Role of Precision Agriculture in Phosphorus Management Practices

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Site-specific management and precision agriculture technologies provide an opportunity for improving agronomic and environmental phosphorus (P) management. Precision agriculture involves a broad spectrum of technologies, concepts, and management practices. There is no distinct production system based on precision management because crop producers are adopting one or more components of precision agriculture. Thus, it is difficult to establish clear distinctions between “precision agriculture” and “modern agriculture” in general, and to precisely define precision agriculture. A particularly integrative and useful definition was proposed by Pierce and Nowak (1999), who defined it as “the application of technologies and principles to manage spatial and temporal variability associated with all aspects of agricultural production for the purpose of improving crop performance and environmental quality.” Advances in electronic and geographical information system (GIS) technologies allow for integrating equipment, crop and soil management systems, and data analysis methods for assessing and managing variability of crop and soil properties more effectively compared with previous management and decision support systems.

The goal of this chapter is to provide an overview of a variety of precision agriculture technologies and associated concepts that are currently applied or can potentially be applied to agronomic and environmental P management. This work should be considered as a complement to more specific work being published in scientific periodicals and to more broadly focused books or book chapters about precision agriculture (i.e., National Research Council [1997], Pierce and Sadler [1997], and Pierce and Nowak [1999], among others).