

# **KUDZU ERADICATION AND MANAGEMENT**

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October 2008

Kudzu patches can be eradicated with *persistent* treatments followed by establishment of fast growing trees or grasses that can out compete with the surviving kudzu plants or by manually removing surviving plants. Or kudzu can be contained and managed with other treatment options. Herbicides, grazing, prescribed burning, disk harrowing, plastic sheeting, and hand and mechanical removal of plants can be used alone or in combinations as eradication or containment treatments. For eradication, every kudzu plant in and around a patch must be killed or removed to prevent reoccupation that can make all prior efforts and investments useless. This means that all landowners sharing a patch must treat together. Landowners often find herbicide applications the easiest means for initiating eradication and containment while herbicides must be strictly applied according to exact label instructions, requirements, and prohibitions. Read, understand, and follow herbicide labels completely before and during use. Commercial applicators can be contracted to perform such applications, but the landowner must give directions in most cases to be successful and cost-effective. Also the establishment of pine plantations, pastures, sod, or other dense plantings as part of the eradication sequence must be done in a timely and proper manner.

## **Kudzu The Plant and Why it is Difficult to Control**

Kudzu cover is difficult to contain because vine runners on the soil surface can grow up to a foot a day in the spring. Newly rooted plantlets then occur at every node along these vine runners or what are termed stolons. Containment then requires either cutting these runners and/or herbicide treatments to control newly emerging plants. The ability of kudzu to spread increases as the plants age or when they grow draped over shrubs and trees. With age or when growing trellised on woody plants, the root crowns and roots grow larger faster. Root crowns are the “heart” of the kudzu plant that grows at the soil surface appearing as woody knots and then balls. Root crowns have buds where new vines start to grow, while the deep and often large roots do not have buds but are rich in starch to support growth. Kudzu patches have a range of plants and root crown sizes especially those over 10 years in existence. Repeatedly deadening or removing the foliage can weaken and kill small plantlets and root crowns while only effective herbicides or manual-mechanical removal can kill larger root crowns greater than about 2 inches in diameter. It is important to know that root crowns can go into stress dormancy after herbicide treatments or mechanical damage not to resprout for two to several years. This is why repeated treatments are necessary over several years, often using combinations of options, and then establishment of competing plants followed by surveillance.

## **Eradication using Livestock Grazing**

One treatment option for some landowners is livestock grazing. Close grazing for 3 to 4 years

can eliminate most kudzu plants when 80 percent or more of the vegetative growth is continuously consumed. All types of grazing animals will readily eat kudzu, but grazing by cattle, hair sheep, and meat goats have shown the most success in eradication. It is particularly helpful if kudzu is overgrazed in August and September for two to three years. Then fast growing tree species should be established at close spacing or pasture grasses planted and managed grazing pressure continued for one or two additional years. Grazing requires fencing the infested area and a source of water for the animals, plus supplemental feed and regular vaccinations to maintain livestock health. Also, vines must be cut from draped trees within the area so that animals can reach the foliage. Kudzu plants that persist after grazing can be eliminated with spot applications of herbicides or manual-mechanical removal of the root crowns (see [www.kokudzu.com](http://www.kokudzu.com) for details on the later).

### **Eradication using Herbicides**

Successful eradication programs using herbicides require that the following jobs be performed correctly: 1) identify the control situations, 2) prepare the site, 3) select the most effective herbicides, 4) treat properly, 5) retreat when necessary, and finally, 6) establish desirable vegetation like trees or grasses for long-term suppression of any emerging kudzu.

### **Site Inspection**

A patch should be inspected closely before treatments begin. This inspection, if done properly, will permit a more careful plan of attack on the patch. There are several basic situations that will require different treatment methods. These are:

- a) open patches on level ground,
- b) patches near ponds, streams, and ditch-banks,
- c) patches near residential sites,
- d) invasion of young pine plantations,
- e) noncroplands, like fence-rows, and
- f) forest openings with kudzu in desirable trees.

