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HERBICIDE TESTS

For Kudzu Eradication

By

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and

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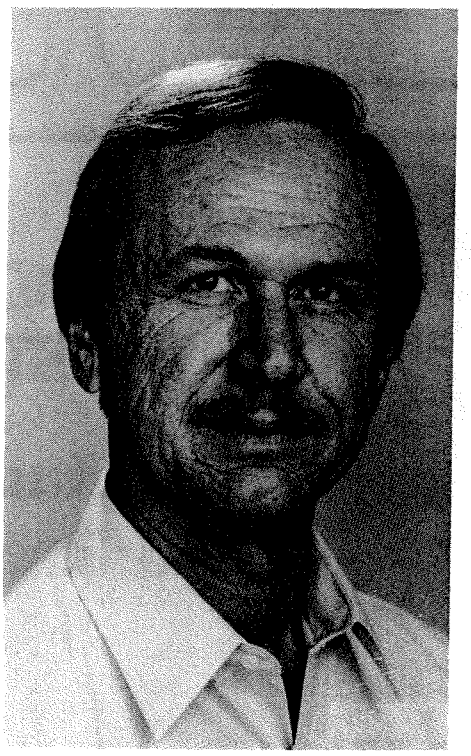
RESEARCH DIVISION

GEORGIA FORESTRY COMMISSION

ABOUT THE AUTHORS



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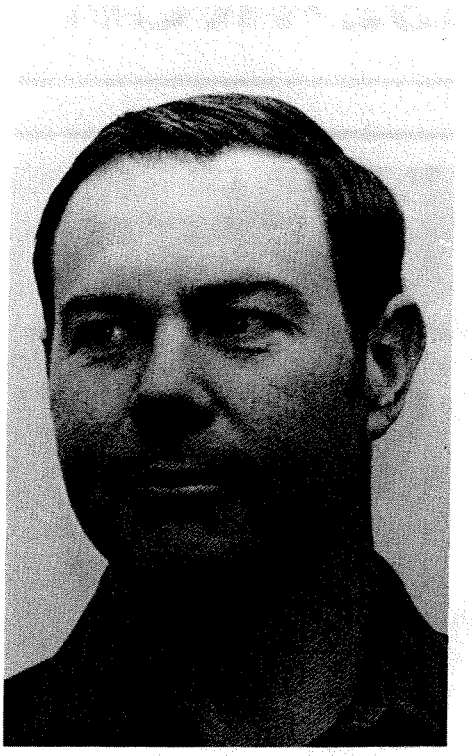

