

Forage Research in Texas

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Department of Soil and Crop Sciences

Project: H-6370

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Location: Angleton

PERFORMANCE OF COOL SEASON ANNUAL CLOVERS IN SOUTHEAST TEXAS

OBJECTIVE:

Evaluate four species of cool season annual clovers for forage production and distribution, protein production, and estimated N₂-fixation.

PROCEDURE:

A cool season annual clover variety trial involving four species and ten varieties was conducted on a Lake Charles clay at the Agricultural Experiment Station at Angleton. Seeding rates were 10 lb/ac for Persian (Trifolium resupinatum L.) and arrowleaf (Trifolium vesiculosum Savi.) and 20 lb/ac for crimson (Trifolium incarnatum L.) and subterranean (Trifolium subterraneum L.). Plots consisted of 6-8 in. rows, 15 ft. long in a Complete Randomized Block design with four replications.

Sixty pounds of phosphorus per acre were applied on Oct. 8, 1979, the day of planting. Forage was harvested with a flail mower at a 1 in. height on Feb. 22, Mar. 24, Apr. 21, and May 28. At the last harvest a 20 x 20 in. sample of the forage below the cutting height was taken on all subterranean clover plots. Kerb (1.5 lb A.I./ac) was applied on Dec. 1 and 2, 4-DB (1.75 lb A.I./ac) on Jan. 14 for weed control.

RESULTS AND DISCUSSION:

Late fall and winter forage production was low because sufficient rainfall to initiate germination did not occur until Oct. 30. Mt. Barker and Woogenellup subterranean clover had the highest winter forage production (Table 1). Although there were significant differences between varieties at the second cutting, dry matter production only ranged from 430 to 980 lb/ac. Crimson varieties were significantly lower than the other species by the third harvest because of their earlier maturity. At the last harvest Tallarook subclover produced 4060 lb/ac, 1500 lb more than Abon Persian, the next highest variety. Subterranean clovers separated out according to maturity with Woogenellup (early mid-season) yielding 290 lb, Mt. Barker (late mid-season) yielding 2060 lb, and Tallarook (late season) yielding 4060 lb/ac. Approximate percentage of the forage at the last harvest below the cutting height was 100, 60, and 35% for Woogenellup, Mt. Barker, and Tallarook, respectively.

Protein production is similar to yield since there was little difference between varieties for percent protein (Table 2). However it is important to

point out the protein and nitrogen production of clovers to demonstrate their economic value as protein supplements for grazing livestock and contribution of nitrogen to the pasture system. If only half of the protein were utilized by livestock and valued at 35¢/lb (equal to cottonseed meal at \$14.70/cwt), protein value per acre of the clover would range from \$75 for Dixie crimson to \$284 for Tallarook subterranean clover.

Symbiotic N_2 -fixation was estimated by subtracting the nitrogen produced by ryegrass receiving no nitrogen fertilizer from the clover nitrogen production. Nitrogen uptake by the grass is used as an estimate of the soil nitrogen which could also be utilized by the clover. This method does under estimate symbiotic N_2 -fixation since the grass removed more soil nitrogen than the clover because of its fibrous root system and the soil is its only nitrogen source. This is obvious from the calculated value of zero N_2 -fixation for Dixie crimson clover.

Table 1. Dry matter production of cool season annual clovers on a Lake Charles clay at Angleton.

	Cutting date				Total
	22 Feb.	24 Mar.	21 Apr.	28 May	
	----- lb/ac -----				
Subterranean					
Tallarook	660 c*	630 d-f	2490 a	4060 a**	7840 a
Mt. Barker	1150 ab	770 b-d	2140 ab	2060 c	6120 b
Woogenellup	1380 a	840 a-c	2000 bc	290 e	4510 cd
Arrowleaf					
Yuchi	850 bc	650 c-e	1990 bc	1770 c	5260 c
Amclo	780 bc	860 ab	1950 bc	1120 d	4710 cd
Meechee	570 c	430 g	1820 bc	1130 d	3950 d
Crimson					
Tibbee	750 bc	980 a	730 e	--	2460 e
Chief	560 c	710 b-e	1180 d	--	2450 e
Dixie	450 c	690 b-e	820 de	--	1960 e
Persian					
Abon	630 c	460 fg	1570 c	2490 b	5150 c

* Values in a column followed by the same letter are not significantly different at the .05 level using Duncan's Multiple Range Test.

**Subterranean yields at the last harvest include a 20" x 20" sample of the forage below the cutting height.

Table 2. Protein production and estimated N₂-fixation of cool season annual clovers on a Lake Charles clay at Angleton.

	Protein		Estimated N ₂ -fixation
	By Mar. 24	Total	
	----- lb/ac -----		
Subterranean			
Tallarook	333	1623 a*	191
Mt. Barker	486	1283 b	137
Woogenellup	573	1030 c	96
Arrowleaf			
Yuchi	332	1067 c	102
Amclo	388	1047 c	99
Meechee	216	862 d	70
Crimson			
Tibbee	376	506 e	13
Chief	290	510 e	17
Dixie	260	427 e	0
Persian			
Abon	248	1043 c	99

*Values in a column followed by the same letter are not significantly different at the .05 level using Duncan's Multiple Range Test.