

Active Sensor Strategies for In-season Application of Urea in Corn

Daniel W. Barker and John E. Sawyer
Department of Agronomy, Iowa State University

IOWA STATE UNIVERSITY
Extension and Outreach

c Results

During this study, drought persisted across Iowa each year (Fig. 1), influencing in-season N treatment response and yield. In 2012 and 2013, there were 376 and 192 stress degree days, respectively (Table 1).

Corn yield and NUE were the same between the three strategies each year and overall (Fig. 2). Notably, SNS corn yields were the same as PP-N and RNS, showing yield response to sensor applied N, even in dry summer conditions. The NUE mean separations (SNS in 2012 and PP-N in 2013) were not statistically significant across sites and years, due to inconsistent/variable strategy responses at each site.

Figure 3 shows a comparison of PP-N and PP+S-N strategies across a normal year (2009), wet year (2010), and dry years (2012-13). There was positive sensor N differential in all years when limited N was applied prior to planting (minor exception at the PP-N plateau in 2009). The sensor differential becomes smaller with more applied PP-N. Plateau pre-plant N rates for the PP+S-N varied dramatically across years (0, 97, and 148 kg N ha⁻¹ for wet, dry, and normal years respectively) averaging 80 kg N ha⁻¹.

d Conclusions

- Drought conditions (especially after in-season N application) had a significant effect on N strategy response and yield potential during this study.
- The SNS provided more opportunity to preserve yield potential when growing conditions were uncertain.
- Across diverse years, the best PP-N rate to apply when using additional sensor-based N was approximately 80 kg N ha⁻¹.