In the winter or early spring when kudzu is dormant, walk over the patch and determine your situation or locate the parts of a patch that are in these situations. The location of nearby sensitive homesites, crops (like soybeans, peanuts, and cotton), or gardens or ornamental trees should also be noted. Streams, gullies, ponds, and ditch-banks should be identified and their surrounding slopes estimated as far as possible routes of herbicide movement during rainstorms.

Control difficulty and herbicide rates will be determined by the age of the patch. Older patches, with large kudzu roots and root crowns, are the most difficult to eradicate. Root crowns will be large when the patch is over 10 years old or when vines have spread into trees. Examine the kudzu root crowns to plan treatment. If many of the root crowns are over 2 inches in diameter, it will probably require a higher herbicide rate and more retreatments for eradication. Higher rates and more treatments will also be required on clayey soils, especially if it is rocky or there are old terraces, or both. Also, downed trees and debris will hinder herbicides from reaching hidden kudzu plants and roots. Kudzu is especially difficult to eradicate under these situations.

### **Site Preparation**

For some patches in appropriate situations, mainly forest areas, prescribed burning can be used not only to reduce debris to facilitate more effective treatment but also to kill small kudzu plants and

to sever tree-draped vines. Burning will only kill the very small plants. A good time to burn is in February and early March when dead kudzu leaves are compacted for good fuel and winter exposure of erodible soils can be minimized following the burn. Many application hazards such as old wells or gullies can be found after a burn and marked using very tall poles with flagging. Also, the size and density of kudzu root crowns can be readily seen after a burn, to help identify areas that will require higher rates or more coverage.

Logging of kudzu-draped trees is advised one year in advance of treatment, if possible. Winter logging can permit the logs to be skidded into the patch so that vines are not spread further with logging. Skidding outside the patch will invariably spread kudzu.

Both grazing by livestock and disking with a harrow can be used for one or two summers prior to treatment to weaken kudzu plants. Disking can also be used several months after treatment to help disrupt and dislodge weakened kudzu roots.

### **Effective Herbicides**

#### **Open Patches on level ground**

Most herbicides will brown kudzu leaves and vines, but few will result in root crown control. Tordon 101 Mixture and Tordon K (see table at the end for common names and manufacturers) are the most cost-effective herbicides of the 25 tested on kudzu over an 8-year period. These are herbicides labeled for forest areas, not residential locations. Both herbicides are applied as sprays to the foliage and then the herbicide must be washed from the leaves by rainfall for root uptake. Both of these are **restricted use herbicides** because: they are very water soluble and can leach through sandy soils into streams and ground water; nearby trees with roots in the area can be killed or injured; many crops are very sensitive to these herbicides especially soybeans and grapes; and they are relatively persistent and may injure or kill plants introduced into the area too soon. A permit must be gained to purchase restricted use herbicides, which is issued by your county agent or state regulatory agency after proper use procedures are reviewed. Kudzu is a legume and Tordon herbicides are very effective on leguminous plants. Tordon herbicides are prohibited for use in Florida.

Effective rates are:

#### Kudzu less than 10 years old

- a. Tordon 101 Mixture at 1 gallon per acre
- b. Tordon K at 0.5 gallons per acre
- c. Tordon 101 Mixture at 0.5 gallons per acre  
+ Tordon K at 1 quart per acre

#### Kudzu more than 10 years old

- a. Tordon 101 Mixture at 2 gallons per acre
- b. Tordon K at 0.5 gallon per acre
- c. Tordon 101 Mixture at 1 gallon per acre  
+ Tordon K at 0.5 gallon per acre

The higher rates should be used on patches that are older than 10 years and on clayey and stony soils. Application of these herbicides can occur from June through September (see later section on application). Treatments should not be made with Tordon until at least June, because all kudzu plants must be growing at the time of treatment for control to be effective. Kudzu plants will not all emerge in a patch at the same time. The last applications should be made at least one month before expected frost. Tordon K treated kudzu will remain only yellow for some weeks to months, because it is slow in activity, which also results in the best control. The 2,4-D in Tordon 101 turns the foliage brown within a short period.

