

1977

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Recommended Citation

Pierce, Robert A. and Kirkwood, Robert T. (1977) "Evaluation of Plantings for Wildlife on a Power Line Right of Way in Southern Arkansas," *Journal of the Arkansas Academy of Science*: Vol. 31 , Article 28.
Available at: <http://scholarworks.uark.edu/jaas/vol31/iss1/28>

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Evaluation of Plantings for Wildlife on a Power Line Right of Way in Southern Arkansas

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ABSTRACT

The combination of types of land preparation and species of plants seeded along a power line right-of-way was evaluated in terms of the effects upon wildlife. Relative population densities of plants, birds, and mammals were determined for each of the areas under study. A study of the reduction in maintenance costs in relation to the initial investment for preparation and seeding of the land was made.

INTRODUCTION

Arner (1951, 1954, 1960, 1966), Strode and Chamberlain (1959), Egler (1953, 1957), Pound and Egler (1953), and Bramble et al. (1956) have all reported investigations dealing with plantings along power line rights-of-way in various parts of the United States. These investigations involved various combinations of seed bed preparation, fertilization, and seeding.

This study is concerned with plantings along an Arkansas Power and Light Company 500 kv transmission line right-of-way which extends from Mabelvale, Pulaski County, Arkansas, to El Dorado, Union County, Arkansas. Construction of this transmission line was completed in 1967. Three years later, May 1970, Arkansas Power and Light Company, in cooperation with International Paper Company, made experimental plantings where the right-of-way crossed International Paper Company land. Five plots, two in Saline County and three in Grant County, received various treatments. The work was performed by International Paper Company and by contract.

METHODS AND MATERIALS

A bulldozer was used to clear and level the right-of-way at the time of land preparation, and, in sites where a seed bed was prepared, the original preparation was with a crawler tractor and a bush-and-bog disc. Regular farm equipment was used for other preparation.

Plot No. I - Saline County at transmission towers 52-54. This plot is 877 meters (.55 miles) in length and contains 4.97 hectares (12.29 acres). Treatment - No seedbed preparation. Entire plot burned. No fertilizer or lime. One-half plot seeded to strips of *Sericea lespedeza*, *Kobe lespedeza*, German Foxtail millet (*Setaria italica* [L.] Beauv.) and a 45 foot wide (13.7 meters) strip of *Pensacola Bahia* grass. (*Paspalum notatum* Flugge).

Plot No. II - Saline County at transmission towers 56-58. This plot is 1049 meters (.65 mile) in length and contains 5.95 ha. (14.7 acres). Treatment - No seedbed preparation. Entire plot burned. Lime applied at rate of 3 tons per acre; fertilizer, 10-20-10, at the rate of 400 lbs. per acre. One-half of plot seeded to strips of *Sericea lespedeza*, *Kobe lespedeza*, German foxtail millet and a 45 foot wide (13.7 meter) strip of *Pensacola Bahia* grass. Remainder of plot not planted.

Plot No. III - Grant County at transmission towers 85-87. This plot is 623 meters (.387 miles) long and contains 3.53 ha. (8.7 acres). Treatment - Entire plot burned and disced. No lime or fertilizer applied. One-half of plot planted to strips of *Sericea lespedeza*, *Kobe lespedeza*, German foxtail mil-

let, and a 45 foot (13.7 meter) wide strip of *Pensacola Bahia* grass. Remainder of plot not planted.

Plot No. IV - Grant County at transmission towers 91-95. This plot is 1345 meters (.836 miles) long and contains 7.62 ha. (18.8 acres). Treatment - Entire plot disced, limed at the rate of 2 tons per acre between towers 93-95. Fertilizer applied at the rate of 400 lbs. per acres of 10-20-10. Half of plot was planted to strips of *Sericea lespedeza*, *Kobe lespedeza*, German foxtail millet, and a 45 foot (13.7 meter) wide strip of *Pensacola Bahia* grass. The rest of the plot was not planted.

Plot No. V - Grant County at transmission towers 157-159. This plot is 714 meters (.44 mile) long and contains 4.05 ha. (10.0 acres). Treatment - Entire plot disced, fertilized with 10-20-10 at the rate of 400 lbs. per acre, and limed at the rate of 3 tons per acre. Entire plot planted with strips of *Sericea lespedeza*, *Kobe lespedeza*, German foxtail millet, bicolor lespedeza and a 90 foot (27.4 meter) wide center strip of *Pensacola Bahia* grass.

Vegetation was sampled in meter square quadrats. Quadrats were laid out longitudinally in a straight line at the center of each planted strip. The first quadrat was located 10 meters in from the end of the strip and subsequent quadrats were located at 10 meter intervals.

