Herbaceous Forest Vegetation Management

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ARKANSAS FOREST RESOURCES CENTER

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Bio

- B.S. and M.S. from Mississippi State University in Forest Management
- Ph.D. in Applied Science from University of Arkansas at Little Rock
- Worked in extension and research for 18 years
- Research Interests
  - Hardwood management
  - Forest vegetation control
  - Woodland restoration
    - Oaks
    - Shortleaf pine
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Acknowledgements

- Dr. Andrew Ezell – Mississippi State University (retired)
- Dr. Brady Self – Mississippi State University - Extension
- Dr. Eric Taylor – Texas A&M Forest Service

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Session Objectives

- Native competitors
- Non-native invasives
  - Ecological impacts in established stands
- Impacts on tree seedling establishment
- Decision support tools for competition control
- Management to maintain herbaceous vegetation

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Know Your Objectives

- Timber
- Ecological restoration
- Wildlife
- Recreation
- Aesthetics
- Water quality

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Herbaceous Forest Vegetation

Considerations

- Important ecological role
  - Cover and food for wildlife
  - Plant diversity
- Significant competitors to tree seedling establishment

We must understand the importance of herbaceous vegetation and the need to make informed decisions regarding control operations

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Vegetative Competition

- Serious competitor to crop trees
- Competes for sunlight
- Competes for soil water and nutrients
- Competes for growing space
- Can cause a reduction in growth and survival

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Planning for Artificial Regeneration

1. Evaluate site quality (productivity)
   - A. Soil surveys
   - B. Sampling
   - C. Baker and Broadfoot
2. Establish management goals
   - A. Timber product
   - B. Wildlife
3. Select tree species
   - A. Mixed species
4. Examine planting concerns
   - A. Mineral soil
     - i. Sub-soiling
     - ii. Fertilization
   - B. Competing vegetation
     - i. Chemical site prep
     - ii. HWC
5. Predation
   - A. Small mammals
   - B. Deer

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Competition Sources

- Common grasses
  - Bermuda grass
  - Bahiagrass
  - Johnson grass
  - Fescue
  - Broomsedge
- Woody species
  - Persimmon
  - Blackgum
  - Sweetgum
  - Ash
  - Hickory
  - Sumac

- Broadleaf weeds
  - Fireweed
  - Goldenrod
  - Curly dock
  - Horsetail
  - Ragweed
  - Smartweed
  - Pigweed
- Vines
  - Trumpet creeper
  - Poison Ivy
  - Virginia creeper

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Vegetative Control Options

- Mechanical
  - Good tool for gaining access, ephemeral to poor affects on control
- Prescribed fire
  - Good method for clearing and providing some control
- Chemical
  - Good method for providing targeted control of vegetation

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Mechanical

- Chopping
- Disking
- Mowing
- Shearing
- Mulching

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Prescribed Fire

- Site preparation
- Natural regeneration
- Habitat management
  - Sets back succession
- Burn program can provide vegetation control

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Forest Herbicides Advantages

- Useful on all terrain
- Ease of application
- Quick
- Economical vs. mechanical operations
- Low disturbance to a forest site
  - vegetation and litter remain intact

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Forest Herbicides Concerns?

- Low toxicity
- Long application intervals
- Non-restricted herbicides
- Many have aquatic labels

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When Considering an Application

1. Identify application goals
2. Identify crop species
3. Identify major competitors
4. Identify application type
5. Identify application constraints
6. Seek professional assistance

Make an informed decision!

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When to Employ Chemical Control

- Tree seedling establishment
  - Conifers
  - Hardwoods
- Forest Stand Improvement
  - Improve species composition
  - Remove invasive species
  - Preparation for herbicide application
- Setting
  - Production forestry – large acreage
  - Wildlife management areas – large acreage
  - Environmental mitigation sites – various sizes
  - Small woodlot – a few acres
  - Urban – public use areas, homeowners

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Site Preparation and HWC

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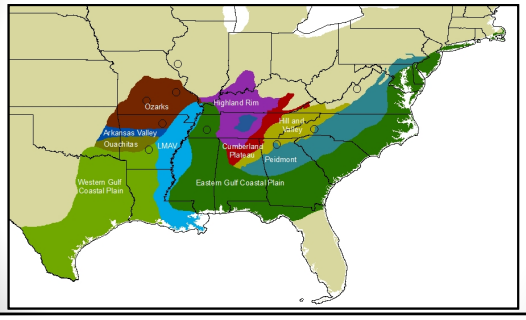
Physiography in the Southeast



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Know your Crop Species

- Pine
  - Loblolly
  - Shortleaf
  - Longleaf
  - Slash
- Hardwoods
  - Oaks
  - Many other species
    - Mast producers for wildlife
    - Increased diversity