**Rainfall is required within 2 to 5 days after application for good control to occur with Tordon herbicides.** Ideally, rainfall less than one inch should occur two to three days after application. The herbicide must be washed into the upper soil layer for root uptake following foliar uptake. Both entry routes make this the most effective treatment. Also, Tordon is decomposed by sunlight and the longer it remains on the foliage without rainfall the less active ingredient will be present. Any trees with roots in or near the treated area may be injured or killed, while loblolly pine shows some resistance to low rates. Tordon should not be used near streams, ponds, and other sensitive areas. These herbicides can move in rain water and runoff, so do not use it where the slope will permit washing into off-site areas or to roots of desirable trees and plants

Even after using the more-effective Tordon herbicides, broadcast retreatments will be required in most cases and follow-up spot treatments in all cases, which are discussed in later sections.

There are other herbicides that are less effective than Tordon and more costly that can be used for containment and management on forested sites, as well as, multi-year treatments for possible eradication. These herbicides are (in decreasing order of effectiveness):

Escort XP by DuPont (4 ounces per acre),

Transline by DowAgro Sc (21 ounces per acre),

Oust XP by DuPont plus Accord (3 ounces plus 2 quarts per acre)

Arsenal Applicators Concentrate (1 quart per acre) or Chopper Gen II (2 quarts per acre) by BASF

Krenite by DuPont (3 gallons per acre),

Garlon 4 and 3A by Dow (1 to 2 gallons per acre), or

Accord SP by DowAgro Sc or Roundup Extra (glyphosate extra strength) (1 gallon per acre).

These herbicides and their generic substitutes work best on patches less than 10 years old, but may require two to ten annual broadcast treatments (Transline, Garlons and glyphosate) before spot treatments begin. Combining some herbicides in a tankmix will also increase their effectiveness. All of these should be applied after midsummer, after draped kudzu has started to flower--with Escort at midsummer and Krenite at the end of summer. Foliar browning will occur with all these herbicides (less so with Arsenal), but regrowth can be expected.

### **Residential Sites.**

Multiple applications per year can be made with Roundup, sold by Monsanto Chemical Company, to suppress kudzu growth. Apply Roundup at the rate of 1 to 2 gallons per acre (spot

treatment with 2.5 ounces Roundup per gallon of water). Extreme care should be used when applying around desirable plants so that unseen sprays do not drift. Trees with roots in the treated area should not be damaged because Roundup is not soil active, except for shallow rooted trees. In some cases, continued mowing of invading vines is as effective as making a herbicide application. Other herbicides sold at lawn centers may be just as effective as Roundup in suppressing kudzu regrowth, especially those with the active ingredient triclopyr (usually sold as the poison ivy control product).

Black plastic sheets can be laid on top of kudzu and pinned in place, which will result in killing of many young plants. It must be kept in place for 1-3 years, but this has not been fully determined. Also see other alternatives tested by the Spartanburg South Carolina's Coalition to Control Kudzu without Herbicides at [kokudzu.com](http://kokudzu.com).

### **Young Pine Plantations**

Kudzu invading loblolly pine plantations can best be treated with Escort XP or mixtures of Escort XP (DuPont) with Arsenal AC (BASF Company) or Accord (DowAgro Sc). Only partial control can be expected by these treatments when the kudzu has been present for several years, requiring multi-year retreatments.

For treating plantations of 2-year-old loblolly pines, apply Escort XP at 3 to 4 ounces per acre or Escort XP at 1 to 1.5 ounces per acre in a mixture with either Arsenal AC at 1 pint or Accord at 1 quart. Apply a single treatment during midsummer when kudzu is actively growing and the pines are not water stressed. Direct the spray away from the young pines when possible, especially the growing tips. Some growth suppression and possible damage of the pine may occur. Two years of treatment will probably be required. If old established kudzu plants are present, they should be spot-treated just around the root crown with Tordon. For old kudzu growing in young pines, treatment with Tordon should be considered for eradication, although the pines will be killed.

