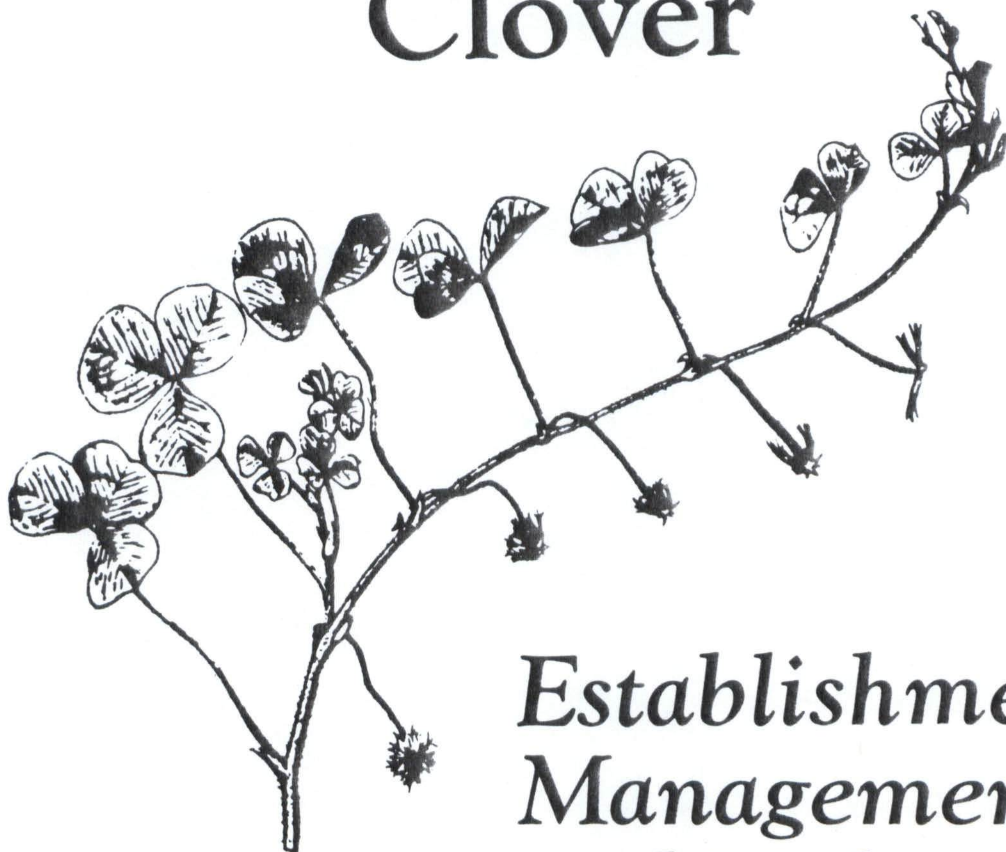
MP-1640
March 1988

Subterranean Clover



Establishment, Management, and Utilization in Texas

THE TEXAS AGRICULTURAL EXPERIMENT STATION/Neville P. Clarke, Director/The Texas A&M University System/College Station, Texas

CHAPTER 11

Subterranean Clover Use in Texas

D. H. BADE, D. J. DORSETT, A. M. SCHUBERT, and C. L. POHLER

Interest in subterranean clover has been moderate but continual since it was established in coordinated demonstrations in 1974. The largest increase in planted acres has occurred in South Central and Southeast Texas (Table 1). Subterranean clover acreage is expected to continue to increase the next few years. Because subclover does not produce an impressive tall growth, producers have been reluctant to try it. As it is used, producer confidence in its production increases. A period of trial and error is also necessary for every new forage to determine which soils, climates, and pasture systems it is adapted to. Following is a discussion on how it has performed in certain areas of the state.

East Texas

Subterranean clover is not a reliable reseeding legume on the deep sandy soils of East Texas. Numerous trials at the Texas A&M University Agricultural Research and Extension Center at Overton have shown that, at best, current subclover varieties may provide only one grazing season from a natural reseeding state. The most critical factors governing this lack of reliable reseeding appear to be related to the high percentage of soft seed and the amount and frequency of rainfall during seed set and throughout the summer months. Thus, the only reliable subclover that is available for grazing in East Texas occurs in those pastures which are overseeded on an annual basis.

One report from Carthage, Texas indicates that subclover has been a very dependable reseeding fall legume on a slightly heavier soil. The only time this stand has not reseeded itself is when spring insect damage prevented a good seed set. Present research and extension data have shown that subclover cannot be recommended as a dependable reseeding clover for sandy soils in this area of the state.

Central Texas

Subclover performs very well on clay pan soils as long as pH is below 7.3. Clare and Koala are two varieties which should be adapted to these high pH soils. Germination of soft seed is not an apparent problem even though summer rainfall is generally limited. It establishes readily in the fall, produces some fall grazing, can tolerate close-continuous grazing, and matures early enough to allow spring growth of the base pasture grass while moisture still exists in the soil. Other species like arrowleaf clover or ryegrass tend to live longer and exhaust soil moisture so that the base grass produces little if any late spring growth without additional rainfall. Moisture limitations may well be the key factor in how far west a clover is grown. Experience has shown that subclover has reseeded under dry spring conditions. This may be an additional reason for use of subclover west of the blacklands where limited moisture would not allow arrowleaf clover to reseed.