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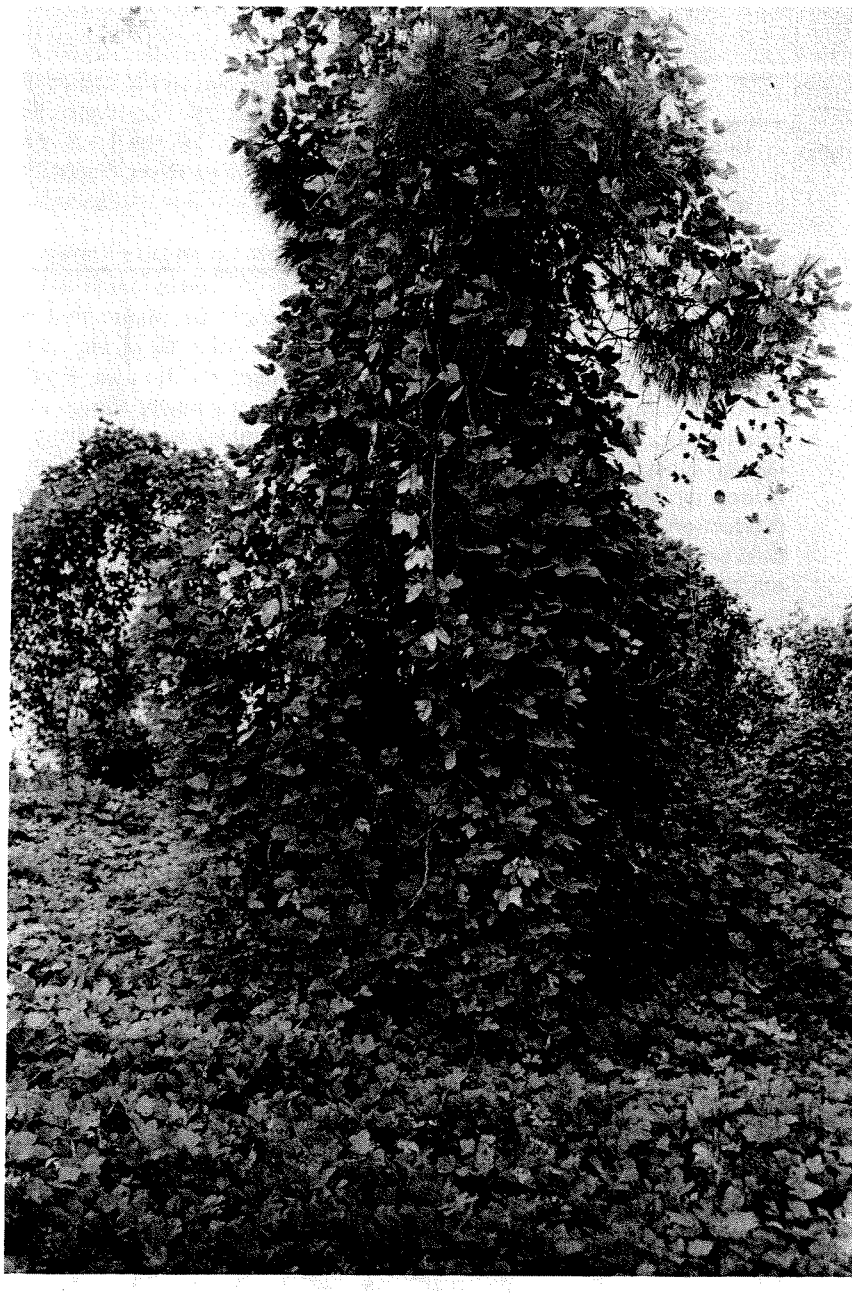
HERBICIDE TESTS For Kudzu Eradication



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ABSTRACT

Kudzu control treatments using 15 herbicides at 1 and 2 rates were tested at six locations in Georgia and Alabama. Treatments and retreatments occurred over a 2-year period. Tordon® 101 Mixture at 2 gal/acre was the most cost-effective treatment, averaging about $77 per acre for herbicide costs. Tordon 10K Pellets (presently not being manufactured) gave slightly better control, but at 3 times the cost. Both herbicides reduced kudzu coverage to 1% or less. Banvel® gave greater than 95% control with an average cost of $220 per acre. All treatments decreased in effectiveness as patch age increased and as soils became more stony.

Tree-draped kudzu was controlled using a 1% solution of Garlon® 4 in diesel oil applied only to vines before foliage developed. Tordon 101 Mixture and Banvel 720 were sprayed at 1 gal/acre on kudzu growing under and on 35 ft pines without pine mortality. Several treatments at this rate spaced at least 2 growing seasons apart will be required to eradicate kudzu that is invading pine stands of this size.

[1]Discussion of herbicides in this paper does not constitute recommendation of their use or imply that uses discussed here are registered. If herbicides are handled, applied or disposed of improperly, there is potential for hazards to the applicators, offsite plants, and environment. Herbicides should be used only when needed and should be handled safely. Follow the directions and heed all precautions on the container label.

INTRODUCTION

Kudzu is a costly vine pest because it is completely stopping forest production on millions of acres in the Southeast. This oriental vine, once considered to be the ultimate solution to soil erosion, is so relentless it can completely overwhelm the largest trees. Most timberlands can produce an average of at least $50 to $75 per acre per year in wood. Economically then, this amount could be spent annually on eradication treatments before establishing pines. Without eradication, the landowner not only loses potential wood production, but kudzu strengthens its hold on the land, and the owner's regular tax payments accelerate and compound the annual loss.

