

Alfalfa and Cool-Season Clovers¹

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Cool-season legumes make most of their growth in the winter and spring when temperatures are too low for warm-season forages to grow. Their growth is highly dependent on soil moisture, and therefore they can be grown in areas of the state where rainfall is sufficient to maintain good soil moisture—especially on soils with better-than-average soil moisture holding capacity or where irrigation is available and affordable. Use of adapted cool-season legumes in a livestock enterprise can reduce the need for stored feed during the winter months when warm-season forages are dormant. Cool-season legumes are high in quality and result in improved animal performance, including growth, milk production, conception rate, weaning weight, and weaning percentages. Legumes have the ability to "fix" nitrogen, and those adapted to Florida can add from 50 to 200 pounds per acre of nitrogen for use by grasses growing in association or for use by subsequent crops. In some cases, legumes can eliminate the cost of commercial-fertilizer nitrogen, and the "biological" nitrogen does not result in increased soil acidity and is less prone to leaching losses.

When used to overseed perennial warm-season grasses, the grazing season is extended, resulting in more total forage production per land unit and more efficient use of land resources. Mixtures of cool-season legumes can often lengthen the grazing season compared to the use of a single species. Legume pastures are generally very attractive to casual observers and are environmentally acceptable as a source of "natural," slow-release nitrogen to reduce the potential of nitrates in ground water.

Alfalfa

Alfalfa (*Medicago sativa*) is popularly known as "the queen of forages" and is often the forage by which all other forages are judged. It is an erect, upright-growing perennial with many leafy stems arising from large crowns at the soil surface. Alfalfa (Figure 1) has a long taproot, making it drought tolerant, and it may grow as tall as 24 to 36 inches. Although called a warm-season legume by some (top growth is killed by a freeze), it has been placed with the cool-season legumes because in Florida it is

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planted at the same time as other cool-season legumes, and its best production occurs during the spring. Plant a variety that is adapted to Florida's environment. Varieties not adapted to Florida will live for only one or two years, but adapted varieties such as Florida 99 may live three or more years. Alfalfa produces high-quality forage for all kinds of livestock and is especially favored by dairymen and horse owners, with large amounts of alfalfa hay imported annually into Florida by these two groups. Alfalfa can be grazed, used as greenchop, ensiled, or made into haylage, but the majority is utilized as hay. In areas where it is well adapted, grazing use is increasing and varieties are being developed specifically for grazing.



Figure 1. Alfalfa

Successful alfalfa production requires a higher level of management than any other forage crop. Stand persistence is dependent on harvest management. Harvesting at the early bloom stage is usually the best compromise to obtain acceptable forage yields and allow adequate root reserves for good stand persistence.

Grazing or haying alfalfa should begin when plants are approximately 10-16 inches in height. When alfalfa is grazed, grazing should be terminated when plants are about 2-3 inches in height. Alfalfa cut for hay should be harvested at 3-4 inches in height.

Florida weather is not always conducive to making good hay, so planning for alternative use such as silage, haylage, or grazing may be necessary to best utilize the forage and manage for stand persistence. If attempting to graze, graze rotationally since continuous grazing depletes food reserves in the roots and results in rapid stand loss.

Alfalfa requires a fertile, well-drained soil for good growth. Deep sands and poorly drained soils or soils that are flooded or waterlogged for more than a short time should be avoided. Fertility and lime requirements are relatively high and should be met using soil-test results. The spotted alfalfa aphid, the alfalfa weevil, and leafhoppers may require insecticide applications, and nematodes are often a serious problem on varieties not adapted to Florida's environment.

Alfalfa may be planted from October 1 to November 15 when soil moisture is adequate for good germination. Seeds must be inoculated with the proper strain of nitrogen-fixing bacteria and planted as quickly after inoculation as possible at 10 to 13 pounds of seed per acre in rows 6 to 10 inches wide, or at 18 to 20 pounds per acre if broadcasted, followed by disking and cultipacking.

White Clover

White clover (*Trifolium repens*) is a cool-season legume that spreads by creeping stems that root at nodes. Although a perennial in most places, it often behaves as an annual under some management situations in Florida. White clover is a very high-quality forage; Florida research has shown improvement in conception rate, milk production, weaning weights, daily gains, and overall animal performance from animals grazing grass pastures with white clover in the mixture.

White clover (Figure 2) grows best under cool temperatures and on fertile, well-drained soils with good moisture-holding capacity. The heavier soils of

northwest Florida and some flatwood sites in northeast and peninsular Florida are the preferred sites for growing white clover. Although it tolerates fairly wet soils, it cannot survive under prolonged flooding. Deep droughty sands result in poor production and should be avoided, as stands quickly disappear. The most successful sites are those that remain moist during fall, winter, and spring.