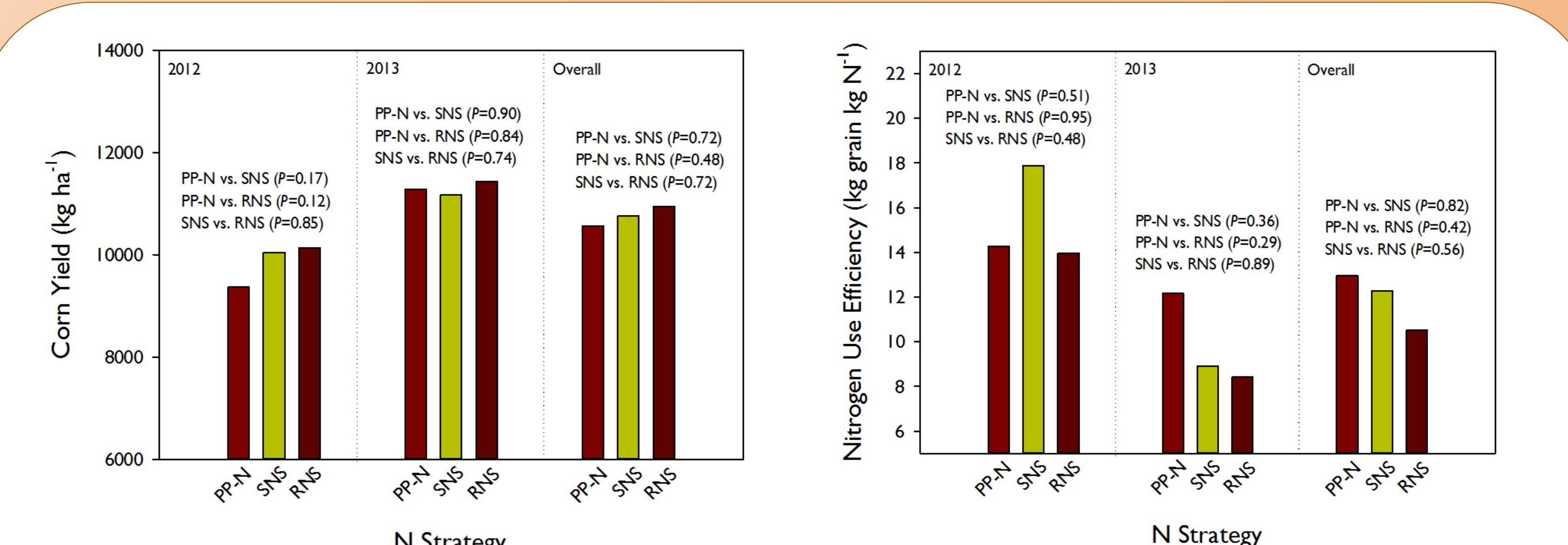
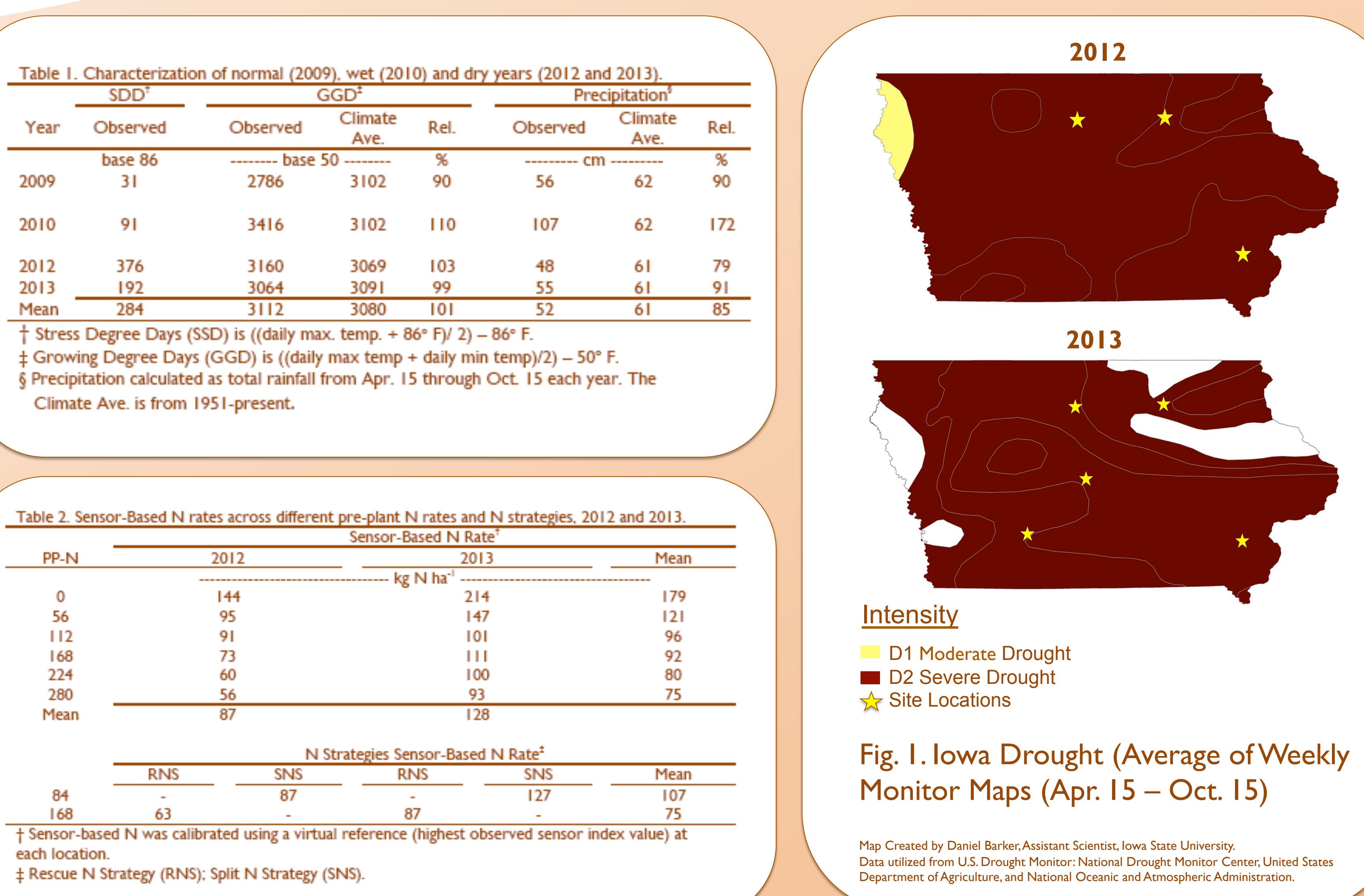