The most widely used herbicide for kudzu control since the mid-1960's has been Tordon 10K Pellets. Thousands of acres have been reclaimed from kudzu's hold by using 40 to 60 lb of this product per acre. However, the price of this pelleted herbicide has doubled in the past few years, resulting in effective kudzu treatments that cost $240 per acre and more. In an effort to identify more cost-effective herbicides, the study reported here was initiated with the cooperation of the Georgia and Alabama Forestry Commissions, the Southern Forest Experiment Station of the U. S. Forest Service, and Alabama River Woodlands Corporation of Monroeville, Alabama.

What is already known?

A kudzu patch is comprised of rootstocks or plants that range in age from one year to as old as the first establishment on the area. Plants can vary in size from a newly rooted node on a vine to a complex system having as much as 200 lb of woody root and stem tissue.

Auburn University researchers (Davis and Funderburk 1964) found that it took 13 treatments and retreatments of a 1:1 mixture of 2, 4-D and 2,4,5-T to finally eradicate kudzu on test plots. Although different rates of application were tested--varying from 0.5 to 5 lb acid equivalent per acre, the 13 treatments at all rates were still required. From this it can be assumed that the large rootstocks were the hardest to control. Also, the repeated retreatments were more important to eradication success than the rates.

Brender and Moyer (1965), U. S. Forest Service researchers at Macon, Georgia, reported on the exceptional success of Tordon herbicides. They tested Tordon 10K Pellets and the liquid formulations, Tordon K and Tordon 101 Mixture. The pellets and Tordon K contain only the soil-active ingredient picloram (10% and 24%, respectively), and the Tordon 101 Mixture has picloram (10.2%) and 2,4-D amine (39.6%). Repeated applications in two successive years were required of the Tordon 10K and Tordon K, regardless of initial rate, and results were not followed past 2 years. They concluded that the spray applications were more effective than the pellets and that the pellets were least effective on sloping ground.

Other researchers at Auburn University (Dickens and Buchanan 1971) applied many of the available herbicides at different times during the growing season. They found that Tordon 101 Mixture was consistently effective when sprayed from June to October. Another herbicide, Banvel (Table 2) showed promise in these 1-year studies and was best when applied after August, in central Alabama. Tordon 101, Tordon K and Banvel were shown to be more effective than 2,4-D or 2,4,5-T. Banvel pellets have also been found effective, while Velpar® granules gave mixed results (Miller 1982).

Further herbicide trials (Miller 1985)

Figure 1. The tractor-sprayer treating the large research plots.

identified the effective control afforded by repeated applications of Banvel 720 ® and Spike® herbicides. Spike 80W (80% wettable powder of tebuthiuron) was shown to provide good control and is registered for fencerow applications on noncroplands. Several herbicides that are labeled for kudzu control, such as Roundup®and Acme Brushkiller®, were found found to be ineffective at the timings and rates tested. Kudzu treatments were shown to be best assessed 1 or 2 years after application, certainly not at the end of the same year of application. It was reported that partially controlled rootstocks, while showing no sign of growth, can survive under the ground for at least one growing season.

METHODS

Patch Treatments

In this particular study, six different kudzu patches were used to test herbicide treatments. Three locations were in Georgia and three in Alabama (Table 1). Four of these were on the Piedmont and two were on the Upper Coastal Plain. Five locations were along main highways; and these experiments also served as demonstration areas where public information signs marked each treatment and showed herbicide costs.

Fifteen herbicides were applied at 1 or 2 rates to 20 plots at each location (Table 2). In this randomized complete-block study design locations acted as blocks. At five of the locations 40-x40-ft plots were used, separated by 5-ft buffer strips. On these plots herbicide mixtures were applied with a CO_2-backpack research sprayer in two perpendicular spray passes to ensure complete and uniform coverage. The equivalent of 80 gal/acre of spray volume was applied to assure foliar coverage. At the sixth location in southern Alabama, nonreplicated 0.5- and 0.25-acre plots were used, with 5-ft buffer strips. Between-plot buffers were maintained by periodic applications of Tordon 101. On the large plots, a tractor sprayer (Figure 1) was used to simulate operational applications and a cluster-nozzle (Spraying System's 5880 Boomjet Nozzle) provided broadcast coverage with a handgun for spot applications. Perpendicular spray passes were not used on these plots, but several passes in opposite directions were performed. Pelleted herbicides were applied uniformly by hand at all locations.

