MEDIC FORAGE AND SEED YIELD AT STEPHENVILLE AS AFFECTED BY INITIATION DATE OF MONTHLY HARVESTS

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Summary

Six medics (*Medicago spp.*), Dixie crimson clover (*Trifolium incarnatum*), and hairy vetch (*Vicia villosa*) were seeded at Stephenville in 1996 and evaluated for frost damage and establishment in the Spring of that year. The self-reseeded plots were harvested monthly starting in January, February, March, or left unclipped to determine forage yield of all entries and seed production of the medics. 'Armadillo', 'BECOM96', and 'BEFLK96' burr medics (*M. polymorpha*), all collected from naturalized burr medic stands at TAES-Beeville, showed good plot cover, plant vigor, and yield in January and February. Mechanical forage harvest to a 2 in cutting height severely limited seed production of all but 'Jemalong' barrel medic (*M. truncatula*). Unclipped Armadillo, BEFLK96, and 'Circle Valley' burr medics produced over 600 lb seed per acre despite a dry spring.

Introduction

Burr medics are naturalized and ubiquitous in Texas winter and spring pastures. Their potential for adding high quality crude protein to ruminant diets as well as soil cover during winter low ebbs in forage production has been widely recognized. As a result of a collection effort initiated by W.R. Ocumpaugh throughout the state, screenings at TAES-Beeville, and plot evaluations in the region; germplasm with high production potential has been selected for regions to the south of 31^{o} latitude (Ocumpaugh *et al.* 1997 & 1998). Included is the newly released Armadillo burr medic, plus BECOM96 and BEFLK96 burr medic accessions. The objectives of this study were to:

1. Determine adaptation of Texas selections to a site north of 31^{o} latitude.
2. Measure the effect of early clipping on seed production.

Procedure

Plots (5' X 20' replicated 4 times) seeded to Dixie crimson clover, hairy vetch, burr medics (BECOM96, BEFLK96, Armadillo, and Circle Valley), and barrel medics ('Jemalong' and 'Parabinga') in the Fall of 1996 were evaluated for frost damage (1=low, 3=high) in February and height and vigor (10=vigorous, 1=low vigor) during April and May of 1997. The self-

reseeded plots were again evaluated at monthly intervals starting in December, 1997 and ending in March, 1998 for vigor, frost and insect damage, plot cover percentage and plant height. The plots were located in loamy soils (pH of 7.0 and 4 ppm P) and monthly rainfall was 4.2", 2.6", 2.5", 4.5" and 0.3" from December through April of the clipping trial. Quadrats (97 $in^{2)}$ in each plot were flagged and harvested at a 2 in stubble height at monthly intervals starting in January, February and March to measure dry matter (DM) production. Crude protein concentration (CP), neutral detergent fiber (NDF) and acid detergent fiber (ADF) were estimated from replicated samples of each entry. After a one-month rest period from March to April, seed production was measured in all quadrats as well as from a previously non-harvested control.

Results and Discussion

Observations made during the first year indicated good establishment (Table 1) and seed production. The only severe frost occurred in February and indicated that the barrel medics were more severely affected, the burr medics were intermediate and the vetch and crimson clovers showed no damage. Although plant height increased from April to May, plant vigor declined as a result of senescence and insect predation.

Table 1. Plant vigor (10=high, 1=low), average plant height (inches) and frost damage (3=severe, 0=none) of 8 winter annual legumes at Stephenville, Texas over the winter of 1996-1997.

