Performance of Annual Clovers At Yoakum, 1987-1988

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Summary

Annual, cool-season legumes could potentially play an important part in meeting the nutritional needs of livestock in south-central Texas, if they are adapted to the area. Performance of selected species and cultivars have been assessed for several seasons at our location on alkaline clay soil and acid sandy soil sites. Two berseem clover entries and Hubam sweetclover were the most productive in the 1987-88 tests. Subterranean clover entries were relatively less productive, at least partially because of the tendency to underestimate yields due to harvest height of the prostrate growth habit and drought stress during mid-winter. Koala, Clare, and PI-400 were among the most productive subclovers on both the high and low pH test sites.

Introduction

Adapted annual, cool-season forage legumes have a potential for extending the south-central Texas grazing season with high quality forage. The area of interest lies about 90 miles south-southeast of Austin in a mixture of the Post Oak Savannah and Blackland Prairies vegetative areas. This region has an abundance of both slightly acid-to-neutral sandy loam soils and slightly alkaline-to-alkaline clay soils. Winters are usually relatively mild, but freezing temperatures occur during every winter. Duration of freezing temperatures is usually short, but can persist for several days during unusually cold winters. May and September are historically the wettest months. Winter rains are common, but extended periods without rainfall can occur at any time during the year. Livestock producers in the region depend on summer-produced hay for a significant amount of winter feed. Mild, damp conditions cause low-growing, warm-season grasses to quickly lose nutritive value after maturity or frost.

We evaluated the productivity of selected annual clovers on both soil types at the TAMU Agricultural Research Station at Yoakum during the 1987-88 growing season. This work is a part of a multi-year project to determine which forage legume species and cultivars are best adapted to this area. Previous studies have indicated that at least some subclovers perform well in our area, despite the sensitivity of some cultivars to iron chlorosis on high pH soils. This test emphasized subclovers to evaluate adaptation of a range of germplasm while including entries of other species for comparison.

Procedure

The alkaline test site was on a Denhawken clay loam soil at pH 7.8 to which 69 lbs/A of phosphorus were added on September 16, 1987. The acid test site was on a Hallettsville fine sandy loam soil at pH 6.0 to which 69 lbs/A of phosphorus and 90 lbs/A potassium were added on September 16, 1987. Both tests were planted on prepared-seedbeds. Plots were 13' in length and composed of five rows spaced 10" apart. Planting date was October 8, 1987. Seeding rates were 12 lbs/A for subterranean, berseem, red, and crimson clovers and 8 lbs/A for arrowleaf, balansa and sweetclovers. Experimental design for both tests was a Randomized Complete Block with four replications. The acid-site test was sprayed with 1.25 pt/A 2,4-D on November 12, 1987, to control volunteer medic. Both tests were sprayed with Basagran (1 lb/A) and Poast (0.4 lb/A) on December 10, 1987.

Plots were harvested February 24, March 29, May 5, and June 2, 1988. Ends of plots were trimmed back to provide uniform plot length and to minimize border effect. A 4-ft width was harvested from each plot using a flail mower at a 2-inch cutting height. Fresh weight from each plot was recorded and a moisture sample collected, placed in a paper bag and sealed in a zip-type plastic bag. Moisture samples were weighed, removed from the plastic bag, oven-dried and reweighed to obtain percent dry matter which was used to adjust fresh yield to dry forage yield.

Results and Discussion

Rainfall during the growing season was less than the 45-year average (Table 1). The unusually dry conditions in January and February almost certainly reduced late winter growth and forage yields of many of the entries.

The test conducted on the high pH soil (Table 2) had a greater range of yields among entries than did the acid soil research site (Table 3). The top three and bottom entries were the same for both tests. Berseem clover has been very productive in the area, especially on alkaline soils. It is late-maturing with growth through June if moisture is available. They will, however, delay grass growth when over-seeded on warm

TABLE 1. RAINFALL (INCHES) AT TAES, YOAKUM

Month	1987-88	45-Yr Mean
September	1.08	4.31
October	0.77	3.01
November	3.55	2.57
December	3.87	2.44
January	0.26	2.40
February	0.37	2.57
March	1.79	1.95
April	3.46	3.21
May	2.54	4.25
June	2.50	3.27
TOTAL	20.19	29.98