Fig. 1. Iowa Drought (Average of Weekly Monitor Maps (Apr. 15 – Oct. 15))

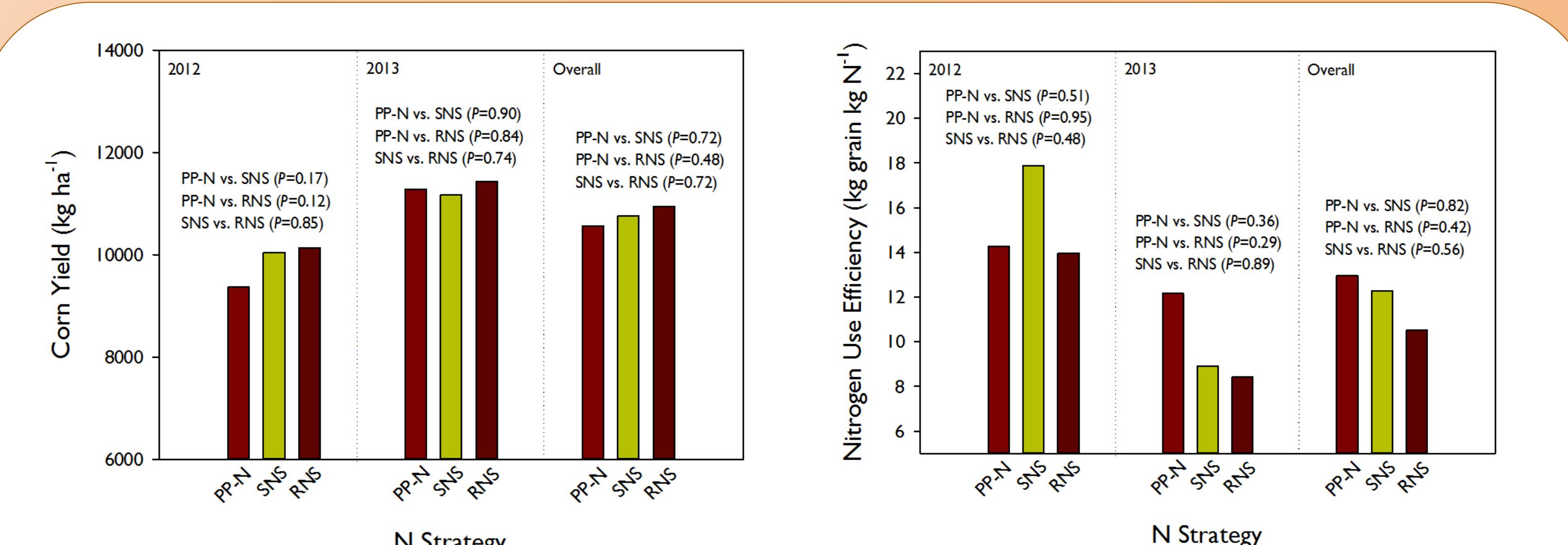


Fig. 2. Comparison of yield and NUE [(N yield – zeroN yield)/total N applied] utilizing three N application strategies, 2012 and 2013. Statistical contrasts were made using PROC MIX.

