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Location: Beeville-College Station

EVALUATION OF TROPICAL AND WARM-SEASON LEGUMES

OBJECTIVE:

To determine the adaptation and production potential and to identify major problems and limitations of warm-season legumes.

PROCEDURE:

In 1977, 24 commercially available tropical legumes were obtained from CSIRO Division of Tropical Pastures - Pasture Research Station (Dr. D. Eagles), Samford, Qld. Seed were appropriately inoculated (inoculum courtesy Dr. Joe Burton) and planted in either single or duplicated 2-row plots, 96 to 100 cm width rows, 6 m long at Beeville and College Station in May and early June, 1978, respectively. Only limited evaluation was planned in 1978, the primary interest being in winter hardy or self-seeding materials. Visual observations and limited yield measurements were made in 1978.

RESULTS:

Initial stands at Beeville were obtained on only 15 of 25 entries in the test (Table 1). Plants of *Calopo* and *Indigofera spicata* failed to survive the summer. Emergence occurred either following planting or with moisture later in the summer or early fall with all entries except *Lotus major* and Cook and Lawson Stylo. Several of the entries made good growth as indicated by observations in October including Silverleaf Desmodium, Cooper Glycine, Highworth Lablab, Siratro, Leichhardt Macrotyloma, and Verano Stylo. However, in the spring of 1979 there was no recovery growth and no reseeded stands. Low temperatures encountered in the winter of 1978-79 were -7C on December 8 and -6C on January 1 and 2.

The planting was made later at College Station. The clay soil crusted and cracked during the emergence, and jungle ricegrass (*Echinochloa colonum*) competed with the plants in the early stage. Only 11 of the 25 entries established any plants. Dry matter production was determined as the plants entered dormancy. Yields ranged from 2200 kg/ha to over 11,000 kg/ha. Cooper Glycine, Siratro, *Macroptilium bracteatum*, Verano Stylo, and Highworth Lablab made good growth and ground cover.

In the spring of 1979 a few plants each of Silverleaf Desmodium, Siratro and *Macroptilium bracteatum* made recovery growth. Verano Stylo volunteered to a complete stand. Hunter River alfalfa also survived though the initial stand was poor. Minimum temperatures at College Station were about 1C lower than those at Beeville on the same dates.

Approximately 50 warm-season legume accessions were established by transplanting rooted seedlings in the field in early July, 1978 at College Station. Primarily, species not previously evaluated were included in this study. Some of the species are of native (USA) origin such as *Desmanthus*, *Rhynchosia*, *Aeschynomene*, and *Galactia*. Observations made in early fall (Table 3) indicate that several of the *Alysicarpus*, *Rhynchosia*, and *Calopogonium* entries made good growth. Essentially all of the established entries made some seed and a few (*Rhynchosia reticulata* 163098, *Alysicarpus rugosus* 286530, 189492; *Galactia* Sp. 206319) produced abundant seed.

Preliminary observations in the spring of 1980 indicate poor survival which is surprising since a number of the entries are native perennials. It is recognized that some of the entries are annual types. The 1979-80 winter was considered milder than average though the minimum temperature was about the same as in 1978-79. The only accessions with surviving plants are listed below:

<u>Species</u>	<u>PI</u>
<i>Desmanthus virgatus</i>	171962 - 1 plant
<i>Pueraria lobata</i>	300095
<i>Pueraria lobata</i>	326583 - 2 plants
<i>Pueraria thumberiana</i>	9227
<i>Rhynchosia reticulata</i>	163098
<i>Rhynchosia sublobata</i>	300101
<i>Galactia</i> SP	201260
<i>Lespedeza cuneata</i>	286450 - 1 plant
<i>Lespedeza cuneata</i>	310409 - 3 plants

Seedlings volunteered in the spring from:

<u>Species</u>	<u>PI</u>
<i>Rhynchosia minima</i>	322614
<i>Rhynchosia reticulata</i>	163098
<i>Alysicarpus rugosus</i>	286530
<i>Alysicarpus rugosus</i>	189492
<i>Rhynchosia minima</i>	316627
<i>Rhynchosia minima</i>	322615
<i>Desmanthus virgatus</i>	283247

