DEVELOPMENT OF SWITCHGRASS AS A BIOENERGY CROP

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In 1992, the U.S. Department of Energy initiated its feedstock development program by choosing two model species upon which to develop a nationwide research infrastructure. Switchgrass (*Panicum virgatum*) was chosen as the herbaceous model plant and poplar (*Populus* spp.) was chosen as the woody model plant. Switchgrass was chosen for several reasons that included: (1) broad species adaptation within the USA including suitability on a wide range of marginal lands; (2) its native status; (3) relatively high biomass yields and high drought tolerance; (4) high seed production potential, ease of processing seed, and previous existence of a viable seed industry; and (5) its value in natural resource conservation programs. The principal accomplishment of the 10-year program was a projected 25% reduction in production costs for switchgrass biomass crops, achieved by (1) selection of the most adapted varieties within many regions of the USA, (2) optimization of harvest timing and frequency, and (3) reduction of nitrogen fertilization levels to minimize nitrate losses to groundwater. Most studies have shown that two harvests per year will increase biomass yields, but generally not enough to offset the increased production costs associated with a second harvest. Optimal nitrogen fertilization rates are about 100-120 lb N/A (110-130 kg N/ha) to achieve a balance between maximizing biomass yield and minimizing nitrate leaching into groundwater. Although switchgrass can be grown from Mexico to Canada, the range of adaptation of individual varieties is much more limited. Most varieties should not be moved more than one hardiness zone north or south of their origin. Likewise, eastern and western varieties are generally best adapted within their respective regions, east or west of the Mississippi River. A system of switchgrass gene pools has been proposed as a mechanism to classify and deploy switchgrass germplasm for breeding, marketing, and conservation purposes. A number of new varieties have been developed with increased biomass yield potential and these gains will continue as new switchgrass breeding programs have been established in strategic regions of the USA and as new genetic technologies come into play.

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