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Available Products

Site Prep
Pine

UACES MP553

Herbicide	Products	Time of Year	Target	Resistant (at typical rates)
imazapyr	Arsenal AC, Polaris AC, Chopper Gen2, Polaris SP	Growing season following full leaf expansion.	Most hardwoods, annual and perennial grasses and forbs, Bermuda, fescue, crabgrass, dog fennel, pigweed, greenbrier.	Elms, woody legumes, wax myrtle, croton, blackberry, buckeye, baccharis, pine
glyphosate	Accord XRT II, Rodeo, Roundup Pro	Prior to planting, active growth following full leaf expansion.	Most hardwood and conifer species, grasses and broadleaf weeds, blackberry.	Blackgum, hickory, greenbrier, Virginia creeper, trumpet vine
glyphosate and imazapyr	Prep-it	During periods of active growth.	Control most annual and perennial grasses, broadleaf weeds, vines, and woody plants.	
metsulfuron methyl	Escort XP, Patriot	During periods of active growth following full leaf expansion	Wide range of annual and perennial broadleaf weeds, elm, kudzu, multiflora rose	Some grasses, yellow poplar, loblolly pine
sulfometuron methyl	Oust XP, Spyder, SFM 75	Early spring, before herbaceous weeds emerge or shortly thereafter.	Annual grasses and forbs and certain perennial herbs.	Bermuda, broomsedge, croton, trumpet creeper, panicums, pines, hardwoods
sulfometuron and metsulfuron methyl	Oust Extra, Spyder Extra, SFM Extra	After full leaf expansion in spring. Herbaceous weeds: apply pre-emergent or shortly thereafter	Various woody plants, vines and herbaceous weeds.	Loblolly pine
Triclopyr	Vastlan, Garlon XRT II, Tahoe 4E, Triclopyr 4E	During periods of active growth.	Most hardwoods, southern pine, waxy species such as bay, gallberry, wax myrtle, and yaupon, forbs, dog fennel, pigweed, greenbrier, morning glory, blackberry	Grasses
aminopyralid	Milestone	Anytime during the growing season when weeds are small and active.	Blackberry, morning glory; horseweed, pigweed, thistle, sicklepod, ragweed, wilding pines, locust, redbud, mimosa, kudzu, Japanese stiltgrass	Grasses and longleaf pine
clopyralid	Transline, Clean Slate, Clopyralid 3, Stinger	Anytime during the growing season. Preferred when weeds are small and actively growing.	Certain broadleaf weeds including thistle, kudzu, sicklepod, morning glory, ragweed, coffee weed most legume species.	Most established grasses and woody plants
dicamba	Vanquish	During periods of active growth.	Many annual and perennial broadleaf weeds, woody brush (including oaks and pines), multiflora rose.	
fosamine	Krenite S	Apply during the growing season.	Postharvest control of pine and hardwood species for pine site renovation	Non-woody plants (usually) and waxy leafed species
hexazinone	Velpar DF, Velossa, Velpar L	Early spring-early summer after bud break and before hardening off.	Most hardwoods, blackberry, crabgrass, fescue, lespedeza, horseweed, dog fennel, annual and perennial rye grass.	Yellow-poplar, eastern redcedar, sassafras, blackgum, hollies, beauty-berry, bermudagrass, broomsedge, johnsongrass, trumpet creeper
picloram	Tordon 22K, Trooper 22K, Picloram 22K	During periods of active growth.	Annual, biennial, and perennial broadleaf weeds, woody plants especially legumes, southern pine and vines.	Most grasses are resistant
picloram + 2,4-D	Grasslan L, Tordon 101 Mixture	During periods of active growth.	Most annual and perennial broadleaf weeds, woody plants, and vines.	Most grasses are resistant
saflufenacil	Detail	During active pine growth in late spring to early fall.	Control wilding pines in site preparation.	A variety of species. Designed to be a tank mix component.

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Available Products

Site Prep
Hardwoods

UACES MP553

Herbicide	Products	Time of Year	Target	Resistant (at typical rates)
imazapyr*	Chopper Gen2, Polaris SP	August	Most hardwoods, annual and perennial grasses and forbs, Bermuda, fescue, crabgrass, dog fennel, pigweed, greenbrier.	Elms, woody legumes, wax myrtle, croton, blackberry, buckeye, baccharis, hickory, pine
glyphosate	Accord XRT II, Rodeo, Roundup Pro Concentrate	Prior to planting, active growth following full leaf expansion.	Most hardwoods (black locust, persimmon, sassafras, sumac, sweetgum, yellow-poplar), southern pine, most annual and perennial grasses and forbs.	Red maple, blackgum, hickory, dogwood, greenbrier, Virginia creeper, trumpet creeper