All herbicides were applied in late May and June, except Krenite® , Roundup ® and Garlon® 4 and Garlon 3A, which were applied in August according to

Table 1. Approximate age of kudzu and soil properties at each study location.

Location	Patch Age	pH	Organic Matter	Sand	Silt	Clay
	Years		Percent			
Georgia:						
Carrollton[1]	10	5.1	2.9	55	25	20
Newnan[1]	30	6.0	1.4	58	22	20
Buena Vista[1]	20	5.2	2.2	75	15	10
Alabama:						
Dadeville[1]	10	5.0	1.6	54	27	20
Opelika[1]	40	4.9	2.7	52	27	21
Monroeville	30	5.5	1.7	64	20	16

[1]Study locations where treatments were applied to the 40- x 40-ft plots.

Table 2. Description of the test herbicides.

Herbicide	Manufacturer	Formulation[1]
Tordon 10K Pellets[2]	Dow	10% a.i. pellet of picloram
Trodon 101 Mixture[2]	Dow	½ lb a.e. picloram + 2 lb a.e. 2,4-D amine per gal
Spike 40P[3]	Elanco	40% a.i. pellet of tebuthiuron
Banvel	Velsicol	4 lb a.i. dicamba per gal
Banvel 520	Velsicol	1 lb a.i. of dicamba + 2 lb a.i. 2,4-D ester per gal
Banvel 720	Velsicol	1 lb a.i. dicamba + 2 lb a.i. 2,4-D amine per gal
Amitrol T[2]	Union Carbide	2 lb a.i. amitrole per gal
Krenite	Dupont	4 lb a.i. fosamine per gal
Garlon 4	Dow	4 lb a.i. triclopyr ester per gal
Garlon 3A	Dow	3 lb a.i. triclopyr amine per gal
Roundup	Monsanto	4 lb a.i. glyphosate per gal
Oust	Dupont	75% a.i. disperable granule of sulfometuron methyl
2,4,5-T ester[3]	none	4 lb a.e. 2,4,5-T ester per gal
2,4-D ester	several	3.8 lb a.i. 2,4-D ester per gal
Super Brush Killer	P.B.I. Gordon	½ lb a.e. dicamba + 2 lb a.e. 2,4-D ester + 2 lb a.e. 2,4-DP ester per gal
Maintain CF125	Uniroyal	1 lb a.i. chlorflurenol ester per gal
Weedone 2,4-DP	Union Carbide	4 lb a.e. 2,4-DP amine per gal

[1]Formulations are soluble liquids if not otherwise specified; a.i.=active ingredient; a.e.=acid equivalent (weight of the acid form of the active ingredient).

[2]Restricted use pesticide; Consult with your county agent before purchasing.

[3]Herbicide not currently labeled for use in the South.

manufacturer's recommendations. Plot retreatments were performed for 2 years. Herbicides applied in early summer were also retreated as broadcast or spot treatments in August the first year if regrowth warranted. Spraying was usually performed in the early morning hours with high relative humidites and low wind. Adequate rainfall occurred before and after all applications, which ensured active growth of the kudzu and also activation of pellets. This number of test areas was used to ensure that any findings from this research would hold true for a wide range of patch and treatment conditions.

Assessments of treatments were made on the small plots by estimating ground cover of kudzu plants on the interior 20 x 20 ft. On the large plots, coverage estimates were the average of four 20- x 20-ft measurement plots. Plot assessments were made twice a year and retreatments were applied according to these assessments and recommended application times. If coverage of kudzu was greater than 5%, a broadcast retreatment was applied; if less, then a spot retreatment was used. On plots with less than 2% coverage, each surviving rootstock was marked and coded to determine the effectiveness of the spot treatments.

Herbicide costs presented in Tables 3 and 4 are only estimates for the reader's information. The cost estimates were calculated using 1985 suggested retail prices for 30-gal drums (liquids) and 50-lb cartons (pellets), as prices vary considerably by the quantities purchased. Records were kept on herbicide usage for each plot so that cost of retreatments could be calculated.

