

Adjustment of CEAP Cropland Survey Nutrient Application Rates for APEX Modeling

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November 21, 2011

WORKING DRAFT

In the NRI-CEAP Cropland Survey, farm operators were asked to provide information on nitrogen and phosphorus application rates for all crops grown on the sample field for the previous 3 years. Preliminary APEX model runs revealed, however, that the reported fertilizer levels were often insufficient to meet agronomic needs over the 47 years of the model simulation. This not only resulted in crop yields significantly below those reported in the survey and by other sources but also produced inflated estimates of soil erosion and sediment loss because of the lack of crop growth and canopy cover that normally protects the soil from the forces of wind and water during the crop growing period.

Some of the cases were determined to be data entry errors, including errant unit conversions. These were corrected when the intended response was clear. In most cases, however, this was not possible. In a few cases, the explanation could be that residual soil fertility levels had been built up in years prior to the survey period and only modest amounts of nitrogen or phosphorus were needed during the years reported in the survey. Reported applications during drought years or other conditions indicative of impending crop failures would also be expected to be less than agronomic requirements.

To obtain appropriate estimates of the effects of conservation practices, it was necessary to add additional nitrogen and phosphorus when the reported levels were insufficient to support reasonable crop yields throughout the 47 years in the model simulation. The approach taken was to first identify crop samples that have nitrogen or phosphorus application rates recorded erroneously or were under-reported in the survey. The set of crop samples identified were treated as if they had missing data. Additional nitrogen or phosphorus was added to these crop samples so that the total nitrogen use was similar to that for the unadjusted set of crop samples.¹

The methods used to estimate which sample points required additional nitrogen or phosphorus application and how much is addressed in this documentation report.

FORTHCOMING

¹ An alternative approach was considered where the goal was to add only the minimum amount of nitrogen necessary to each crop sample that appeared to need additional nitrogen, as was done for phosphorus. While this would have assured that agronomic conditions for crop growth would be met throughout the 47-year simulation, all of the adjusted samples would meet the criteria for the no-practice scenario, and the effects of conservation practices would likely have been over-estimated. The selected approach provides a more conservative estimate of the effects of conservation practices on nitrogen loss.