Quadrats were divided into decimeter segments which were numbered from 0 to 9 from left to right and from 0 to 9 from top to bottom. Ten decimeter squares were selected in each meter square by using a table of random numbers. The stems in these decimeter squares were counted. These counts were then used to determine the density of the species present on the planted strips.

Although every plot was studied during this investigation, plots III, IV, and V and a control area of about 4 hectares between plots III and IV were studied intensively. Plants on the control area were typical of those in the third year of an "old field" succession.

In all quadrats the presence of a species was recorded and an ocular estimate of the amount of area occupied by each species was made. Division of the quadrat into decimeter squares was an aid in this determination of coverage.

In addition to the determination of coverage by each species, an estimate of abundance was made according to the following scale:

Rate - 1 to 4 stems per square meter
Occasional - 5 to 14 stems per square meter
Frequency - 15 to 29 stems per square meter
Abundant - 30 to 99 stems per square meter
Very abundant - 100 + stems per square meter

When coverage and abundance had been determined they were combined into a Total Estimate Scale, a numerical index describing the plant community, suggested by Braun-Blanquet (1951) as reported in Smith (1966). This index is as follows:

- + - Individuals of a species very sparsely present in the stand; coverage small.
- 1 - Individuals plentiful, but coverage small
- 2 - Individuals very numerous if small; if large, covering at least 5 percent of the area.
- 3 - Individuals few or many, collectively covering 25 to 50 percent of the area.
- 4 - Plants cover 50 to 75 percent of the area.
- 5 - Plant species covers 75 to 100 percent of the area.

(It should be noted that the comparative terms used in this index are derived from abundance and coverage tables in Smith [1966]).

Nomenclature follows Fernald (1950) except for grasses in which case Hitchcock (1950) is used. Maisenhelder (1969) was used for the identification of tree seedlings.

An attempt was made to determine the effect of right-of-way management upon birds and mammals as well as upon plants. Counts of birds were made by walking the length of a plot on a line from one tower to the next. Similar counts were made a quarter of a mile outside each boundary of a plot. All birds seen and heard were identified and listed. The relative abundance of mammals was determined using a variety of techniques—live-trapping, snap-trapping, pellet counts, and dropping boards. Determination of actual numbers of mammals is a problem in itself and was not attempted.

RESULTS AND DISCUSSION

The only treatment received by Plot I was burning. No seedbed preparation was carried out, and no lime or fertilizer was applied to the area. None of the planted species was successful in competition with normal first year successional plants. As shown by Table II, the density for any species planted in this plot was less than one stem per square decimeter. Kobe lespedeza was found on only 40% of the square decimeter sample sites, and the frequency index for any other species was even less than 40%. No German foxtail millet (*Setaria italica* [L.] Beauv.) was found growing in Plot I although it had been planted in one of the strips in this plot.

Although Plot II received no seedbed preparation, it was burned, and fertilizer and lime were both added. Scattered patches of Kobe lespedeza and *Sercia lespedeza* became established (Table III). Although broomsedge (*Andropogon virginicus* L.) was the most common plant growing in this plot, the cultivated species had persisted until the spring of 1976.

Two plots which were not planted but on which a seedbed was prepared were sampled. One of these, Plot III, received no fertilizer or lime. The other, Plot IV, had lime added at the rate of 2 tons per acre and 10-20-10 fertilizer added at the rate of 400 pounds per acre. Because of the large number of species present on these plots, 20 quadrats were used in sampling. The number of species sampled in the two plots was similar. The two most abundant species on both areas were crabgrass (*Digitaria sanguinalis* [L.] Scop.) and horseweed (*Erigeron canadense* L.). The species found on these plots are tabulated in Tables IV and V.

Tables VI to X indicate the vegetation sampled on Plot V. Densities per square decimeter and the Total Estimate (Smith, 1966) are recorded for each plant species sampled in each planted strip. *Sercia lespedeza*, Kobe lespedeza, and Bahia grass (*Paspalum notatum* Flugge) had excellent stands in the season following planting. Coverage by Kobe lespedeza was 75% or more in all quadrats. Only four other species appeared in the ten sample quadrats (Table VI). *Sercia lespedeza* had 50% or less coverage in half of the samples taken in the strip in which it was planted. Twelve other plant species occurred sporadically in this strip. Bahia grass had a coverage of 75 percent or more in only 20 percent of the decimeter squares sampled in the strip in which this plant was seeded. Ten other species of plants were present in the quadrats that were sampled. Foxtail millet (*Setaria italica* [L.] Beauv.) did not reseed and was not found in 1971. The bicolor lespedeza (*Lepedeza bicolor* L.) planting was unsuccessful and only a few plants were present the first year.