Unlike other forest competition, kudzu must be completely eradicated from any one area or it will spring back from a few surviving rootstocks to engulf any planted tree seedlings. Thus, zero-percent coverage of kudzu regrowth is the uncompromising goal of any herbicide treatment program for this vine pest.

Table 3. Treatment results from 40 x 40 ft plots: rate of herbicide treatment and retreatment, percentage of kudzu ground cover 2 years after treatment, and cost of herbicide.

Herbicide	Initial Rate	Retreatment[1] Type	No.	Rate	Kudzu cover	Herbicide cost[2]
	Product/acre				Percent	$/acre
Tordon 10K Pellets	50 lb	s	2	1 teaspoon per crown	0.1	245
Tordon 10K Pellets	40 lb	s	2	1 teaspoon per crown	0.8	266
Tordon 101 Mixture	3 gal	s	2	1 pt in 3 gal water	1.0	99
Tordon 101 Mixture	2 gal	s	2	1 pt in 3 gal water	1.0	77
Spike 40P	15 lb	s	1	5 pellets per crown	0.4	*
Banvel	2 gal	sb	2	½ gal/acre	5.0	220
Amitrol-T[3]	2 gal	sb	3	same as initial	13.0	165
Amitrol-T[3]	1 gal	sb	3	same as initial	39.0	90
Krenite	3 gal	b	1	1 gal/acre	29.0	150
Garlon 4	1 gal	b	1	½ gal/acre	34.0	105
Garlon 3A	1½gal	b	1	½ gal/acre	35.0	110
Roundup[3]	1 gal	b	1	½ gal/acre	36.0	105
Oust[3]	22 oz	sb	2	same as initial	37.0	285
Oust[3]	12 oz	sb	2	same as initial	53.0	184
2,4,5-T ester	1 gal	sb	1	same as initial	49.0	*
2,4-D ester	2 gal	b	2	same as initial	57.0	70
Super Brush Killer	1 gal	b	2	same as initial	64.0	130
Maintain CF 125	1 gal	b	2	same as initial	83.0	226
Weedone 2,4-DP	1 gal	b	2	same as initial	92.0	75
Check	--	--	--	----	100.0	--

[1]Retreatment: s=spot treatment; b=broadcast retreatment; sb=plots required either spot or broadcast retreatment

[2]1985 prices.

[3]A wetting agent was added to the spray mixture.

*A recommended selling price was not available becasue these herbicides are not labeled for application in southeastern states.

Draped Kudzu Treatments

Three research studies were performed on the control of draped kudzu, that kudzu which is growing up into trees and hanging down in a draped fashion. One study tested water-soluble herbicides, another oil-soluble herbicides, and a third tested tractor application of Tordon 101 and Banvel 720 in a tree-draped pine stand.

Water-soluble herbicides that were safe to apply under pines were selected for testing. At the study location near Buena Vista, Georgia, each herbicide mixture was applied to three draped loblolly pine trees (each a replication) that were 40 ft tall and occurred around the margins of the test patch. Treatments were assigned randomly to a population of preselected trees. Herbicides were applied in June as 1 gal of mixture per tree. Application was made to kudzu foliage up to a height of 15 ft and for a radius of 5 ft around each tree. A 3-gal hand sprayer was used. Kudzu vines were examined in June the following year and the maximum diameter of vine that was controlled was recorded.

Another study at the location near Opelika, Alabama, tested oil-soluble herbicides using the same experimental procedure as the water-soluble herbicide test. The only application difference was that spraying was mainly on vines in early April before foliage was fully developed. A 1% mixture of diesel oil and herbicide, again to a height of 15 ft, was applied. Vine kill was assessed in August of the same year. Dead vines could easily be broken, and thus positive identification of control was possible at this time.

