

Herbicide Options for Loblolly Pine Management

The development of herbicides labeled for pines effectively changed the way pine silviculture is performed. Before pine-friendly herbicides, the only vegetative competition control methods available to forest managers were mechanical vegetation removal (cutting and bulldozer work) and prescribed fire. Mechanical removal of competing vegetation is uneconomical, and prescribed fire cannot be used with most pine species until the trees are large enough to withstand the effects of fire. Consequently, early pine planting efforts often used high planting densities to combat the negative effects of vegetative competition on seedling survival.

Land managers face multiple challenges (reduced growth, survival, and future stem quality) from vegetative competition when attempting to regenerate pines. Grasses, broadleaf species, and other tree species all compete with pines for nutrients, water, and sunlight. Herbicides reduce this competition. The best chance of achieving good competition control, thus assuring adequate survival and subsequent seedling growth, comes from proper chemical site preparation. However, there are other circumstances and special considerations to think about when using herbicides in pine management.

Herbicides have proven beneficial in management efforts by lowering establishment costs, increasing growth, and reducing mortality when regenerating pine stands. This publication discusses the options available for treating undesirable vegetation in pine management. It is extremely important to follow labeled application rates and timing to avoid negative impacts. While this publication is not an extensive list of treatment options, it provides information on the most effective product names, rates, and application timings based on operational forest herbicide work and research.

These herbicide recommendations are intended for use in loblolly pine management. While most are safe for longleaf, slash, and shortleaf efforts, you must be aware of special considerations for these species. If your management efforts involve these species, please consult your local Extension agent, Extension forestry specialist, or consulting forester before using the information in this publication.

Note: The information given here is for educational purposes only. References to commercial products, trade names, or suppliers are made with the understanding that no endorsement is implied and that no discrimination against other products or suppliers is intended.

Chemical Site Preparation

Chemical site preparation involves applying herbicides in an attempt to control competing vegetation before planting (Figures 1 and 2). Crop trees have not been planted and are not a concern at this point, so you have greater flexibility



Figure 1. Typical scenario encountered in cutovers. Note the presence of both woody and herbaceous competition.



Figure 2. Excellent vegetative control post-chemical site preparation.

in herbicide choice. In addition, you can use higher rates of herbicides for site preparation applications. These higher rates may be necessary to control more inherently resistant species or species that have developed resistance to pine-appropriate herbicides.

Applications using imazapyr (e.g., Arsenal AC, Chopper GEN) and glyphosate (e.g., Accord Concentrate, Accord XRT II) are typically prescribed for use in pine management. Planting should not be performed for at least 2 months post-application when using imazapyr at the rates commonly used in site preparation. Wait 3 months if the site has sandy, loamy-sand, or sandy-loam textures; is moderately well, well, or excessively well drained; or has organic matter content of greater than 2 percent. Currently, the standard chemical site preparation recommendation in pine management is:

28–32 oz/acre Chopper GEN2 + 4–5 qt/acre of a forestry-labeled glyphosate product + surfactant [nonionic at 0.5% vol/vol or methylated seed oil (MSO) at 1% vol/vol]

- **Detail (saflufenacil) may be added to this mix at 2 oz/acre to increase natural pine control.**

The site preparation treatment above is intended for general use and is appropriate when the onsite species mix is nonwaxy-leaved species. In situations where waxy-leaved species (wax myrtle, yaupon, gallberry) comprise a significant portion of the targeted species mix, use a triclopyr product in lieu of glyphosate in the tank mixture. The most commonly prescribed site preparation for areas with waxy-leaved species is:

32–48 oz/acre Chopper GEN2 + 1–1.5 qt/acre Garlon 4 + MSO (2.5% vol/vol late spring/summer or 1–1.5% vol/vol for August or later applications)

Other site preparation mixtures are sometimes prescribed with varying rates of any of the above products. These applications will work but may use more herbicide than is actually needed to control onsite vegetation. Additionally, various products are sometimes included in the prescribed tank mix to increase overall efficacy of the treatment. Two of the more commonly encountered include:

- **20 oz/acre Arsenal AC + 4–6 qt/acre of a forestry-labeled glyphosate product + an appropriate surfactant**
 - **Detail (saflufenacil) may be added to this mix at 2 oz/acre to increase natural pine control.**
- **16–24 oz/acre Arsenal AC + 4–6 qt/acre of a forestry-labeled glyphosate product + 1–1.5 qt/acre Garlon 4 + an appropriate surfactant**



Figure 3. Effective herbaceous weed control. Note the undamaged and free-to-grow pine seedlings.

