

## Agronomic and economic viability of *Miscanthus x giganteus* as a novel biofuel in the Maryland climate

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Our study examined the effects of land quality and a water-absorbent polymer on the growth of *Miscanthus x giganteus*. Our goal was to help efficiently utilize previously uncultivable land and meet U.S. alternative energy goals. Currently, most U.S. biofuel is produced from corn, which requires arable land for growth and therefore significantly disrupts the production of food crops. We predicted that *M. x giganteus* would be able to thrive on marginal land, unlike corn, with the aid of a water-absorbing polymer in the soil around the roots. *M. x giganteus* is a sterile hybrid, 3-meter-tall grass native to southeast Asia. In Europe, its biomass has been co-fired with coal in power plants. For three years, *M. x giganteus* was grown on both arable and marginal land in central Maryland, with measurements of individual plant height, mass, and energy content taken yearly for each land type. A water-absorbing polymer was included around the roots of half of the plants, with the thought that the polymer could be a reservoir for water for the plant when under water-limited conditions. At the end of three years, we found that our crop grew better on the arable land. Plants growing on the arable land were taller and weighed more than the plants on the marginal land. With regard to the water-absorbing polymer, we found that it did not affect the growth of *M. x giganteus* or the energy content of the plant. Finally, an economic cost-benefit analysis showed that growing *M. x giganteus* would not be a viable commercial enterprise in Maryland, without the use of fertilizer and based on existing revenue and expense scenarios. The main drivers of the cost of a commercial enterprise were the cost of land in Maryland and the relatively low value of combustible *M. x giganteus*.

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