CIRCULAR 165

JANUARY 1969

WEED CONTROL in SERICEA LESPEDEZA

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FIRST PRINTING 3M, JANUARY 1969

WEED CONTROL in SERICEA LESPEDEZA

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SERICEA LESPEDEZA (*Lespedeza cuneata* L.) is a summer perennial legume grown in the Southeast for hay, pasture, and soil conservation *(6)*. It is valuable in this area because of its ability to make substantial growth on relatively poor soil *(1)*. Studies at Auburn University Agricultural Experiment Station of fine-stem lines of sericea have led to the development and release of the Serala variety *(2,3,4)*. Serala offers promise for increasing sericea acreage in Alabama.

Sericea seed are small and produce weak seedlings. Also, stands are usually established during early spring when conditions favor rapid growth of weeds. Because of the poor competitive ability of sericea seedlings, weed control is a major problem during establishment. Although better stands of sericea can be obtained by broadcast seeding than by drill seeding *(8)*, weeds still offer severe competition during the first year.

Considerable research has been directed toward controlling weeds in clover and other small-seeded legumes. Lee *(7)* and Schrieber *(9)* reported that ethyl *N*, *N*-dipropylthiocarbamate (EPTC) gave good control of grasses and some broadleaf weeds in establishing stands of legumes when applied preplant and incorporated. Phenoxy herbicides are used for postemergence control of weeds in annual lespedeza. Freeman *(5)* reported that *N*-(2-mercaptoethyl) benzenesulfonamide S-(0,0-diisopropyl phosphorodithioate) (bensulide) did not injure Korean lespedeza when applied at rates as high as 8 pounds per acre. However, *N*-butyl-*N*-ethyl-alpha,alpha,alpha-trifluoro-2, 6-dinitro-*p*-toluidine (benefin) was injurious to Korean lespedeza at rates above ¾ pound per acre. Review of literature failed to provide reference to chemical weed control in sericea.

The objective of this study was to compare several herbicides for preemergence control of weeds and injury to sericea lespedeza.

EXPERIMENTAL PROCEDURES

Weed control experiments were conducted in sericea during 1966 on a Cahaba sandy loam soil at the Plant Breeding Unit, Tallassee. In 1967, experiments were also included on Susquehanna clay loam soil at Tuskegee Experiment Field, Tuskegee. Experiments were located on areas known to be infested with many common weeds.

Preplant herbicides were incorporated with a double-section disk harrow. Each plot was disked twice. Recleaned Serala sericea was planted with either a conventional planter or with a Planet Junior hand planter. About 30 to 80 seed were planted per foot of row at a depth of about ¼ inch. All experiments were started within the period March 24 to April 5. Counts of grass and broadleaf weeds and sericea seedlings were made 8 to 15 weeks after herbicide application. Visual ratings of weed control and crop injury were also made at various times during the growing season. Seed were combine harvested from one experiment in 1967 and yields expressed as unhulled seed per acre.

One experiment was conducted in 1967 on established sericea. In this experiment, sericea had been established the previous year. The experimental area was mowed, raked, and treated with herbicides before the sericea started growing in the spring.

Herbicides evaluated during this investigation are listed in the Appendix.

RESULTS AND DISCUSSION

In 1966, vernolate gave acceptable control of annual grasses and some broadleaf weeds when applied at rates of 2.0 pounds per acre or more, Table 1. No reduction in stand of sericea occurred at rates as high as 8.0 pounds per acre. Although there was some early stunting, it persisted for only 2 to 4 weeks.

Results of both experiments with vernolate in 1967 were similar to those in 1966, Tables 2 and 3. Vernolate was effective at rates of 2.4 pounds per acre or greater. No crop injury or reduction in stands of sericea was detected at rates as high as 9.6 pounds per acre. None of the vernolate treatments caused a reduction in yield of sericea seed. Average plant height of sericea on plots treated with vernolate was similar to that on untreated checks.

