History of Southern Forage Crops

Prior to European settlement, the Southern U.S. was mainly forest interspersed with small patches of burned areas where Indian women grew crops of corn, beans and squash. Grazing animals consisted mainly of deer and bison that were hunted for meat.

During the late 1600s, some Indians began to raise cattle that they acquired from European colonists. There was some grazing of native grasses, but no hay was harvested. Later, Indians such as the Cherokee tribe adopted the European practice of raising cattle, sheep, and horses on planted pastures.

European settlers in the region found big bluestem, indiangrass, and switchgrass growing on favorable soils. These grasses were generally nutritious and relished by livestock, but overgrazing soon reduced vigor and stands, resulting in widespread replacement by less desirable grasses such as broomsedge and three-awn grasses. Most of the native grasses on leached, infertile soils common to much of the Southern U.S. were handicapped by low nutritive quality, low yield, short productive season, and/or intolerance to grazing. Thus, animal agriculture based on native grasses was at a distinct disadvantage in the South.

Forage production with improved species developed differently in the South than it did in other parts of the nation. In the Northeast and Midwest, commercial dairy, beef, and sheep production on European-introduced cool season forage plants increased rapidly during the 1800s to supply the needs of large industrial cities and for export to Europe. Natural grasslands in the more arid West were exploited for

Bison such as these originally grazed native grasses.

beef cattle and sheep. In contrast, agriculture in the South consisted of cash crops such as cotton, with livestock being grown on only a limited scale to supply the local demands of small cities and rural areas.

Improved pastures and large-scale beef and dairy production did not occur in much of the South until the 1930s and 1940s. Since then, there was a massive expansion of cattle production throughout the region, and forages have become an important agricultural commodity. Currently, there are an estimated 60 million acres of perennial pasture in the South, making up about 75 percent of the total pasture acreage in the humid eastern U.S. In addition, there are about 19 million acres of annual pastures in the South.

European settlers in the Northeast introduced cool season species such as orchardgrass, perennial ryegrass, timothy, bluegrass, and white clover, which were productive there. As the settlers migrated west and south, they found these species were also adapted to the upper South. Farther south, they succeeded with these cool season forages in the mountains, but failed at lower elevations. Colonists at Savannah, Georgia, introduced alfalfa in 1736, but it failed. Virginia farmers were also disappointed with alfalfa, which performed poorly due to soil acidity and low fertility.

None of the improved forage species commonly grown in the South are native to the region or even to other areas of the U.S. Most Southern forage plants, like most of the nation's human population, were originally immigrants from other parts of the world **(Figure 1.1).**

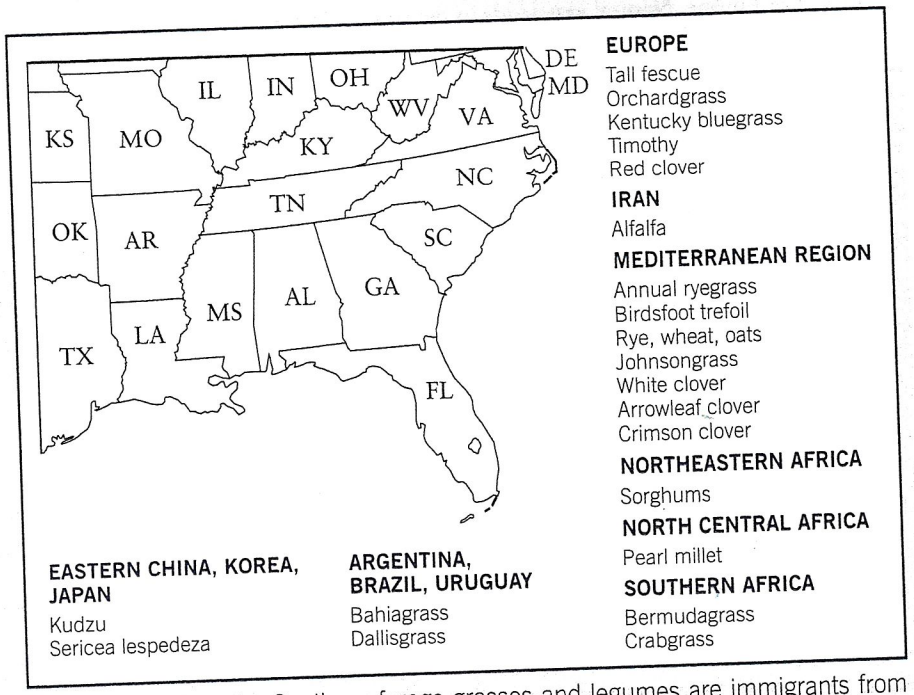


Figure 1.1 All major Southern forage grasses and legumes are immigrants from other parts of the world.