ENTRY	PLANT VIGOR		PLANT HEIGHT (in)		FROST DAMAGE
	4/97	5/98	4/97	5/97	2/98
M. truncatula					
Jemalong	5.00	0.50	7.2	10.4	1.25
Parabinga	0.00	2.00	3.2	2.6	3.00
M. polymorpha					
BEFLK96	5.50	8.50	6.7	9.3	0.75
BECOM96	6.50	0.50	9.1	11.9	1.00
Circle Valley	5.00	3.00	6.5	6.1	1.00
Armadillo	7.50	1.00	9.8	11.2	0.75
V. villosa	4.50	0.50	9.6	22.8	0.00
T. incarnatum					
Dixie	4.50	2.00	8.3	18.9	0.00
P VALUE	0.001	0.001	0.001	0.001	0.001
LSD	1.52	1.26	5.7	9.3	0.41
CV (%)	20.0	11.2	21.1	21.4	29.0

During the second season, all the burr medic plots had high plot covers (Table 2) as early as December (80%) relative to the barrel medics (31%) and the hairy vetch or crimson clover (13%). Individual plant vigor was higher for the burr medics early in the season but the hairy vetch and clover were the most vigorous in March (Table 2). Plant heights increased gradually over the season and were highest for the hairy vetch (6.3 in) and lowest for Jemalong (2.6 in) by March (Table 2).

Table 2. Plot cover (%), plant vigor (10=high, 1=low) and tallest plant (inches) of 8 winter annual legumes at Stephenville, Texas over the winter of 1997-1998.

ENTRY	--------PLOT COVER (%)------				---------PLANT VIGOR---------				-----PLANT HEIGHT (in)---			
	12/97	1/98	2/98	3/98	12/97	1/98	2/98	3/98	12/97	1/98	2/98	3/98
M. truncatula												
Jemalong	46	53	51	65	5.0	5.0	5.5	5.3	0.9	1.5	2.6	2.6
Parabinga	15	16	26	48	5.8	6.5	8.0	8.3	1.4	1.7	4.1	4.3
M. polymorpha												
BEFLK96	75	72	80	80	7.5	9.0	8.3	7.3	1.2	2.0	4.5	4.7
BECOM96	90	73	83	83	8.3	7.8	9.0	4.8	1.2	1.9	3.9	3.9
Circle Valley	71	79	93	75	7.8	8.3	9.3	2.2	1.4	1.9	3.9	4.1
Armadillo	84	80	81	78	7.8	8.0	8.8	7.8	1.2	2.0	3.9	4.6
V. villosa	13	26	40	70	6.3	7.8	7.8	9.5	1.7	2.1	3.2	6.3
T. incarnatum												
Dixie	13	13	26	55	6.8	6.0	7.5	9.8	1.2	1.3	3.3	6.0
P VALUE	0.001	0.001	0.001	0.15	0.001	0.001	0.001	0.001	0.001	0.001	0.11	0.001
LSD	14.5	15.0	20.0	27.7	1.3	1.6	1.4	2.1	0.2	0.6	1.3	1.3
CV (%)	19.5	20.3	22.4	27.3	13.2	14.9	11.7	19.8	12.7	12.7	22.0	18.7

Frost damage (Table 3) was greatest in January, following 2 days of temperatures below 25^{o} F. Freeze damage on average was greatest for the burr medics (1.1) compared to the barrel medics (0.6) and the clover or vetch (0.0). Insect damage (Table 3) by alfalfa weevil (*Hypera postica*l) and green cloverworm (*Platypena scabra*) on average was also highest in the burr medics (2.0) compared to the barrel medics (1.1) and the clover or vetch (0.0) in March.

Table 3. Frost and insect damage (0 = none; 3 = severe) of 8 winter annual legume at Stephenville, Texas over the winter of 1997-1998.

ENTRY	FROST DAMAGE		INSECT DAMAGE
	1/98	3/98	3/98
M. trancatula			
Jemalong	0.6	0.0	1.3
Parabinga	0.5	0.0	0.8
M. polymorpha			
BEFLK96	0.8	1.0	1.3
BECOM96	1.4	1.5	2.3
Circle Valley	1.1	1.5	2.3
Armadillo	1.0	1.0	2.0
V. villosa	0.0	0.0	0.0
T. incarnatum			
Dixie	0.0	0.0	0.0
P VALUE	>0.1	0.001	0.007
LSD	1.098	1.027	0.55
CV (%)	33.6	11.1	30.1

The burr medics had the greatest forage yields (Table 4) at the initial clippings in January and February, 757 lb/acre on average for February and 1232 lb/acre on average for February. Armadillo had the lowest production amongst the burr medics, 59% in January and 68% in February relative to the highest producing, BEFLK96. By March, Armadillo produced 64% the DM yield of BEFLK96, which topped the list at 2201 lb/acre.