Table 1. Estimated Subterranean Clover Acreage[1]

Location	1980	1985
	Acres	
District 9 (East Texas)	1,970	6,591
District 10 (Central Texas)	180	2,647
District 11 (Southeast Texas)	210	12,720
District 14 (Middle Gulf Coast)	200	2,885
State	4,682	29,484

[1]From MP-1618, Texas Agricultural Experiment Station.

Southeast Texas

Subclover is adapted to most of the fine sandy loam and clay upland soils in Southeast Texas. Efforts to obtain stands in the Brazos and Colorado Riverbottoms have been disappointing. Possible reasons are higher soil pH, competition from burclover, and poor nodulation due to poor survival of introduced rhizobia or competition from native rhizobia. Subclover has done well on the poorly drained clay soils where white clover is usually found. Subclover is not as well adapted to these clay soils as white clover, although it is earlier and has more forage production. Good subclover stands can be obtained if planted on an area where white clover was not present. A subclover-white clover mixture will develop if planted to an area where white clover was present.

Most subclover acreage in Southeast Texas is west of the Colorado River where the soils are less acidic. Clare and Koala are the most productive varieties on soils with a pH greater than 7.2. Mt. Barker and Karridale do well at lower pH's. Competition from burclover and its associated rhizobia is a frequent problem in getting good subclover stands on neutral and alkaline soils. Burclover and some broadleaf weeds can be taken out of subclover with three-fourths lb/A of 2,4-D. Observations indicate subclover can recover from up to 1 lb/A of 2,4-D while burclover is very susceptible.

Middle Gulf Coast

Observations of subterranean clover have been made at the Texas A&M University Agricultural Research Station at Yoakum since the winter of 1981-82. While forage yields are not as great as those of some clover species (for example, Yuchi arrowleaf and Bigbee berseem clovers), they have been quite good—frequently 1-½ tons/A or more of air dry forage as estimated by mechanical harvest (Table 2). There is a tendency to underestimate subclover yields by our harvesting techniques, because much of the forage is below the mower cutting height.

The entries in Table 2 show a range of yields from around 400 to 4,600 pounds of dry clover forage per acre with variation because of stand density, crop year, land preparation, companion species, soil type and pH, and variety. Some of the variability in the data is due to reseeding. The trend toward a decrease in productivity with each succeeding year in the first 15 entries in the table is partly due to decreased stand. Cold damage was also a factor during the winters of 1983-84 and 1984-85. In the plots on the Carbengel clay loam soil, the high pH may have had an adverse affect—especially during the first 2 years of the study. However, natural reseeding was good during fall 1985, and excellent stands and yields were observed during the late winter and spring 1986. Reseeding was excellent in fall 1986 and although not measured, productivity appeared high into spring 1987 until the pasture was accidentally sprayed with picloram. In that field, the stand actually thickened up with succeeding years of natural reseeding. Land preparation and type of companion crop affects subclover performance. In most of our trials, we have seen little if any benefit from discing sods before seeding with clovers as long as an effective seeder was used. It is critical, however, that the height of companion grasses be reduced by close mowing or grazing before sod-seeding. Even when good emergence was achieved, seedlings were weak and tended to die when tall grass was left on the pasture during seeding. It appears that subclovers were more productive in bermudagrass sods than in Pensacola bahiagrass or Klein-75 sods. While it is probably of limited practical use to producers, production on prepared seed bed usually exceeded that of sod-seeded subclover.

Soil Adaptation

Mt. Barker has been the most readily available variety during the time we have been looking at subclovers. Initial observations indicated that this variety performed well when the soil pH was lower than about 7.3. As we examine more varieties, we are finding that some, such as Clare, Kaola, Trikkala, Larisa, and perhaps Meteora perform better than Mt. Barker under higher pH conditions. Although our experience with some of these "newer" varieties is not extensive, the trend seems to be emerging that some may be superior regardless of the soil pH. As discussed in other sections of this publication, there is considerable variation among varieties in problems with chlorosis when growing in high pH soils under moist soil conditions.

Soil Water Problems

Adequate soil water is a concern with any agricultural activity in much of Texas. It has been our observation that periods of drought, especially during the normal period of rapid clover growth during the spring, are more damaging to subclover production and plant survival than to some other clover species. This has been especially evident in thick, lush stands of subclover in which the plants showed wilting, leaf color changes, and death when soils began to dry out. Clover yields were bound to be directly correlated to rainfall amounts from January 1 until the first cutting and rainfall amounts between subsequent cuttings when data for a number of years and experimental conditions were combined. It does, however, appear that subclover can set a seed crop under fairly dry spring conditions. We have observed fields in which we were convinced that drought-induced plant death would prevent natural reseeding, only to find good stands emerging in the fall.

