Giant Miscanthus Establishment

Introduction
Giant Miscanthus (Miscanthus x giganteus), a warm-season perennial grass originating in Southeast Asia from two ornamental grasses, *M. sacchariflorus* and *M. sinensis*, is a popular candidate crop for biomass production in the Midwestern United States. This sterile hybrid is high yielding with many benefits to the land including soil stabilization and carbon sequestration. Vegetative propagation methods are necessary since giant Miscanthus does not produce viable seed.

Field Preparation
A giant Miscanthus stand first begins with field seedbed preparation. To provide good soil to rhizome contact, the seedbed should be tilled to a 3- to 5-inch depth. Soil moisture is critical to proper establishment for early stage germination. If working with dry land, prepare your field just prior to planting for optimal soil moisture. Good soil contact is also critical, so conversely, don’t till when the land is wet and clods will form. Nutrient (NPK) and lime applications should be made to the field as necessary before planting, following typical corn recommendations for the area. Giant Miscanthus does not have high nutrient requirements once established, but fields last for 20-30 years, so it is important that adequate nutrition be present at establishment.

Timing
Currently, we only recommend spring planting of giant Miscanthus in the upper Midwest, and it should be timed similar to corn planting. When soil temperatures have reached 50º F and probability of a spring frost is low, it is time to plant. Though Miscanthus can be planted as late as June, late planting leaves less time for the plant to develop a strong rhizome system to see it through the winter. Do not plant after July 1 without irrigation.

Choosing your plant material
At this time, there are two plant material options for starting a giant Miscanthus stand: rhizomes and small plants, commonly called ‘plugs.’

Rhizomes
Rhizomes (Fig. 1) are overwinter storage organs that can also be used to grow new plants, similar to potatoes. Traditionally, new giant Miscanthus fields have been propagated by digging rhizome segments from ‘mother fields,’ a labor intensive process best done on sandy soils with specialized equipment. Rhizomes can be harvested from a dormant field of giant Miscanthus, typically any time after the first frost in the fall and before the last one in the spring. If not immediately replanted in a new field, they should be kept moist and cool (37-40º F) in storage. Ideal rhizomes have two to three visible buds, are light colored, and firm (Fig. 1). Smaller rhizomes or those that are soft to the touch will likely have lower emergence.

RHIZOME PLANTING
Specialized rhizome planters are becoming available in the United States, and are based on potato planting technology. Typical planting rates are around 5-15 acres/day, though they can be much higher in ideal conditions. Because rhizomes are not all the same, planting depth can vary. It doesn’t matter what direction the rhizome faces, but it needs to be covered by 2 inches of soil. It is important that the rhizome is not sticking out of the ground, or it will quickly dry out. Rhizomes should be planted at a rate sufficient to achieve about 6,000 plants per acre. It is difficult to know how many rhizomes this requires, since rhizomes are usually planted by weight, not by number. It is important to work with a rhizome supplier and planter that can help you calibrate the planter to achieve recommended populations. In Iowa, it is reasonable to expect 20-30 percent of rhizomes will either not grow, or die in the first year, so overplant accordingly.

Small plants (‘plugs’)
Alternatively, vegetative propagation can be used to generate new giant Miscanthus fields in the greenhouse from stem or rhizome cuttings (Fig. 2). This allows the use of smaller plant pieces that can be divided more often, generating more plants in a given period of time than traditional rhizome production. This method is more expensive, but generates a uniform plant similar to what you might buy in a ‘six-pack’ container from a garden center (approximately 2” x 2” root ball).
Weed management. Weed control is essential in the establishment year. Apply a pre-emergent herbicide at planting, and then control broadleaves as needed during the summer. Grass herbicides will not be safe on giant Miscanthus. Cultivation can also be effective, but take care not to damage emerging Miscanthus shoots. In 2013, only a few herbicides are labeled for giant Miscanthus. Harness® (Monsanto Co., acetochlor), Harness Xtra® (Monsanto Co., acetochlor + atrazine), Bicep® (Syngenta Co., metolachlor + atrazine), and 2,4-D can all be safely and legally used. Prowl® (BASF Corp., pendimethalin) products also worked well in research trials. Check with your local officials to understand herbicide restrictions in your area.

• Nutrient needs. As described under ‘Field Preparation,’ nutrients should be brought up to corn thresholds prior to planting. No additional fertilizer is necessary during the establishment year.

• Harvest. Don’t harvest the first year of growth! Establishing Miscanthus does best when the first year’s growth is left on the field over winter. If desired, you can mow or burn it in late spring the following year. Harvesting or burning prior to the first winter has been related to heavy plant losses in some environments. Minimal inputs are needed following establishment. If weed pressure is heavy as the crop emerges in the second year, an herbicide application might be beneficial. As the stand matures, it will quickly outcompete weeds and an application should not be necessary in subsequent years.

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