



Establishing and Managing Switchgrass as a Forage

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Switchgrass (SG) is a tall-growing, warm-season, perennial grass that is native to much of the United States including Mississippi. It is adapted to hot, summer conditions with peak growth occurring from May through September. Over the last few years, due to increase in oil prices, switchgrass has received interest as a renewable fuel source, since it produces large amounts of cellulose that can be digested and converted to ethanol. Switchgrass can produce high-quality forage with yields ranging from 2 to 5 tons per acre depending on variety, rainfall, soil type, as well as other environmental conditions. The nutrient content of this forage can be as high as 16 percent crude protein, if harvested correctly.

There is the possibility of having switchgrass as a “dual purpose” crop: biofuel and forage crop. While switchgrass is planted primarily for biofuels production, there is potential to harvest the early growth through haying or grazing, then managing the remainder of the season’s growth for biofuels. The summer growth of switchgrass also makes switchgrass excellent forage for grazing. Switchgrass can provide good quality forage for grazing animals and provide the opportunity to rest tall fescue pastures during a stressful time of the year or when establishing new warm-season pastures such as bermudagrass.

Establishment

Switchgrass germinates and develops more slowly than other perennial warm-season grasses due to a high proportion of dormant seed. What may appear to be an unsatisfactory stand may actually be a good stand. Wait until the following summer before abandoning the seeding with poor germination. Seed should always be purchased and planted on a pure live seed basis (PLS). Switchgrass germinates very slowly when soil temperature is below 60 °F. Planting switchgrass should occur from mid-April to mid-June. Switchgrass should be planted at 10 lb of pure live seed per acre for conventional tillage. For no-till or drill seedings, 8 lb per acre might be adequate. Pounds of bulk seed needed can be calculated [$\text{lb. needed} = \text{recommended lb per acre} \div (\text{germination} \times \text{purity})$] where germination and purity are expressed as decimal values instead of total percentages. Seed should be placed no deeper than 1/4 to 1/2 inch. Consider cultipacking after drill planting in order to obtain good seed-soil contact.

Fertilization

For establishing switchgrass, soil pH should be 5.0 or above, although a pH of 6.0 is highly recommended. If soil test indicates medium or higher phosphate (P_2O_5) and potash (K_2O), then no fertilizer is needed at planting. No nitrogen should be applied at planting since switchgrass is good scavenger of nutrients. Nitrogen is seldom needed in the establishment year. During the grazing season, nitrogen should only be applied if soil moisture is not limiting. For hay, actual nitrogen applications should be 45 to 60 lb per acre in both early summer and mid-summer. Under grazing conditions, nitrogen applications of 45 to 60 lb per acre can be applied in early summer and up 60 lb per acre in mid-summer if extra forage growth is needed.

Weed Control

Weed management can be very difficult while establishing switchgrass. Sites with extensive perennial weed infestations should be avoided as they are difficult to manage while establishing



switchgrass. It is important to reduce the weedy grass populations as much as possible before planting. If not controlled properly, summer annuals such as barnyard grass, crabgrass, and foxtail could be a major obstacle. This can be done with repeated cultivations and/or burndown herbicide applications before planting switchgrass. Herbicide application, usually glyphosate (Roundup) or paraquat (Gramoxone), may be needed in early April to obtain a weed control. About 4 to 6 weeks later or as close to the day of planting as possible, spray again. One year prior to SG planting, a field should be tilled as needed to bury excess trash, increase infiltration, or smooth the land for planting. Annual broadleaf weeds emerging after planting can be controlled with mowing and/or the use of labeled broadleaf selective herbicides such as Grazon P+D or Weedmaster. If a broadleaf herbicide is used as a post-emergence herbicide, wait until switchgrass plants have at least 3 to 4 leaves (or are 3 to 4 inches tall) before application to avoid injury.

Grazing Management

Since switchgrass is a tall-growing grass, the management must differ from that used for cool-season or other warm-season grasses. Although there are several SG varieties available, Cave-in-rock is the preferred variety where grazing or hay will be the intended usage. Cave-in-Rock is ready to graze in late May and has little growth in September. Other varieties such as Alamo and Kanlow are both best suited for wildlife, soil conservation, and biofuel because of the late growth in the season.