TABLE 1. EFFECT OF VERNOLATE ON GRASS AND BROADLEAF WEED CONTROL, SERICEA STANDS, AND INJURY TO SERICEA LESPEDEZA, PLANT BREEDING UNIT, 1966

Herbicide	Rate	Stand			Crop Injury[1]	
		Grass weeds 5/30/67	Broadleaf weeds 5/30/67	Sericea 5/30/67	4/28/66	6/24/66
	Lb./A	*Plants/ 100 ft.*[2]	*Plants/ 100 ft.*[2]	*Plants/ft.*	*Pct.*	*Pct.*
vernolate	1.0	405	261	21	0	0
vernolate	2.0	55	168	23	5	0
vernolate	3.0	43	42	25	37	0
vernolate	4.0	40	30	26	23	0
vernolate	8.0	6	27	23	45	1
Check	----	586	1,312	19	0	0

[1] Per cent injury to sericea; 0 = no injury, 100 = complete kill.
[2] Number of grasses or broadleaf weeds per 100 feet of row, 12-inch band.

TABLE 2. EFFECT OF VERNOLATE ON GRASS AND BROADLEAF WEED CONTROL AND SEED YIELD OF SERICEA LESPEDEZA, PLANT BREEDING UNIT, 1967

Herbicide	Rate	Stand		Seed yield 11/3/67
		Grass weeds 6/14/67	Broadleaf weeds 6/14/67	
	Lb./A	*Plants/ 100 ft.*[1]	*Plants/ 100 ft.*[1]	*Lb./A*
vernolate	1.2	181	21	770
vernolate	2.4	82	26	562
vernolate	3.6	138	25	627
vernolate	4.8	74	30	641
vernolate	9.6	15	18	898
Check	----	303	86	652

[1] Number of grasses or broadleaf weeds per 100 feet of row, 12-inch band.

TABLE 3. EFFECT OF VERNOLATE ON GRASS AND BROADLEAF WEED CONTROL, SERICEA STANDS, AND INJURY TO SERICEA LESPEDEZA, TUSKEGEE EXPERIMENT FIELD, 1967

Herbicide	Rate	Stand			Crop injury	Av. height of sericea
		Grass weeds 8/13/67	Broadleaf weeds 8/13/67	Sericea 8/13/67		
	Lb./A	*Plants/ 100 ft.*[1]	*Plants/ 100 ft.*[1]	*Plants/ft.*	*Pct.*	*In.*
vernolate	1.2	144	331	80	0	15
vernolate	2.4	88	313	90	0	17
vernolate	3.6	175	281	76	0	15
vernolate	4.8	25	131	90	0	15
vernolate	9.6	0	256	75	0	18
Check	----	769	175	71	0	15

[1] Number of grasses or broadleaf weeds per 100 feet of row, 12-inch band.

Weed control in all experiments for both years with EPTC was comparable to that of vernolate, Tables 4,5,6. Although EPTC did not reduce the stand of sericea in 1966, treatment with the two highest rates did cause considerable stunting that persisted throughout the growing season, Table 4. Early injury was observed in the experiment conducted on the sandy loam soil at the Plant Breeding Unit in 1967; however, no injury was evident after 6 weeks, except at the 9.6 pounds per acre rate, Table 5. Only slight, early injury was observed at any rate in the experiment conducted on the sandy clay loam soil, Table 6. Average height of sericea on plots treated with EPTC was similar to that on untreated plots. None of the EPTC treatments caused a significant reduction in yield of sericea seed, Table 5.

