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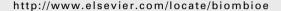
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Effects of rhizome size, depth of planting and cold storage on Miscanthus x giganteus establishment in the Midwestern USA

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ABSTRACT

High-yielding perennial grasses have been touted as ideal candidates for widespread commercial bioenergy production due to the combination of high productivity and low inputs. Recent research on Miscanthus x giganteus has shown it to be a particularly attractive option for biomass production in the Midwestern USA, however no previous research has been done on optimizing the establishment of M. x giganteus under the growing environment within the Midwest. In side-by-side replicated field experiments, the optimal rhizome size and planting depth of M. x giganteus rhizomes was determined in Urbana, IL USA. In a glasshouse study, the effect of cold storage over time was determined on M. x giganteus rhizomes. Results of this study suggest that to maximize above-ground biomass production of M. x giganteus in the establishment year, rhizomes should be 60–75 g, planted to a depth of 10 cm and kept in cold storage for as little time as possible. These results provide necessary data for maximizing the likelihood of establishing commercially viable M. x giganteus production from rhizome propagation in an area that is projected to be a major contributor to renewable energy goals in the U.S.A.

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1. Introduction

The perennial rhizomatous grass, Miscanthus x giganteus has great potential as an energy crop because of its high yield and low energy input [1,2]. M. x giganteus is a naturally occurring sterile triploid hybrid of Miscanthus sacchariflorus and Miscanthus sinensis [3]. Many of the characteristics which make M. x giganteus an ideal feedstock for energy production have been suggested to be characteristics of invasive weeds [4], therefore it is desirable that sterile germplasm be used for widespread biomass feedstock production to minimize the risk of invasiveness. M. x giganteus has been studied for use as a biofuel in Europe for more than 10 years without reported escapes into natural or cultivated ecosystems [5]. This experience has

shown the advantages of the crop including high yields with low fertilizer and pesticide inputs, and has also identified limitations, namely relatively high establishment costs, a narrow genetic base, and limited hardiness in the first winter following establishment [5].

The cost of establishing M. x giganteus is high because the plant's sterility necessitates that it be planted from propagules other than seed and to date, very little specialized equipment exists for this purpose. Planting is done vegetatively [6], which is typically more difficult and costly than seed establishment. Two means of vegetative reproduction have been studied: rhizome division and plantlet micro-propagation in tissue culture [5]. The advantage of rhizome division is that it takes place while the plant is dormant and less

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