Table 4. Dry matter aboveground production of 8 winter annual legumes at Stephenville, Texas over the winter of 1997-1998.

ENTRY	JANUARY				FEBRUARY			MARCH
	1/98	2/98	3/98	Total	2/98	3/98	Total	3/98
	lb DM/acre							
M. truncatula								
Jemalong	210	168	219	597	258	321	580	830
Parabinga	48	316	213	577	186	314	500	501
M. polymorpha								
BEFLK96	939	597	220	1756	1400	482	1882	2201
BECOM96	768	594	218	1580	1176	146	1323	1801
Circle Valley	768	438	39	1245	1394	47	1441	1638
Armadillo	553	595	108	1256	1072	921	1879	1400
V. villosa	185	218	431	834	393	934	1327	1272
T. incarnatum								
Dixie	70	279	1362	1711	246	1231	1477	1529
P VALUE	0.001	0.24	0.001	0.05	0.001	0.009	0.03	0.29
LSD	441	439	388	886	538	655	918	1375
CV (%)	68	75	75	50	49	81	48	67

Hairy vetch and crimson clover had higher NDF (22%) and ADF (30%) values than the medics on average (Table 5). Hairy vetch had greater (33.6%) and crimson clover lower (23.8%) CP concentration than the medics on average (29.7%).

Table 5. Acid detergent fiber (ADF), neutral detergent fiber (NDF) and crude protein (CP) percentages of dry matter for aboveground portions of 8 annual winter legumes at Stephenville, Texas over the winter of 1997-1998.

ENTRY	ADF %	NDF %	CP %
M. trancatula			
Jemalong	16.3	23.3	30.7
Parabinga	16.2	20.8	29.9
M. polymorpha			
BFLK96	15.7	21.0	29.4
BECOM96	16.5	23.8	30.4
Circle Valley	16.0	21.9	30.0
Armadillo	16.2	23.2	28.0
V. villosa	22.5	27.5	33.6
T. incarnatum			
Crimson clover	19.6	26.9	23.8
P VALUE	0.001	0.001	0.002
LSD	1.8	2.9	3.6
CV (%)	6.9	8.5	8.4

Forage harvests in January, February and March severely limited seed production in April compared to the non-harvested control (Table 6). The only exception was Jemalong barrel medic, which produced more seed in the January monthly clipped plots than in the non-harvested plot. Very limited rainfall during the last 6 weeks of the trial may have severely limited seed production during this year.

Table 6. April seed production of 6 medics harvested monthly starting in January, February, March, or never harvested.

	Medic harvests			
	January	February	March	None
	lb/acre			
M. truncatula				
Jemalong	294	83	80	246
Parabinga	0	0	7	346
M. polymorpha				
BEFLK96	0	9	4	840
BECOM96	0	0	0	85
Circle Valley	1	0	0	804
Armadillo	83	5	13	702

Entry X Harvest P=0.01; s.d.=116

Conclusions

These results indicated that burr medics have a potential for early season forage production and were able to survive freezes and insect damage during the year of this trial. Quality indicators, except for higher CP in hairy vetch, were better for the medics than for crimson clover and hairy vetch. It appears, however, that BFLK96 is more productive at this latitude than Armadillo. Average DM yield was 29% higher and estimated CP production was 35% higher for BFLK96 than Armadillo. Armadillo, however, appears to produce more seed under the stress of early and repeated harvests and low spring rainfall. The question of when and how to graze/cut medics without destroying reseeding ability needs further research. The use of these medics as early winter forage has to be balanced with their dependence on spring seed set for stand persistence.

References

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