



Clover Selection in Mississippi

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Most of the forage production in Mississippi targeting livestock is dominated by warm-season perennial grasses (bermudagrass and bahiagrass) and cool-season annual grasses (annual ryegrass and small grains). However, there is a number of clover species that can complement forage production to improve yields, reduce nitrogen inputs, improve forage quality, and extend the grazing season.

The most common clover species adapted to Mississippi consist of annuals and perennials cool-season species. These clovers have the ability to develop nodules in their roots through a bacteria called Rhizobia and provide their own nitrogen. When properly inoculated, clovers have the capability to fix nitrogen from the air and transfer that usable nitrogen to be used by the clovers or any surrounding grasses. Conservative estimates of annual nitrogen production can range from 90 to 200 pounds per acre depending on the clover species. Because of this nitrogen fixing potential, the use of nitrogen fertilizer is not recommended on pastures containing greater than 30% clover. If nitrogen is applied, there is a tendency that it can stimulate grass or weed growth and reduce the persistence of the clover. Most clovers will require a minimum pH of 6.0 to maintain productivity and persistence and should be fall planted following seeding rates recommendations.

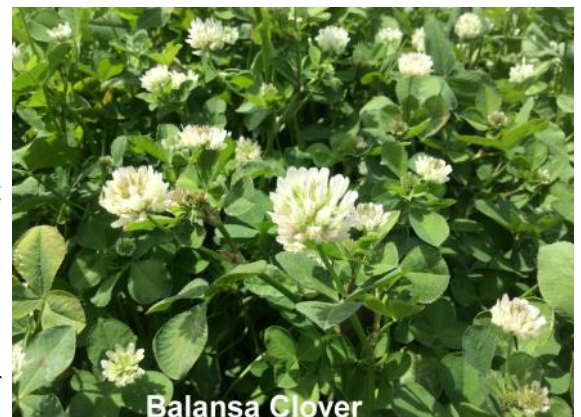
Annual Cool-season Clovers

Arrowleaf Clover (*Trifolium vesiculosum*) – Despite of the early growth in the winter, arrowleaf is a late maturing clover with good growth until early to mid-May. Some of the unique plant characteristics include large leaflets that are rounded at the base and pointed at the tip. The leaves tend to have V-shaped water marks with pronounced veins and the flowers are white to pink when immature and brown when mature. Plants have an upright growth and can a height up to 50 inches. It could be susceptible to virus and root diseases. Arrowleaf is adapted to soils that well- to moderately-drained and pH of 5.8 or higher. It does not do well in light textured, droughty soils with low fertility or soils that are wet and poorly drained. It can provide a good reseeding potential and can have up to 90% of hard seed. Several fungal pathogens in the soils (*Pythium ultimum*, *Pythium irregular*, *Rhizocotonia solani* and *Fusarium proliferatum*) can cause damage at different growth stages.



Arrowleaf Clover

Balansa Clover (*Trifolium michelianum*) – Balansa has been used extensively as cover crop clover. Like ball clover, balansa can be confused with white clover, but some of the unique characteristics are the hairless and serrated leaves, the hollow stems, and the combination of pink and white flowers. It is usually has a good residing potential when allow to bloom during the first year and every other year to maintain the seed bank. Balansa has good cold tolerance, it is adapted to hay clay and wet soils, soil pH ranging from 5.5 to 7.0, and excellent waterlogging. It is a late maturing clover with aggressive vertical growth and 4-5 weeks of flowering, making it very competitive with cool-season annual grasses. Balansa maintains good forage quality due to the later maturing and the hollow stems with fiber accumulation when compared to clovers with a woodier stem. Because of the growth comes from the crown, it can toler-



Balansa Clover

ate heavy grazing and this can increase tillering. If grazing, make sure that grazing is done before flowering or otherwise it will not recover well. Bloat risk can occur and increase when cattle is grazing lush pastures dominated by balansa.

