

Switchgrass Production and Use in New Jersey

Fact Sheet 1075

Cooperative Extension

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Introduction

Switchgrass (*Panicum virgatum*) is a tall, vigorous, warm season perennial grass used for summer hay and pasture, soil conservation and wildlife habitat. Recent attention has also been given to its use as a biomass energy crop either for direct combustion in stoves or power plants or for cellulosic conversion to ethanol. Switchgrass is a cross-pollinated, fibrous rooted species that tolerates both wet and dry soils. Switchgrass can thrive in soils with low or marginal fertility. These characteristics make it a good choice for summer forage when cool season grasses suffer from summer stress and where sandy or less productive soil conditions exist.

Variety Selection

Switchgrass varieties are of two general types, "upland", typically grown in the north and "lowland", which is generally grown in the southern states. Upland types are shorter, mature earlier, have a dense growth habit, and finer stems when compared to lowland types. Lowland types are typically taller, more robust, have coarser stems, a more pronounced bunch habit, and are later in maturity. Because switchgrass is photoperiod sensitive, it is important to grow types adapted to New Jersey; although, later maturity and higher biomass yields can be achieved by growing some lowland 'southern' types in New Jersey. However, winter hardiness can be a problem with lowland types in the more northwestern climates of New Jersey. 'Alamo' and 'Kanlow' are among the lowland types that have performed well in New Jersey. 'High Tide' is a new germplasm release adapted to wetter coastal environments and performs well in New Jersey. Upland types available include the more locally adapted 'Carthage' (also known as New Jersey 50), 'Blackwell' (rust resistant), 'Cave-In-Rock', 'Pathfinder' and 'Shawnee'. The latter two are higher in forage quality. The USDA-NRCS Plant Materials Center in Cape May can make specific recommendations for variety and planting practices.

Seed Quality, Selection and Rate

Like other small-seeded warm season grasses, switchgrass can be difficult to establish so attention must be given to choosing quality seed and using proper establishment practices. Switchgrass is notorious for having delayed, or poor seed germination. It is important to choose seed that has a high amount of Pure Live Seed (PLS) which is the percent germination of the seed multiplied by the percent pure seed of the actual seed of the variety of switchgrass desired. The recommended seeding rate for New Jersey is 10lbs of PLS/A. This is based on ~250,000 seeds per pound. If seed is larger or smaller, adjust rates accordingly. In non-traditional crop areas (i.e., stabilization of shorelines) plugs can be used for transplanting.

Seeding Method and Date

Producers are strongly advised to prepare a firm seedbed where seed can be drilled in narrow rows (6"-10") at $\frac{1}{4}$ to $\frac{1}{2}$ inch depth, followed by press wheels or a cultipacker. Recommended planting dates for New Jersey are late April to early May in southern Jersey, and mid-May to early June in northern Jersey. The soil temperature during planting should be at least 60-65 F and early weed growth should be destroyed by tillage. It is helpful to plant into a moist seedbed and provide for adequate moisture during the first month of establishment. Slow germination of switchgrass in cool soils may enhance weed invasion and rescue chemical weed control may be necessary.

Fertility

Switchgrass can tolerate inherently lower fertility levels compared to other production crops in New Jersey. However, switchgrass will perform best with adequate nutrients. Soil testing is very important before establishment. It is important to maintain optimal phosphorus and potassium levels in soil. Soil pH levels should be at least 5.5 and preferably near 6.5. During establishment, band nitrogen near the seed at rates of no more than 10 lbs/A. Excessive N from fertilizer, manures or other organic sources can encourage weed competition for the slow growing seedlings. Following the establishment year, 60-80 lbs of N/A can be topdressed after switchgrass reaches 4-6

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inches in the spring. Additional N may be needed if an early grazing occurs followed by a full harvest for hay or energy biomass. In this case, 40 lbs can be applied in the spring with another 40-60 lbs following the first grazing or harvest.

Pest Control

Weeds are generally the most serious challenge to switchgrass establishment because of its slow, early growth. Delayed planting may allow for a first and second flush of weeds to be controlled by tillage. Mowing just above the height of young grass seedlings is often effective in controlling or suppressing fast, early growing broadleaf weeds. A few herbicides are labeled for switchgrass during the establishment year, such as 2, 4-D. Similar products can be used, once switchgrass is established, to control broadleaf weeds. As always, read and follow label directions for any planned pesticide use.

Insects can be a problem, particularly in the establishment year under dry conditions. Pests like grasshoppers and flea beetles may need to be controlled if serious leaf damage occurs. Leaf and stem rusts can be a problem, but newer varieties have displayed some resistance. Spot blotch caused by *Bipolaris sorokiniana* can also be problematic on switchgrass and affect grass quality especially in New Jersey. 'Kanlow' and 'Carthage' have better resistance than 'Blackwell' and 'Pathfinder' (moderately susceptible) and 'Shawnee' (highly susceptible).

Harvest Management and Forage

Unless exceptional growth occurs during the establishment year, stands should not be hayed or grazed. In the second year, grazing can begin when plants reach 12" and be grazed quickly (less than 2 weeks) down to 4" - 6" (just above growing point), with a rest period lasting at least a month. Rotational grazing schemes can provide for these practices, can enhance the quality of forage grazed by the livestock, and provide for better stand maintenance. A final grazing should be completed by September 1, in northern New Jersey and September 15, in southern New Jersey. An 8" stubble should be left to go through the winter. For hay, harvest at boot stage before heads emerge, and leave a 4" stubble. If sufficient forage regrowth occurs, forage can be grazed, as noted above.

Harvesting for Biomass Energy

Maximum biomass yield will come from allowing switchgrass to grow to maturity and dry down before harvesting. Harvest can take place 2-3 weeks after a killing frost in the fall, and up to mid-March the following year. An 8" stubble height should remain after cutting. Harvest in the spring allows for some winter habitat for wildlife, provides a reduction in plant constituents that reduce energy quality, and produces a biomass with less moisture. This must be balanced against a loss in yield from overwinter weathering. Specific harvest, packaging, processing, and transportation schemes for biomass energy have not been established in New Jersey. Some small scale units are available for direct combustion of the dried hay-like biomass or biomass compressed into pellets.

Special Considerations

When making switchgrass part of a USDA-supported conservation program, practices dictated by the USDA agencies should be followed. For example, currently, with the Conservation Reserve Program (CRP), land can only have one cutting harvested between July 15 and October 13 (after nesting season). Only 1/3 of the total acreage should be harvested annually, or total crop harvest can occur only once in 3 years (if allowed in the contract). This could allow for harvest for forage or biomass, as noted above, but USDA Field Office should be contacted before such practices are attempted.

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