Previous work with *Siratro* (Siewerdt and Holt; *Agro.* 66:65-67, 1974; 67:544-546, 1975) indicated that *Siratro* survives some winters at College Station. Other observations (unpublished) indicate that Silverleaf *Desmodium* and Cooper *Glycine* have some cold tolerance. However, winter kill of all of the introduced tropical legumes has been experienced repeatedly at College Station at temperatures near or below -7C. The 1978-79 results confirm the previous observations and experiences. Thus, the available introduced perennial tropical legume cultivars lack adequate winter hardiness for most of the state. Further study of native legumes such as *Rhynchosia* and *Desmanthus* is required to determine their potential adaptation.

Table 1. Performance of Tropical Legumes at Beeville, 1978.

Species	Cultivar or Accession No.	Observations	
		July 17	October 10
1. <i>Alysicarpus vaginalis</i>	Alyceclover, Local	Few plants, 5-20 cm tall, dark green	Decumbent, 60 cm spread, blooming
2. <i>Alysicarpus vaginalis</i>	Alyceclover, Australia	Fair stand, 5-30 cm tall, starting to burn from heat and drought	25-30 cm tall, 100 cm spread
3. <i>Calopogonium muconoides</i>	Calopo	Few plants, 10-15 cm tall, burning severely	No stand
4. <i>Centrosema pubescens</i>	Belalto	Fair stand, 10-25 cm tall, slight leaf burning	Sparse, running type
5. <i>Desmodium intortum</i>	Greenleaf	Partial stand, 15-30 cm tall, slight leaf burning	Sparse stand
6. <i>Desmodium uncatum</i>	Silverleaf	Partial stand, 5-10 cm tall, insect damage	Good appearance
7. <i>Glycine wrightii</i>	Cooper	Few plants, 30 cm tall, plants almost dried up	Good appearance, 15-20 cm tall
8. <i>Indigofera spicata</i>	CPI 16110	Very few plants, 7.5-15 cm tall, dried up	No stand
9. <i>Lablab purpureus</i>	Highworth	Good stand, runners 60-120 cm long, slight burn	Good growth, 70-75 cm tall, solid ground cover
10. <i>Leucaena leucocephala</i>	Peru	No stand	Plants erect, 60 cm tall
11. <i>Lotononis bainesii</i>	Miles	No stand	Small, late emergence
12. <i>Lotus major</i>	- -	No stand	No stand

Table 1 Continued

13.	<i>Macroptilium atropurpureum</i>	Siratro	Good stand, plants 25-40 cm tall, severe burn	Good appearance 15-20 cm tall, blooming
14.	<i>Macroptilium bracteatum</i>	CPI 27404	3-4 plants, 15 cm tall, dried up.	Good appearance, 60 cm tall
15.	<i>Macroptilium lathyroides</i>	Murray	Partial stand, 30 cm tall, dried up.	60 cm tall, leaves only on upper 1/2 of plant
16.	<i>Macrotyloma axillare</i>	Archer	No stand	Sparse stand, fragile appearance
17.	<i>Macrotyloma uniflorum</i>	Leichhardt	Good stand, 15-35 cm tall, leaves beginning to burn	Dense, bush type, 40 cm tall, 30 to 40 cm wide
18.	<i>Medicago sativa</i>	Hunter River	No stand	Late emergence
19.	<i>Stylosanthes guianensis</i>	Cook	No stand	No stand
20.	<i>Stylosanthes hamata</i>	Verano	No stand	Prostrate, 100 cm spread, 15 cm tall, broad leaf
21.	<i>Stylosanthes humilis</i>	Lawson	No stand	No stand
22.	<i>Stylosanthes humilis</i>	Patterson	No stand	Sparse stand, fragile appearance, yellow
23.	<i>Stylosanthes fruticosa</i>	CPI 40615	No stand	Sparse stand, fragile plants
24.	<i>Vigna umbellata</i>	Rice Bean	Good stand, plants 60 cm tall, slight leaf burning	Not much forage

Table 2. Performance of tropical legumes at College Station, 1978.