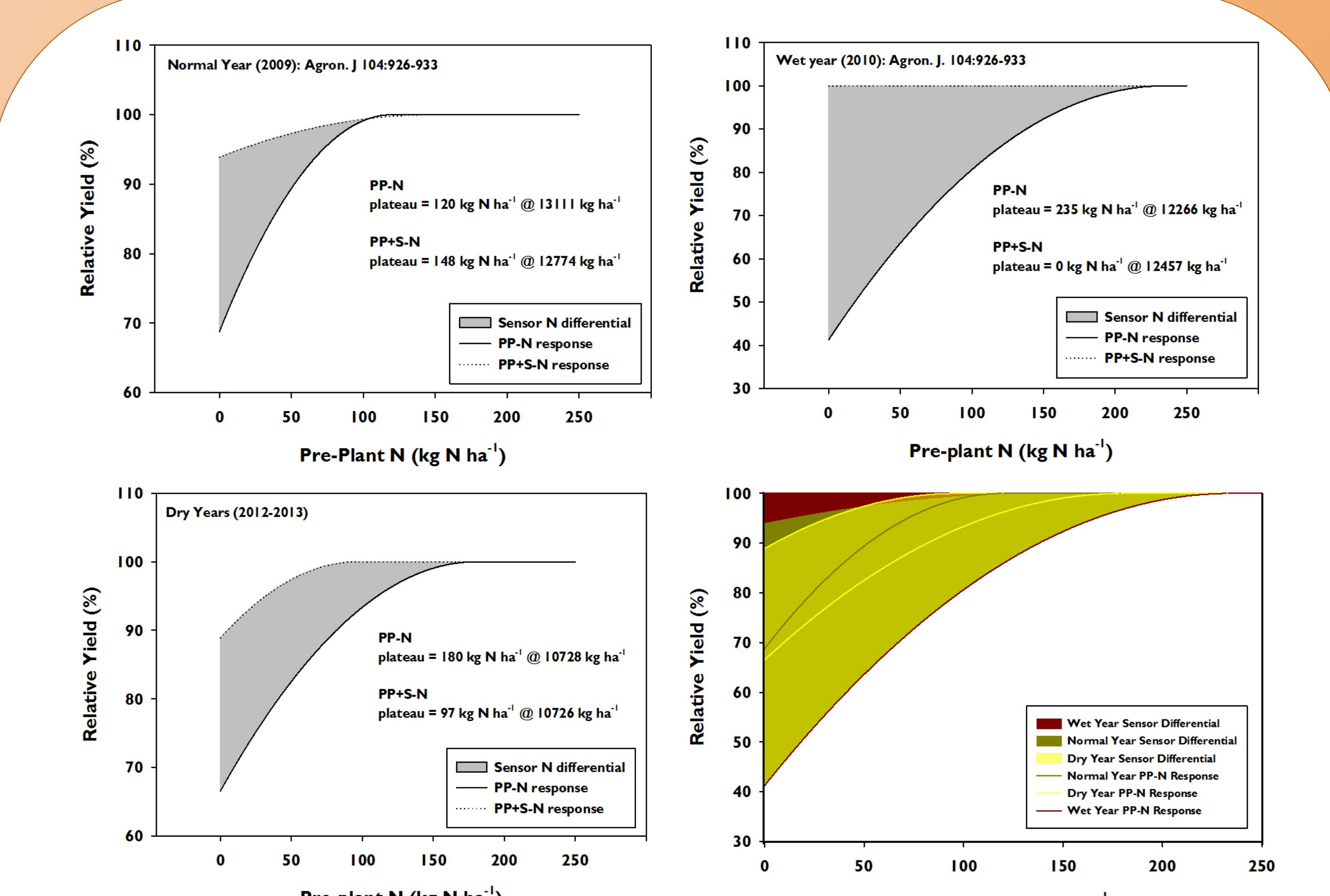


Fig. 3. Relative yield response to pre-plant N (PP-N) and PP-N with additional sensor N applied (PP+S-N). Grain yield and applied pre-plant N rate were fit to a statistically significant quadratic-plateau response model. Relative yield was calculated using the model curve yield divided by the calculated plateau yield for each strategy.

Acknowledgements:

Appreciation is extended to the Iowa State University research farm managers and their staff for efforts with research trials, N applications, and corn harvest.

