

ACCOMPLISHMENT REPORT
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Fertilizer Nitrogen rates optimize bioenergy feedstock production and environmental quality in semi-arid environments. Renewable bioenergy feedstocks offset the demand for conventional petroleum-based energy resources. Switchgrass (*Panicum virgatum* L.) is a warm-season perennial C4 grass that has been utilized for lingo-cellulosic ethanol production. However, little is known about its potential as a feedstock in the semi-arid northern Great Plains USA, including the impact of N fertilizer application on biomass production and on environmental quality. Beginning in 2009, ARS researchers at Sidney, Montana measured switchgrass biomass that ranged from 1.8 to 12.3 Mg ha⁻¹. In most years, N application increased switchgrass biomass, but response to N rates above 28 kg N ha⁻¹ was inconsistent. Biomass from fertilized switchgrass averaged 6.5 Mg ha⁻¹ compared to 4.4 Mg ha⁻¹ for the unfertilized control. Soil tests indicated the potential of over fertilization of switchgrass feedstocks to impact environmental quality in semi-arid environments, leading to annual N rate recommendations to not exceed 28 kg N ha⁻¹.