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Available Products

HWC
Pine

UACES MP553

Herbicide	Products	Time of Year	Target	Resistant
imazapyr	Arsenal AC, Polaris AC	Late in second growing season following planting. Broadcast foliar application or directed foliar.	Many hardwoods, annual and perennial grasses and forbs, Bermuda, fescue, crabgrass, dog fennel, pigweed, greenbrier, morning glory.	Elms, woody legumes, wax myrtle, croton, blackberry, buckeye, baccharis, hickory, pine
glyphosate	Accord XRT, Rodeo, Roundup Pro Concentrate	Later summer or early fall, after formation of final conifer resting bud. Broadcast foliar application.	Many hardwoods (black locust, persimmon, sassafras, sumac, sweetgum, yellow-poplar), most annual and perennial grasses and forbs.	Red maple, blackgum, hickory, dogwood, greenbrier, Virginia creeper, trumpet creeper
metsulfuron methyl	Escort XP, Patriot	Active growth following full leaf expansion. Herbaceous weeds: apply pre-emergence or shortly thereafter. Broadcast foliar application.	Wide range of annual and perennial broadleaf weeds and woody plants, kudzu, multiflora rose.	Some grasses, yellow poplar
sulfometuron methyl	Oust XP, Spyder, SFM 75	Dormant season prior to conifer bud break. Broadcast foliar spray for herbaceous weed control.	Annual grasses and forbs and certain perennial herbs.	Bermuda, broomsedge, croton, trumper creeper, Johnsongrass, panicums
sulfometuron methyl + metsulfuron methyl	Oust Extra, Spyder Extra, SFM Extra	Active growth following full leaf expansion. Herbaceous weeds: apply pre-emergence or shortly thereafter. Broadcast foliar spray, loblolly pine only.	Various woody plants, vines and herbaceous weeds including blackberry. Suppression of bermudagrass and Johnsongrass	Conifers somewhat
triclopyr	Vastlan, Element 3A, Tahoe 3A, Element 4, Garlon 4 Ultra, Tahoe 4E, Garlon XRT	During periods of active growth. Directed spray application only.	Many hardwoods, vines, and broadleaf weeds such as dog fennel, pigweed, greenbrier, morning glory, sericea lespedeza.	Persimmon, black cherry, sumac, some oaks and hickories
aminopyralid	Milestone	Spring to late summer: broadcast foliar overtop only on longleaf. Do not use over the top of loblolly or slash pine.	Broadleaf weeds such as blackberry, morning glory; vetch, horseweed, pigweed, sicklepod, ragweed, and wilding pine suppression.	Young longleaf pine
clopyralid	Transline, Clean Slate, Clopyralid 3	Mid to late summer, after conifers have hardened off. Broadcast foliar application made over the top of tolerant tree species or directed spray for broadleaf weed control.	Certain broadleaf weeds including thistle, sicklepod, morning glory, ragweed, coffeeweed, wisteria, kudzu and many legume species	Grasses and many woody plants
hexazinone	Velpar DF, Velossa, Velpar L	Spring after bud break and before full leaf expansion. Broadcast foliar application.	Many hardwoods, blackberry, crabgrass, fescue, lespedeza, horseweed, dog fennel, annual and perennial rye grass	Grasses, yellow-poplar, eastern redcedar, sassafras, blackgum, hollies, American beautyberry, Bermudagrass, white snakeroot, broomsedge, Johnsongrass, sicklepod, trumpet vine

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Available Products

HWC
Hardwoods

UACES MP553

Herbicide	Products	Time of Year	Target	Resistant
clopyralid	Clean Slate, Transline	Anytime during the growing season. Preferred when weeds are small and actively growing.	Many broadleaf weeds such as sicklepod, morning glory, ragweed, coffeeweed, thistle, wisteria, and kudzu.	Grasses and most hardwood species
glyphosate	Rodeo, Refuge	Summer, during active growth, after full leaf expansion and before fall color. Spot treatments only avoiding contact with desirable species or broadcast during dormant period when hardwood crop trees are dormant.	Many hardwoods (black locust, persimmon, sassafras, sumac, sweetgum, yellow-poplar) most annual and perennial grasses and forbs.	Red maple, blackgum, greenbrier, Virginia creeper, trumpet vine.
oxyfluorfen	Goal 2XL	For maximum crop tree safety applications should occur prior to bud swell in the spring or after trees have initiated dormancy in the fall. Apply only as a directed spray to the soil beneath the trees.	Pre and early post emergent control of certain grasses and broadleaf weeds.	Apply to established deciduous trees or after transplanting. Oaks, poplar, sweetgum, eucalyptus, cottonwood and many others.
sulfometuron methyl	Oust XP, Spyder, SFM 75	Early spring, after soil has settled around planting slit and before bud swell stage.	Annual grasses and forbs and certain perennial herbs.	Bermuda, broomsedge, croton, trumpet vine, Johnsongrass, panicums
fluazifop-P-butyl	Fusilade DX	When grasses are in an early growth stage. Two or more applications may be needed for some grasses.	Annual and perennial grasses	All broadleaf weeds
clethodim	Select 2EC, Intensity, Dakota	When grasses are in an early growth stage. Two or more applications may be needed for some grasses.	Annual and perennial grasses	All broadleaf weeds