A large number of plant species were found on the control area. Broomsedge appeared in every quadrat with the coverage being 50 percent or more in three-fourths of the quadrats. The other species, although numerous, were scattered in their distribution and their

coverage was nearly always 5 percent or less. The species found in the control area are tabulated in Table XIV.

Table XV indicated birds present in the treated areas and adjacent to them. The right-of-way runs north and south. Fewer species of birds were seen or heard as the investigator walked along the center of the treated areas from one tower to the next than when he walked along a line ¼ mile east or west of the right-of-way.

As indicated by Tables XI and XII, the most abundant small mammal on the study plots was the white-footed mouse (*Peromyscus leucopus*). The density of this mammal was higher on the treated areas than on the control area. The cotton rat (*Sigmodon hispidus*) was present in greater numbers in the control area than in the treated plots. This observation agrees with those of Goertz (1946) and Stoddard (1931) both of whom found that "old fields" provide a favorable habitat for cotton rats.

Pellet counts indicated that cottontail rabbits (*Sylvilagus floridanus alacer* [Bangs]), swamp rabbits (*Sylvilagus aquaticus* [Bachman]), and white-tailed deer (*Odocoileus virginianus* [Zimmerman]) made more use of plots which had been limed, fertilized, and planted than they did of untreated or unplanted plots (Table XIII). Swift (1948) found that deer selected the most nutritious wheat and clover forage, often traveling over areas containing less nutritious plants to graze on plants having higher nutritional value. Crawford (1950) reported that with the application of lime, phosphate, and other fertilizers on areas adjacent to untreated areas, animals would graze on plants on the treated areas first. Greater growth of young animals and better reproduction by mature animals was obvious among animals that had fed in treated areas. The data collected in this study, and Crawford's and Swift's observations, would indicate that greater use of the limed and fertilized areas by deer and rabbits would result in higher populations of these animals than would be present on untreated sections of the rights-of-way.

The plantings were established at a cost of about \$95.00 per acre. Plantings in Union County in 1971 cost \$156.73 per acre but \$65.00 of this was for pre-planting bulldozer work which is a one-time cost, at least part of which could logically be charged to rights-of-way clearing and development. This would leave a cost of \$90.83 per acre for planting. These plantings did not require any maintenance work until 1976 when the Union County planting was mowed at a cost of \$9.50 per acre. This should be compared to a cost of \$17.50 an acre for mowing unplanted rights-of-way in the same section of the transmission line—a saving of \$8.00 per acre over a five-year period. Future maintenance by mowing on the modified three-year cycle which Arkansas Power and Light Company now follows would result in a saving of \$2.67 per acre per year in maintenance costs on planted versus unplanted sections of the rights-of-way. Thus, it would take 34 years to recover the cost of establishing the planting plus any expense needed to re-establish the planting.

Power companies such as Duke Power Company and Georgia Power Company in the southeastern United States that were making plantings for erosion control and wildlife enhancement in the late 1960s and early 1970s have generally stopped this activity according to G. Spencer (pers. comm.). The economics of this method of rights-of-way management, particularly the high initial cost and the long period required for reduced maintenance costs to equal establishment costs, make it difficult for those responsible for rights-of-way maintenance to justify this program.

Reduced maintenance costs on planted right-of-way do present some opportunities, however, since power lines cross private lands. Power companies can justify sharing in the costs of plantings for wildlife made by a landowner on a right-of-way. Such an arrangement would probably appeal only to a landowner for whom an enhancement of wildlife habitat would be of monetary benefit. Members of a private hunting club might, for instance, be willing to pay part of the cost of plantings on a right-of-way crossing their land. Government agencies, such as the Forest Service or the Game and Fish Commission, might consider such cost-sharing to be an advantageous expenditure of funds. In any case, the cost-sharing would reduce the number of years necessary for the power company to recoup its investment in the plantings.

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Table I. Land treatment at each of the five study sites

Plot No.	County	Area (hectares)	Seedbed Preparation	Burned	Fertilizer	Lime	Plantings*
I	Saline	4.97	None	Yes	None	None	1,2,3,4 on 1/2 of area
II	Saline	5.95	None	Yes	10-20-10 400 lb/acre	3 T/ac	1,2,3,4 on 1/2 of area
III	Grant	3.53	Disced	Yes	None	None	1,2,3,4 on 1/2 of area
IV	Grant	7.62	Disced	No	10-20-10 400 lb/acre	2 T/ac	1,2,3,4 on entire area
V	Grant	4.05	Disced	No	10-20-10 400 lb/acre	3 T/ac	1,2,3,4,6 on entire area

* 1 = *Serecia lespedeza* (*Lespedeza serecia*), 2 = *Kobe lespedeza* (*L. striata*), 3 = German foxtail millet (*Setaria italica*), 4 = Pennacolia Bahis grass (*Paspalum notatum*), 5 = Hairy vetch (*Vicia villosa*), 6 = Bicolor lespedeza (*Lespedeza bicolor* L.)

