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NITROGEN MANAGEMENT FOR SUSTAINABLE AGRICULTURE

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Fertilizer use in agriculture will always be under scrutiny as it involves economics as well as environmental concerns. Inefficient crop utilization of N can reduce farmers' profitability, and N lost from agricultural land has adverse ecological impacts on environmental quality. Calls to achieve environmental sustainability in agricultural production systems will only intensify over time. The principle of 4R nutrient stewardship that include right source, right time, right rate, and right place of nutrient application should be at the foundation of any frontier technologies developed to achieve sustainable agricultural production. Any effort towards achieving one or more of these stewardship practices would ensure lesser environmental implications such as water quality issues or greenhouse gas emissions. This paper will discuss the efforts towards that goal of sustainable agriculture made over years in Nebraska, one of the largest agricultural states in the U.S. and share a glimpse forward to where nutrient management might go. Following years of research by multiple scientists in Nebraska, there is an easy-to-follow worksheet that farmers can use to optimize nutrient management. Most recent N research has addressed improvement in N use efficiency by using specialized N formulations, in-season N application guided by crop canopy sensors mounted on field equipment or unmanned aerial systems (drones). Other agronomic and conservation practices such as soil conservation will play a valuable role in supporting 4R nutrient stewardship. The University of Nebraska-Lincoln has taken research to farmers and been conducting demonstration trials that evaluate crop sensors for efficient N use and stewardship of the environment. These field trials point to the need for strategies which direct crop N status at early growth stages and need for adoption of technologies such as crop sensors for furthering the objectives of sustainable agriculture.

Keywords: *Nitrogen, Crop sensor, Stewardship, Water quality*