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April

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May/June

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October

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Clearcuts and Site Prep

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Clearcuts and Site Prep

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Chemical Site Prep and HWC

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Clearcuts and HWC

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Clearcuts and HWC

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Clearcuts and HWC

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No Chemical Control

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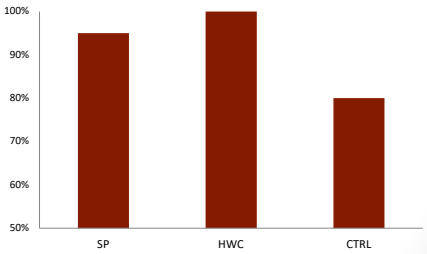
First year survival for cherrybark oak planted in clearcut



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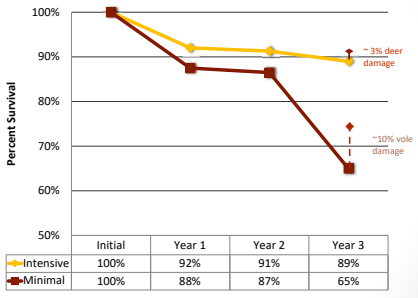
Annual Nuttall Oak Survival in Minimum Site Prep versus Intensive Site Prep



	Initial	Year 1	Year 2	Year 3
Intensive	100%	92%	91%	89%
Minimal	100%	88%	87%	65%

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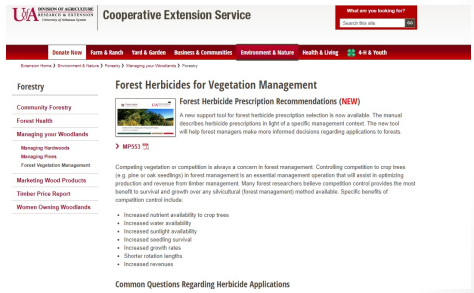
MP553

https://www.uaex.edu/environment-nature/forestry/managing-woodlands/



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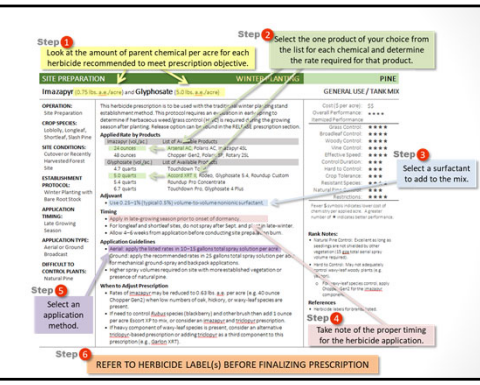

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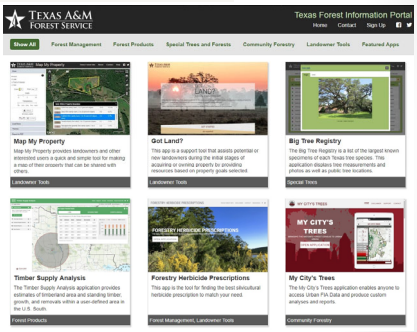
http://texasforestinfo.tamu.edu/



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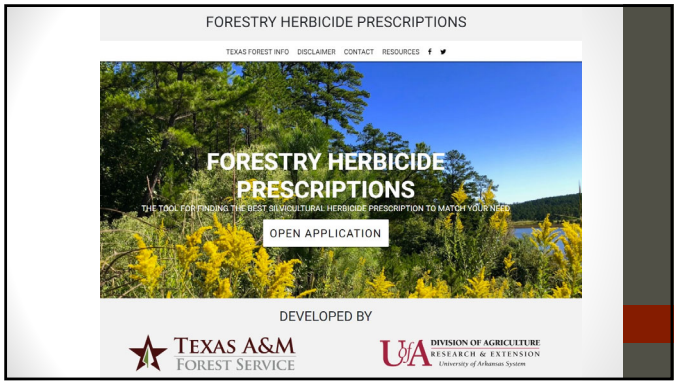

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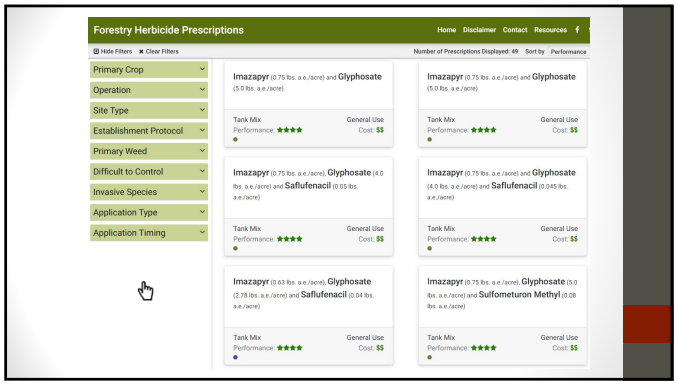

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Woodland Restoration Project

- Goals:
  - Replace open shortleaf pine system
  - Create northern Bobwhite habitat
  - Reduce fuel loads
- Operations
  - Herbicide injection
  - Rx Fire
  - Thinning
  - Broadcast herbicide