Table II. Plot No. I - Burned - No fertilizer or lime. Plants on all seeded strips. Density* and total estimate—October, 1971

Species	Quadrat Number										Frequency Index										
	1		2		3		4		5			6		7		8		9		10	
	D	TE	D	TE	D	TE	D	TE	D	TE	D	TE	D	TE	D	TE	D	TE	D	TE	
Kobe lespedeza (<i>Lespedeza striata</i> L.)	0.1	+ 0.0	0.0		0.0		0.2	+ 0.1	+ 0.1	+ 0.0	0.0		0.0		0.0		0.0		0.1	+	40
Serecia lespedeza (<i>Lespedeza serecia</i> L.)	0.0		0.1	+ 0.1	+ 0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.1	+	30
Bahia grass (<i>Paspalum notatum</i> Flugge)	0.0		0.0		0.0		0.0		0.1	+ 0.0	0.0		0.0		0.0		0.0		0.1	+	20
German foxtail millet (<i>Setaria italica</i> Beauv.)	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0

* Mean number of stems per square decimeter

Table III. Plot No. II - Burned - Fertilized and limed. Plants on all seeded strips. Density* and total estimate—October, 1971

Species	Quadrat number										Frequency Index										
	1		2		3		4		5			6		7		8		9		10	
	D	TE	D	TE	D	TE	D	TE	D	TE	D	TE	D	TE	D	TE	D	TE	D	TE	
Serecia lespedeza (<i>Lespedeza serecia</i> L.)	0.2	+ 0.4	+ 0.0		0.7	2	6.7	3	6.4	3	0.0		0.3	+ 0.1	+ 4.1	3					80
Kobe lespedeza (<i>Lespedeza striata</i> L.)	0.4	+ 0.0	0.0		7.3	3	8.9	4	0.0		2.1	2	6.4	3	0.2	+ 0.3	+				70
Bahia grass (<i>Paspalum notatum</i> Flugge)	0.0		0.0		1.0	2	0.3	+ 0.0	0.0		1.3	2	0.0		0.0		0.1	+			40
German foxtail millet (<i>Setaria italica</i> Beauv.)	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0

*Mean number of stems per square decimeter

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Table IV. Plot No. III - Disc'd - No fertilizer or lime. Plants on unplanted section of plot. Total estimate—October, 1971

Species	Quadrat Number																				Freq. Index
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Crab grass (<i>Digitaria sanguinalis</i> (L.) Scop.)	3	2	3	2	+	+	+	+			+	2	+	3		3	3	2	3	+	80
Horseweed (<i>Erigeron canadense</i> L.)	2	2	3	2	3	3	2	4	4	2	3				3	+	+	+		4	80
Buttonweed (<i>Diodia teres</i> Walt.)	3	2	3	2	+	3	+			+				3	+		+				60
Partridge pea (<i>Cassia nictitans</i> L.)	+	+	+	+										3	+				2		30
Broomsedge (<i>Andropogon virginicus</i> L.)	+	+			+					+						+					25
Common ragweed (<i>Ambrosia artemisiifolia</i> L.)		3	2	5		3										3					25
Panic grass (<i>Panicum</i> spp.)															+	+					10
Bracted plantain (<i>Plantago aristata</i> Michx.)									+											+	10
Loblolly pine (<i>Pinus taeda</i> L.)												+									10
Big bluestem (<i>Andropogon gerardii</i> Vitman)	+	+													+						15
Wild bean (<i>Strophostyles leiosperma</i> (T & G) Piper)	+	+	+																		15
Slender lespedeza (<i>Lespedeza virginica</i> L.)	+						2														10
Fleabane daisy (<i>Erigeron strigosus</i> , Muhl.)																		2	2	+	15
Wild lettuce (<i>Lactuca canadensis</i> L.)		+								+											10
Spanish needles (<i>Bidens bipinnata</i> L.)											+	3									10
Dewberry (<i>Rubus trivialis</i> Michx.)							+	2													10
Butterfly pea (<i>Clitoria mariana</i> L.)																	2				10
Coreopsis (<i>Coreopsis grandiflora</i> Hogg)							+			+											10
Goldenrod (<i>Solidago</i> spp.)															+						5
Blackeyed susan (<i>Rudbeckia hirta</i> L.)																					5
Paspalum (<i>Paspalum</i> spp.)															+						5
Yellow foxtail (<i>Setaria lutescens</i> (Weigel) Hubb.)											2										5
Black gum (<i>Nyssa sylvatica</i> Marsh.)						+															5
Hickory (<i>Carya tomentosa</i> Nutt.)										+											5
Sweet gum (<i>Liquidambar styraciflua</i> L.)																+					5

