Forage Adaptation

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New species and varieties of forage grasses and legumes developed in other areas of the USA and other countries are often offered for sale in our state. Will they do well here? That depends on a lot of factors. The likelihood of success is greatest if the growing conditions in its area of origin is similar to that in our area. Knowing something about the conditions in the area of origin can help us predict what will happen. Colonists at Savannah, Georgia attempted to grow alfalfa in 1736 but it failed. In contrast, the early introduction of alfalfa to California by Spanish settlers was highly successful. Today, we know why. Alfalfa is native to northern Iran and the Caucasus mountain area with a relatively dry climate and soils with pH 7 to 8 and a good supply of potassium. Similar conditions existed in California. In contrast, the soil acidity, low fertility, and very wet conditions of the Savannah area were not favorable for alfalfa. General Olglethorpe wisely set up a plant introduction test garden in Savannah where all sorts of forage, grain, fruit, vegetable, and ornamental plants were planted. It was the first such test garden in the American colonies. Today, we continue this practice to obtain information on adaptability of new species and varieties for specific areas.

Climate

Climatic conditions are the main factor determining adaptation of forage species and varieties. Temperature and distribution and amount of rainfall are the main variables. Climate extremes are more likely to determine adaptation than are average conditions. Since Georgia is influenced by the continental effects of occasional winter cold blasts from Canada, some forage plants such as the perennial warm season kikuyugrass are killed while in marine climates such as coastal South Africa with similar **average** temperatures but no extreme cold the survival is good. Climatic conditions in southern Brazil, Uruguay, and Argentina are similar to ours so we grow many of the same forage species they do. Bahiagrass and dallisgrass, natives to this region of South America, are well adapted here and are grown widely in pastures. Arrowleaf clover, introduced successfully here from the Mediterranean area, was later introduced from the southeastern USA to southern Brazil where it is widely grown today.

Rainfall distribution over the year varies greatly from one area of the southeastern USA to another. In the large Coastal bermudagrass pasture belt of east Texas, July and August rainfall averages only about 3 inches each month as compared to 4 to 5 inches at Tifton, GA. In contrast, October and November rainfall in east Texas averages 3.5 to 4 inches per month while Tifton averages only about 2.5 inches. This means that establishment and autumn growth of winter annuals such as wheat, rye, ryegrass, and clovers are much more dependable in east Texas than at Tifton. South Mississippi and Alabama also receive higher rainfall in autumn (3.5 inches per month in October and November at Mobile, AL), favoring autumn forage growth.

Within Georgia, autumn rainfall decreases from north to south in the state:

Location	September	October	November
	inches		
Blairsville	5.4	4.2	6.0
Calhoun	4.2	3.4	4.2
Athens	3.8	3.0	3.4
Eatonton	2.8	2.9	3.6
Tifton	3.7	2.3	2.5

In addition to higher rainfall during autumn in northern Georgia, cooler temperatures make the rainfall more effective for growth of cool season plants. Thus, autumn growth of tall fescue is better at Calhoun than at Eatonton. Early autumn growth of tall fescue at Blairsville is excellent but at this higher elevation (2100 feet) lower temperatures and frosts in late autumn result in reduced growth. Cooler summers and higher rainfall over most of the year at Blairsville are favorable for adaptation and longer stand survival of cool season species such as perennial ryegrass, orchardgrass, red clover, and birdsfoot trefoil than at locations further south. However, at this location winter killing of non-dormant forage varieties can be a problem.

Soils

Soils may modify the effects of climate, differing greatly in water and nutrient-holding capacity, drainage, and potential for pests such as nematodes. Subsoil acidity with aluminum toxicity can be a problem in the Piedmont, Coastal Plain, and Flatwoods areas and limit root development and survival of some forage species. Forage species that are tolerant of subsoil acidity have an adaptation advantage, such as pearl millet, bahiagrass, bermudagrass, tall fescuet rye, annual ryegrass, annual lespedeza, and sericea lespedeza. Another problem on well drained sandy soils are nematodes. Cool season species such as tall fescue and orchardgrass are especially sensitive to nematodes as roots are destroyed, resulting in stand losses. Some progress has been made in development of more nematode-tolerant tall fescue as is the case with the GA-5 variety.

Conclusion

Generally, forage varieties developed in this region are more likely to be adapted to local conditions than those from great distances. This may be a result of greater tolerance to climate and soil but also tolerance to local pest problems. Excellent performance of a species or variety in another climate and soil zone is no assurance that it will perform well in our area. When trying a new variety developed in a distant state or country, it is best to plant only a small area and observe the adaptation for several years before planting large areas.