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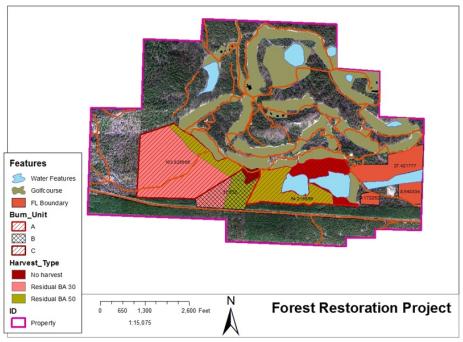

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Restoration Objectives

FOREST ROADS AND FIRE LANES

Aminopyralid (0.11 pounds a.e./acre) — GENERAL USE / SINGLE PRODUCT

OPERATION: Forest Roads and Fire Lanes

CROP SPECIES: Grasses

SITE CONDITIONS: Roadside, Fire Lane, Wildlife Opening

APPLICATION TIMING: Early Growing Season

APPLICATION TYPE: Ground Broadcast

Target Plant: Broadleaf Plants

This herbicide prescription is useful to help establish and maintain grasses and control annual, biennial and perennial broadleaf weeds on forest roads, fire lanes and wildlife openings. This protocol is for ground-based foliar treatment where plant selectivity is desired.

Available Products

Aminopyralid (vol./ac.)	List of Available Products
7 ounces	Milestone

Adjuvant
- Non-ionic surfactant should be used in spray mixtures at 1–2 quarts per 100 gallons of spray mixture.

Timing
- Anytime when plants are actively growing.

Application Guidelines
- Apply the recommended rates in a minimum of 10 gallons or more total spray solution per acre for ground broadcast treatments.

When to Adjust Prescription
- Rates may be increased for better control of woody species or some other target plants using label recommended methods. See label for details.

Prescription Weakness
- Does not provide good woody control without a tank mix partner.

Cost per acre:	cc
Overall Performance:	★★★
Itemized Performance	
Grass Control:	none
Broadleaf Control:	★★★★
Woody Control:	★
Vine Control:	★★★
Effective Speed:	★★★★
Control Duration:	★★★
Hard to Control:	★★★
Crop Tolerance:	★★★
Resistant Species:	★★★
Natural Pine Control:	★
Restrictions:	★★

Fewer $ symbols indicates lower cost of chemistry per applied acre. A greater number of ★ indicates better performance.

Rank Notes:
- Restrictions: Do not apply near water. Restrictions exist for areas to be hayed or foraged.

References
- Herbicide labels for brands listed.

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Restoration Objectives

FOREST ROADS AND FIRE LANES

Aminopyralid plus **Triclopyr** (premixed at 1.1 pounds a.e./acre) — GENERAL USE / SINGLE PRODUCT

OPERATION: Forest Roads

CROP SPECIES: Grasses

SITE CONDITIONS: Any

APPLICATION TIMING: Anytime When Plants are Actively Growing

APPLICATION TYPE: Ground Broadcast

Target Plant: Broadleaf Plants, Woody, Shrubs, Vines, Trees

This herbicide prescription is useful to help establish and maintain grasses and control selected woody plants, annual, biennial and perennial broadleaf weeds on forest roads, fire lanes and wildlife openings.

Available Products

Aminopyralid (vol./ac.)	List of Available Products
9 pints	Capstone

Adjuvant
- Non-ionic surfactant should be used in spray mixtures at 1 to 2 quarts per 100 gallons of spray mixture.

Timing
- Apply anytime when plants are actively growing.

Application Guidelines
- Apply the recommended rates in 20 gallons or more total spray solution per acre for broadcast treatments.

When to Adjust Prescription
- If dense, non-legume woody species are to be controlled consider an alternative application.

Prescription Weakness
- May provide only partial control for many woody species.

Cost per acre:	$$
Overall Performance:	★★★
Itemized Performance	
Grass Control:	none
Broadleaf Control:	★★★★
Woody Control:	★★
Vine Control:	★★★
Effective Speed:	★★★★
Control Duration:	★★★
Hard to Control:	★★★
Crop Tolerance:	★★★
Resistant Species:	★★★
Natural Pine Control:	★
Restrictions:	★★

Fewer $ symbols indicates lower cost of chemistry per applied acre. A greater number of ★ indicates better performance.

Rank Notes:
- Woody Control: Will control woody legumes, poplar, poison ivy, wisteria, sumac, kudzu and rose.
- Restrictions: Do not allow direct application to enter water. Restrictions exist for areas to be hayed or foraged.

References
- Herbicide labels for brands listed.

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Restoration Objectives

EARLY-ROTATION RELEASE – WOODY PLANTS | **LOBLOLLY PINE**

Imazapyr (0.5 pounds a.e./acre) | GENERAL USE / SINGLE PRODUCT

OPERATION: Early-Rotation Woody Release

CROP SPECIES: Loblolly Pine

SITE CONDITIONS: Young, Pre-commercial Stand

ESTABLISHMENT PROTOCOL: Any

APPLICATION TIMING: Mid to Late Growing Season

APPLICATION TYPE: Band, Broadcast

DIFFICULT TO CONTROL PLANTS: None

This woody release treatment is for use in young loblolly pine stands, after July 15 of the first growing season or after, where woody competition is not adequately addressed during chemical site preparation.

