First Harvest Yield of Several Subclovers and Annual Medics as Influenced by Seeding Density

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Summary

Field studies were conducted using several seeding rates with four subclovers and three annual medics of varying genetic makeup and seed size to determine how first harvest yields were effected by seeding density. Pure live seed (PLS) per foot of row was used as a measure of density and was calculated based on seeding rate, seed size, and germination percent. Comparisons were made between seeding density and seeding rate to test the validity of seeding rate recommendations for large numbers of cultivars regardless of seed size. Subclovers were found to level in yield at approximately 12 PLS/ft of row; the medics at approximately 35 PLS/ft of row. With large seeded cultivars, such as Koala subclover and the annual medic Paraponto, the highest seeding density (12 and 15 PLS/ft, respectively) was too low to determine if a maximum yield was obtained. This data also shows the annual medics Jemalong and Serena to be superior to the subclovers tested in early winter production. Koala subclover was superior to the other subclovers in early winter production.

Introduction

The use of legumes in South Texas is a relatively new practice. Several subclovers and annual medics have been evaluated for their potential use. Evers(1984) reported that for subclover, seeding rate had its greatest effect on first harvest yield and concluded that 12 lbs/A was adequate for Mt. Barker subclover. Similar testing for optimum seeding rate has not been reported for other subclover cultivars or the annual medics. The objective of this research was to determine the optimum seeding density for subclovers and medics of varying genetic makeup and seed size.

Procedures

Two seeding rate tests were planted Oct. 24, 1988. One test was comprised of four subclover cultivars, the other of three annual medic cultivars. The subclovers tested include Koala (*Trifolium brachycalycinum*); Mt.Barker, Karridale (*T. subterraneum*); and Trikkala (*T. yanninicum*). The three medics evaluated were Jemalong (*Medicago truncatula*), Paraponto (*M. rugosa*), and Serena (*M. polymorpha*). The tests were planted on Parrita sandy clay loam, with a pH of 7.1. Before planting, the area was fertilized with 100 lbs/A of 0-46-0. Both tests were planted in randomized complete block designs with four replications. Plots were planted on prepared seedbed with a 5-row plot drill at 10-inch row spacings. No weed control chemicals were utilized. The treatments included four seeding rates of each cultivar (Tables 1 and 2). Pure live seed (PLS) per foot was later calculated based on seed size and laboratory germination. The only yields considered for this test were those from the first harvest. The subclovers were harvested on February 13, 1989 to a height of 1.5 inches. The medics were harvested on January 31, 1989 to a height of 3.5 inches. Harvesting consisted of hand clipping a 3-ft section of row. Legumes were hand separated from other volunteer vegetation. Reported yields are for the planted legume portion only.

TABLE 1. PURE LIVE SEED (PLS) PER FOOT OF ROW FOR FOUR SEEDING RATES OF FOUR SUBTERRANEAN CLOVER CULTIVARS

Cultivar	Seeding Rate (lbs/A) 4	8	12	16	Seed Size	Lab Germ.
	PLS/ft of row				g/100 seeds	%
Koala	3	6	9	11	1.2057	98.75
Mt. Barker	4	8	11	15	0.9061	94.00
Karridale	4	8	12	16	0.8047	93.25
Trikkala	4	8	12	16	0.8447	95.25

TABLE 2. PURE LIVE SEED (PLS) PER FOOT OF ROW FOR FOUR SEEDING RATES OF THREE ANNUAL MEDIC CULTIVARS

Cultivar	Seeding Rate (lbs/A) 6	12	18	24	Seed Size	Lab Germ.
	PLS/ft of row				g/100 seeds	%
Serena	15	30	45	60	0.3377	95.25
Jemalong	18	35	53	71	0.2981	98.00
Paraponto	4	7	11	15	1.4546	95.25

Results

Subclovers

Table 3 reports first harvest yields at the four different seeding rates. From this table it is obvious that maximum yields varied between cultivars even at the highest seeding rates, with Koala being the superior subclover in terms of first harvest yield. The cultivars Karridale and Mt. Barker had similar trends in yield based on seeding rate and density. Mt. Barker and Karridale have similar seed size (Table 1). They both appear to have leveled off in yield at 12 lbs/A, or 12 PLS/ft. We were unable to detect a "yield plateau" for Koala (Table 3). This is probably due to Koala's large seed size; thus, even at the highest seeding rate (16 lbs/A), seeding density was only 12 PLS/ft. Trikkala, a cultivar not well adapted to South Texas, had such low yields and high variation that no conclusions could be made as to its optimum seeding rate.

TABLE 3. FIRST HARVEST DRY MATTER YIELDS OF FOUR SUBTERRANEAN CLOVER CULTIVARS

Cultivar	Seeding Rate (lbs/A) 4	8	12	16
	lbs/A			
Koala	265	465	472	641
Mt. Barker	35	192	445	392
Karridale	50	150	292	234
Trikkala	46	100	42	119

Medics

Variation in the maximum yield was observed among the medic cultivars (Table 4). Serena was the superior medic in this test. The cultivar Jemalong appears to reach a yield plateau at approximately 12 lbs/A. Serena yields leveled out between 12 and 18 lbs/A. Jemalong and Serena are similar in seed size, which explains why they level out at approximately the same rate (Table 2). It should be noted that the seeding densities at which the medics showed a leveling in yields (35 PLS/ft) is much higher than those for the subclovers (12 PLS/ft).

Paraponto, a large seeded medic (Table 2), had very low, variable yields. At the highest seeding rate (24 lbs/A), the seeding density was only 15 PLS/ft. This seeding density compared to that of Jemalong and Serena at their lowest seeding rates (6 lbs/A) (Table 4). Interestingly, the yield of Paraponto at the highest seeding rate was similar to that of Jemalong and Serena at their lowest seeding rates (Table 4), the point of equal seeding densities.

TABLE 4. FIRST HARVEST DRY MATTER YIELDS OF THREE ANNUAL MEDIC CULTIVARS

Cultivar	Seeding Rate (lbs/A) 6	12	18	24
	lbs/A			
Serena	618	1,125	1,371	1,405
Jemalong	499	972	1,002	1,137
Paraponto	338	273	184	545

Discussion

We've concluded that this research needs to be repeated, based on seeding densities, rather than seeding rate. Also a greater range in densities should be examined to determine yield plateaus for each cultivar regardless of seed size.

These preliminary results, indicate a general "best" seeding rate for subclover or annual medic is probably not appropriate. Difference in seed size is one reason that different seeding rates for different cultivars need to be considered.

Since the data in this test is based on first harvest yields, discussion of early winter legume production is possible. Data indicates Koala to be the superior subclover in early production (Table 3). However, the annual medics Jemalong and Serena yielded more than the subclovers. The low seeding density of Paraponto does not allow us to compare it to the other legumes in terms of early production.

Literature Cited

1. Evers, G.W. 1984. Subterraneum clover establishment. TAES MP-1565.