The third tree-draped study tested 1- and 2-gal/acre rates of Tordon 101 and Banvel 720 applied by a tractor sprayer with a cluster nozzle to replicated 0.4-acre plots. The treatments were replicated 3 times. The study site near Eatonton, in central Georgia, had kudzu invading an established pine plantation. The pines averaged 35 ft in height with kudzu growth in the crowns. Treatments were applied in October using 40 gal of mixture per acre and spraying the ground and draped kudzu up to a height of 10 ft. Treatment effectiveness and pine damage were assessed the following growing season in May and October.

RESULTS

Patch Treatments

The most effective herbicides tested for the treatment of kudzu were Tordon 10K Pellets, Tordon 101 Mixture, and Spike 40P Pellets -- an experimental herbicide (Table 3). Tordon 10K was most effective at the 50-lb/acre rate, with an average cost that was slightly cheaper

than the 40-lb rate when retreatments were included. As far as herbicide costs, spray applications of Tordon 101 yielded almost comparable control to the pellets with a much lower herbicide cost. The majority of regrowth on Tordon-treated plots came in the second growing season after treatments, when partially controlled rootstocks recuperated and resprouted.

The relative effectiveness of the other tested herbicides can be judged from the 2-year results presented in Table 3. Banvel and Amitrol T, both at 2 gal/acre, were fairly cost-effective, but Amitrol T does not appear capable of completely controlling the larger kudzu plants. The other herbicide rates listed below Amitrol in Table 3 are ineffective in controlling large kudzu plants that have rootstocks greater than 2 inches in diameter.

The amount of control provided by both the effective and ineffective herbicides varied by location, with the difficulty of control mainly correlated to patch age. Plots in patches that were less than 10 years old were essentially controlled with one application of Tordon herbicides, requiring at the most only 1 or 2 spot retreatments in the second growing season. Also, Amitrol T at the 2-gal/acre rate, Banvel, Oust, Super Bush Killer, 2,4-D and 2,4,5-T produced greater than 90% control after 2 broadcast treatments on these younger patches. The 40-year-old patch near Opelika, which was the oldest test patch, had 3 times more kudzu

Table 4. Large plot results (Monroeville, AL): rate of herbicide treatment and retreatment, percentage of kudzu ground cover 2 years after treatment, and cost of herbicide.

Herbicide	Initial Rate	Retreatment[1] Type	No.	Rate	Kudzu cover	Herbicide cost[2]
	Product/acre				Percent	$/acre
Tordon 10K Pellets	50 lb	s	3	tablespoon per crown	0.5	284
Tordon 10K Pellets	40 lb	s	3	tablespoon per crown	0.1	225
Tordon 101 Mixture	3 gal	sb	2/1	--[4]	1.0	116
Tordon 101 Mixture	2 gal	sb	2/1	--[4]	6.0	104
Spike 40P	15 gal	s	1	5 pellets per crown	0	*
Banvel	2 gal	b	3	1 gal/acre	20.0	374
Amitrol T[3]	2 gal	b	3	same as initial	80.0	120
Amitrol T[3]	1 gal	b	3	same as initial	98.0	60
Krenite	3 gal	b	1	1 gal/acre	100.0	150
Garlon 4	1 gal	b	1	½ gal/acre	95.0	105
Garlon 3A	1½ gal	b	1	½ gal/acre	98.0	110
Roundup[3]	1 gal	b	1	½ gal/acre	100.0	105
Oust[3]	22 oz	b	1	same as initial	100.0	295
Oust[3]	12 oz	b	1	same as initial	100.0	160
2,4,5-T ester	1 gal	b	1	same as initial	98.0	*
2,4-D ester	2 gal	b	2	same as initial	100.0	60
Super Brush Killer	1 gal	b	2	same as initial	100.0	123
Maintain CF 125	1 qal	b	2	same as initial	100.0	90
Weedone 2,4-DP	1 gal	b	2	same as initial	100.0	75
Check	---	--	--	----	---	---

[1]Retreatment: s=spot treatment; b=broadcast retreatment; sb=plots required either spot or broadcast retreatments.

[2]1985 prices.

[3]A wetting agent was added to the spray mixture.

[4]Spot treatment made twice with 1 qt Tordon 101 in 3 gal water and one broadcast retreatment used ½ gal/A.

*A recommended selling price was not available, because these herbicides are not labeled for application in southeastern states.

