

# Breeding Subterranean Clover for Improved Reseeding

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## Summary

Seventeen selections and two varieties of subterranean (sub) clover were evaluated for 2 years for their ability to produce persistent hard seed (Table 1). High levels of persistent hard seed are necessary to insure reseeded. Three selections were identified which maintained 60 percent or more hard seed after 90 days of storage at simulated summer field temperatures. Based on further testing, these selections will be used directly as improved reseeded sub clover germplasm or in crosses with other sub clover selections.

## Introduction

Sub clover is a winter annual forage legume with high potential for use in pasture systems in the U.S. Southern Region. Sub clover is low-growing and after pollination the seed heads are pegged downward toward the soil, allowing seed production under continuous grazing. Experiments at Overton indicate that current sub clover varieties, all developed in Australia, are unreliable in reseeded. The level of persistent hard seed, grazing management, and environment all affect reseeded. Adapted sub clover varieties with a higher level of persistent hard seed are needed. Objectives of the subterranean clover breeding program at Overton are: 1) development of sub clover germplasm that produces a high

percentage of persistent hard seed; and 2) incorporation of the persistent hard seed trait into productive, reliable, reseeded varieties of sub clover adapted to Texas.

## Procedure

Seventeen sub clover selections and two check varieties were planted at Overton on October 26, 1983 and October 19, 1984. These experimental lines originated as single plant selections from 'Mt. Barker,' 'Mississippi Ecotype,' and P.I. 311498 sub clover. Original selection was based on seed dormancy and hard seed rating. Prior to planting, 90 lb/A of both P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O were applied to the Sawtown fine sandy loam soil. Seeding rate was 0.5 g/3 ft row of inoculated (Nitragin type WR) seed. Experimental design was a randomized complete block with two replications. Each year at maturity, seed were harvested and a sub-sample was hand-cleaned for hard seed determination. Initial percent hard seed was measured by placing 200 seed from each sub clover line on moist germination paper in petri dishes (50 seed/dish, 4 dishes). The germination paper was checked daily and kept moist with deionized water. After 10 days, seed that had not imbibed water were counted as hard seed.

To determine persistence, or rate of softening, of the hard seed, seed counted as hard were placed in a controlled temperature incubator with a daily cycle of 12 hours at 25°C and 12 hours at 40°C. This simulates day/night field temperatures for summer in East Texas. At 30, 60, and 90 days, the seed were removed and hard seed percent checked as described above.

TABLE 1. PERSISTENCE OF HARD SEED FROM EXPERIMENTAL LINES AND CHECK VARIETIES OF SUBTERRANEAN CLOVER

Line	Storage at 25°/40°C daily cycle <sup>1</sup>								Origin	Original <sup>2</sup> Selection Class
	Harvest		30 days		60 days		90 days			
	84	85	84	85	84	85	84	85		
	-----Percent hard seed-----									
D-26	78	68	70	47	47	29	41	24	Mt. Barker	DS
B-20	80	50	70	45	50	37	43	33	"	NDS
I-41	91	79	81	75	59	64	52	53	Miss. Ecotype	NDH
G-1	87	75	70	71	49	53	45	43	"	NDH
G-16	82	79	70	73	52	61	42	57	"	NDH
H-2	86	80	75	79	71	69	64	62	"	NDH
E-22	80	66	71	64	55	52	45	51	"	DS
B-23	80	72	71	70	51	38	45	31	"	NDS
E-23	86	68	77	64	68	56	64	51	"	DS
K-42	85	60	82	53	62	47	54	39	"	DH
I-35	78	65	78	62	46	51	26	45	"	DH
K-15	89	82	88	82	83	77	77	75	"	DH
K-43	85	81	82	75	72	72	61	70	"	DH
F-26	83	70	72	60	45	51	36	41	P.I. 311498	DH
D-42	78	61	58	57	36	45	29	41	"	DS
C-2	68	74	48	52	32	34	27	33	"	DS
B-28	70	74	61	55	46	38	42	35	"	NDS
Mt. Barker	64	68	59	58	43	51	40	45		
Miss. Ecotype	85	81	71	75	51	64	43	58		

<sup>1</sup>25°C for 12 hours, 40°C for 12 hours.

<sup>2</sup>DS = dormant soft, NDS = non-dormant soft, DH = dormant hard, NDH = non-dormant hard.

KEYWORDS: Sub clover/Overton/reseeded/hard seed.

## Results and Discussion

The results are summarized in Table 1. Three sub clover lines were identified which maintained 60 percent or more hard seed after the 90-day storage for both 1984 and 1985. After 90 days of storage, Mt. Barker sub clover dropped to 40 and 45 percent hard seed in 1984 and 1985, respectively.

In field experiments conducted at Overton and An-  
gleton, Mt. Barker sub clover germinated over 98 percent of total seed that germinated in the summer or fall preceding seed maturation. Under these conditions, no hard seed carried over to the next year was available to compensate for stand failures. In this situation, reseeding management becomes crucial. One stand failure due to fall drought, unseasonably cold weather, or insect infestation could break the reseeding cycle.

Further testing is required to determine if the high hard seed sub clover lines identified in this study have improved reseeding capability under field conditions. Other characteristics such as forage production, maturity, and pest resistance will determine if these lines are directly usable as improved sub clover germplasm or if they would only be used in a crossing program to introduce the hard seed character into other lines with desirable agronomic qualities.