There is a valid concern that, while clover grown during the cool-season may be of value, it uses water which would have otherwise been stored for use by its associated warm-season grass. We have initiated experiments to determine the amount of water which subclover used during its growth period and the impact of that use on production of its associated warm-season grass. First year observations this winter and spring indicated that the subclover did reduce soil water content by late spring, but that water contents recovered quickly when the rains started in May and June. In some cases, soil water contents even appear to be higher in the plots which had previously been covered with subclover. We do not know whether this is good or bad, because it may indicate an improved soil structure or some other positive condition, or it may only reflect reduced grass growth with subsequent reduction in water use. It will be necessary to repeat these observations for several seasons to be able to understand these effects over the long term. We can, however, predict that the earlier maturing, shorter statured subclover is likely to cause less problems for its associated grass than will a later maturing, taller clover, such as Yuchi arrowleaf or Bigbee berseem.

Summary

Advantages of Subterranean Clover

- Can tolerate close continuous grazing and still produce a seed crop for reseeding purposes.
- Easier than other clovers to establish due to large seed size.
- Early fall production, again due to seed size.
- Most varieties adapted to pH's below 7.2. Clare and Koala are adapted to soils with pH above 6.
- Competition from subclover stops in late spring while moisture is still adequate for summer grass growth.
- Better adapted to low rainfall areas than most other clover varieties.
- Thick cover of subclover suppresses weed growth.

Disadvantages of Subterranean Clover

- Lack of impressive growth height discourages producer usage.
- Will not reseed in the deep sandy soil of East Texas.
- Subterranean clover may be susceptible to heavy insect feeding damage.
- If not heavily utilized during a dry spring, subclover may deplete soil moisture and reduce summer grass growth.

Table 2. Subterranean Clover Yields in the Middle Gulf Coast and South Central Regions of Texas

Year	Soil Type	Soil pH	Cultivar	Land Prep	Annual Yield Pounds/Acre
1983	Straber LS	7.0	Mt. Barker	Bahia Sod	1,150
1984	Straber LS	7.0	Mt. Barker	Bahia Sod	1,604
1985	Straber LS	7.0	Mt. Barker	Bahia Sod	815
1983	Straber LS	7.0	Mt. Barker	Klein Sod	1,508
1984	Straber LS	7.0	Mt. Barker	Klein Sod	1,760
1985	Straber LS	7.0	Mt. Barker	Klein Sod	1,197
1983	Straber LS	7.0	Mt. Barker	Coastal Sod	3,681
1984	Straber LS	7.0	Mt. Barker	Coastal Sod	2,430
1985	Straber LS	7.0	Mt. Barker	Coastal Sod	1,636
1983	Straber LS	7.0	Mt. Barker	CoastCr Sod	3,570
1984	Straber LS	7.0	Mt. Barker	CoastCr Sod	1,754
1985	Straber LS	7.0	Mt. Barker	CoastCr Sod	592
1983	Straber LS	7.0	Mt. Barker	Brazos Sod	3,042
1984	Straber LS	7.0	Mt. Barker	Brazos Sod	1,809
1985	Straber LS	7.0	Mt. Barker	Brazos Sod	1,138
1984	Carbengel CL	8.0	Mixture	Com Ber Sod	407
1985	Carbengel CL	8.0	Mixture	Com Ber Sod	937
1986	Carbengel CL	8.0	Mixture	Com Ber Sod	1,349
1985	Halletvl FSL	6.0	Mt. Barker	Prep Seed Bed	1,700
1985	Halletvl FSL	6.0	Clare	Prep Seed Bed	326*
1985	Halletvl FSL	6.0	Meteora	Prep Seed Bed	1,497
1985	Halletvl FSL	6.0	Woogenellup	Prep Seed Bed	2,113
1986	Halletvl FSL	6.0	Mt. Barker	Prep Seed Bed	1,205
1987	Halletvl FSL	6.0	Mt. Barker	Prep Seed Bed	2,969
1987	Halletvl FSL	6.0	Karridale	Prep Seed Bed	3,384
1987	Halletvl FSL	6.0	Clare	Prep Seed Bed	2,856
1987	Halletvl FSL	6.0	Meteora	Prep Seed Bed	2,894
1987	Halletvl FSL	6.0	Woogenellup	Prep Seed Bed	2,993
1987	Halletvl FSL	6.0	Koala	Prep Seed Bed	3,799
1987	Halletvl FSL	6.0	Trikkala	Prep Seed Bed	3,848
1987	Halletvl FSL	6.0	Larisa	Prep Seed Bed	3,674
1987	Denhawken CL	7.7	Mt. Barker	Prep Seed Bed	3,393
1987	Denhawken CL	7.7	Karridale	Prep Seed Bed	3,280
1987	Denhawken CL	7.7	Clare	Prep Seed Bed	4,118
1987	Denhawken CL	7.7	Meteora	Prep Seed Bed	4,262
1987	Denhawken CL	7.7	Woogenellup	Prep Seed Bed	3,567
1987	Denhawken CL	7.7	Kaola	Prep Seed Bed	4,604
1987	Denhawken CL	7.7	Trikkala	Prep Seed Bed	3,744
1987	Denhawken CL	7.7	Larisa	Prep Seed Bed	3,675

*Poor Stand