All applications listed above should occur in August to October before planting. If spraying must occur after this timeframe, give special consideration to the amount of time between application and planting. Earlier applications may not adequately reduce vegetative competition.

Herbaceous Weed Control

Site preparation will not typically provide long-lasting control of herbaceous competition after planting unless a product with sufficient residual soil activity is added to the mixture. Herbaceous weed control (HWC) involves using herbicides designed to control herbaceous competition during the first growing season after planting (Figure 3). Often, the herbicide is simply included in the site preparation tank mix and is one of these two products:

- **3 oz/acre Oust XP (Consideration should be given to soil pH. See label.)**
- **4 oz/acre Oust Extra (Consideration should be given to soil pH. See label.)**

However, in situations where HWC was not included in the site preparation tank mix, several options are available. These applications should occur the March or April after planting, and two of the most commonly prescribed are:

- **4 oz/acre Arsenal AC + 2 oz/acre Oust XP (Consideration should be given to soil pH.)**
- **6 oz/acre Arsenal AC**

Woody Release

Woody release is the practice of controlling woody species directly competing with young pines (Figure 4). From an economic standpoint, woody release should be used only if competing stems are present in quantities that threaten successful establishment and survival of planted pines.



Figure 4. Example of a release application where hardwood completion threatened to outcompete planted pine. Note arrows pointing to healthy, undamaged pine seedlings.

Typically, competition of this level is present only if chemical site preparation was not performed or was not successful. This treatment type should be performed as early as possible when the presence of competing woody species is confirmed, or when failure of site preparation efforts is noted.

For woody release to be beneficial, herbicide application should occur between years 1 and 5 while the stand is precommercial. Imazapyr applications are the most commonly prescribed. August through October are the preferred months for application. Earlier applications during the year may result in reduced pine tree growth. Release applications should not be performed under drought, disease, or other vigor-reducing stress. The most common woody release prescription is:

12–14 oz/acre Arsenal AC (no more than 0.25% vol/vol nonionic surfactant may be used for release applications)

For added control of blackberry, Escort XP can be added at 1 oz/acre.

In situations where waxy-leaved species are the targeted woody species, triclopyr can be used. However, the application cannot be broadcast and is a directed-spray application only. Use extreme caution to avoid contact with pine needles. Application timing should occur between June and September using the following prescription:

3% vol/vol rate of Garlon 4 or 2% vol/vol rate of Forestry Garlon XRT (DIRECTED SPRAY APPLICATION ONLY)



Figure 5. Example of mid-rotation brush control application results.

Mid-rotation Brush Control

This application type is similar to woody release; however, the practice is performed later in a stand's rotation (Figure 5). Typically, treatment occurs the first year after a thinning operation when pines are 15- to 18-years-old. However, if delayed, the application should be performed no later than 5 years after thinning. Mid-rotation brush control (MRBC) is not always needed and should only be performed if onsite woody competition threatens to decrease growth and vigor of planted pines to a point that the application becomes economically beneficial. Application should be performed between August and October and should not be performed if crop trees are under drought, disease, or other vigor-reducing stress. The most common MRBC prescriptions are:

- **14–16 oz/acre Arsenal AC**
- **26 oz/acre Chopper GEN + 0.5% vol/vol nonionic surfactant (GROUND APPLICATIONS ONLY)**

For added control of blackberry, Escort XP can be added at 1 oz/acre to either treatment.

Invasive/Noxious Species

Invasive species can be a concern in pine management, but most can be controlled with the treatment scenarios detailed above. It is easiest and most effective to control these species during site preparation applications, but encroachment by noxious species can occur. If you encounter problematic species in your pine management efforts, consult your local Extension agent or Extension forestry specialist for treatment recommendations. A few species merit special consideration and are discussed below.

Kudzu

Several compounds are labeled for kudzu control, but Escort XP (metsulfuron methyl) is the most commonly prescribed because it gives excellent results. Transline (clopyralid) may also be used, but efficacy will not be as great as Escort XP. Treatment recommendations include:

- **4 oz/acre Escort XP + an appropriate surfactant**
- **21 oz/acre Transline + an appropriate surfactant**

Application timing for all three products should be in July to October. Because of kudzu's layering nature, overall spray volumes should be in the 50–100 gallons per acre (GPA) range for adequate coverage.

