HERBACEOUS BIOMASS: STATE OF THE ART

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Meeting the U.S. Departments of Agriculture and Energy's goal of replacing 30 percent of transportation energy by 2030 with cellulosic biofuels will require development of highly productive energy crops. It is estimated that a billion-ton annual supply of biomass of all sources will be required to meet this goal, which represents a fivefold increase over currently available biomass. Under one scenario, dedicated energy crops yielding an average of 8 dry tons/yr are projected to be planted on 55 million acres. Switchgrass (*Panicum virgatum* L.) is a perennial native grass that has received substantial interest as a potential energy crop due to its wide adaptation. However, it produces relatively low yields on productive soils and has other limitations related to seed dormancy and establishment. More recently, Miscanthus (*Miscanthus* × *giganteus*) has been touted as a potential energy crop. A warm-season perennial grass native to Southeastern Asia, it has relatively high yield potential when grown on productive soils. However, it is a sterile hybrid that must be propagated vegetatively and requires a few years to achieve maximum production. Both species have potential as dedicated energy crops, but require further improvement and development. Other crops with high potential for cellulosic energy are photoperiod-sensitive sorghum (*Sorghum bicolor* (L.) Moench) and corn (*Zea mays* L.) cultivars. Vegetative development of these cultivars occurs over a longer period in temperate regions and they produce little or no viable seed. A rational long-term approach will be required to develop alternative, high-yielding biomass crops specifically designed for energy and industrial uses. A significant research effort is needed to identify alternative plant species that produce higher biomass yields and have desirable biomass traits, develop cultivated varieties of alternative species through genomics and plant breeding approaches, and develop appropriate crop management practices and systems for producing dedicated energy crops.

KEY WORDS: biomass, bioenergy, switchgrass, *Miscanthus*, sorghum, corn

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