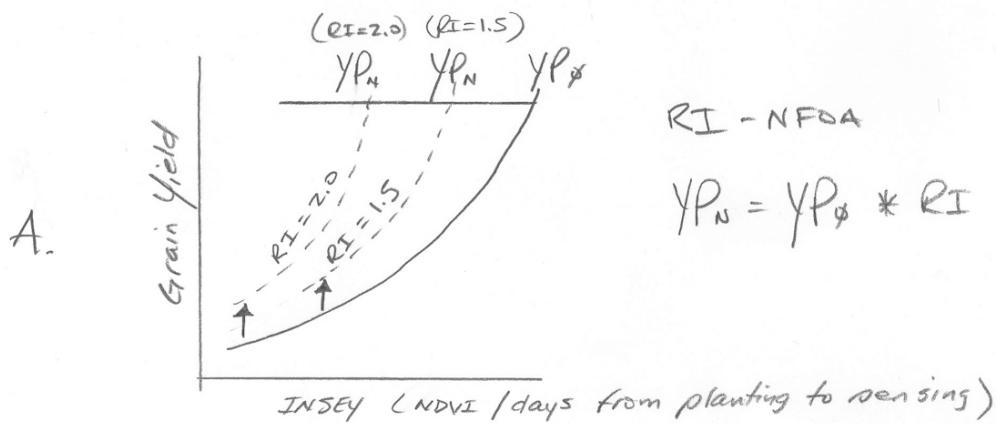
[Variability in Optimum Nitrogen Rates for Maize](#). Agron. J. 108:2165-2173. (doi:10.2134/agronj2016.03.0139).

Algorithm for Determining In-Season Fertilizer N rates Using Yield Prediction and the Response Index

Methodology for generating Algorithms (dates back to 2003)

- [The Key to OSU Algorithm Development: Recognizing the Independence of Yield Potential and N Responsiveness](#)
 - [In Season Prediction of Corn Grain Yield Potential Using Normalized Difference Vegetation Index \(Teal, 2006\)](#)
 - [Improving Nitrogen Use Efficiency in Cereal Grain Production with Optical Sensing and Variable Rate Application, Agron J. \(94\):815-820](#)
 - [Nitrogen Fertilization Optimization Algorithm 2003](#)
 - [Nitrogen Fertilization Optimization Algorithm 2000](#)
 - [2004 Outline for Generating New Crop Algorithms for N Fertilization](#)
 - [2005 Nitrogen Fertilization Optimization Algorithm using PLOT CV's](#)
 - [2005 CV Algorithm: Manuscript](#)
- [2016 Algorithm \(5813\)](#)

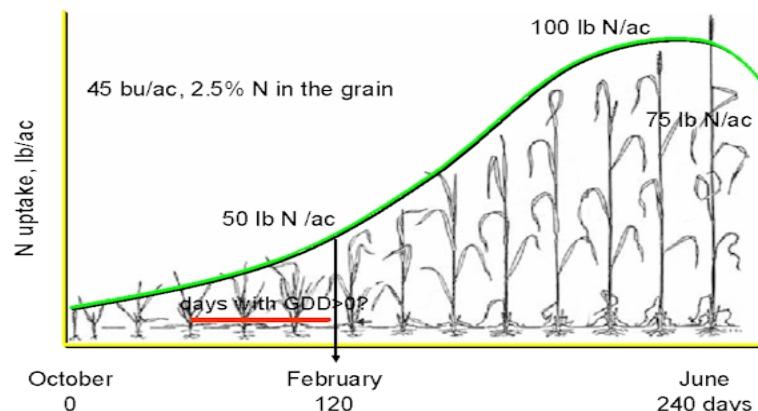
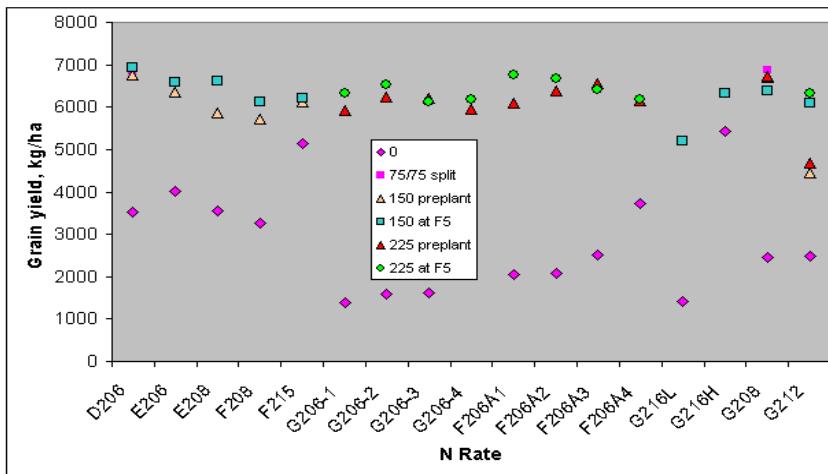




Measurement/Action	NDVI	NFOA	OSU-Precision Sensing	Varvel, Schepers, and Francis (1997)
			Sufficiency	
<i>Non-N limiting</i>	0.85		Response Index = 0.85/0.65 = 1.31	= 0.65/0.85 * 100 = 76%
<i>Farmer Check</i>	0.65			
<i>Planting date</i>			1.days where GDD >0 2.days from planting to sensing = 60	
<i>Predict Yield Potential</i>			= 0.65/ days where GDD>0 $YP_0 = 2334.9 \exp(NDVI^2.6493)$ = 13071 kg/ha	
<i>Grain N uptake YP_0</i>			= 13071 * 1.25%N 163	
<i>Grain N uptake YP_N</i>			= 13071 * 1.31 * 1.25%N 214	
<i>N Recommendation</i>			= (214-163)/0.70 73	+ N if <95% Rate = 30 lb N/ac checked every 7 days applied N all the way to R3 At max uptake (5 lb N/ac/day)
Sufficiency <90%, Max yields not achieved with in-season N, as yield potential had already been reduced. corn grain = 1.25%N				







INSEY: Rate of N uptake over 120 days, $> \frac{1}{2}$ of the total growing days
and should be a good predictor of grain yield