TABLE 4. EFFECT OF EPTC ON GRASS AND BROADLEAF WEED CONTROL, SERICEA STANDS, AND INJURY TO SERICEA LESPEDEZA, PLANT BREEDING UNIT, 1966

Herbicide	Rate	Stand			Crop injury[1]	
		Grass weeds 5/30/67	Broadleaf weeds 5/30/67	Sericea 5/30/67	4/28/66	6/24/66
	Lb./A	*Plants/ 100 ft.*[2]	*Plants/ 100 ft.*[2]	*Plants/ft.*	*Pct.*	*Pct.*
EPTC	3.0	26	137	2	33	5
EPTC	5.0	9	40	2	47	35
EPTC	7.0	23	107	16	57	40
Check	----	586	1,312	19	0	0

[1] Per cent injury to sericea; 0 = no injury, 100 = complete kill.
[2] Number of grasses and broadleaf weeds per 100 feet of row, 12-inch band.

TABLE 5. EFFECT OF EPTC ON GRASS AND BROADLEAF WEED CONTROL, CROP INJURY, AND SEED YIELD OF SERICEA LESPEDEZA, PLANT BREEDING UNIT, 1967

Herbicide	Rate	Stand		Crop injury[1]		Seed yield 11/3/67
		Grass weeds 6/14/67	Broadleaf weeds 6/14/67	6/14/67	8/18/67	
	Lb./A	*Plants/ 100 ft.*[2]	*Plants/ 100 ft.*[2]	*Pct.*	*Pct.*	*Lb./A*
EPTC	3.6	58	123	12	0	648
EPTC	4.8	74	99	27	0	809
EPTC	9.6	58	64	45	27	572
Check		303	86	0	0	652

[1] Per cent injury to sericea; 0 = no injury, 100 = complete kill.
[2] Number of grasses or broadleaf weeds per 100 feet of row, 12-inch band.

In general, EPTC was more injurious to sericea than vernolate, Figure 1. Injury was more pronounced in 1966 than in 1967 and was greater on sandy soil than on clay soil.

