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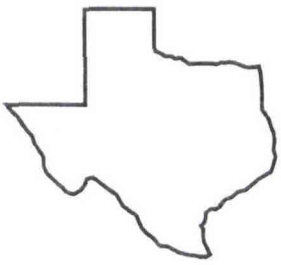
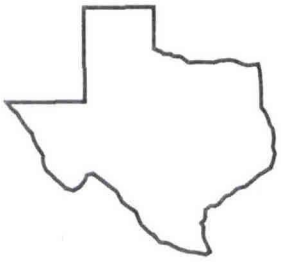
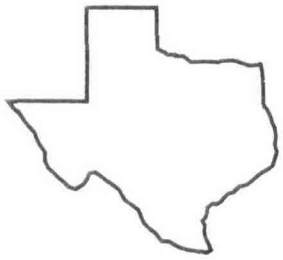
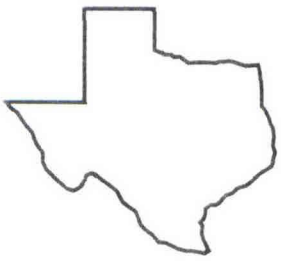




Overton Field Day Report - 1994





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WARM-SEASON ANNUAL LEGUMES INTERPLANTED WITH PINE SEEDLINGS

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Background. Productive timberlands in East Texas occupy about 12 million acres and are valued at more than $350 million. With ever-growing demands for lumber and other wood products, many timber areas are being clear cut. Although this management practice has certain immediate economic incentives and replanted pine seedling survival advantages, site integrity is disrupted. Site sustainability with minimum erosion is desirable; thus, alternative methods of replanting pine seedlings are worthy of consideration. Interplanting legumes with non-N-fixing plants has shown the biological and economic value of converting atmospheric nitrogen into forms available for plants to enhance growth and nutritive value. The use of legumes in forest ecosystems has the potential to reduce soil erosion, provide a nutrient source to pine seedlings, and provide a portion of the diet for wildlife.

Research Findings. A field study was conducted to evaluate the potential of selected warm-season annual legumes to affect growth of pine seedlings. 'Iron and Clay' cowpeas (*Vigna unguiculata*), common alyceclover (*Alysicarpus vaginalis*), and 'Comanche' partridge pea (*Cassia fasciculata*) were planted in the alleyways (8' wide) of newly planted loblolly pine seedlings. An additional treatment of phosphorus (50 lbs/ac P_2O_5 as 0-46-0) was applied at planting of the legumes in May 1991. Data were taken at 12 and 24 months after pine seedling planting.

Pine seedling mortality was greater when interplanted with either alyceclover or partridge peas because of the competition exerted by the legumes for light, space, and soil moisture (Table 1). Interplanted cowpeas did not affect pine seedling mortality. After 2 years of growth, pine seedlings grown with cowpeas were taller than pines in all other treatments. Partridge peas developed a dense canopy 2 to 3 times taller than the pine seedlings and thus caused the greatest reduction in pine seedling growth. Somewhat similar trends were apparent for pine seedling diameter and root weight.

Phosphorus fertilization increased yields of all legumes (Table 2). Yields of both cowpeas and alyceclover were increased by more than 3-fold with P application; whereas, yields of partridge peas were increased by over 1.4-fold. Thus, partridge peas appear to either be more efficient in use of P and/or require less P for growth than either cowpeas or alyceclover. The N content of leaf, stem, and root of pine seedlings was increased by P fertilization. Although P fertilization did not affect pine seedling growth during the first two years, N uptake was enhanced.

Application. Although the data collected thus far may be preliminary for timber management practices, it is clear that warm-season annual legumes can have an immediate effect on pine seedling growth. Of the 3 legumes evaluated, cowpeas appear to offer the most positive impact on pine seedlings along with the existing documentation of beneficial forage quality contribution for deer. Partridge peas are well-adapted to the upland, infertile, sandy soils of East Texas and thus offer competition that may be detrimental to pine timber production.

Table 1. Initial mortality and growth parameters of pine seedlings as affected by warm-season annual legumes.

Treatment	Mortality[1]	Height[2]	Diameter[2]	Root weight[1]
	Trees/plot	---------inches---------		g DM/plant
Pine seedlings only	4.6 a[3]	42.0 b	0.87 bc	8.3 a
Pine seedlings + cowpeas	4.8 a	44.8 a	0.98 a	7.2 ab
Pine seedlings + alyceclover	10.0 b	41.8 b	0.91 ab	7.4 ab
Pine seedlings + partridge peas	10.8 b	37.7 c	0.78 c	5.1 b

[1]Mortality ratings and root weights taken 12 months post planting.
[2]Height and diameter measurements taken at 24 months post planting.
[3]Means in a column followed by a different letter are different at P<0.05 for mortality and root weight and P<0.10 for height and diameter as determined by Duncan's Multiple Range Test.

Table 2. Warm-season annual legume dry matter (DM) yields and nitrogen (N) content of leaf stem and root of pine seedlings.

	Phosphorus	No phosphorus
LEGUME	----------lbs/ac DM----------	
Cowpeas	2238 a[1]	717 b
Alyceclover	6018 a	1839 b
Partridge peas	7397 a	5212 b
PINE SEEDLING	----------% N content----------	
Leaf	1.26 a	1.09 b
Stem	0.63 a	0.54 b
Root	0.44 a	0.36 b

[1]Means within a row followed by a different letter are different at P<0.05 as determined by LSD.