Figure 2. White Clover

White clover should be seeded at 3 to 4 pounds of seed per acre between October 1 and November 15 when soil moisture is adequate for germination. December plantings in north Florida sometimes result in some seedlings being lost to freeze damage. Plant varieties adapted to Florida's environment, such as "Osceola" and "Louisiana S-1". Inoculation with the proper strain of nitrogen-fixing bacteria is essential for good clover establishment and growth. The greatest potential use of white clover is probably in combination with warm-season perennial grasses (e.g., bahiagrass or bermudagrass). When planting into grass sods, the grass should be mowed or grazed as closely as possible prior to seeding. A light disking or chopping is usually beneficial, and various types of "sod seeders" are available which do a good job of seeding. Grazing the grass to reduce competition during seedling development may be necessary to successfully establish the clover in mature grass stands. Care must be exercised to prevent excessive trampling or grazing of the young clover seedlings. Overgrazing of the clover seedlings at this young stage can result in reduced stands and reduced subsequent production. Fertilization and liming should be done according to soil-test recommendations.

Flowering in white clover occurs over a long period of time. Managing to allow some seed to mature can help maintain a good clover stand. Reducing grazing pressure during flowering, or rotational grazing to rest pastures for short periods, can allow some seed to mature. White clover should be grazed when plants are approximately 6-8 inches in height. To maintain vigorous stands, terminate grazing when plants are about 1-3 inches.

Crimson Clover

Crimson clover (*Trifolium incarnatum*) is one of the most colorful forage plants in Florida and is frequently seen along roadsides, where it is planted for highway beautification. Crimson clover (Figure 3) is a reseeding winter annual with an erect growth habit and a shallow taproot system. The flowers are a brilliant red color, elongated in shape, and often more than two inches long. The leaves are dark green and covered with dense hairs. Crimson clover is best adapted to the heavier, well-drained soils of Florida, performing poorly on dry, sandy, and poorly drained sites. It is most widely grown in north and northwest Florida. In central and south Florida, it flowers and stops growing very early; therefore its production is very limited in south and central Florida. Crimson clover produces more forage at low temperatures than other clovers. It is fairly tolerant of soil acidity and is often seeded in mixture with small grains and ryegrass. Crimson clover is also often seeded into warm-season perennial grass pastures (bermudagrass and bahiagrass) and may reseed under some management conditions. Crimson clover may be planted from October 1 to November 15 at 20 to 26 pounds of seed per acre. Most improved crimson clover varieties are adapted to Florida conditions, but they vary in spring maturity. Seeds germinate in the fall, and plants produce very little top growth while developing a strong root system, so very little forage is available for grazing before February. Grazing should be delayed until 6-8 inches of growth accumulate. Terminate grazing when plants are 3-5 inches in height. Crimson then grows rapidly until flowering begins about mid-April. Forage is very high quality with both leaves and stems readily consumed. Although it is generally grazed, it may be harvested as high-quality hay or silage. If trying to

manage for reseeding, reduce grazing pressure for about three weeks when in full flower.



Figure 3. Crimson Clover

Red Clover

Red clover (*Trifolium pratense*) is a high-quality forage legume that can be grown throughout Florida when planted on moist, fertile soils with good drainage. It can be grazed in late winter and spring or used as a hay crop. In northern states red clover is a short-lived perennial that persists for 1 to 3 years, but in Florida it normally behaves as a winter annual. Nematodes have been a serious pest of red clover in Florida. Breeding and selection under Florida conditions has led to the development of the "Cherokee" and "Southern Belle" varieties, which have a high level of nematode resistance. Although not normally practiced, these varieties could be managed as reseeding annuals if producers were willing to forgo some grazing in the early summer and allow seeds to mature. "Cherokee" and "Southern Belle" are two popular and recommended cultivars.

Planting should be done from October 1 to November 15 when good soil moisture is available. Under optimum conditions, 8 to 10 pounds of seed per acre are sufficient, but 12 to 15 ensure a good stand under less favorable conditions. If seeded in a mixture with other cool-season forages, 3 to 5 pounds per acre are sufficient. Use the proper nitrogen-fixing bacteria to inoculate the seeds prior to planting unless seeds are preinoculated. Fertilize and lime as indicated by soil-test results.