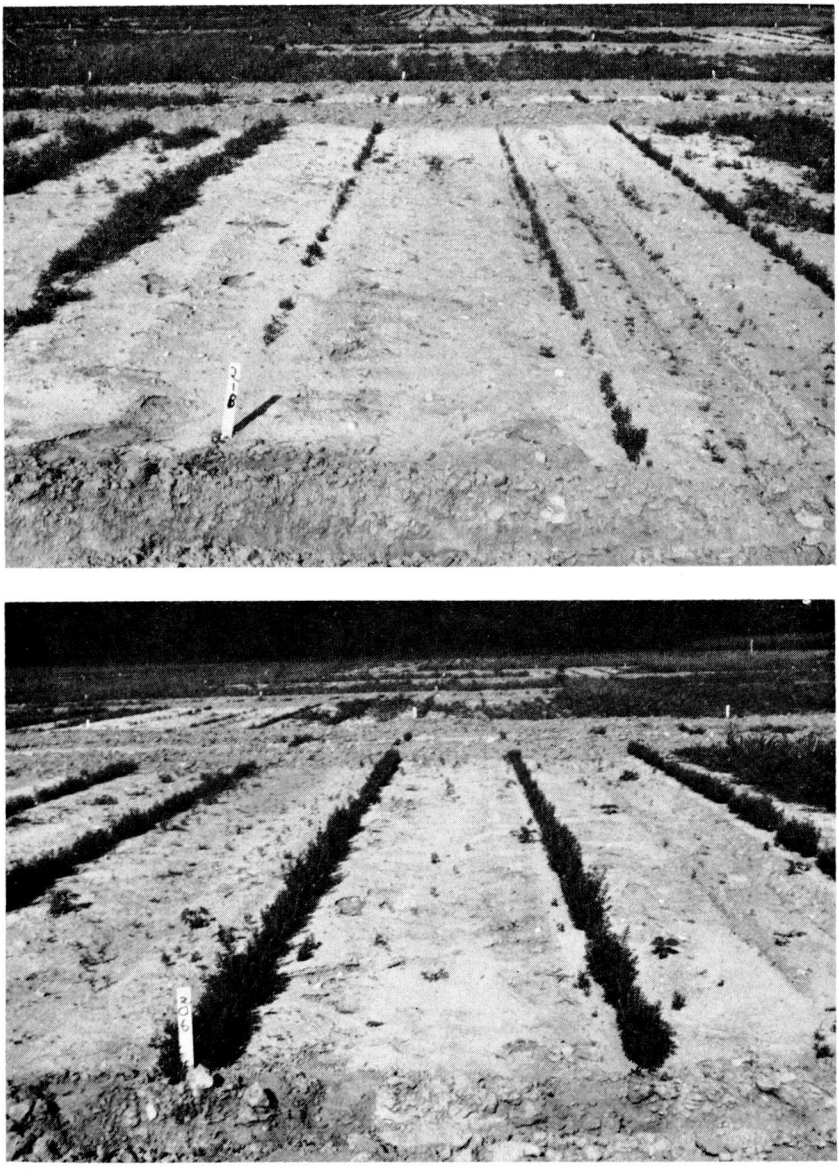

FIG. 1 Sericea lespedeza plots showing degree of injury from EPTC and vernolate. The severe stunting shown in the upper photo was on a plot that had been treated with 7 lb./A of EPTC. The uninjured sericea in the lower photo was on a plot that had been treated with 8 lb./A of vernolate.

TABLE 6. EFFECT OF EPTC ON GRASS AND BROADLEAF WEED CONTROL, SERICEA STANDS, AND INJURY TO SERICEA LESPEDEZA, TUSKEGEE EXPERIMENT FIELD, 1967

Herbicide	Rate	Stand			Crop[1] injury	Av. height of sericea
		Grass weeds 8/13/67	Broadleaf weeds 8/13/67	Sericea 8/13/67		
	Lb./A	*Plants/ 100 ft.*[2]	*Plants/ 100 ft.*[2]	*Plants/ft.*	*Pct.*	*In.*
EPTC	3.6	50	419	75	0	15
EPTC	4.8	13	469	75	10	18
EPTC	9.6	13	606	74	3	14
Check		769	175	71	0	15

[1] Per cent injury to sericea; 0 = no injury, 100 = complete kill.
[2] Number of grasses or broadleaf weeds per 100 feet of row, 12-inch band.

Benefin gave acceptable grass control at all rates that were evaluated, Tables 7,8, and 9. Control of broadleaf weeds, such as pigweed and carpetweed, was acceptable; however, ragweed, morningglory, and sicklepod (coffeeweed) were not controlled. Stands of sericea were not reduced by any benefin treatment in 1966 and only by the highest rate at one location in 1967, Tables 8 and 9. Although early stunting of sericea occurred on some of the plots treated with benefin in 1966 and at one location in 1967, this was not reflected in a decrease in height when measured at the end of the growing season, Table 9. Injury was more severe on the sandy soil than on the sandy clay soil where no height reduction was evident after 6 weeks, Tables 8 and 9. The lower yield of sericea seed on plots treated with benefin is attributed to late season competition from broadleaf weeds. Plots treated with the lowest rate of benefin had a higher population of broadleaf weeds at the end of the growing season than did the cultivated check.

Bensulide and siduron both gave effective grass control in each experiment during the 2-year period, Tables 10,11, and 12. Broadleaf weed control was poor in all cases. Where observed, crop injury was slight and of short duration. Neither bensulide nor siduron reduced crop height in the experiment conducted on the sandy clay soil in 1967. Bensulide did not cause a reduction in yield of sericea seed at any rate tested, Table 11.

Control of early season weeds in established stands of sericea is sometimes a problem. If a herbicide that would give control for the first 5 to 8 weeks of the growing season were used, competition from sericea would probably eliminate most late-germinating weeds.