Applied Rate by Products

Imazapyr (vol./ac.)	List of Available Products
16 ounces	Arsenal AC, Polaris AC, Imazapyr 4SL
32 ounces	Rotary 2SL

Adjuvant

- Add 0.25% crop oil concentrate.

or

- Add 0.25% non-ionic surfactant.

Timing

- This application is designed for mid to late growing season timing, after saplings have hardened off for the current growing season.

Application Guidelines

- Aerial: Apply the recommended rates in 10 gallons total spray solution per acre.
- Ground: Apply the recommended rates in 20 gallons total spray solution per acre for mechanical ground spray and backpack applications.
- Higher spray volumes required on site with more established, denser/taller vegetation.

When to Adjust Prescription

- If significant presence of oak and/or hickory, raise rates to 20 and 40 ounces per acre, respectively.
- If significant present of elm or brambles refer to imazapyr and metsulfuron methyl early-rotation release prescription.

Prescription Weakness

- Elm and a few other species may not be fully controlled.

Cost per acre:	¢
Overall Performance:	★★★
Itemized Performance	
Grass Control:	★★★
Broadleaf Control:	★★★
Woody Control:	★★★
Vine Control:	★★★
Effective Speed:	★★
Control Duration:	★★★
Hard to Control:	★★★
Crop Tolerance:	★★★
Resistant Species:	★★★
Natural Pine Control:	none
Restrictions:	★★★★

Fewer $ symbols indicates lower cost of chemistry per applied acre. A greater number of ★ indicates better performance.

Rank Notes:

- Effective Speed: With late season application, may be following spring before full effect is observed.

References

- Herbicide labels for brands listed.

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Table 3.—Plant species that are tolerant to imazapyr or that commonly recolonize a site following an application of imazapyr (from American Cyanamid Company 1995)

Tolerant		Recolonize	
Scientific name	Common name	Scientific name	Common name
Amorpha fruticosa	Indigo bush	*Amaranthus hybridus*	Pigweed
Amphicarpa bracteata	Hog peanut	*Ambrosia artemisiifolia*	Common ragweed
Apios americana	Ground nut	*Ambrosia trifida*	Giant ragweed
Cassia fasciculata	Partridge pea	*Andropogon* spp.	Broomsedges
Cassia nictitans	Small partridge pea	*Bidens* spp.	Beggar ticks
Centrosema virginianum	Butterfly pea	*Callicarpa americana*	American beautyberry
Cercis canadensis	Redbud	*Campsis radicans*	Trumpet vine
Clitoria mariana	Butterfly pea	*Gaultheria americanus*	New Jersey tea
Desmodium nudiflorum	Beggarweed	*Chenopodium album*	Lambsquarters
Desmodium rotundifolium	Beggarweed	*Croton capitatus*	Woody croton
Desmodium tortuosum	Florida beggarweed	*Croton glandulosus*	Dove weed
Ephrosia virginiana	Goats rue	*Cuscuta gronovii*	Lovevine
Galactia mohrii	Erect milk pea	*Diodia teres*	Poor joe
Indigofera caroliniana	Wild indigo	*Epilobium angustifolium*	Fireweed
Lespedeza bicolor	Bicolor lespedeza	*Euphorbia corollata*	Flowering spurge
Lespedeza capitata	Roundhead lespedeza	*Geranium carolinianum*	Wild geranium
Lespedeza hirta	Hairy lespedeza	*Ipomoea purpurea*	Morningglory
Lespedeza intermedia	Wand lespedeza	*Mollugo verticillata*	Carpet weed
Lespedeza japonica	Japonica lespedeza	*Oenothera biennis*	Evening primrose
Lespedeza procumbens	Prostrate lespedeza	*Otuelo stricta*	Yellow wood sorrel
Lespedeza striata	Common lespedeza	*Panicum* spp.	Panic grasses
Lespedeza thunbergii	Thunburg lespedeza	*Parthenocissus quinquefolia*	Virginia creeper
Psoralea psoralioides	Samson snakeroot	*Passiflora incarnata*	Maypop
Rhynchosia reniformis	Dollar weed	*Physalis virginiana*	Ground cherry
Rhynchosia tomentosa	Hairy rhynchosia	*Physalacea americana*	Pokeweed
Robinia pseudo-acacia	Black locust	*Polygonum pennsylvanicum*	Pennsylvania smartweed
Rubus argutus	Blackberry	*Rhus copallina*	Winged sumac
Rubus trivialis	Dewberry	*Rhus glabra*	Smooth sumac
Schrankia microphylla	Sensitive briar	*Rhus radicans*	Poison ivy
Sesbania macrocarpa	Sesbania	*Richardia scabra*	Florida purslane
Strophostyles helvola	Milk pea	*Rumex hastatulus*	Sheep-sorrel
Strophostyles umbellata	Trailing wild bean	*Smilax bona-nox*	Greenbrier
Stylosanthes biflora	Pencil flower	*Trichostema dichotomum*	Blue curls
Tephrosia spicata	Spike tephrosia	*Viola* spp.	Violets
Vicia dasycarpa	Narrowleaf vetch	*Vitis rotundifolia*	Muscadine grape
Vigna vexirela	Wild pea		

