

## UTILIZATION OF ALFALFA

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To properly manage alfalfa it is necessary to understand how an alfalfa plant grows. This understanding will help the farmer produce the highest quality forage and lengthen stand life by avoiding practices that weaken the alfalfa plant and make it more susceptible to diseases and insects.

Alfalfa grows back in the spring or after each cutting from the crown, with energy stored as starch in the tap root. Maintaining high levels of starch in the root at appropriate times are a key to a healthy stand. As shown in Figure 1, regrowth uses starch from the root until the plant is 6 to 8 inches tall. When the plant is 8 to 10 inches tall (usually during the third week), the plant has grown enough leaf area to supply its own energy as well as begin to replenish the starch content of the root. The starch content of the root reaches a maximum between 1/10 and full bloom. When the alfalfa is cut for hay, the cycle of use and replenishment of root starch

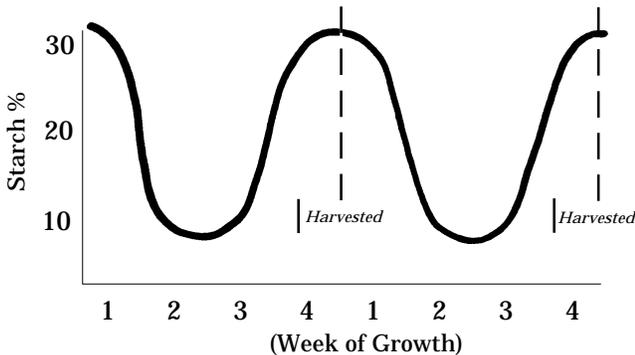


Figure 1. Starch content of alfalfa roots during growth

begins again. High levels of root carbohydrate allow the plant to regrow fast and are critical after the last fall cutting to enhance winter survival and spring regrowth.

### Cutting Management

Cutting management of alfalfa determines both the quality of the harvested forage and the health and stand life of the crop. As with any forage, the content of metabolizable energy, crude protein, and minerals declines with maturity. On the other hand, forage yield increases as the plant matures and reaches a maximum at about full bloom. After full bloom, growth is reduced and tonnage harvested may even decrease because of leaf loss and lodging.

Thus, the earlier alfalfa is cut the higher the quality but the lower the yield. The time to cut alfalfa to optimize these two opposing trends is from bud to 1/10 bloom stage. Cutting at the bud stage will produce the highest quality hay where needed, for instance when fed to milking herds, at slight tonnage reductions; and cutting at 1/10 bloom will produce good tonnage of high quality forage adequate for most other livestock needs. The 1/10 bloom stage usually occurs at 30-33 days after the previous cutting, and, therefore, according to Figure 1, the bud to 1/10 bloom stages have allowed adequate replenishment of root reserves for regrowth or overwintering.



Generally across South Carolina, farmers let alfalfa get too mature before harvesting. After 1/10 bloom, leaf loss increases and, since most of the metabolizable energy and crude protein are in the leaves, much forage quality is lost. Another consideration is that, when harvested at more mature stages, the interval between cuttings is increased, and this frequently means loss of one or more cuttings per year with the corresponding yield loss. Additionally after 1/10 bloom, the shoots for the next crop begin to grow. If harvest is delayed too long, the shoots for the next crop are cut with the alfalfa harvest and growth of the next crop is delayed. A final consideration is that many of the yield- and stand-threatening diseases are foliar and become more severe as the topgrowth matures. Thus, removing the topgrowth in a timely fashion reduces the effect of foliar diseases on the plant and increases stand life.

Alfalfa should be cut at a 3-inch stubble height. This height will allow harvesting of most of the forage but avoid crown damage and leave shoots of the next crop that have already started growing.

The windrow of hay should be removed from the field as soon as possible. Not only is forage quality lost through leaf loss and leaching as the windrow lays in the field, but the windrow will slow regrowth of the next crop by shading. Further, insects in the windrow may severely damage the alfalfa shoots underneath the windrow and delay regrowth.

At all times, traffic over the field should be minimized. Vehicle and implement weight increase soil compaction which can reduce alfalfa growth. Also, the wheels of pickups and implements can damage alfalfa crowns which may directly kill plants, reduce their ability to regrow, or, if the crowns are split, make them more susceptible to infection with diseases that are nearly always fatal to the plant.

## Harvest Method

Alfalfa is a versatile crop that can be harvested as green chop, silage, haylage, or hay. Each method of harvest has advantages and disadvantages that must be weighed in a farm management system.