Species	Cultivar or Accession No.	Yield kg/ha	Observations	Stand June, 1980
1. <i>Alysicarpus vaginalis</i>	Alyceclover, Local	-	No stand	0
2. <i>Alysicarpus vaginalis</i>	Alyceclover, Australia	3293	Uniform stand, about 90 cm tall (?)	0
3. <i>Calopogonium muconoides</i>	Calopo	-	No stand	0
4. <i>Centrosema pubescens</i>	Belalto	-	No stand	0
5. <i>Desmodium intortum</i>	Greenleaf	-	No stand	0
6. <i>Desmodium uncatum</i>	Silverleaf	-	Very poor stand, plants 25 cm tall, about 75 cm spread	0
7. <i>Glycine wrightii</i>	Cooper	3087 4975	Plants spread 7 cm; Plants 25-30 cm tall, 60-75 cm spread laterally	0
8. <i>Indigofera spicata</i>	CPI 16110		Not planted	0
9. <i>Lablab purpureus</i>	Highworth	11869	Plants flowering and green at frost, 100 cm tall, 120 cm spread	0
10. <i>Luecaena leucocephala</i>	Peru	-	Very poor stand, few "woody" plants 175 cm tall with branch spread of 110 cm	0
11. <i>Lotononis bainesii</i>	Miles	-	No stand	0
12. <i>Lotus major</i>	-	-	No stand	0
13. <i>Macroptilium atropurpureum</i>	Siratro	5152 5347	Good stand and vigor, plants 30-37 cm tall, 75-95 cm spread	Reseeded Some survival

Table 2 Continued

14. <i>Macroptilium bracteatum</i>	CPI 27404	5474	Leaves green at frost, plants spaced about 15 cm, 60 cm tall, 100 cm spread plants	4
15. <i>Macroptilium lathyroides</i>	Murray	-	Not planted	0
16. <i>Macrotyloma axillare</i>	Archer	2370	Not uniform stand, about 60 cm spacing, plants 45 cm tall, 95 cm spread	0
17. <i>Macrotyloma uniflorum</i>	Leichhardt	2214	Poor stand, plants all dormant at frost, 25 cm tall, 50 cm spread	0
18. <i>Medicago sativa</i>	Hunter River	-	Poor stand, 30 cm plant spacing, old growth senescent, 5 cm new growth	All Plants
19. <i>Stylosanthes guianensis</i>	Cook	-	No stand	0
20. <i>Stylosanthes hamata</i>	Verano	3637	Plants spaced about 10 cm, 35 cm tall, 73 cm spread	Reseeded
21. <i>Stylosanthes humilis</i>	Lawson	-	No stand	0
22. <i>Stylosanthes humilis</i>	Patterson	-	No stand	0
23. <i>Stylosanthes fruticosa</i>	CPI 40615	-	No stand	0
24. <i>Vigna umbellata</i>	Rice bean	-	No stand	0

Table 3. Evaluation of warm-season Legumes at College Station, 1979.