Switchgrass breaks winter dormancy in late April and can provide some grazing in late May, but makes the most of its growth in June, July, and August. In the south, approximately 60% of annual biomass accumulation is obtained by late June. Switchgrass becomes very stemmy and unpalatable as it matures (Figure 1), but during the target grazing period forage quality is high and palatability is good (Table 1). When harvesting switchgrass for hay, the first cutting occurs at the late boot stage (around mid-June). This should allow for a second cutting in mid-August, leaving enough re-growth to survive the winter. Early-season production, late April to late May, produces the highest quality forage and can be easily diverted for hay. Crude protein levels could easily range from 14 to 16% from early May to late June.

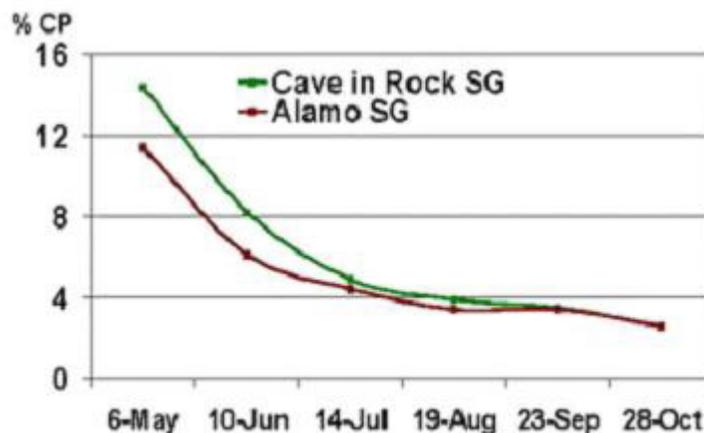


Figure 1. Changes in crude protein of two switchgrass cultivars.
Source: Sladen et al., 1994.

Switchgrass is suited to rotational grazing systems. Grazing switchgrass calls for watchful management practices to ensure survival of the stand. It is recommended that grazing begins when there are 18 to 24 inches of growth (mid-May) and to stop grazing when there are 8 to 12 inches of stubble left,



and to rest the pasture 30 – 45 days between grazing periods. The reason for leaving that amount of residue is due to the elevated growing point in switchgrass (usually > 5” above soils surface). Removing the growing point will in the long run reduce yield, plant vigor, and stand persistence. Single rotations of 2 to 4 weeks of grazing should be planned. Stocking rates of 3 to 5 steers per acre will probably be ideal. Switchgrass is very slow to establish and no grazing should be planned during the establishment year, unless it a very brief period (2 to 3 days) at a high stocking rate to remove weed competition. During the second year, production of the stand might be 50 to 75% of the potential. If managed correctly, stand longevity of switchgrass could be more than 15 years.

Table 1. Forage quality characteristics of switchgrass

Quality	Growth Stage	
	Vegetative to boot	Boot to head
	----- % -----	
CP	10 – 14	6 – 10
ADF	35 – 40	40 – 50
NDF	55 – 60	60 – 75
TDN	58 – 62	50 – 58
RFV	90 – 104	62 – 90

CP = Crude Protein; ADF = Acid Detergent Fiber; NDF = Neutral Detergent Fiber; TDN = Total Digestible Nutrients; RFV = Relative Feed Value.

Source: Ball et al., 2002.

Switchgrass is an excellent forage for beef and/or dairy cattle; however, it has shown toxicity in horses, sheep, and goats through chemical compounds known as saponins, which cause photosensitivity and liver damage in these animals. Switchgrass may also cause a phototoxic reaction in horses in which they may lose some hair and suffer sunburns. This is not a common problem, but horse owners should be aware of it. Switchgrass also provides great environmental benefits. It provides excellent erosion control when used as filter strips, grass hedges, or cover for river levee banks. It is also beneficial for wildlife. The upright growth provides wildlife some overhead cover for protection, quality nest sites, and free movement which facilitates food searching.