

**Fertility trends in 20 years of Nutrient Drawdown and BMP at Wisconsin Cropping System Trials.
Dustin Sawyer¹, Phillip Barak², Janet Hedtcke³, Joshua Posner⁴**

¹ MSc candidate, Dept of Soil Science, UW-Madison

² PhD, Professor, Dept of Soil Science, UW-Madison

³ Asst Superintendent, West Madison Agricultural Research Station, UW-Madison

⁴ PhD, Professor, Dept of Agronomy, UW-Madison (deceased)

Abstract

Established in 1990, the Wisconsin Integrated Cropping Systems Trials (WICST) was designed to compare six Wisconsin cropping systems for productivity, profitability, sustainability and environmental impact. The cropping systems were chosen to cover the range of agricultural practices in place throughout Wisconsin and include dairy forage, grain, conventional, no-till and organic practices. Detailed yield records were paired with tissue analysis to determine nutrient removal per hectare. Soil fertility has been measured post-harvest for each plot every autumn. Nutrient additions are based upon University of Wisconsin best management practices and are carefully monitored and recorded. Twenty years into the study, enough data were gathered to look for long-term trends in fertility losses, additions, and availability.

Yearly phosphorus and potassium removals are subtracted from additions to yield a nutrient net loss. These nutrient drawdowns are intentional, as initial soil test values indicated excessively high nutrient levels at the establishment of the WICST. Nutrient losses are then plotted with time to yield a nutrient reduction rate for the plot. Likewise, soil test data are plotted against time, with the assumption that soil test reduction would have a slope correspondent with the nutrient balance. This was found to not be true, more so for potassium than for phosphorus. This discrepancy between nutrient loss as determined by soil testing and nutrient loss as determined by nutrient balance can be thought of as the soil's buffering capacity, and may change the way that soil test data are interpreted.