For treating kudzu in longleaf pine regenerating stands, apply Transline at 21 ounces per acre. Treatment should be after midsummer. Avoid application over the top of longleaf pine seedlings when active elongation is underway, because needle damage may occur. Multi-year retreatments of resprouts kudzu will be needed.

### **Forest Openings and Kudzu in Desirable Trees**

Apply Escort XP (DuPont) at 4 ounces per acre or Transline (Dow) at 21 ounces per acre as a spray solution. Transline is less effective than Escort but safe on many tree species except black locust, redbud, and mimosa. These trees belong to the family of legumes, like kudzu, and Transline is selective for controlling legumes.

### **Application for Eradication**

Complete and thorough coverage by spray mixtures is required by any application approach. Open patches have been successfully treated using sprayers on crawler, skidder, and farm tractors; using truck-mounted spray units and dragging hose; and by backpack sprayers and mistblowers.

Helicopter applications are also effective. Large tractor sprayers are useful for breaking through draped kudzu when treating mature patches. The benefits of using tractor sprayers increase as the depth of kudzu increases. Hose and backpack applications become much more difficult and slow when kudzu is over 2 feet deep.

How much spray mixture is needed per acre when treating with Tordon? Many applicators give different answers. Volumes of 40 to 200 gallons per acre are used by some tractor and hose applicators. Obviously there are benefits in coverage by high volumes and possible soil activation can occur with very high volumes. However, the current recommendation is 40 to 80 gallons of spray mixture per acre, because successful eradication has been achieved using these volumes

Double coverage with a tractor sprayer is one of the best methods for open-patch kudzu treatment, where terrain permits. Half the mixture is applied by parallel passes in one direction, and the remaining half is applied using parallel passes that are at right angles to the first. Swath overlaps of 3 to 5 feet are used to further minimize skips that are common with kudzu treatments. Always treat skipped spots soon after browning makes them evident.

Where it is impossible to make right-angled passes, double coverage can be achieved by retreating a swath in the opposite direction or by using 50-percent swath overlaps. Only by using double coverage, or perhaps high volume coverage with hose applications, is it possible to hold down the number of retreatments. Both options can lower eradication costs and produce quicker results. Using double coverage can usually eliminate one broadcast retreatment.

Old terraces, common in Piedmont kudzu patches, make tractor spraying difficult. Good control is hard to achieve in terraces, especially in stony soils. It is best to spray along the lower side, into the terrace, applying in both directions, resulting in a slightly higher rate.

Before beginning open-patch treatments with tractor sprayers, make one or more passes around the outer edge of a patch. Boomless spray nozzles can be tilted up on these outer passes to treat up into the draped vines eliminating the need for cutting. A spraygun can also be used to treat vines in trees. Most pines and hardwoods that are larger than 10 inches in trunk diameter will not be killed by spraying the vines with Tordon 101, unless the trees are already weak. Sprayguns are also necessary to treat kudzu in gullies and canyons, and steep patches from roadsides. Success in application with Tordon herbicides is evident by complete browning of the patch within a few weeks after the initial application. Browning will be slower with Tordon K than Tordon 101, and is weather dependent. Any skipped areas will remain green and these should be treated during the first year.

### **Retreatments**

An applicator or landowner must be persistent in examining patches for up to 10 years after treatment. Most control is accomplished with one or two broadcast treatments, but plants may continue to appear for many years. Large kudzu root crowns have the ability to go into stress dormancy for 1 to 10 years before resprouting. Of course, patches less than 10 years old will

probably be mostly controlled by only one broadcast application of Tordon herbicides.