Table V. Plot No. IV - Disc'd, fertilized, and limed. Unplanted plot. Total Estimate—October, 1971

Species	Quadrat Number																				Freq. Index
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Horseweed (<i>Erigeron canadense</i> L.)	3	4	3	2	+	+	4	3	3	3	+	+	+	+	2	3	3	4	2	+	100
Crab grass (<i>Digitaria sanguinalis</i> (L.) Scop.)	2	2	+	3	3	+	+				3	3	4	4	3	+	2				75
Common ragweed (<i>Ambrosia artemisiifolia</i> L.)	3	3	+	3	3	2		3				3	3						1		60
Buttonweed (<i>Diodia teres</i> Walt.)	2	1	1	2	+	2	+	+	2	+									2		60
Bracted plantain (<i>Plantago aristata</i> Michx.)	2	2	2				+			+	2	2			+	+		2	+		55
Partridge pea (<i>Cassia nictitans</i> L.)					+						+			2	+						25
Broomsedge (<i>Andropogon virginicus</i> L.)		+	+	+	2	+															25
Indian grass (<i>Sorghastrum nutans</i> (L.) Nash.)											2				2	2					15
Sorrel (<i>Oxalis</i> spp.)	+							+											+		15
Yellow foxtail (<i>Setaria lutescens</i> (Weigel) Hubb.)	+	2	2																		15
Smilax (<i>Smilax</i> spp.)									2					2	+						15
Paspalum (<i>Paspalum</i> spp.)		+	+													+					15
Pokeberry (<i>Phytolacca americana</i> L.)									4	4											10
Wand lespedeza (<i>Lespedeza intermedia</i> (S.Wats.) Britt.)				+											+						10
Blackberry (<i>Rubus</i> spp.)									2										+		10
Fleabane daisy (<i>Erigeron strigosus</i> , Muhl.)								2	+												10
Panic grass (<i>Panicum</i> spp.)																				+	10
Slender lespedeza (<i>Lespedeza virginica</i> L.)								+													5
False dandelion (<i>Pyrrhophagus carolinianus</i> (Walt.) DC)					+																5
Dwarf sunac (<i>Rhus copallina</i>)																+					5
Blackeyed susan (<i>Rudbeckia hirta</i> L.)																				2	5
Sweet gum (<i>Liquidambar styraciflua</i> L.)					+																5
Loblolly pine (<i>Pinus taeda</i> L.)																			+		5
Aster (<i>Haploappus divaricatus</i> (Nutt.) Gray)																		2			5

Table VI. Plot No. V—Disc'd, fertilized, and limed. Plants on Kobe Lespedeza Strip. Density* and total estimate—July, 1971

Species	Quadrat Number																				Frequency Index
	1		2		3		4		5		6		7		8		9		10		
	T	D	T	D	T	D	T	D	T	D	T	D	T	D	T	D	T	D	T	D	
Kobe lespedeza (<i>Lespedeza striata</i> var. Kobe)	10.4	5	13.8	5	9.6	5	8.9	5	11.2	5	12.3	5	8.1	5	9.9	5	10.1	5	10.1	5	100
Yellow foxtail (<i>Setaria lutescens</i> (Weigel) Hubb.)	0.1	+	0.1	+			0.1	+					0.2	+			0.1	+			50
Common ragweed (<i>Ambrosia artemisiifolia</i> L.)	0.1	+			0.1	+	0.1	+					0.2	2							40
Smartweed (<i>Polygonum</i> spp.)	0.1	+																			10
Horseweed (<i>Erigeron canadense</i> L.)			0.1	+																	10

* Mean number of stems per square decimeter.

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Table VII. Plot No. V - Discd, fertilized and limed. Plants on Foxtail Millet Strip. Total Estimate - July, 1971