Kudzu was first introduced into this country to stabilize eroding slopes.

cover after 2 years than the 10-year-old patch at Dadeville. This was probably due to the older age and therefore a greater density of larger plants. The only soil factor that appeared to be correlated with control-difficulty appeared to be stoniness--i.e., the more stones, the more difficult to control the kudzu.

Table 4 shows treatment results on the large plots near Monroeville and exemplifies the difficulty in controlling a kudzu patch 30 years or older. Control was less on these large plots due to the plants' large size, the presence of stony soils with frequent stony terraces, and lack of crosswise spraying during applications. Again, the soil-active pelleted herbicides were the most effective, with Spike 40P giving eradication on this plot. Control with the liquid herbicide mixtures often varied across the spray swath when using the cluster nozzle. The least control was on the outer edges. Amitrol T and Oust gave less control where tractor tires had passed. Probably uptake and translocation of the herbicides were disrupted by damage to the leaves and vines. However, this did not occur with all foliar active herbicides. The complete or nearly complete cover of kudzu on many treated plots does not mean that no kudzu was controlled by these herbicides. It does mean, however, that the numerous surviving plants quickly grew vines to recover the entire plot area.

Spot Retreatments

Spot retreatments using both the Tordon 101 and Banvel were completely effective when the foliage and root crown were thoroughly wetted with a mixture of 1 pt herbicide in 3 gal water. Spot treatments of the Tordon 10K pellets were only about 80% reliable and were least effective on stony and sloping ground. Even when pellets were placed on the uphill side of the surviving plant, control was not assured.

Tree-draped Treatments

The results of the water-soluble herbicide study are shown in Table 5. Only Oust at the highest tested rate provided total control, killing all vines less than 3/4 to 1 inch in diameter. However the costs of Oust treatments were high: at approximately $1.75 per tree for the high rate and $0.94 for the low rate (1985 prices). One severely infested and weakened test tree was killed by the high rate of Oust. The other test herbicides were not effective at the rates tested.

Table 5. Size of vines controlled 1 year after application using 1 gal of the mixture per kudzu-draped tree.

Herbicide mixed in 100 gal of water		Treated	Diameter of vines controlled, smaller than:
			Inches
Oust	1.7 lb	June	3/4-1
Oust	0.9 lb	June	1/2-3/4
Weedone 2,4-DP	1 gal	June	1/4-1/2
2,4,5-T	1 gal	June	1/2
2,4-D	1 gal	June	1/2
Amitrol T	2 gal	June	1/2
Maintain CF 125	1 gal	June	1/2
Super Brush Killer	1 gal	June	1/2
Roundup	1 gal	Aug.	1/2
Garlon 4	1 gal	Aug.	1/2
Krenite	3 gal	Aug.	1/2
Check	--	--	1/4-3/8[1]

[1]Vine size killed by winter cold.

Table 6. Size of vine controlled with herbicide-diesel mixtures applied as 1 gal per kudzu-draped tree. Treated in April and assessed in August of the same year.

Herbicide[1]	Diameter of vines controlled, smaller than
	Inches
Garlon 4	1
Banvel 520 + ½% wetting agent	1/2
Weedone 2, 4-DP	1/4
Super Brush Killer	1/4
Check	1/4[2]

[1]Herbicides all mixed as 1% solutions (1 gal in 100 gal) with diesel.

[2]Vine size killed by winter cold.

The results of the oil-soluble herbicide trial are presented in Table 6. Garlon 4 applied at 1 gal/tree of a 1% solution in diesel gave the best control. Only a few vines that exceeded 1 inch in diameter or vines that were shielded from the spray application by other entwining vines were not killed by this mixture. The cost of this treatment would be about $0.60 per tree. The other herbicides were not effective at the rates tested.