TABLE 7. EFFECT OF BENEFIN ON GRASS AND BROADLEAF WEED CONTROL, SERICEA STANDS, AND INJURY TO SERICEA LESPEDEZA, PLANT BREEDING UNIT, 1966

Herbicide	Rate	Stand			Crop injury[1]	
		Grass weeds 5/30/67	Broadleaf weeds 5/30/67	Sericea 5/30/67	4/28/67	6/24/66
	Lb./A	*Plants/ 100 ft.*[2]	*Plants/ 100 ft.*[2]	*Plants/ft.*	*Pct.*	*Pct.*
benefin	0.75	70	344	23	5	2
benefin	1.0	171	304	21	7	5
benefin	1.5	36	352	26	3	0
benefin	2.0	49	350	18	15	20
Check	----	586	1,312	19	0	0

[1] Per cent injury to sericea; 0 = no injury, 100 = complete kill.
[2] Number of grasses or broadleaf weeds per 100 feet of row, 12-inch band.

TABLE 8. EFFECT OF BENEFIN ON GRASS AND BROADLEAF WEED CONTROL, CROP INJURY, AND SEED YIELD OF SERICEA LESPEDEZA, PLANT BREEDING UNIT, 1967

Herbicide	Rate	Weed control		Crop injury[1]		Seed yield 11/3/67
		Grass weeds 6/14/67	Broadleaf weeds 6/14/67	6/14/67	8/18/67	
	Lb./A	*Plants/ 100 ft.*[2]	*Plants/ 100 ft.*[2]	*Pct.*	*Pct.*	*Lb./A*
benefin	0.9	3	33	17	17	413
benefin	1.2	0	36	47	27	444
benefin	2.4	4	32	42	22	541
Check	----	303	86	0	0	652

[1] Per cent injury to sericea; 0 = no injury, 100 = complete kill.
[2] Number of grasses or broadleaf weeds per 100 feet of row, 12-inch band.

TABLE 9. EFFECT OF BENEFIN ON GRASS AND BROADLEAF WEED CONTROL, SERICEA STANDS, AND INJURY TO SERICEA LESPEDEZA, TUSKEGEE EXPERIMENT FIELD, 1967

Herbicide	Rate	Stand			Crop[1] injury	Av. height of sericea
		Grass weeds 8/13/67	Broadleaf weeds 8/13/67	Sericea 8/13/67		
	Lb./A	*Plants/ 100 ft.*[2]	*Plants/ 100 ft.*[2]	*Plants/ft.*	*Pct.*	*In.*
benefin	0.9	206	525	74	0	14
benefin	1.2	169	256	83	17	16
benefin	2.4	106	569	59	10	14
Check		769	175	71	0	15

[1] Per cent injury to sericea; 0 = no injury, 100 = complete kill.
[2] Number of grasses or broadleaf weeds per 100 feet of row, 12-inch band.

TABLE 10. EFFECT OF BENSULIDE AND SIDURON ON GRASS AND BROADLEAF WEED CONTROL, SERICEA STANDS, AND INJURY TO SERICEA LESPEDEZA, PLANT BREEDING UNIT, 1966

Herbicide	Rate	Stand			Crop injury[1]	
		Grass weeds 5/30/67	Broadleaf weeds 5/30/67	Sericea 5/30/67	4/28/66	6/24/66
	Lb./A	*Plants/ 100 ft.*[2]	*Plants/ 100 ft.*[2]	*Plants/ft.*	*Pct.*	*Pct.*
bensulide	4.0	4	430	16	5	0
bensulide	8.0	2	369	28	3	0
siduron	4.0	91	320	21	5	0
siduron	8.0	5	212	23	7	0
siduron	12.0	4	275	20	15	0
Check		586	1,312	19	0	0

[1] Per cent injury to sericea; 0 = no injury, 100 = complete kill.
[2] Number of grasses or broadleaf weeds per 100 feet of row, 12-inch band.