Green chop is a method of providing high-quality forage used most frequently in dairy operations. This harvest method minimizes field losses of forage and nutrients; and because the plants are harvested intact, release of nitrogen as ammonia is decreased. Because of the higher water content of the forage, it passes through the rumen faster resulting in more

by-pass proteins to the intestine of cattle. The major disadvantages of green chop are the high labor requirement involved in daily harvesting and that quality is continually changing as each day's harvest is more mature than that of the previous day.

Silage and haylage have many similar characteristics but are distinctly different. Silage is harvested at 60 percent or more moisture, may or may not be wilted in the field, and undergoes a definite fermentation in the silo. Haylage is wilted in the field to between 40 and 60 percent moisture, must be stored in an air-tight silo, and does not undergo fermentation. The advantages of either system are that field losses are minimized, harvest is less delayed by unfavorable weather, and both are better adapted to mechanization and computerized feeding for maximum utilization of nutrients. The major disadvantage is the cost of harvesting equipment and silos for storage.

Most alfalfa is harvested as hay because of reduced equipment investment and increased marketing potential. However, field losses of nutrients can be high if proper harvesting practices are not used. Alfalfa cut for hay should be conditioned at cutting to allow the stems to dry at more nearly the same rate as the leaves. Otherwise the leaves will dry faster, fall off the stems, and, since most of the metabolizable energy and protein are in the leaves, considerable amounts of the nutrient value will be lost. Alfalfa should be windrowed, raked, or tethered when as wet and tough as possible to reduce leaf loss. Hay should be field-cured to 18-20 percent moisture before baling.

Hay that is harvested too wet will mold and heat. If severe enough, the heating can result in temperatures that will cause a fire to start. Generally the results of heat damage are less dramatic and cause a browning or "caramelized" reaction. Hay becomes more palatable but digestibility of the protein has been greatly reduced. The extent of protein damage can be determined by having hay analyzed for acid detergent fiber nitrogen (ADF-N).

Many products are marketed to be applied to alfalfa during the cutting and harvesting processes. These products fall basically into two categories: dessicants and preservatives. The dessicants, primarily potassium carbonate and sodium carbonate, are applied at cutting and increase the rate of drying. They have been effective in some cases, especially on summer cuttings when drying conditions are most favorable. The preservatives are applied at

baling and prevent mold and heat damage of wet hay. Most preservatives sold are organic acid compounds with high percentages of propionic acid. To be effective, propionic acid must be applied at the appropriate rate, depending on moisture content of the hay, and uniformly distributed throughout the hay. Neither dessicants nor preservatives are necessary for making good hay under normal conditions and should be considered only when drying conditions are poor or rain is threatening.

## **Grazing**

Alfalfa is an excellent pasture legume that provides high yield, high quality forage, and dependability. Alfalfa should be grazed in a rotational system with a rest period to allow building up of root reserves as discussed above. Continuous grazing will result in a rapid decline of the stand. Generally, cattle should be put on alfalfa pasture in the late vegetative stages and allowed to continue grazing for 7 to 10 days followed by a 20- to 30-day rest period for the pasture. Grazing can begin earlier than recommended if cutting hay or silage through the spring and early summer, but late summer and fall regrowth should be allowed to mature to the bud to 1/10 bloom stage to replenish root reserves for better winter survival and spring regrowth.

A major consideration when grazing alfalfa is the possibility of bloat in the cattle. This problem can be minimized by careful management. Never start grazing on an alfalfa pasture with hungry cattle. The cattle will gorge themselves and most likely develop bloat. Cattle that have been fed will begin

grazing the alfalfa, but at a slower rate which will give their systems a chance to adjust to the different feed. Another option for reducing bloat problems is to limit the time that cattle are allowed to graze the first few days on pasture. Cattle that are left on the pasture for 2 - 3 hours and then removed will generally not be able to eat enough to have significant bloat problems.

## **Management of Regrowth**

Management of regrowth, both in the spring and after each harvest, is an essential component of high yields. Poor regrowth management will delay regrowth and result in fewer harvests and, therefore, less yield for the season. The major components of regrowth management are to drive over the field as little as possible, to get the previous harvest off of the field as fast as possible, and to make sure the soil pH and fertility are adequate. Alfalfa has a high requirement for potassium and boron compared to most other crops. Adequate levels of these nutrients are essential for rapid regrowth and high yield. Split applications of these nutrients may be necessary in high-yielding fields.

Where irrigation is a possibility more options exist to stimulate regrowth. Alfalfa begins its spring growth during late February in the Coastal Plain and Savannah River Valley and during early March in the Piedmont. If soil moisture is low, an irrigation at this time will stimulate spring regrowth and cause the first harvest to be earlier. An irrigation immediately after each cutting will also stimulate regrowth of the next crop.