Species	Quadrat Number										Frequency Index
	1	2	3	4	5	6	7	8	9	10	
Crab grass (<i>Digitaria sanguinalis</i> (L.) Scop.)	4	3	2	3	3	3	3	3	2	3	100
Horseweed (<i>Eriogon canadense</i> L.)				2	2		2	2		2	60
Buttonweed (<i>Diodia teres</i> Walt.)		2		+		+			+		40
Common ragweed (<i>Ambrosia artemisiifolia</i> L.)	+	3	2				2				40
Yellow foxtail (<i>Setaria lutescens</i> (weigel) Hubb.)		+				+	+				30
Spanish needles (<i>Bidens bipinnata</i> L.)	2	+			+						30
Partridge pea (<i>Cassia nictitans</i> L.)		+			+		+				30
Kobe lespedeza (<i>Lespedeza striata</i> var. Kobe)	+		2			+					30
Dwarf sumac (<i>Rhus copallina</i> L.)					+			+			20
Creeping lespedeza (<i>Lespedeza repens</i> L.)					+		+				20
Broomsedge (<i>Andropogon virginiana</i> L.)								+		+	20
Smilax (<i>Smilax</i> sp.)						+		+			20
Wild lettuce (<i>Lactuca canadensis</i> L.)					+				+		20
Panic grass (<i>Panicum</i> sp.)	+			+							20
Pokeberry (<i>Phytolacca americana</i> L.)			+					+			20
Blackberry (<i>Rubus</i> sp.)					+						10
Mullen (<i>Verbascum virgatum</i> Stokes)										+	10
Smartweed (<i>Polygonum</i> sp.)										+	10
Paspalum (<i>Paspalum</i> sp.)			+								10
False dandelion (<i>Pyrrochloa carolinianus</i> (Walt.) DC)						+					10
Dewberry (<i>Rubus trivialis</i> Michx.)					+						10
Woolly Croton (<i>Croton capitatus</i> Michx.)									+		10
Butterfly pea (<i>Clitoria mariana</i> L.)							+				10
Persimmon (<i>Diospyros virginiana</i> L.)										+	10

Table VIII. Plot No. V - Discd, fertilized, and limed. Plants on bicolor Lespedeza Strip. Total Estimate - July, 1971

Species	Quadrat Number										Frequency Index
	1	2	3	4	5	6	7	8	9	10	
Crab grass (<i>Digitaria sanguinalis</i> (L.) Scop.)	3	2	3	4	3	3	3	3	2	3	100
Horseweed (<i>Eriogon canadense</i> L.)	2	+			+	2	2				70
Common ragweed (<i>Ambrosia artemisiifolia</i> L.)	+	2	2	+					+		50
Buttonweed (<i>Diodia teres</i> Walt.)		2			+	+	+				40
Yellow foxtail (<i>Setaria lutescens</i> (weigel) Hubb.)		+						3	2	+	40
Dwarf sumac (<i>Rhus copallina</i> L.)				+						+	30
Blackberry (<i>Rubus</i> sp.)					+	+					20
Smilax (<i>Smilax</i> sp.)							+	+			20
Spanish needle (<i>Bidens bipinnata</i> L.)					+						10
Partridge pea (<i>Cassia nictitans</i> L.)									+		10
Creeping lespedeza (<i>Lespedeza repens</i> L.)										+	10
Mullen (<i>Verbascum virgatum</i> Stokes)			+								10
Persimmon (<i>Diospyros virginiana</i> L.)										+	10
Bicolor lespedeza (<i>Lespedeza bicolor</i> L.)					+						10

Table IX. Plot No. V—Discd, fertilized, and limed. Plants on Bahia Grass Strip. Density* and Total Estimate—July, 1971

Species	Quadrat Number										Frequency Index										
	1		2		3		4		5			6		7		8		9		10	
	D	T	D	T	D	T	D	T	D	T		D	T	D	T	D	T	D	T	D	T
Bahia grass (<i>Paspalum notatum</i> Flugge)	12.9	5	9.4	4	10.1	4	13.1	5	0.2	+ 3.1	2	8.7	4	9.9	4	8.1	4	9.1	4	100	
Crab grass (<i>Digitaria sanguinalis</i> (L.) Scop.)	0.3	+	3.6	3	0.2	+	1.8	1	0.1	+ 2.5	2	1.1	1			0.1	+	0.1	+	90	
Buttonweed (<i>Diodia teres</i> Walt.)	3.1	3	1.8	1	2.5	3	0.5	+	0.5	+ 0.9	2	1.1	2	1.7	1					80	
Kobe lespedeza (<i>Lespedeza striata</i> var. Kobe)	1.0	+	0.6	+			0.6	+	0.4	+ 0.1	+	0.1	+			0.1	+			70	
Yellow foxtail (<i>Setaria lutescens</i> (weigel) Hubb.)							6.5	4	4.0	3	1.2	2	0.1	+	5.9	4				60	
Common ragweed (<i>Ambrosia artemisiifolia</i> L.)			0.5	+	0.1	+				1.0	2	1.3	2			0.7	2			50	
Horseweed (<i>Eriogon canadense</i> L.)							0.1	2			0.1	+						0.1	2	30	
Partridge pea (<i>Cassia nictitans</i> L.)			0.1	+												0.1	1			20	
Slender lespedeza (<i>Lespedeza virginica</i> L.)					0.1	+														10	
Spanish needles (<i>Bidens bipinnata</i> L.)							0.1	+												10	

* Mean number of stems per square decimeter

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Table X. Plot No. V—Disced, fertilized, and limed. Plants on Serecia Lespedeza Strip. Density* Total Estimate—July, 1971