TABLE 11. EFFECT OF BENSULIDE ON GRASS AND BROADLEAF WEED CONTROL, CROP INJURY, AND SEED YIELD OF SERICEA LESPEDEZA, PLANT BREEDING UNIT, 1967

Herbicide	Rate	Weed control		Crop injury[1]		Seed yield 11/3/67
		Grass weeds 6/14/67	Broadleaf weeds 6/14/67	6/14/67	8/18/67	
	Lb./A	*Plants/ 100 ft.*[2]	*Plants/ 100 ft.*[2]	*Pct.*	*Pct.*	*Lb./A*
bensulide	4.8	3	31	0	0	662
bensulide	9.6	0	22	0	0	720
Check	----	303	86	0	0	652

[1] Per cent injury to sericea; 0 = no injury, 100 = complete kill.
[2] Number of grasses or broadleaf weeds per 100 feet of row, 12-inch band.

TABLE 12. EFFECT OF BENSULIDE AND SIDURON ON GRASS AND BROADLEAF WEED CONTROL, SERICEA STANDS, AND INJURY TO SERICEA LESPEDEZA, TUSKEGEE EXPERIMENT FIELD, 1967

Herbicide	Rate	Stand			Crop[1] injury	Av. height of sericea
		Grass weeds 8/13/67	Broadleaf weeds 8/13/67	Sericea 8/13/67		
	Lb./A	*Plants/ 100 ft.*[2]	*Plants/ 100 ft.*[2]	*Plants/ft.*	*Pct.*	*In.*
bensulide	4.8	25	194	67	10	16
bensulide	9.6	63	644	69	0	15
siduron	9.6	106	538	75	0	16
Check	----	769	175	71	0	15

[1] Per cent injury to sericea; 0 = no injury, 100 = complete kill.
[2] Number of grasses or broadleaf weeds per 100 feet or row, 12-inch band.

Preemergence herbicides such as atrazine, prometryne, fluometuron, diuron, and linuron gave effective control of most annual grasses and weeds when applied in early spring to dormant lespedeza, Table 13.

TABLE 13. EFFECT OF HERBICIDES ON WEED CONTROL AND SERICEA LESPEDEZA WHEN APPLIED TO DORMANT SERICEA, PLANT BREEDING UNIT, 1967

Herbicide	Rate	Weed[1] control	Crop injury[2]	
			4/8/67	7/8/67
	Lb./A	*Rating*	*Pct.*	*Pct.*
atrazine	2.5	10.0	12	0
atrazine	5.0	9.5	57	20
prometryne	2.5	10.0	07	0
prometryne	5.0	10.0	17	0
fluometuron	1.5	8.0	12	0
fluometuron	2.0	9.0	05	0
fluometuron	3.0	10.0	25	20
diuron	1.0	5.2	25	0
diuron	2.0	8.7	00	0
linuron	2.0	10.0	07	0
linuron	4.0	10.0	17	0
Check		0.0	00	0

[1] Per cent weed control; 0 = no control, 10 = complete control.
[2] Per cent crop injury; 0 = no injury, 100 = complete kill.

SUMMARY AND CONCLUSIONS

Various herbicides were evaluated in a 2-year period for control of weeds during stand establishment and in established stands of sericea lespedeza. Of the herbicides evaluated, vernolate appeared to offer the greatest promise. Vernolate gave acceptable control of grasses and some broadleaf weeds at rates of 2.0 pounds per acre or higher. Sericea was tolerant to 9.6 pounds per acre of vernolate. Weed control with EPTC was comparable to that of vernolate; however, EPTC caused more injury to sericea. This was particularly true on sandy loam soil.

Benefin, siduron, and bensulide gave acceptable control of annual grasses and some broadleaf weeds. Most rates of these herbicides caused little or no injury to sericea. Atrazine, fluometuron, prometryne, diuron, and linuron gave control of annual grasses and broadleaf weeds when applied to an established stand of dormant sericea.

