

7-2007

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Guretzky, John A., "Switchgrass Establishment Requires Patience" (2007). *Agronomy & Horticulture -- Faculty Publications*. 570.
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Switchgrass Establishment Requires Patience

By John Guretzky

As a leader in bioenergy research and development, the Noble Foundation is evaluating the agronomics and economics of switchgrass as a bioenergy crop. Switchgrass is a native range and pasture grass that has been identified by state and national leaders as a potential crop to be grown, harvested and converted into ethanol. Slow seedling establishment has previously limited adoption of switchgrass in forage production. Presently, scientists in the Noble Foundation's Agricultural and Forage Improvement divisions are researching ways to improve switchgrass establishment. Here is what we know, and don't know, about the process.

Seed Selection and Quality

Two types of switchgrass, lowland and upland, are available for planting. Lowland types tend to grow taller and more rapidly than upland types. Lowland cultivars adapted to the southern plains include Alamo and Kanlow. Adapted upland cultivars include Blackwell and Cave-In-Rock. Although forage quality differences may exist, all varieties are suitable for hay or pasture.

When choosing a variety, it is important to purchase high quality, certified seed. Freshly harvested seed can have a high percentage of dormancy. Seed dormancy is typically reduced if the seed is properly aged for one year. Seed older than two years may become less viable and have poor seedling vigor under field conditions. Check with seed companies on availability and quality of their seed before making purchases.

Planting Date and Methods

Current research shows that spring is the best time to plant switchgrass in Oklahoma. The average date of the last spring freeze in southern Oklahoma typically falls between March 22 and March 31. Switchgrass will germinate at soil temperatures of 50°F, although seedling growth is best when air temperatures reach 75°F to 85°F. When soil moisture and temperatures are good, average emergence will be 10-21 days after planting.

Planting methods include drilling or broadcasting into either tilled or no-tilled seedbeds. Drilling involves planting in rows using either a conventional or no-till drill. Broadcast seeding refers to techniques where seed is spread uniformly across the soil surface. Regardless of method, switchgrass should be planted at shallow depths, 0.25 to 0.5

inches, in seedbeds that are firm enough to allow good seed-to-soil contact, but not so much as to restrict root growth.

Research shows that switchgrass produces similar yields across a range of seeding rates and row spacings. At lower plant population densities, individual plants are able to exploit more space and soil resources, attain greater size and maintain biomass yields equivalent to those grown at higher plant population densities. Recommended seeding rates of switchgrass range from two to 10 pounds of pure live seed (PLS) per acre, with the higher rates applied to sites with poorer growing conditions. Generally, four pounds PLS per acre is sufficient. Second year stands of one to 1.5 plants per square foot (43,000 to 65,000 plants per acre or more) would be considered fully successful stands. Stands with less than 0.5 plants per square foot (22,000 plants per acre) may require partial reseeding to maximize biomass yields.

Soil Fertility and Weed Control

As with planting any crop, soils should be tested and phosphorus and potassium deficiencies be corrected before seeding. Lime is typically not required unless pH drops below 5.5. Because of slow seedling growth, nitrogen fertilizer should not be applied during the seeding year as it enhances weeds over that of switchgrass. Fifty to 150 pounds of nitrogen per acre typically maximize biomass yields of fully established second year stands. Currently, there are not proven weed control methods that consistently allow switchgrass stand development. The best form of weed control is to delay planting until "grassy" weeds emerge so they can be sprayed with glyphosate before planting. Broadleaf weeds can generally be controlled with 2, 4-D amine after switchgrass reaches the four-leaf stage.



Switchgrass planting at the Noble Foundation Dupy farm
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<http://www.noble.org/ag/research/switchgrass/>