Bermudagrass was introduced from Africa, probably in the late 1600s, and soon became one of the most important grasses in the lower South. Dallisgrass, a native of Argentina and Brazil, was introduced accidentally through the port of New Orleans and grown in Louisiana in the early 1800s. Johnsongrass, native to the Mediterranean area, was introduced into South Carolina in the 1830s. In about 1840 it was planted by Colonel William Johnson on the black soils of central Alabama where it became a popular forage grass.

Common bahiagrass was first introduced from Brazil by University of Florida personnel in 1913. It was found to be well adapted but low yielding. E.H. Finlayson, an agricultural Extension agent, found a much more vigorous and productive bahiagrass growing near the ship docks at Pensacola, Florida, in 1935. It was eventually released by the University of Florida and the Soil Conservation Service (SCS) as the variety Pensacola, which now comprises the majority of the bahiagrass acreage in the U.S.

Tall fescue, the most widely grown cultivated pasture grass in the U.S., was in all likelihood originally introduced as a contaminant in other grass seed from Europe. It was found growing on a hill pasture in eastern Kentucky in 1931 by E.N. Fergus, a professor at the University of Kentucky. Tall fescue was growing on this farm when it was purchased by William M. Suiter in 1887. Tests revealed that it was a productive grass, and it was released in 1943 as the variety Kentucky 31. There was phenomenal acceptance, and planting of this variety in the late 1940s and 1950s, as it was useful in a large portion of the lower Midwest and upper South where other cool season

Kentucky 31 tall fescue originated from plants growing in this pasture on the William Suiter farm, Menifee County, Kentucky.

perennial grasses were not well adapted. Later releases of Claire timothy and Boone orchardgrass by the University of Kentucky provided additional forage grasses for the upper South.

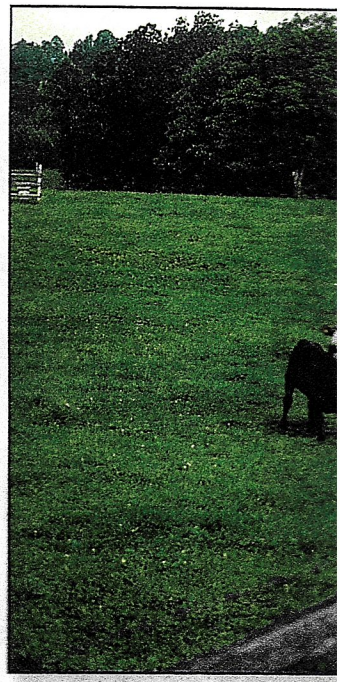
The cereal grasses—oats, wheat and rye—were grown as grain crops in the South from the time of the first European settlements. Later, they became important as high quality winter annual grazing crops. Annual ryegrass, native to the Mediterranean area, was also introduced into the South during the early years of European settlement and is now the most common component in winter annual pastures.

There was little selection or breeding of forage crops in the South until the 1930s. When G.W. Burton came to Tifton, Georgia, as a forage grass breeder in 1936, common bermudagrass was generally considered a weed in row crops. His remarkable breeding program soon resulted in release of the hybrid variety Coastal which was more drought-tolerant, and much higher yielding than common bermudagrass. At present, it is estimated that there are over 10 million acres of this variety in the South.

There have since been many notable achievements in developing improved forage varieties for the South. Dr. Burton's breeding program has released several additional improved bermuda hybrids that are more productive, more cold hardy, and/or more digestible. Other breeding work at Tifton by Dr. Burton and W.W. Hanna greatly improved the nutritive quality of pearl millet, a summer annual grass native to Africa. Another breeding achievement at Auburn University in Alabama resulted in the release of AU Triumph, the first winter-productive tall fescue variety for the lower South. The first novel (non-toxic) endophyte tall fescue variety was developed in 1999 at the University of Georgia by J.H. Bouton and G.C.M. Latch of AgResearch New Zealand.