Species	Quadrat Number																				Frequency Index
	1		2		3		4		5		6		7		8		9		10		
	D	T	D	T	D	T	D	T	D	T	D	T	D	T	D	T	D	T	D	T	
Serecia lespedeza (<i>Lespedeza serecia</i> L.)	6.3	3	4.9	2	8.1	5	7.9	5	8.2	5	8.0	5	4.8	4	4.1	3	3.9	3	3.3	3	100
Horseweed (<i>Erigeron canadense</i> L.)			0.2	2			0.1	+			0.1	+			0.1	+			0.3	1	50
Common ragweed (<i>Ambrosia artemisiifolia</i> L.)	0.2	2			0.1	+							0.1	+							50
Kobe lespedeza (<i>Lespedeza striata</i> var. <i>Kobe</i>)	4.7	3	7.9	5					0.2	+											10
Buttonwood (<i>Didia teres</i> Walt.)	0.7	2							0.8	2									0.1	+	10
Wild lettuce (<i>Lactuca canadensis</i> L.)							0.1	+					0.1	+			0.1	+			50
Spanish needles (<i>Bidens bipinnata</i> L.)							0.1	+					0.1	+							20
Plantain (<i>Plantago pusilla</i> Nutt.)							0.1	+											0.1	+	10
Dwarf sumac (<i>Rhus copallina</i> L.)							0.1	+											0.1	+	10
Persimmon (<i>Diospyros virginiana</i> L.)									0.1	+					0.1	+					10
Blackberry (<i>Rubus</i> sp.)													0.1	+			0.1	+			10
Broomsedge (<i>Andropogon virginicus</i> L.)																	0.1	+			10
Wild carrot (<i>Daucus pusillus</i> Michx.)															0.1	+					10

* Mean number of stems per square decimeter

Table XI. Number of scats present on 100 boards.

	III (July 18-20)	Plot No. IV (Aug. 11-13)	V (July 21-23)	Control (Aug. 8-10)
Cotton rat (<i>Sigmodon hispidus</i>)	0 0 0	0 0 1	5 8 11	13 7 11
Pine vole (<i>Pitymys pinetorium</i>)	2 3 1	0 1 1	4 1 2	1 9 6
White-footed mouse (<i>Peromyscus leucopus</i>)	19 13 21	17 13 18	21 23 18	17 21 13
Shorttail shrew (<i>Blarina brevicauda</i>)	0 1 2	0 0 0	0 0 0	0 0 0

Table XII. Per acre density of rodents—snap-trap area.

	III (July 18-20)	Plot Number IV V		Control
White-footed mouse (<i>Peromyscus leucopus</i>)	41.30	42.39	33.70	23.91
Pine vole (<i>Pitymys pinetorium</i>)	2.17	2.17	2.17	4.35
Cotton rat (<i>Sigmodon hispidus</i>)	1.09	4.35	7.61	11.96
Shorttail shrew (<i>Blarina brevicauda</i>)	5.43	0.00	0.00	0.00
Density-All species	50.00	48.91	43.48	40.22

Table XIII. Pellet Counts-December, 1971

Plot No.	Total Stations	Pellets Present	
		Deer	Rabbit
1	300	12	21
2	300	12	21
3	300	7	6
4	300	19	182
5	300	43	258

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Table XIV. Plants on control plot. Total Estimate—September, 1971

