

MANAGEMENT OF NITROGEN AND NITRIFICATION INHIBITORS FOR CORN AND WHEAT PRODUCTION ON CLAYPAN SOILS

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ABSTRACT

Use of nitrification inhibitors (NI) in agricultural production systems is considered a risk reduction management strategy to optimize crop production and minimize potential environmental nitrogen (N) contamination especially under conditions favorable for potentially high N loss, such as with wet conditions in poorly-drained soils or due to N fertilizer application timing. This thesis examined the use of two NIs (nitrapyrin and KAS-771G77) in conjunction with different application rates and application timings of urea ammonium nitrate (UAN) fertilizer solution and anhydrous ammonia (AA) for its effects on soil N and corn (*Zea mays* L.) and early or late-planted winter wheat (*Triticum aestivum* L.) production and N use efficiency. Multiple field trials were conducted from 2012 to 2016 in Northeast Missouri in poorly-drained claypan soils at the University of Missouri Greenley Memorial Research Center. Results of these trials indicated that both pre-emergence or V3 sidedress applications of UAN fertilizer solution plus nitrapyrin can be effective for corn production, but the V3 application may allow for a lower rate of UAN application and may lower risk of N loss. Examination of the effects of fertilizer source, application timing and addition of NI for early- or late-planted winter wheat indicated that spring application of AA with KAS-771G77 produced the highest yields for early-planted wheat and fall application of AA with KAS-771G77 resulted in highest yields for late-planted wheat. Use of NIs can provide growers with options to best manage N fertilizer applications in corn and winter wheat crops when risk of N loss is high due to climatic conditions or because of N application timing or workload considerations.