Legumes have been less successful in the South, a result of low soil fertility, subsoil acidity, heat, drought, pest problems, and generally higher management requirements than grasses. Crimson clover, a winter annual from the Mediterranean region, was introduced into the U.S. in 1819, but did not become important until 1880. The long-term breeding work of W.E. Knight in Mississippi did much to improve this clover, and resulted in release of the winter-productive variety Tibbee. Arrowleaf clover, a winter annual from Italy, was released in the early 1960s. In particular, the Auburn University-selected variety Yuchi became important due to its ability to extend the winter annual grazing season in the lower South.

Improved perennial clovers became available in the late 1940s when E.N. Fergus released Kenland red clover, followed by disease-resistant red clover varieties of N.L. Taylor, both at the University of Kentucky. Regal ladino white clover was developed at Auburn University by P.B. Gibson, E.D. Donnelly, and W.C. Johnson. Intermediate white clover varieties Louisiana S-1 by C.R. Owen at Louisiana State University, and Durana and Patriot by J.H. Bouton at the University of Georgia, all made major contributions to pasture improvement.



Tall fescue-white clover-birdsfo calves. (Tim and Peg Taylor far

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Tall fescue-white clover-birdsfoot trefoil provides excellent pasture for beef cows and calves. (Tim and Peg Taylor farm in eastern Kentucky.)

Alfalfa, originally from Iran, was of little importance in the South until the development of better adapted, improved varieties and enhanced soil fertilization technology. Alfalfa acreage declined with the arrival of the alfalfa weevil, but recovered with new control measures. The development of grazing-tolerant varieties at the University of Georgia by Dr. Bouton in the late 1980s greatly increased the feasibility of using alfalfa as a pasture species.

Common annual (striate) lespedeza was introduced to Georgia from eastern Asia in 1846, later spreading throughout the region. Korean annual lespedeza (a separate species) was introduced in 1920 and became important in the upper South. Sericea, a perennial lespedeza, was introduced from Japan in the late 1890s, but did not become important until the 1920s and 1930s. Sericea is especially tolerant of low fertility and acid subsoils, but was considered a low-quality forage plant. Later, the breeding program of Dr. Ed Donnelly at Auburn University developed fine-stemmed and low-tannin sericea varieties with improved palatability and nutritive quality. Subsequently, his successor Dr. Jorge Mosjidis released a grazing-tolerant variety named AU Grazer in 1997.

Several other forage species have shown promise and some are being utilized. Berseem, ball and rose clovers are valuable winter annuals in certain areas of the lower South. In portions of the Gulf Coast area and in peninsular Florida, perennial peanut is a valuable, high-quality hay plant. In the upper South, there is greater use of warm season perennial grasses such as big bluestem, caucasian bluestem, switchgrass, and indiangrass.

Introduction of improved forage plants, together with advances in fertilization and weed control, has greatly increased productivity of pastures and hay areas. Pasture renovation that has included establishing legumes in grass sods has improved yield and quality of pastures and hayfields. Along with forage improvement, there have been great advances in animal breeding, control of animal breeding season, and animal health care.

Grazing research by scientists such as Roy Blaser in Virginia and G.O. Mott in Florida has shown the great potential of well-managed pasture for livestock production in the South. Probably the least progress has been made by Southern livestock producers in managing pastures and hay fields for high forage quality. Improper grazing often results in surplus grass of reduced quality, and the resultant shading prevents development of new tillers and leaves. Most hay is cut when it is too mature and stored outside, reducing digestible energy and protein, and wasting forage.

Forage production in the South has come a long way, mainly through improved plants, farm equipment inventions, and fertilization. **Table 1.1** lists some significant dates.

The primary challenges for the future are better management of existing grasses and legumes for improved nutritive quality, and matching animal nutrient requirements with the available forages. Adoption of these skills will result in continued progress in the efficiency and profitability of Southern forage/livestock systems. SF

Table 1.1 Some significant events affecting Southern forage/livestock production.