Identification	P. I.	Tier & Row	Notes
<i>Aeschynomene scabra</i>	296044	T1 R 1 - 2	Chlorotic, very stemmy
<i>Aeschynomene indica</i>	225551	T2 R 1 - 2	Tall, stemmy somewhat chlorotic
<i>Aeschynomene indica</i>	257662	T3 R 1 - 2	Very erect, woody, stemmy, chlorotic
<i>Alysicarpus rugosus</i>	189492	T3 R 3	Fair growth and leafiness, both decumbent and erect stems
<i>Desmanthus virgatus</i>	171962	T1 R 4	Upright, 40" tall, leafy
<i>Desmanthus virgatus</i>	283247	T2 R 4	Tall, Stemmy, not as good as 171962
<i>Lespedeza cyrtobotrya</i>	286480	T1 R 5	Very little growth
<i>Pueraria lobata</i>	300095	T1 R 6	2 plants, fair growth, long runners
<i>Alysicarpus vaginalis</i>	217904	T2 R 6	Very short, fair spread, seeding heavily
<i>Alysicarpus vaginalis</i>	219829	T3 R 6	V. decumbent, dense, good spread, good <i>Alysicarpus</i> type
<i>Alysicarpus rugosus</i>	200207	T4 R 6	Erect, woody, stemmy
<i>Aeschynomene falcata</i>	364378	T3 R 7 - 8	V. Poor growth, chlorotic
<i>Calopogonium muconoides</i>	189080	T2 R 9 -10	Somewhat chlorotic, viney, good growth
<i>Alysicarpus vaginalis</i>	286288	T3 R 9 -10	V. good spread density, v. decumbent, good growth, promising
<i>Alysicarpus vaginalis</i>	322296	T4 R 9 -10	Good spread, more erect than most aly.
<i>Galactia</i> sp.	200744	T3 R11-12	Good color, not much growth, invaded by <i>C. muconoides</i>
<i>Galactia</i> sp.	200745	T4 R11-12	Not as much growth as <i>R. minima</i> 322615 but better than G. sp. 206316, promising
<i>Rhynchosia minima</i>	322614	T1 R13-14	Running type, small leaves, dense cover
<i>Rhynchosia minima</i>	316627	T2 R11-12	Running type, small leaves, dense cover
<i>Galactia</i> sp.	201260	T2 R13-14	Running type
<i>Galactia</i> sp.	206319	T3 R13-14	Good color, fair promise, better spread than 207744

Table 3 Continued

<i>Rhynchosia minima</i>	322615	T4 R13-14	Good density, spread, vigor, good promise
<i>Rhynchosia reticulata</i>	163098	T1 R15-16	Running type, small leaves, dense cover (may be variations from <i>R. Minima</i> R13-14)
<i>Alysicarpus vaginalis</i>	189493	T2 R15-16	Bunch type, poor growth
Alyceclover	--	T3 R15-16	Fair growth and color, more erect than T3 R15-16
<i>Alysicarpus vaginalis</i>	316125	T4 R15-16	Fair <i>Alysicarpus</i> type
<i>Alysicarpus rugosus</i>	286530	T1 R17-18	Stemmy, erect
<i>Rhynchosia sublobata</i>	300101	T2 R17-18	Spreading from few plants, fair growth
<i>Calopogonium muconoides</i>	281634	T3 R17-18	Fair spread from few plants, chlorotic
<i>Rhynchosia minima</i>	319487	T4 R17-18	Small leaf, dense, compact, good promise
<i>Galactia jussiaena</i>	322541	T1 R19	Erect, viney type, good seed
<i>Galactia jussiaena</i>	367914	T2 R19	Few, seim-erect viney plants
<i>Pueraria lobata</i>	326583	T3 R19	Erect, viney type, v. broad leaves, no spread from 2 plants
<i>Alysicarpus ovalifolius</i>	316124	T1 R20	Short, dense compact
<i>Rhynchosia phaseoloides</i>	291132	T2 R20	Fair, semi-erect, viney type

Following failed to survive transplanting.

Identification	P.I.	Tier & Row
<i>Alysicarpus rugosus</i>	257666	T1 R 3
<i>Alysicarpus rugosus</i>	200207	T4 R 3
<i>Desmanthus depressus</i>	162672	T2 R 3
<i>Desmanthus virgatus</i>	322411	T3 R 4
<i>Desmanthus virgatus</i>	404310	T4 R 4
<i>Lespedeza thunbergii</i>	286481	T2 R 5
<i>Lespedeza cueneata</i>	286450	T3 R 5
<i>Lespedeza cueneata</i>	301409	Tr R 5
<i>Lespedeza stipulacea</i>	186586	T1 R 7 - 8
<i>Sespedeza striata</i>	296574	T4 R 7 - 8
<i>Aeschynomene falcata</i>	322289	T3 R 7 - 8
<i>Lespedeza striata</i>	286460	T1 R 9 -10
<i>Pueraria thumberana</i>	9227	T1 R11 -12
<i>Pueraria phaseoloides</i>	291132	T4 R19