**World Phosphorus Use Efficiency in Cereal Crops**

**ABSTRACT**

A current estimate of global phosphorus use efficiency (PUE) for cereal production is not available. The objectives of this paper were to estimate PUE for cereal crops grown in the world and to review methods for improvement. Phosphorus use efficiency was determined using world cereal harvested area, total grain production, and phosphorus (P) fertilizer consumption from 1961 to 2013, in addition to assumptions established from previous literature. World PUE of cereal crops was calculated using both balance and difference methods. Using the balance method, cereal grain P uptake is divided by the P fertilizer applied. Alternatively, the difference method accounts for P coming from the soil and that is subtracted from applied P. Utilized in this analysis is the estimate that cereal production accounts for 61% of the total harvested cropland. Cereal grain yields increased from 1.35 Mg ha-1 to 3.90 Mg ha-1 between 1961 and 2013. In 1961, the world’s fertilizer P consumption was 4,770,182 Mg and increased to 16,662,470 Mg of P fertilizer by 2013. This represents a 3.5x increase in P fertilizer consumption over 53 years. Phosphorus use efficiency estimated using the balance method was 77%. Using the difference method, PUE for cereal production in the world was estimated to be 16%.