Cellulosic biomass is among the most promising alternatives to fossil fuels being considered in Missouri. In order to become a viable energy source, there needs to be a reliable supply of cellulosic material. Miscanthus, switchgrass, or a native prairie mix are posed to meet that supply. This study analyzes the profitability of those three cropping systems when grown for bioenergy relative to corn and soybeans. It uses a stochastic budgeting model with actual grain yields, FAPRI baseline prices, and ALMANAC modeled grass yields to demonstrate how landscape soils, government programs like Biomass Crop Assistance Program (BCAP), and crop insurance affect the decision to plant bioenergy crops. The analysis assumes that the producers are risk averse and seek to maximize utility. Results show that perennial grasses grown for bioenergy have a higher relative profitability on flooded Belknap soils and Armstrong and Armster eroded upland soils versus Putnam soil which is non-eroded and upland, that government support increases profitability of these bioenergy crops but not enough for utility maximizing producers to choose them, and crop insurance decreases the likelihood of planting them by mitigating the risks associated with corn and soybeans.