Results from the treatment of tree-draped plots using Tordon 101 and Banvel 720 are shown in Tables 7 and 8. Neither herbicide was especially effective in this situation after 1 application. In the open-patch trials, Tordon 101 was about twice as effective as Banvel 720 and this is generally what is shown in Table 1 with this tree-draped situation. Infestations in the study plots ranged from severe to light. The more densely covered plots were least controlled with Tordon while lower levels of kudzu growth were effectively reduced with just one application. Banvel generally yielded more consistent control. Although it is apparent from the May assessment that additional control was given by the higher rates, the greater levels of control were not enough to war-

Table 7. Kudzu coverage in trees and on the ground and honeysuckle coverage, as assessed during the first growing season after treatment.

Herbicide	Rate	Trees with Kudzu on Stems in Oct[1/]	Kudzu Ground Cover May	Kudzu Ground Cover Oct	Honeysuckle Ground Cover Oct
	Gal/acre	Percent			
Tordon 101	1	38	15	38	67
Tordon 101	2	39	5	38	60
Banvel 720	1	51	42	57	55
Banvel 720	2	43	27	57	62

[1/] Kudzu was climbing 100% of the stems before treatment and covered 100% of the ground. Honeysuckle averaged 80% coverage before treatment.

Table 8. Damage to overstory pines as a result of kudzu treatments, as assessed in May and October during the first growing season after applications.

Herbicide	Rate	Assessment	Pine Damage[1] None	Slight	Severe	Dead[1]	Total Number of Pines
	Gal/acre		Percent of Total				
Tordon 101	1	May	36	28	35	0	92
		Oct	98	1	1	0	
Tordon 101	2	May	40	27	33	0	82
		Oct	78	7	14	1	
Banvel 720	1	May	29	35	35	0	72
		Oct	100	0	0	0	
Banvel 720	2	May	40	30	30	0	48
		Oct	75	17	6	2	

[1]Pine damage classes: None=no damage, slight=needles yellow or brown on less than ¼ of the total crown, severe=needles discolored or dead on greater than ¼ of the total crown, dead=all needles brown or absent.

rant the added expense. Kudzu cover in October was equal for the two rates of both herbicides.

Table 8 shows that pine injury and death were increased by using the two gallon rates of both herbicides. At the low rates, most trees showing signs of damage at the May assessment recovered by October. At the higher rates, damage in a few trees was sufficient to attract bark beetles or other insects, which resulted in the death of 1 to 2% of the stand.

The presence of abundant honeysuckle complicated control treatments. Honeysuckle draped on the stems shielded some kudzu during herbicide spraying and also encouraged reinfestation. It has been observed that kudzu can climb into pine crowns much more rapidly when climbing honeysuckle is initially present. Kudzu is more adept at climbing other vines than pine boles. In this trial honeysuckle was not apparently controlled by the test treatments, because much of the honeysuckle was shielded by the kudzu during application. Honeysuckle is often found underneath kudzu during the growing season and dominant during the dormant season.

SUMMARY

The most cost-effective treatment for kudzu was Tordon 101 Mixture applied at 2 gal/acre using perpendicular spray passes. Retreatments should be applied two full years after the initial application. Tordon 10K pellets were slightly more effective than Tordon 101, but the cost was about 3½ times more. On young patches (less than 10 years old) the 40 lb/acre rate of Tordon 10K provided comparable control to the 50-lb rate. But for older patches the 50-lb rate was more cost-effective. Banvel provided better than 95% control, but required 2 successive broadcast treatments on older patches.

An experimental herbicide, Spike 40P, shows much promise as a single application treatment for eradication. The long persistence of this soil-active herbicide provides continued control over a 3-year period. Pine seedlings planted on these plots in the third planting season after application showed some toxicity symptoms but 75% survived one growing season.

For controlling kudzu draped on trees, a 1% solution of Garlon 4 in diesel oil gave control of 1 inch and smaller vines. Treatment can be in early spring, before new growth appears. Oust controlled draped kudzu when applied in the growing season but this treatment cost 3 times more than the Garlon 4 treatment. Spraying draped kudzu with Tordon 101 and Banvel 720 at 1 gal/acre rates did not kill 35 ft pines and appeared to be safe for plantations of similar size.

DISCLAIMER

Use of trade names is for the reader's information and convenience and does not constitute official endorsement or approval by the U. S. Department of Agriculture or the Georgia Forestry Commission to the exclusion of any other suitable product.

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