Species	Quadrat Number																				Frs	Ind.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
Broomsedge (<i>Andropogon virginicus</i> L.)	4	2	5	5	2	5	5	4	4	4	5	3	4	2	4	5	5	3	5	5	10	
Partridge pea (<i>Cassia pictitans</i> L.)	+	+	+	+						+	+		2	2			+			+	5	
Creeping lespedeza (<i>Lepedeza repens</i> L.)				3		+				2		2			+					3	30	
Horseweed (<i>Erigeron canadense</i> L.)	2	3			2							+		+							30	
Butterweed (<i>Dioclea tetras</i> Walt.)	+		+								+	+	+							+	30	
Wild bean (<i>Strophostyles leiosperma</i> (T & G) Piper)	+		+				2		+							2					30	
Butterfly pea (<i>Clitoria mariana</i> L.)					+				2	+			2	2					2		30	
Clitoria (<i>Clitoria mariana</i> L.)									2	+			2						2		20	
Loblolly pine (<i>Pinus taeda</i> L.)						+					2								+	+	20	
Wand lespedeza (<i>Lepedeza intermedia</i> (S.Wats.) Britt.)	+		+								2			3					+	+	20	
Beggar lice (<i>Desmodium</i> spp.)					+	2		+				2			3				+	+	20	
Smilax (<i>Smilax</i> spp.)					+										+						+	20
Fleabane daisy (<i>Erigeron strigosus</i> , Muhl.)					+					+	+										+	20
Spanish needles (<i>Bidens bipinnata</i> L.)				2									+									20
Downy milk pea (<i>Galactia volubilis</i> L.)						+									+	2						20
Mullen (<i>Verbascum virgatum</i> Stokes)													2		+					+		20
Pencil flower (<i>Stylosanthes biflora</i> L.)									2						+	2						20
Southern Red Oak (<i>Quercus falcata</i> Michx.)		+		2										4								20
Erected plantain (<i>Plantago aristata</i> Michx.)			+							+												20
Skull cap (<i>Scutellaria incana</i> Ehler)													+									20
Grape (<i>Vitis</i> spp.)										2											2	20
Aster (<i>Heterosappus divaricatus</i> (Nutt.) Gray)															2							20
Witchgrass (<i>Leptocloa cernatum</i> (Schult.)						+																20
Black-eyed susan (<i>Rudbeckia hirta</i> L.)									2										+			20
Common ragweed (<i>Ambrosia artemisiifolia</i> L.)																				+		20
Blackberry (<i>Rubus</i> spp.)													+		3							20
Hickory (<i>Carya tomentosa</i> Nutt.)									3													20
False dandelion (<i>Pyrroloporus carolinianus</i> (Walt.) DC)										+												20
Goldenrod (<i>Solidago</i> spp.)													+									20
Wild lettuce (<i>Lactuca canadensis</i> L.)																					+	20
Muscadine (<i>Vitis rotundifolia</i> Michx.)																+					2	20
Sorrel (<i>Oxalis</i> spp.)																+						20
Wild carrot (<i>Daucus pusillus</i> Michx.)			+																			20
Big bluestem (<i>Andropogon gerardii</i> Vitman)					+																	20
Coreopsis (<i>Coreopsis grandiflora</i> Hogg)																						20
Purple coneflower (<i>Heliopsis scabra</i> (L.) Moench)															2							20
Paspalum (<i>Paspalum</i> spp.)				+																		20
Dogwood (<i>Cornus florida</i> L.)																2						20
Blackberry (<i>Rubus trivialis</i> Michx.)																					2	20
Dwarf sunac (<i>Rhus corallina</i> L.)												3										20
Cherry bark oak (<i>Quercus falcata</i> var. <i>paucifolia</i> Ell.)																						20
Unidentified grass						3																20
Red maple (<i>Acer rubrum</i> L.)										+												20

Table XV. Birds identified on and adjacent to right-of-way

(C=along line down center of right-of-way; E=along line ¼ mile east of east border of right-of-way; W=along line ¼ mile west of west border of right-of-way)

Species	Plot Number		
	V	VII	Control
Bobwhite quail (<i>Colinus virginianus</i>)	C, E		
Mourning dove (<i>Zenaidura macroura</i>)	C, E	C	
Yellow-billed cuckoo (<i>Coccyus americanus</i>)	E		E
Barred owl (<i>Syrinx varia</i>)		W	
Yellow-shafted flicker (<i>Colaptes auratus</i>)	C		
Pileated woodpecker (<i>Hylocichla pileatus</i>)	W	W	
Red-headed woodpecker (<i>Melanerpes erythrocephalus</i>)	W, E	W	W
Downy woodpecker (<i>Dryobates pubescens</i>)		W	W
Eastern kingbird (<i>Tyrannus tyrannus</i>)	C		C
Eastern wood pewee (<i>Contopus virens</i>)	W, E	W	W
Blue jay (<i>Cyanocitta cristata</i>)	E	W	E
Carolina chickadee (<i>Parus carolinensis</i>)	W	E	W
Tufted titmouse (<i>Parus bicolor</i>)			E
White-breasted nuthatch (<i>Sitta carolinensis</i>)		W	
Catbird (<i>Hamotella carolinensis</i>)	E		W
American robin (<i>Turdus migratorius</i>)			C
Wood thrush (<i>Hylocichla ustulata</i>)		W	
Bluebird (<i>Sialia sialis</i>)			C
Blue-gray gnatcatcher (<i>Polioptrila caerulea</i>)			E
Red-eyed vireo (<i>Vireo olivaceus</i>)			W
Yellow-breasted chat (<i>Icteria virens</i>)	W		
Eastern meadowlark (<i>Sturnella magna</i>)	C	C	
Orchard oriole (<i>Icterus spurius</i>)			
Cardinal (<i>Cardinalis cardinalis</i>)	W		
Indigo bunting (<i>Passerina cyanea</i>)			C
Rufous-sided towhee (<i>Pipilo erythrophthalmus</i>)	W		
Field sparrow (<i>Spizella pusilla</i>)	C		C