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Woodland Restoration Project – applications used

- Herbicide injection of hardwoods
- Herbicide injection of pine
- Broadcast foliar application

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Woodland Restoration – fuel loads/shortleaf control

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Woodland Restoration - thinning

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Woodland Restoration – broadcast application

- Brush control
- Reset succession
- Release specific plants
- Promote shortleaf regeneration

- Herbicides used
- Triclopyr
- Imazapyr
- Aminopyralid

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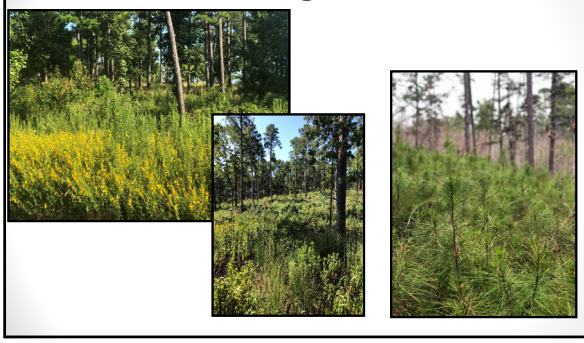
Woodland Restoration - goals



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Non-Native Invasive Species

Displace native vegetation
Lower habitat quality for wildlife
Increase fire severity risk
Spread readily through disturbance
Can be difficult to control

Cogongrass, *Source USDA Forest Service SRS*

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Non-Native Invasive Plants of the Southeast U.S.

- Invasive.org
  - https://www.invasive.org/south/seweeds.cfm
  - 470 terrestrial and aquatic plants and trees listed for the SE United States
  - 116 are listed on the Federal Noxious Weed List
  - 43 species monitored by the USFS FIA and State Monitoring

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US Forest Service FIA and State Monitoring

43 species monitored across 13 states

- 7 herbaceous species
- 12 vine species
- 18 shrub species
- 6 tree species

Chinese Privet, *Source Inaturalist*

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US Forest Service FIA and State Monitoring - Herbaceous

Festuca arundinacea Schreb.	tall fescue
Imperata cylindrica (L.) Beauv.	cogongrass
Microstegium vimineum (Trin.) A. Camus	Japanese stiltgrass
Miscanthus sinensis Anderss.	Chinese silvergrass
Phyllostachys aurea Carr. ex A.& C. Rivière	golden bamboo
Alliaria petiolata (Bieb.) Cavara & Grande	garlic mustard
Vinca minor L.	common periwinkle

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US Forest Service FIA and State Monitoring - Vines

Celastrus orbiculatus Thunb.	oriental bittersweet
Dioscorea alata L.	winged yam
Dioscorea bulbifera L.	air-potato
Dioscorea polystachya Turcz.	Chinese yam
Euonymus fortunei (Turcz.) Hand.-Maz.	winter creeper
Hedera helix L.	English ivy
Lonicera japonica Thunb.	Japanese honeysuckle
Lygodium japonicum (Thunb. ex Murr.) Sw.	Japanese climbing fern
Pueraria montana var. lobata (Willd.) Maesen & S. Almeida	kudzu
Vinca major L.	big periwinkle
Wisteria floribunda (Willd.) DC.	Japanese wisteria
Wisteria sinensis (Sims) DC.	Chinese wisteria

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US Forest Service FIA and State Monitoring Shrubs

Elaeagnus angustifolia L.	Russian olive
Elaeagnus pungens Thunb.	thorny olive
Elaeagnus umbellata Thunb.	autumn olive
Euonymus alatus (Thunb.) Sieb.	winged burning bush
Lespedeza bicolor Turcz.	shrubby lespedeza
Lespedeza cuneata (Dum.-Cours.) G. Don	sericea lespedeza
Ligustrum japonicum Thunb.	Japanese privet
Ligustrum sinense Lour.	Chinese privet
Ligustrum vulgare L.	European privet
Lonicera fragrantissima Lindl. & Paxton	sweet breath of spring
Lonicera maackii (Rupr.) Herder	Amur honeysuckle
Lonicera morrowii Gray	Morrow's honeysuckle
Lonicera tatarica L.	Tatarian honeysuckle
Nandina domestica Thunb.	sacred bamboo
Rosa bracteata J.C. Wendl.	Macartney rose
Rosa laevigata Michx.	Cherokee rose
Rosa multiflora Thunb.	multiflora rose
Solanum viarum Dunal	tropical soda apple

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US Forest Service FIA and State Monitoring - Trees

Ailanthus altissima (P. Mill.) Swingle	tree-of-heaven
Albizia julibrissin Durazz.	mimosa
Melaleuca quinquenervia (Cav.) Blake	melaleuca
Melia azedarach L.	chinaberry
Paulownia tomentosa (Thunb.) Sieb. & Zucc. ex Steud.	princesstree
Triadica sebifera (L.) Small	Chinese tallowtree

