Economic Response of Processing Potato to Nitrogen Fertilizer Rate as Affected by Nitrogen Timing and Soil Moisture

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Two multi-year studies were conducted in Manitoba, Canada to evaluate the effect of nitrogen (N) fertilizer rate and its interactions with timing of N application (pre-plant, split application) and moisture regime (irrigated, non-irrigated) on the yield and net revenue (NR) of potato (*Solanum tuberosum* L.). Based on soil test N, all sites were expected to be N-responsive, with soil test N ranging from 24 to 45 kg NO_3-N ha^{-1} to 60 cm. Split application showed similar marketable yield and NR to pre-plant N in Study 1; the potential for N losses with split vs preplant application was not assessed. In Study 2 comparing potato N response under different moisture regimes, irrigated treatments produced significantly higher yields and NRs than non-irrigated treatments, but the interaction between N rate and moisture regime was not statistically significant suggesting that potato responded similarly to increasing N rate whether grown under rainfed or irrigated conditions. NR curves for N inputs were generally relatively flat, and the NRs were only slightly less than the optimal NR within the vicinity of the optimum. The optimal economic N rate based on net revenue ranged from 157 kg N ha^{-1} for pre-plant N application in Study 1 to 193 kg N ha^{-1} for irrigated production in Study 2, or averaged about 180 kg N ha^{-1}.