**Following a successful initial treatment with Tordon herbicides, retreatments should then be delayed for two years, with a one-year layout.** Broadcast retreatments are usually made using half the rate of the first. In other words, if a successful application is made in year 1 using Tordon, then another broadcast treatment using half the rate should be applied in year 3. Research has shown that many of the large kudzu roots that are severely injured will not sprout for 2 years, and thus the recommended delay. On older patches, some kudzu will regrow in the year after application, but all injured large rooted plants will lay dormant for two or more years before sending up a vine. Retreatments in successive years are needed if Tordon herbicides and double coverage are not used, and if rainfall does not occur within a week after treatment with Tordon.

Broadcast retreatments are usually more cost effective when there is greater than 20% cover in regrowth. Spot applications can be made when less is found. Because of the rapid regrowth of many plants after treatment it takes care and diligence to locate surveying root crowns in the thick vegetation. For spot treating of scattered plants, use the backpack sprayer mixture of 1 pint Tordon 101 or 0.5 pints Tordon K in 4 to 5 gallons of water. Only the vines near the root crown should be sprayed to medium wetness with this mixture as well as the soil within 1 foot of the root crown (all vine growth does not have to be treated, only that near the root-crown). When the vines and root-crown area are sprayed to medium wetness, 99-percent effective control can be obtained with these mixtures.

### **Plant Desirable Trees or Plants**

To complete kudzu eradication, establish desirable plants on the area to prevent soil loss and regain productivity. Kudzu should be eradicated or mostly suppressed before planting desirable trees. For older patches, this means a minimum four-year treatment period using Tordon herbicides: initial broadcast application in year 1, layout in year 2, rebroadcast treatment in year 3, and spot treatments in year 4. Pines and hardwood trees can be planted 6 months after the last treatment with Tordon herbicides. Further planting delays may be required when multiple year applications have been used on sandy soils because Tordon may persist to injury planted trees (carefully read the herbicide labels regarding this point).

The timely planting of grass in the fall after treatment can produce severe competition and help control weakened kudzu plants. Many grasses are not injured by residual Tordon. In fact, these two herbicides are labeled for use on rangeland and pastures. A grass cover helps control kudzu, protects the soil, and replaces the abundant weed growth that follows kudzu eradication.

### **Recommendation Summary**

Persistence is the key to successful kudzu eradication and management. The most cost-effective treatment for kudzu eradication is Tordon 101 Mixture applied at 2 gallons per acre or and Tordon K applied at 0.5 gallons per acre, using perpendicular spray passes. Retreatment after a successful initial treatment should be applied in the third year after the initial treatment year. Then spot treat remaining plants in the fourth year. Other labeled herbicides are usually less effective and more

costly than these and can be used for containment and management of kudzu cover. Escort XP is highly effective while Transline can be used when safety to other plants on the area is a concern.

Roundup or “poison-ivy herbicides” are the safest herbicide of choice for kudzu problems in residential, home-grounds, and other environmentally sensitive sites. Many years of application will be required for eradication of older patches. Mechanical vine clearing may be another alternative or those methods described at [kokudzu.org](http://kokudzu.org). Persistence in the control treatments outlined in this chapter has been successful in eradicating many patches, and can work for you.

Most brand-name herbicides registered for kudzu control.

<u>Trade name</u>	<u>Common name</u>	<u>Manufacturer</u>
Accord	glyphosate	DowAgro Sc
Arsenal AC or Chopper	imazapyr	BASF
Oust XP	sulfometuron	DuPont
Escort XP	metsulfuron	DuPont
Krenite	fosamine	DuPont
Garlon 3A	triclopyr	Dow
Garlon 4	triclopyr	Dow
Roundup	glyphosate	Monsanto
Tordon 101	picloram + 2,4-D	Dow
Tordon K	picloram	Dow
Transline	clopyralid	Dow

**CAUTION:** Pesticides can be injurious to humans, domestic animals, desirable plants, and fish or other wildlife--if they are not handled properly. Use all pesticides selectively and carefully. Follow recommended practices for the disposal of surplus pesticides and pesticide containers.