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Resources for Invasive Species

- Invasive.org
  - https://www.invasive.org/maps.cfm
- USDA Invasive Website
  - https://www.invasivespeciesinfo.gov/us/arkansas
- Center for invasive species and ecosystem health
  - https://www.bugwood.org/
- USDA Forest Service ID
  - https://www.srs.fs.usda.gov/pubs/35292
- USDA Forest Service Management Guide
  - https://www.srs.fs.usda.gov/pubs/36915

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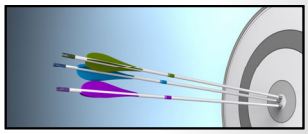
Decisions for Controlling Invasive Species

- Is there potential for non-target impact?
- What are the primary crop trees?
  - Hardwood
  - Conifer
- Can non-chemical methods be effective?
  - Available manpower
  - Size of area
  - Species in question
- If chemical application is necessary, what, when and how?
  - Selective vs. non-selective
  - Application type, broadcast, spot, IPT, etc…
  - Application timing
    - Time of year
    - Number of applications



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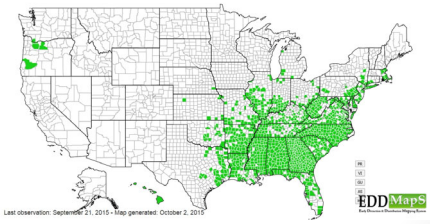
Kudzu

Pueraria montana var. lobata



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Kudzu Control

- Escort at 4 oz/ac, July – Sept
  - 20-40GPA min (80 -100GPA recommended)
- Transline at 21 oz/ac, July – Sept
  - 100GPA, most selective (use in hdwds)
- Garlon 4 at 20% in basal oil with penetrant, Jan - April
  - Basal spray vines ≤ 1" diameter

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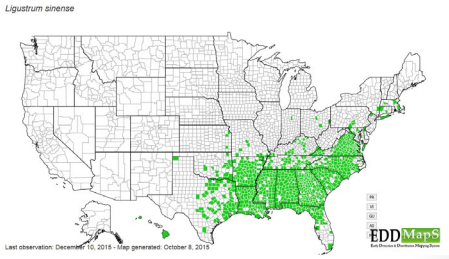
Chinese Privet



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Chinese Privet Control

- Recommended (hardwoods):
  - 3% glyphosate
  - Spray to wet – Feb - March
- 1% Arsenal AC (spray to wet) w/ adjuvant
- 2% Garlon 3A and 4 (spray to wet)
- 20% Garlon 4 in basal oil w/ penetrant
- Treat cut stems w/ 10% Arsenal AC or Velpar L, or 20% Garlon 3A or glyphosate

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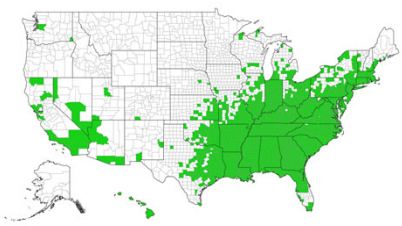
Japanese Honeysuckle



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Japanese Honeysuckle Control

- Recommended (hardwoods):
  - 2% glyphosate
  - Spray to wet
  - In Autumn, prior to freeze but after desirable hardwood trees and plants have gone dormant
  - Not an option in pine
  - Would use 1 oz. Escort XP in pines, but not hardwoods

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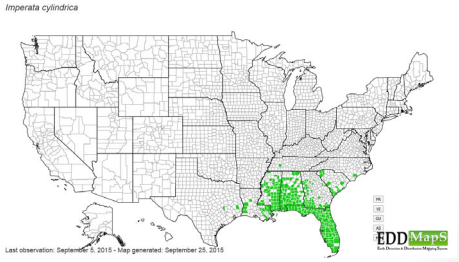
Cogongrass



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Cogongrass

- Arsenal AC as 1% solution in Sept-Oct
- Glyphosate as 2% solution
- Combination of these
- Repeat application!
  - Spring-fall
  - Subsequent years

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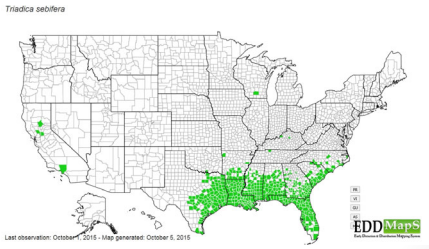
Chinese Tallow Tree



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Chinese Tallow Tree

Foliar Application:
- Imazapyr (Arsenal AC)
- Triclopyr 2% (Remedy*, Garlon 4*, Tahoe 4E*)
- 2-4,D

Injection:
- Imazapyr (Arsenal AC)
- Triclopyr (Remedy, Garlon 3A, Tahoe 3A)
- Picloram& 2,4-D in combination (Pathway)
- 2,4-D

Basal Spray:
- Triclopyr 10-20% (Remedy*, Garlon 4*, Tahoe 4E*)
  - (Pathfinder II - ready to use)

* Mixed with diesel

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