



Establishment and Management of Switchgrass

Several perennial grasses have been evaluated over the past two decades for their potential as biofuel/biomass crops. The United States Department of Energy has identified switchgrass (*Panicum virgatum*) as the perennial grass with the most promise as a biomass crop across much of the USA. Switchgrass is a native, warm season, bunch grass typically sown for conservation purposes. Switchgrass is well-adapted to various environments, it has an efficient growth habit (C4 plant), and a low ash content and these characteristics make switchgrass a promising biofuel crop.

A great deal of land in New York State is suitable for growing switchgrass. In this fact sheet, we present tips for establishing and growing switchgrass. Although switchgrass shows great promise for New York State, it should be realized that this crop alone will not solve our current energy problems; as with all renewable energies it should be viewed as a component of a larger system that can help to reduce our dependence on fossil fuels.



Figure 1: Switchgrass is a promising biofuel crop for New York State.

Variety Selection

Switchgrass varieties should be chosen based on their ability to grow in New York State.

There are upland and lowland varieties. While lowland varieties tend to yield more they are also more susceptible to winter kill. Because of this, only upland varieties are recommended for northern climates. Cave-in-Rock is an upland variety that is generally recommended as it has been shown to do well in northern climates. Other upland varieties that can be grown in New York State include Forestburg, Blackwell, Nebraska, Pathfinder, Sunburst, Trailblazer, and Shawnee.

Site Selection

Switchgrass will grow on many different New York State soil types but it performs best on well-drained loam and sandy loam soils. In addition, biomass intended for combustion should be low in mineral content, including silica, and the silica content of switchgrass grown on sandy soils is lower than for switchgrass grown on clay soils making sandy soils more suitable for biomass production than clay soils.

Fertility Management for Establishment

A standard soil test should be used to assess the nutrient availability at establishment. Follow state guidelines for phosphorous (P) and potassium (K). Switchgrass can grow on soils with a relatively wide pH range; however, a pH of 6.5 is optimal. To reduce competition by weeds it is not recommended to apply manure or nitrogen (N) fertilizer in the year of establishment.

Seedbed Preparation

Switchgrass seed is relatively small, typically counting approximately 300,000 seeds per pound. Because of the small seeds and the need for good seed to soil contact for optimum germination, seedbed preparation is extremely important. Press wheels, rollers or cultipackers should be used before and after seeding to enhance seed to soil contact. One to three seedlings per square foot at the end of the establishment year is considered a successful establishment.

Seeding Rate, Method and Timing

A seeding rate of 7-9 lbs of pure live seed (PLS) per acre is recommended in northern climates but switchgrass seed is often highly dormant, especially immediately after harvest, and for this reason close attention should be given to information such as % dormancy located on the label on the bag. Seeding rates should always be based on PLS. Seeding should occur after the soil temperature reaches 60°F or within 2 weeks of the recommended corn planting dates in your area. Seeding should not take place after June because there is a high risk that the switchgrass will not survive the first winter. Seed should be sown at a depth of ¼ to ½ inch for conventional and no-till planting with the shallower seed depth for heavier soils. No-till and frost seeding can work well; however, ideal conditions are needed for a good establishment. A slightly higher seeding rate is recommended for these types of seedings.

Weed Management

Weed control in the seeding year can greatly increase the success of establishment. Many problematic weeds are able to germinate and emerge with switchgrass and can grow much more rapidly at comparable temperatures. Properly labeled herbicides and mowing are recommended weed control. Chemical weed control can be used in the fall prior to establishment, pre-plant and post-plant. Weeds should be mowed just above the height of the growing switchgrass. Hormone herbicides such as 2,4-D should be avoided as they are known to reduce development of switchgrass in the seeding year.

Fertilization of Established Stands

When managing switchgrass for biomass it is important to balance the fertilizer required for optimum economic yields and to sustain the stand, while minimizing plant uptake of elements such as N, K, chlorine (Cl), and sulfur (S). In a biomass system crop removal of many nutrients is minimized as the crop is left in the field to allow nutrients to leach back into the soil. Following establishment, soil testing should be conducted every three years to re-assess the nutrient status of the soil. Lime, P and K should be applied based on soil test results according to state guidelines.

Following the establishment year, additions of

N fertilizer can improve yields and stand longevity. When switchgrass is managed as a biomass crop under a single cut system, N fertilizer needs are lower than when it is managed under a multiple cut forage system. For a single cut biomass system 50–75 lbs N/acre per year is recommended.

Manure Management

Manure can be used in place of commercial fertilizers. Perennial grasses are considered an environmentally sound location for manure spreading during much of the year and switchgrass grown for biomass could offer a farm additional land to distribute manure on. However, since nutrient removal by the crop is minimized in a biomass-for-combustion system, the amount of manure that can be applied may be limited.

Harvest and Stand Longevity

Switchgrass is a perennial that spreads by rhizomes. For stand longevity, it is not recommended to harvest the switchgrass in the establishment year. The timing of harvest in subsequent years varies based on the intended use of the switchgrass. In northern climates a single cut system and 6-inch stubble height is recommended to assist with plant recovery and stand longevity. This would not be required for a spring mowing of overwintered forage.

Additional Resources:

- o Forages.org, Cornell University website for forage production: www.Forages.org.
- o Cornell University Grass Bioenergy website: www.GrassBioenergy.org.
- o 2007 Cornell Integrated Field Crop Management: www.fieldcrops.org.
- o Nutrient Management Spear Program Agronomy Fact sheets 1, 4, 5, 6, and 19: nmsp.css.cornell.edu/publications/factsheets.asp.

For more information



Cornell University
Cooperative Extension

Grass BioEnergy Program
<http://www.grassbioenergy.org>

Nutrient Management Spear Program
<http://nmsp.css.cornell.edu>

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