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WARM-SEASON ANNUAL LEGUME EVALUATIONS ON ALKALINE SOILS

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Summary

Thirty warm-season annual legumes, including alyceclover (*Alysicarpus vaginalis* DC.), cowpeas (*Vigna unguiculata* [L.] Walp.), mat bean (*Vigna aconitifolia* [Jacq.] Marechal), and phasey bean (*Marcroptilium lathyroides* [L.] Urb.) were evaluated for iron chlorosis, maturity, and forage production at Yoakum in 1994. Several cowpea entries produced 2500 to 4000 lbs/acre. Alyceclover, mat bean, and phasey bean all produced less than 30% of the dry forage yield of Iron and Clay cowpea. Iron chlorosis was not an apparent problem with phasey bean and some cowpea entries but alyceclover and mat bean were chlorotic.

Introduction

Alyceclover, cowpeas, mat bean, and phasey bean are warm-season annual legumes that have the potential for use in Texas as summer grazing for cattle and deer, when warm-season grasses have low quality forage. Additional uses for summer legumes include erosion control and as soil improvement crops. Both cowpeas and alyceclover are known to be well adapted to sandy, acid soil but their production potential on alkaline, clay soils is unknown.

The objective of this study was to identify summer annual forage legumes that are adapted to the alkaline soil and environmental conditions in the middle Gulf Coast region of Texas.

Procedure

Thirty summer legume entries were seeded at a 1-in. depth in 6 ft rows spaced 6 ft. apart at Yoakum, Texas, on 8 June, 1994. These entries were arranged in a randomized complete block design with three replications. Soil type was an Elmendorf clay loam with a pH of 7.8. No fertilizer was applied prior to planting. Moisture conditions were poor after the initial planting until August with the following monthly rainfall totals: June - 1.2 in., July -0.3 in., August - 5.1 in., and September - 2.7 in.

Legume entries were rated on 16 September for iron chlorosis using a 0 to 5 scale (0=no chlorosis and 5=severe chlorosis) and maturity (0=vegetative and 5=mature pods). A 3-ft. section of row was harvested at ground level on 16 September. Samples were air dried at 160° F for seven days, weighed, and legume yields determined on a dry matter basis.

Results

Iron chlorosis did not become apparent until high rainfall was received in August. Iron chlorosis was not a problem with phasey bean, but it was with alyceclover and mat bean (Table 1). Iron chlorosis ratings of the cowpea entries ranged from 0 to 2.6. Cowpea dry forage production ranged from 565 to 3953 lbs dry matter (DM)/acre for TX-93-19 and TX-93-34, respectively. Cowpeas were better adapted to the conditions at Yoakum than alyceclover, phasey bean, or mat bean. Cowpeas are a larger seeded legume and therefore performed better during the June and July drought. Cowpea entries TX-93-34, TX-93-21, and TX-93-39 were identified as superior forage cowpea germplasm sources for high pH soils in the middle Gulf Coast region of Texas. Iron and Clay cowpeas were productive and did not exhibit iron chlorosis at the Yoakum location.

Alyceclover, phasey bean, and mat bean yields were less than 700 lbs/acre for all entries. Phasey bean pod maturity ranged from 3.8 to 4.8 at harvest in September (Table 1). In contrast to cowpea, phasey bean continues to produce vegetative growth when it produces flowers and pods.

Table 1. Chlorosis, maturity, and forage yield of summer legumes at Yoakum, TX in 1994.

Entry	Chlorosis index ¹	Maturity index ²	16 Sept. Dry wt. yields lb/ac
Florida Common alyceclover	3.50	0.00	161
Catjang cowpea	1.33	0.67	2178
Iron and Clay cowpea	0.00	0.33	2501
TX-93-8 cowpea	0.67	4.17	726
TX-93-9 cowpea	1.67	2.17	1533
TX-93-10 cowpea	0.33	1.50	1694
TX-93-15 cowpea	0.67	0.00	2581
TX-93-16 cowpea	0.33	0.00	1371
TX-93-17 cowpea	1.39	1.42	793
TX-93-19 cowpea	2.33	4.83	565
TX-93-21 cowpea	0.00	3.00	3146
TX-93-27 cowpea	1.00	1.67	2662
TX-93-28 cowpea	1.00	4.33	1533
TX-93-30 cowpea	0.89	2.17	1156
TX-93-31 cowpea	0.33	1.33	968
TX-93-32 cowpea	1.39	3.67	1882
TX-93-34 cowpea	2.33	2.33	3953
TX-93-35 cowpea	0.33	0.33	1775
TX-93-36 cowpea	2.00	4.00	807
TX-93-37 cowpea	2.64	4.42	672
TX-93-38 cowpea	1.17	0.33	807
TX-93-39 cowpea	1.00	1.67	2985
TX-93-40 cowpea	0.67	1.33	3146
Whippoorwill cowpea	0.00	5.00	887
OVMB-92 Mat bean	2.33	0.00	323
PI 221897 phasey bean	0.00	4.83	242
PI 276182 phasey bean	0.00	3.83	282
PI 295335 phasey bean	0.00	4.17	686
PI 330346 phasey bean	0.67	4.50	202
PI 330353 phasey bean	0.00	4.67	645
LSD (.05)	1.37	1.94	1174

¹Rated 16 September from 0 to 5 where 0=no chlorosis and 5=severe.

²Rated 16 September from 0 to 5 where 0=vegetative and 5=mature pods.