Ball Clover (*Trifolium nigrescens*) – Producers tend to sometime mistake ball clover with white clover. Its highly-branched stems can produce yellowish to white flowers seed heads, but the blooms are smaller and more rounded than white clover. Ball clover can form a thick mat and grow up to 3 feet tall with most of the growth close to the ground to partially erect. This type of growth makes it ball clover ideal for grazing. Seed is very small and can contain up to 60% hard seed which provide excellent reseeding ability even under close grazing. Although ball clover can tolerate wet heavy soils, it is best adapted to fine sandy loam and clay loam soils. It has a medium to late maturity with flowering approximately two to three weeks later than crimson clover. Most of the production season occurs from mid-March to late May. Ball clover has a high bloat potential and it should be mixed with annual ryegrass or small grains to reduce the risk.



Berseem clover (*Trifolium alexandrinum*) – Berseem clover is commonly grown as a winter annual in areas that experience long, warm winters with minimal frosts. It is well adapted to most soil types except sandy soils and it can tolerate poor drainage. Soils with low in phosphorus can also limit forage production. Contrary to ball clover, the reseeding potential is poor because hard percentage is very low at less than 10%. Because of its upright growth, it can be ready to graze within 60 days when it reaches a 12 to 15 inches height and before it begins to flower. If berseem clover is not grazed or clipped before the early flowering stage, the regrowth potential is severely impacted. Berseem is a very later maturing clover which can extend grazing into late May or early June. Vegetative growth has high protein percent (18 to 26%). One of the advantages with berseem clover is the low bloat risk and potential from grazing and no cases have been reported in the literature.



Crimson (*Trifolium incarnatum*) – Crimson clover can grow in various soil types that are well drained and do not performed in poorly drained or acidic soils. It is considered as one of the annual clovers with poorest forage quality. Despite of quality issues it could be very productive when mixed with cool-season annual grasses. Crimson clover has been around for long time and in the south, it is used as benchmark to compare the performance of other clover species and varieties. One of the disadvantages with crimson is that matures early in the spring (early April) compared to other annual clovers. On the other hand, the early maturity reduces warm-season perennial grasses that are green-up in the spring. Like berseem, crimson clover has a low reseeding potential due to low hard seed production and seed damage caused clover head weevils.



Perennial Cool-season Clovers

Red Clover (*Trifolium pretense*) – Red clover is considered a perennial cool-season legume in other regions, but in the south it is considered a weak biennial or short-lived perennial due to the climatic conditions. Red clover has an upright growth where the main stem does not elongate, but allows the production of many tillers or branches at the lower nodes. The stems are very hairy and hollow, the leaves are oblong to wedged-shaped with a V-shaped white water mark, and the flowers are rose/purple to magenta in color. It is adapted to well-drained loam and clay soils, but can persist in wetter, lower-pH soils than white clover and cannot grow in the shade. It has good drought tolerance with growth extended into late June or early July if moisture is available.



Red clover tends to be an early-flowering type in Mississippi. Red clover can be a good choice in the northern part of the state to seeding in grass sods of bermudagrass and tall fescue. It contains high magnesium concentration which can aid during early spring grazing to prevent grass tetany.

White Clover (*Trifolium repens*) – White clover is perennial cool-season legume and one of the most adaptable clovers in the state. It is best adapted to level, fine sandy loam to clay soils that retain good soil moisture during the growing season. One of the advantages is its persistence under grazing pressure. There are three subtypes of white clover and they include Dutch, intermediate and ladino. The Dutch type is very low growing with small leaves and low forage production. The ladino type has larger leaves with more upright growth, produce fewer flowers and do not reseed well. The intermediate type has slightly faster growth than the Dutch, better grazing tolerant than the ladino and excellent reseeder. Most of the clovers flower from March to June and can produce up to 60% hard seed. White clover could be good companion in perennial grass systems such as tall fescue, bermudagrass and bahiagrass. It can tolerate shade. Bloat is usually a problem for livestock grazing pastures with a large proportion of white clover. It is recommended to limit their intake by using intensive strip grazing or by providing bloating preventative materials.



To get the most out of your clover system, choose a clover species that is appropriate for your climatic conditions, soils and grazing rotation and considering the amount of nitrogen that can delivery throughout the season. It is also important to make sure that clover species is matched with the proper inoculant that could allow root infestation and nodulation.

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