TABLE 2. CLOVER PRODUCTION STUDY OF PH 7.8 TEST, TAES, YOAKUM, 1987-88

Entry	Harvest Date				Total
	February 24	March 29	May 5	June 2	
	Pounds of Dry Forage/Acre				
MS Expl-4 Berseem	2564	3188	2491	1188	9431 a[1]
Hubam Sweetclover	2063	1929	2099	1160	7251 b
Bigbee Berseem	1323	2843	1973	948	7087 b
Redland II Red Clover	355	1371	2150	1753	5628 c
Dixie Crimson	732	2910	739	0	4381 d
RPPS-6 Arrowleaf	305	1009	1546	763	3623 de
PI-43F Subclover	644	1704	1172	0	3520 def
RPPS-5 Arrowleaf	269	1101	1361	724	3455 def
Yuchi Arrowleaf	261	1219	1424	548	3452 def
Koala Subclover	638	1542	864	0	3044 efg
Larisa Subclover	370	1459	838	0	2666 fgh
PI-400 Subclover	382	1658	600	0	2640 fgh
Clare Subclover	697	1493	447	0	2637 fgh
Paradana Balansa	480	2008	0	0	2488 ghi
Meteora Subclover	254	1358	779	0	2391 ghi
Woogenellup Subclover	282	1304	462	0	2048 hij
PI-45A Subclover	255	1086	568	0	1909 hij
Karridale Subclover	270	1077	519	0	1866 hij
Mt Barker Subclover (AUS)[2]	192	919	621	0	1732 hij
Mt Barker Subclover(OR)[2]	168	983	426	0	1577 ij
Trikkala Subclover	240	977	175	0	1392 j
Esperance Subclover	177	607	306	0	1090 j

[1] Mean values followed by the same letter are not significantly different (P<0.05) as determined by Duncan's Multiple Range Test.
[2] Mt. Barker seed sources were Australia (AUS) and Oregon (OR).

season perennial grasses. It does very well when mixed with ryegrass or small grains for winter pasture. Hubam sweetclover did exceptionally well during this mild winter. Winter growth is suppressed by normal low temperatures and can winter kill under unusually cold conditions. There are some problems with Hubam sweetclover. (1) Sweetclover contains coumarin which may be converted to dicoumarol by microbial action. Dicoumarol prevents blood clotting and may result in death of the grazing animal. (2) While we did not measure leaf and stem content, Hubam sweetclover is visibly more stemmy than other entries, which may make the high yields appear more desirable than they actually are. Red and crimson clovers did well on the alkaline site, and arrowleaf clover did well on the acid, sandy site. The 1987-88 growing season was dry enough that iron chlorosis symptoms were not sufficiently apparent to rate plots for differences.

Subclover yields were low in comparison to the other species, because of their prostrate type growth. Previous estimates of forage below the 2-inch cutting height at the last harvest have ranged from 1,000 to 1,800 lbs dry matter per acre. As tables 2 and 3 show, the subclovers were competitive during the first three cuttings, but all had declined to the point that they were no longer harvestable by June 2, because of their earlier maturity. It has, also, been our observation that the subclovers tend to sustain more drought or high temperature injury than do some other clover species. The Paradana Balansa clover performed relatively better under lower pH conditions than under alkaline conditions. Under both soil conditions, Koala, PI-400, and Clare tended to be among the most productive subclover entries. PI-43F subclover was the highest yielding subclover in the high pH test, but was not included in the low pH test because of limitations on seed supply. There were no significant differences or great numeric differences in performance of Mt. Barker subclover grown from Australian- or Oregon-grown seed in either test. Karridale, Mt. Barker, Trikkala, and Esperance subclover were among the lowest-yielding entries in both tests. Larisa subclover grouped with Koala in the high pH test, but was low yielding on the low pH site.

TABLE 3. CLOVER PRODUCTION STUDY OF 6.0 TEST, TAES, YOAKUM, 1987-88

Entry	Harvest Date				Total
	February 24	March 29	May 5	June 2	
	Pounds of Dry Forage/Acre				
MS Expl-4 Berseem	2693	2250	1395	423	6761 a[1]
Hubam Sweetclover	2354	1141	1149	841	5486 a
Bigbee Berseem	1562	1682	1045	1109	5398 a
RPPS-6 Arrowleaf	329	1890	854	346	3419 b
Yuchi Arrowleaf	329	1438	1059	394	3220 bc
RPPS-5 Arrowleaf	368	1576	585	341	2870 b-d
Paradana Balansa	793	1999	0	0	2792 b-e
Redland II Red Clover	108	1191	656	820	2775 b-e
Dixie Crimson	381	1807	426	0	2614 b-f
Koala Subclover	941	941	470	0	2352 b-f
PI-400 Subclover	519	1610	173	0	2302 b-f
Clare Subclover	720	1272	120	0	2112 c-f
Nangeela Subclover	552	1319	134	0	2005 c-f
Woogenellup Subclover	463	1403	137	0	2003 d-f
Meteora Subclover	304	1446	206	0	1956 d-f
PI-45A Subclover	344	1422	137	0	1903 d-f
Mt Barker Subclover(AUS)[2]	424	1167	253	0	1844 d-f
Karridale Subclover	486	1172	156	0	1814 d-f
Mt Barker Subclover(OR)[2]	298	1124	138	0	1560 ef
Trikkala Subclover	356	1065	136	0	1557 ef
Larisa Subclover	278	1074	163	0	1515 f
Esperance Subclover	322	1032	112	0	1466 f

[1] Average followed by the same letter are not significantly different ($P<0.05$) as determined by Duncan's Multiple Range Test.
[2] Mt. Barker seed sources were Australia (AUS) and Oregon (OR).