Year	Significant Events
1701	Grain drill invented by Jethro Tull.
1733	J.E. Oglethorpe established an experimental garden for foreign plant introductions at Savannah, Georgia.
1833	Obed Hussey developed the first successful reciprocating cutter bar hay mower.
1837	John Deere produced the first steel moldboard plow.
1840	Wire-toothed hay dump rake developed.
1840	Justus von Liebig, Germany, founded the science of modern plant nutrition.
1841	Edmund Ruffin, Virginia, increased the yield of crops such as alfalfa with lime.
1843	First fertilizer research on grassland began at Rothamsted, England.
1850	Invention of corn planter.
1862	Morrill Act created the Land Grant University System in the U.S.

(continued)

Southern Forages

Year	Significant Events
1866	Gregor Mendel of Moravia hybridized peas and laid the basis for modern genetics and breeding.
1870	Disk harrow first produced.
1872	First horizontal continual action hay press.
1873	First silo constructed in U.S.
1874	Barbed wire patented for fence.
1886	Hellriegel and Wilfarth, Germany, discovered that legumes fix nitrogen in nodules on roots.
1887	Hatch Act approved, providing funding of U.S. Agricultural Experiment Station system.
1890	Side-delivery hay rake and hay loader developed.
1903	C.W. Hart and C.H. Parr began manufacture of the first gasoline-powered tractors in Iowa.
1908	G.H. Shull discovered the concept of hybrid vigor in corn.
1914	Smith-Lever Act established the Cooperative Extension Service in the U.S.
1918	D.F. Jones developed the double-cross procedure, making production of hybrid corn seed practical.
1919	First grassland plant breeding station in the world started by R.G. Stapledon at Aberystwyth, Wales.
1933	Agricultural Adjustment Act created a county committee system that became the Agricultural Stabilization and Conservation Service in 1954.
1935	Release of Pensacola bahiagrass.
1935	Soil Conservation Act created the SCS, now called the Natural Resources Conservation Service (NCRS).
1940	First Southern Pasture and Forage Crop Improvement Conference held in Tifton, GA.
1940	Self-tying hay baler developed.
1943	Release of Kentucky 31 tall fescue and Coastal bermudagrass.
1944	Joint Committee on Grassland Farming organized at Rutgers University in New Jersey, becoming the American Grassland Council in 1957 and the American Forage and Grassland Council in 1968.
1945	Introduction and use of anhydrous ammonia as a fertilizer.
1948	Society for Range Management organized in Salt Lake City, Utah.
1958	Development of hay baler for large round bales.
1960s	Development of no-till drill for seeding in grass sods.

(continued)

Year	Significant Events
1975	Development of high-voltage electric fence in New Zealand.
1976	Near infrared reflectance spectroscopy described as a method for predicting nutritive value.
1980s	Discovery of the effects of the tall fescue fungal endophyte on livestock and on tall fescue plants.
1990	Release of the first grazing-tolerant alfalfa variety adapted in the South.
1990	First grazing school held in Linneus, MO. This was the prototype for many producer-orientated grazing schools held in many states.
1991	Grazing hands Conservation Initiative (GLCI) organized. This resulted in formation of numerous state GLCI committees comprised of representatives of producer groups, various state and federal agencies, and others interested in addressing issues related to private grazing lands.
1990's	Round bale silage (baleage) became popular.
2000	First commercial availability of stress-tolerant tall fescue containing a novel (non-toxic) fungal endophyte.
2003	White clover varieties released that have greatly improved persistence, including on many sites and soils in the Lower South.
2011	Glyphosate-resistant alfalfa determined to be safe for the environment, consequently resulting in commercial availability to producers.

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profitability of forage/livestock

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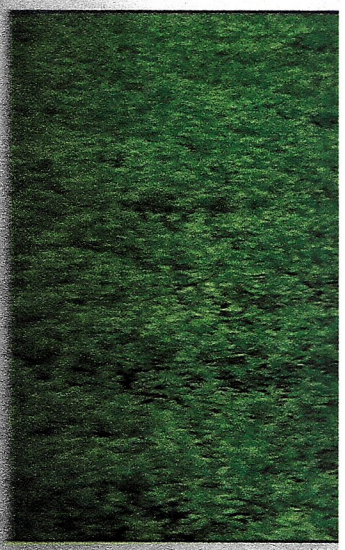

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