Why Do Legumes Fail in Pastures?

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Last month we discussed planting legumes in pastures and how to successfully get stands established. This month, let's talk about failures of well-established legumes. If we know why legumes fail in pastures, then we might be able to avoid or at least reduce failures in the future.

Improper soil conditions

Legume species differ in their tolerance to poor drainage. Legumes such as alfalfa, arrowleaf clover, and crimson clover are not tolerant of poorly drained soils with reduced growth and stand loss occurring over time. Red clover and birdsfoot trefoil are somewhat more tolerant of wet soils. White and ball clovers grow well on wet soils.

Very acid soils (below pH 5.1) prevent growth of virtually all legumes except sericea lespedeza, annual lespedeza, cowpea, and kudzu. Legumes tolerant of soils in a pH range of 5.1 to 5.5 include white, red, crimson, and subterranean clovers. Arrowleaf clover needs a pH above 5.5 and alfalfa pH 6.3 or above.

All legumes except kudzu, sericea and annual lespedezas require medium to high levels of phosphorus and potassium for survival and growth. When legumes are grown with grasses, legume stands will disappear quickly if phosphorus and potassium are low as the grasses are much stronger competitors for these nutrient elements. To be sure of soil fertility, soil test and fertilize or lime as needed.

Improper grazing management to suit the legume plant morphology

Most legumes do not have the type of morphology or development that allows frequent, close removal of topgrowth. In contrast, most grasses are especially well suited for grazing with features that resist grazing pressure such as basal buds for new tiller (shoot) development, regrowth of leaves from the base after being bitten off, and a deep fibrous root system to resist being pulled up.

Perennial legumes differ greatly in their underground features that affect stand maintenance or failure when grazed:

(1) **Crown formers** have a crown of short branched stems near ground level, a deep taproot, and regrowth from the crown or stubble after cutting or grazing. Legumes of this type are alfalfa, red clover, birdsfoot trefoil, sericea lespedeza, and kudzu. Frequent, close grazing will exhaust the food reserves in the root and lead to loss of vigor and eventually death. Continuous close grazing of kudzu and similar type legumes over several years will destroy stands. Rotational grazing or continuous stocking at a moderate level to leave 5 inches of leaf tissue are necessary to replenish root food reserves. Unfortunately, legume breeders have not selected plants under close grazing in the past. In contrast, the alfalfa breeding program of Dr. Joe Bouton at the University of Georgia has been conducted under close continuous grazing. This has resulted in release of the grazing-tolerant Alfagraze variety with more to follow. This program has been expanded to select other legume and grass species under close continuous grazing.

(2) **Rhizome formers** have thick underground stems with large food reserves and many buds that can form new plants. Perennial peanut, an excellent legume adapted to extreme south Georgia, is very tolerant of grazing and yet highly productive. In north and central Georgia, we have been working with kura clover which has similar rhizomes. It is an excellent quality clover that competes with grasses, tolerates hard grazing, but has poor seed production and slow establishment. We are continuing to screen for improved types as this legume is so well adapted as a persistent pasture legume.

(3) **Stolon formers** maintain thick horizontal stems that accumulate large food reserves and also have a mass of buds and leaves at the soil surface that cannot be eaten by grazing animals. White clover has this type plant which is highly tolerant of close continuous grazing.

Annual winter clovers differ somewhat in their grazing tolerance. Subterranean clover has a mass of leaves at the ground surface so can be grazed closely without harm. Arrowleaf clover tends to form short stolons with food storage so will tolerate considerable close grazing. Crimson and berseem clovers initially have a dense of rosette of leaves but later elongate and can be injured by close continuous grazing.

Plant shading by undergrazing

Undergrazing mixed pastures of white clover with tall fescue or orchardgrass during peak grass growth in spring is a common practice and contributes to loss of clover stands. Shading by the taller growing grass prevents clover leaf growth and development of new buds on stolons. Thus, when grazing pressure increases in early summer to utilize the surplus forage, clover plants have been weakened to such an extent that they often disappear.

This problem can be overcome by concentrating more animals during spring on pastures containing clover, giving the clover plants more light. Other grass pastures can be allowed to grow for cutting as hay. This problem is not confined to tall fescue or orchardgrass. Small grains or ryegrass with arrowleaf or crimson clovers when understocked in late winter often shade out the legume, resulting in little clover production in

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spring. Higher grazing pressure in winter generally favors more clover in spring.

Diseases

Leaf diseases are usually less on grazed than hay-harvested legumes adapted to your area. The reason for this is opening the plant cover up to more light and reducing the humidity, thus making it less favorable for diseases to develop. One problem that seriously reduces production and often stand life is virus diseases in white clover and sometimes arrowleaf clover. The yellow mottled leaves of white clover is a common sight on two- to three-year-old stands. No virus-resistant white clover varieties are available so the only solution is replanting with new seed every two years. Virus-resistant arrowleaf clover has been developed in east Texas and should be available in a few years.

Insects

It has been common to apply insecticides to alfalfa for control of alfalfa weevil and sometimes for leaf hoppers. However, in our grazing experience with alfalfa, insect populations are greatly reduced under grazing, as compared with hay cutting, so that application of insecticides may not be necessary. This also seems to be the case with other legumes where grazing disturbs the habitat and makes it less attractive to insects than in a hayfield. However, there may be times when an outbreak of damage by insects could necessitate spraying.

Drought

Drought alone is too often blamed for failures of well-established legumes. Often the problem is another cause such as improper soil conditions or improper grazing management, which was accentuated by drought.

Conclusion

Failures of established adapted legumes in pastures are generally a result of improper soil drainage, poor soil fertility, and either overgrazing or undergrazing. Good management to maintain legumes in pastures will require soil testing, fertilization, and some cross-fencing of pastures to adjust grazing pressures. Maintenance of legumes in pastures can improve forage nutritive quality, supply nitrogen, and often extend the productive season.