Intense precipitation events during the corn growing season on poorly-drained soils in the Midwestern United States can result in yield loss due to abiotic plant stress and nitrogen fertilizer loss associated with flooding. Nitrogen loss from soils also has environmental implications if nitrate reaches surfaces waters or gaseous nitrous oxide emissions occur. The objectives of this study were to determine the effects of soil flooding on enhanced efficiency pre-plant and post-flooding nitrogen fertilizer applications on corn production and soil nitrogen availability/loss. Results of this research show that a 50% reduction in soil nitrate can occur after one day of flooding, and large pulses of nitrous oxide emissions can occur in a short time period when soils are flooded. In the 2012 growing season, slight advantages were observed with the use of enhanced efficiency nitrogen fertilizers and a post-flood nitrogen fertilizer application. A significant loss of corn grain yield was observed after three days of flooding in 2013. These results indicate that saturated soil conditions can have both economic and environmental impacts and there is a need for future research to address both drainage and nitrogen management strategies for possible applications to farmers.