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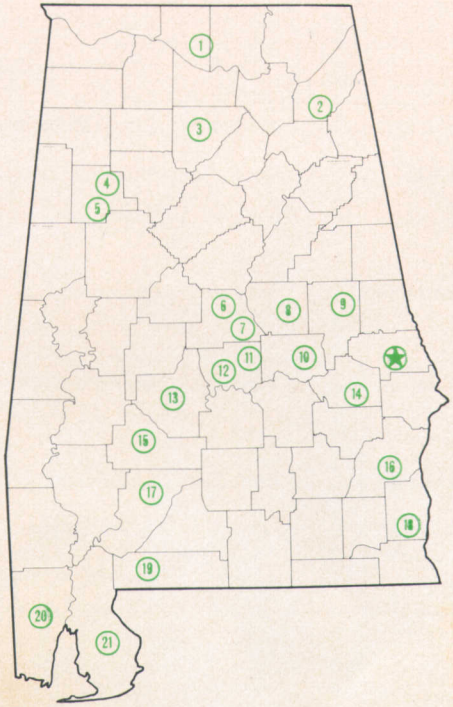
APPENDIX

COMMON AND CHEMICAL NAMES OF HERBICIDES INCLUDED IN VARIOUS EXPERIMENTS

Common name	Trade name	Method of Application	Chemical Name
vernolate	Vernam	preplant incorporated	*S*-propyl dipropylthiocarbamate
EPTC	Eptam	preplant incorporated	ethyl *N*, *N*-dipropylthiocarbamate
benefin	Balan	preplant incorporated	*N*-butyl-*N*-ethyl-alpha, alpha, alpha,-trifluoro-2,6-dinitro-*p*-toluidine
bensulide	Betasan	preemergence	*N*-(2-mercaptoethyl) benzenesulfonamide S-(*0,0*-diisopropyl phosphorodithioate)
siduron	Tupersan	preemergence	1-(2-methylcyclohexyl)-3-phenylurea
fluometuron	Cotoran	preemergence	3-(*m*-trifluoromethylphenyl)-1,1-dimethylurea
atrazine	Atrazine	postemergence	2-chloro-4-ethylamino-6-isopropylamino-*s*-triazine
linuron	Lorox	postemergence	3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea
diuron	Karmex	postemergence	3-(3,4-dichlorophenyl)-1,1-dimethylurea

AGRICULTURAL EXPERIMENT STATION SYSTEM OF ALABAMA'S LAND-GRANT UNIVERSITY

With an agricultural research unit in every major soil area, Auburn University serves the needs of field crop, livestock, forestry, and horticultural producers in each region in Alabama. Every citizen of the State has a stake in this research program, since any advantage from new and more economical ways of producing and handling farm products directly benefits the consuming public.



Research Unit Identification

★ Main Agricultural Experiment Station, Auburn.

1. Tennessee Valley Substation, Belle Mina.
2. Sand Mountain Substation, Crossville.
3. North Alabama Horticulture Substation, Cullman.
4. Upper Coastal Plain Substation, Winfield.
5. Forestry Unit, Fayette County.
6. Thorsby Foundation Seed Stocks Farm, Thorsby.
7. Chilton Area Horticulture Substation, Clanton.
8. Forestry Unit, Coosa County.
9. Piedmont Substation, Camp Hill.
10. Plant Breeding Unit, Tallassee.
11. Forestry Unit, Autauga County.
12. Prattville Experiment Field, Prattville.
13. Black Belt Substation, Marion Junction.
14. Tuskegee Experiment Field, Tuskegee.
15. Lower Coastal Plain Substation, Camden.
16. Forestry Unit, Barbour County.
17. Monroeville Experiment Field, Monroeville.
18. Wiregrass Substation, Headland.
19. Brewton Experiment Field, Brewton.
20. Ornamental Horticulture Field Station, Spring Hill.
21. Gulf Coast Substation, Fairhope.