Japanese Climbing Fern

Japanese climbing fern is an introduced vine that can engulf young pine trees and result in reduced growth and vigor and, in extreme cases, death. If fern coverage is severe enough to warrant a specific treatment, applications should be performed July to October. The current application recommendation is:

- **1 oz/acre Escort XP + an appropriate surfactant**

Cogongrass

Cogongrass is native to southeastern Asia. It was first reported in the United States in the early 1900s and has spread across much of Mississippi. Control can be difficult once cogongrass is established and is most successful if grass patches are treated when they are small. Combinations of imazapyr and glyphosate have been used effectively, but multiple-application treatments are needed for total control. Additionally, aminocyclopyrachlor (Method 240SL and Method 50 SG) has proven effective in cogongrass control. Control recommendations include:

Two-part application:

1. **April to May application of 2% vol/vol glyphosate product (41% product) + 0.5% vol/vol nonionic surfactant. GROUND APPLICATIONS ONLY.**
2. **Followed by a September to October application of 1–1.5% vol/vol Arsenal AC + 0.5% vol/vol nonionic surfactant. MAY TAKE 2–3 YEARS OF TREATMENT FOR CONTROL.**

Two-part application:

1. **May application of 1.5–2 qt/acre glyphosate (54% product) + 0.5% vol/vol nonionic surfactant (or 1–1.5% vol/vol crop oil)**

2. **Followed by the same application in October. BOTH ARE GROUND APPLICATIONS ONLY; MAY TAKE 2–3 YEARS OF TREATMENT FOR CONTROL.**

Aminocyclopyrachlor product at 4 oz active ingredient/acre (e.g., Method 240SL at 16 oz or Method SG at 8 oz) + an appropriate surfactant (April application)

IMPORTANT NOTES: PINE MORTALITY NOT LIKELY, BUT PINES WILL LIKELY BE IMPACTED; GROUND APPLICATIONS ONLY; MAY TAKE 2 OR MORE APPLICATIONS TO ACHIEVE CONTROL.

Eastern Baccharis

Eastern baccharis can form dense canopies that can outcompete young pines if left untreated. The species is not of great concern in older pine stands and will typically be shaded out or controlled in prescribed fire efforts. However, if control is not achieved before planting, a release application may be necessary in the subsequent younger stand. Timing of herbicide treatment varies depending on the compound used. Control recommendations include:

- **Aminocyclopyrachlor product at 4 oz active ingredient/acre (e.g., Method 240SL at 16 oz or Method SG at 8 oz) + an appropriate surfactant (July to September application)**
- **6 qt/acre Garlon 4 + an appropriate surfactant (November to February)**
- **Both treatments are intended for use as DIRECTED APPLICATIONS ONLY and will cause damage to young pines if foliage is contacted.**

Conclusion

Planning herbicide use in pine systems is straightforward and increases pine growth and survival. Herbicide use has become very affordable as the commonly used compounds have decreased in price. Most targeted species can be controlled through careful consideration of effective herbicides and appropriate application timing. Land managers should be cautious when using herbicides in any forest management effort, but current herbicide options make suppressing unwanted vegetation both efficient and cost-effective.

Additional Reading

- Dickens, D., Minouge, P., & Moorhead, D. (2012). *A guide to using imazapyr for chemical site preparation in southern pine plantation establishment*. <https://bugwoodcloud.org/bugwood/productivity/pdfs/20-95BNov2020.pdf>
- Garnett, L., Ezell, A. W., McReynolds, L., & Londo, A. J. (Eds.). (2009). *Six important invasive species of Mississippi*. Mississippi State University Extension.
- Self, A. B. (2023). *Tank mixtures of forestry site preparation herbicides can be antagonistic*. Mississippi State University Extension Publication 3781. <http://extension.msstate.edu/publications/tank-mixtures-forestry-site-preparation-herbicides-can-be-antagonistic>

Notes

Notes

Publication 3233 (POD-08-24)

By **Brady Self**, PhD, Extension Professor, Forestry. Photos by Andrew Ezell.



Copyright 2024 by Mississippi State University. All rights reserved. This publication may be copied and distributed without alteration for nonprofit educational purposes provided that credit is given to the Mississippi State University Extension Service.

Produced by Agricultural Communications.

Mississippi State University is an equal opportunity institution. Discrimination in university employment, programs, or activities based on race, color, ethnicity, sex, pregnancy, religion, national origin, disability, age, sexual orientation, gender identity, genetic information, status as a U.S. veteran, or any other status protected by applicable law is prohibited.

Extension Service of Mississippi State University, cooperating with U.S. Department of Agriculture. Published in furtherance of Acts of Congress, May 8 and June 30, 1914. ANGUS L. CATCHOT JR., Director