# Nitrogen Influences Biomass and Nutrient Partitioning by Perennial, Warm-Season Grasses

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**ABSTRACT**

Recent attention has focused on the use of perennial, warm-season grasses as renewable energy crops. The objective of this study was to assess the effects of N fertilization on partitioning of biomass and nutrients between above- and belowground plant components by four warm-season grass species in Iowa. In 2006–2007, established stands of big bluestem (*Andropogon geradii* Vitman), switchgrass (*Panicum virgatum* L.), indiangrass [*Sorghastrum nutans* (L.) Nash], and eastern gamagrass [*Tripsacum dactyloides* (L.) L.] were fertilized with 0, 65, 140, or 220 kg N $ha^{-1}$ in the spring and harvested following frost in the fall. Dependent on grass species and year, yield response to N was linear or quadratic. Optimum yield after 2 yr was 13.5 Mg $ha^{-1}$ at 140 kg N $ha^{-1}$ for all grasses except eastern gamagrass, which demonstrated lower yield and a consistent linear N response. Nitrogen inputs had pronounced but grass-specific effects on root biomass and nutrient partitioning. For big bluestem and switchgrass, 140 kg N $ha^{-1}$ maximized root biomass and favored allocation of nutrients to roots over shoots. In contrast, for indiangrass and eastern gamagrass, root biomass and root nutrient allocation were adversely affected by N inputs. For all grasses, 220 kg N $ha^{-1}$ shifted allocation of nutrients to shoots over roots. Selection of crops and management practices that optimize yield, and maintain a high level of resource partitioning to roots at low to intermediate N input rates will promote the development of productive and efficient bioenergy systems.