Red clover (Figure 4) may be grazed, harvested as greenchop, or made into hay. Red clover grown in pure stands or in combination with a small grain or ryegrass may be used to provide high-quality grazing for stocker cattle, replacement and first-calf heifers, or as a supplement for mature cows. When grazing a pure stand, a bloat-control product should be used. Red clover is usually ready for grazing by March 1, or when plants are about 8-10 inches in height. When grazed, red clover maintains higher quality and is more productive if grazed rotationally. It may be grazed continuously if stocked at a medium rate, but stocking should not be so light that plants are allowed to mature. Red clover should not be grazed as close as white clover: grazing should be terminated when red clover plants are about 3-5 inches in height.



Figure 4. Red Clover

Red clover makes excellent hay, but the pubescence on the stems can make the hay quite dusty, and therefore it should not be fed to horses because it might cause respiratory problems. It should be cut for hay at 1/4 bloom stage, or when blooms first appear. It recovers quickly after cutting, even when cut at an advanced bloom stage. If rainfall is evenly distributed or if moisture is provided by irrigation, red clover may be cut every 34 to 40 days after the first harvest for a total of 2 to 4 harvests. Using the crop for both grazing and hay may be useful to some producers. A combination of ryegrass and red clover could be grazed until mid-April when the cattle are removed to allow the crop growth to accumulate for a hay harvest. Dairywomen have used ground red-clover hay in their dairy rations.

Arrowleaf Clover

Arrowleaf clover (*Trifolium vesiculosum*), a reseeding annual, has long, branching, hollow stems from 2 to 4 feet long. Leaves are somewhat "arrowhead" shaped and are smooth with a white "V" mark usually showing. Flowers are large and predominantly white, but with a pink or purple tinge. Arrowleaf clover (Figure 5) is generally adapted to the same locations and conditions as crimson clover but is not as tolerant of acidity, with optimum pH levels at 5.8 to 6.5. Arrowleaf can be grazed or harvested as hay or silage, and quality may exceed that of crimson clover. Arrowleaf clover begins flowering about a month later than crimson clover and flowers and produces seed over a long period in late May through June. When grazed to a height of 2 to 4 inches it continues to develop new leaves and remains productive for a longer period of time than when large amounts of forage accumulate. If a hay crop is desired, it may be grazed until mid-April and then harvested at early- to mid-bloom in late May. Arrowleaf should be seeded at 5 to 10 pounds of seed per acre from October 15 to December 1. It reseeds quite well, but seeds harvested should be scarified for satisfactory germination. Since its general requirements are similar to those of crimson clover, a mixture of the two often works well and can extend the grazing season. The leaves of arrowleaf clover turn a distinctive purplish red color in response to any stress, such as disease, nutrient imbalance, pests, or climatic conditions. Arrowleaf can only be grown for one or two years on any given site, after which the production is seriously reduced by the buildup of diseases caused by nematodes and certain viruses. "Apache", a variety developed in Texas, has some resistance to virus diseases.

Sweetclover

Sweetclover (*Melilotus alba*) was recognized in the early 1900s as a good soil-improvement crop and was used extensively in the corn belt and Great Plains of the U.S. Its appearance along railroads in Florida has been attributed to shipments of hay, bedding, or packing material containing sweetclover. It was generally found in areas where the soil pH was near 7.0. Selection and breeding led to the development of varieties adapted to Florida.



Figure 5. Arrowleaf Clover

Sweetclover (Figure 6) is quite drought tolerant and winter hardy. Although adapted to a wide range of climatic and soil conditions, it does best on moderately-drained to moist soils, but it does not tolerate flooding. It has a deep taproot with several buds forming near the crown of the plant. Top growth may reach a height of 8 to 9 feet, but in Florida it usually gets only 4 to 5 feet tall. Although a biennial in most areas of the U.S., it usually acts as an annual in Florida.



Figure 6. Sweetclover

Although first used as a soil-improvement crop, it is mainly used in Florida as a grazing crop, but may be used as hay or silage. Sweetclover contains an aromatic compound called coumarin which results in low palatability until animals become accustomed to grazing it. During heating or spoilage of hay or silage, coumarin forms dicoumarol, a toxic substance that reduces the blood-clotting ability of animals and may cause death.

Sweetclover does not tolerate acidic soil conditions, and soil acidity must be corrected to successfully grow sweetclover. Sweetclover should

be seeded at 12 to 15 pounds per acre between October 1 and November 15. Seeds should be inoculated with the proper strain of nitrogen-fixing bacteria. Sweetclover generally has a shorter grazing season than white clover, with good grazing being available from February through May.

For current variety recommendations, see UF/IFAS EDIS publication SS-AGR-84 *Fall Forage Update* (<http://edis.ifas.ufl.edu/AA266>).