

Herbicide Options for Management of Longleaf Pine



Forest herbicide development has had a tremendous impact on management of southern pines over the last half century. While prescribed fire is still an important tool in silvicultural efforts for longleaf pine (*Pinus palustris*), it is no longer the sole tool available to land managers working to establish longleaf pine and/or manage competing vegetation in these systems. Historically, longleaf pine required periodic fire to promote seedling growth out of the grass stage. The inclusion of herbicide use as a management tool in longleaf silviculture has provided forest managers a valuable tool for use in their regeneration efforts.

Managers attempting to regenerate longleaf pine often face problems that result from the presence of onsite vegetative competition. This competition can prolong time in the grass stage, reduce growth, lower survival, and decrease future stem quality. Grass and herbaceous broadleaf species, as well as vine, shrub, and tree species, all compete with pines for nutrients, water, and sunlight. The best chance at obtaining optimal competition control comes with application of proper chemical site preparation. However, compared to other southern pine species, some special considerations are warranted when prescribing herbicide applications in longleaf pine.

The use of herbicides has proven beneficial in longleaf pine management by lowering establishment costs, shortening the grass stage, increasing growth, and reducing mortality. This publication is intended to inform readers of herbicidal options available for treatment of undesirable vegetation in longleaf-pine management. Adherence to labeled application rates and timing recommendations is extremely important due to negative impacts many herbicides can have if applied improperly. While this publication is not intended to be an all-encompassing list of treatment options, it does review product names, rates, and application timings proven to have greatest effect in both operational forest herbicide work and research.



Figure 1. Typical vegetation scenario encountered in cutovers. Note presence of both woody and herbaceous competition. (Photo by Andrew Ezell)

Herbicide recommendations found in this publication are intended for use in longleaf-pine management. If you are unfamiliar with herbicide application—or you are unsure of anything regarding herbicide applications in forest management—please consult your local Extension agent, Extension forestry specialist, or consulting forester before using information in this publication.

Chemical Site Preparation

Chemical site preparation involves application of herbicides for control of competing vegetation before planting. At this point, crop trees have not been planted and unintended damage is not a concern. Consequently, greater flexibility in herbicide choice exists at this stage. In addition, higher rates of herbicides are labeled for site preparation applications compared to those used after planting. These higher rates may be necessary for control of naturally resistant species and those which have developed resistance to pine-safe herbicides.

Applications using imazapyr (Arsenal® AC, Chopper® Gen2, etc.) and glyphosate (Accord® Concentrate, Accord® XRT II, etc.) are typically prescribed for use in most pine-management efforts. However, waxy-leaved species commonly dominate the competing species complex in longleaf-pine systems and their presence often dictates use



Figure 2. Excellent woody and herbaceous vegetation control post-chemical site preparation. (Photo by Brady Self)

of herbicide tank mixes containing triclopyr (Garlon® 4, Forestry Garlon® 4, Forestry Garlon® XRT, etc.). Planting should not be performed for at least 2 months after application when using imazapyr at the rates normally used in site preparation. In some conditions, you should add an additional month to the time between herbicide application and planting: (1) if the site has sandy, loamy sand, or sandy loam soil; (2) if the site is moderately to excessively well drained; or (3) if the site has organic matter content of greater than 2%. The most commonly prescribed site preparation tank mixture across the longleaf pine range is

32–48 ounces per acre of Chopper® GEN2 + 1–1.5 quarts per acre of Garlon® 4 + MSO (2.5% vol/vol late spring/summer or 1–1.5% vol/vol for August or later applications)

This treatment is intended for general use when waxy-leaved species (such as wax myrtle, yaupon, gallberry) comprise a significant portion of targeted onsite species. In situations where waxy-leaved species are not a concern, a mixture using glyphosate instead of triclopyr will typically have greater effectiveness. The most common site-preparation prescription for areas with nonwaxy-leaved species comprising the majority of targeted vegetation is

28–32 ounces per acre of Chopper® GEN2 + 4–5 quarts per acre of a forestry-labeled glyphosate product + surfactant (nonionic at 0.5% vol/vol or Methylated Seed Oil [MSO] at 1% vol/vol)

These applications should occur from August to October before planting. If an application is made after that time, give special consideration to the amount of time between spraying and planting. Earlier applications may not provide an adequate reduction in vegetative competition due to natural encroachment of these species over time.

Herbaceous Weed Control

Site preparation does not provide long-lasting herbaceous vegetation control after planting unless an herbicide product with sufficient residual soil activity is added to the

mixture. Herbaceous weed control (HWC) makes use of herbicides designed to control postplanting herbaceous competition during the first growing season. Often, a product containing sulfometuron methyl (Oust® XP) is included in the site preparation tank mix to eliminate the cost of performing a second application after planting. A typical addition to a site-preparation application in longleaf pine systems is

3 ounces per acre of Oust® XP (Consideration should be given to soil pH; see label.)

However, in situations where growing season HWC was not considered and not included in the tank mix for the site-



Figure 3. Herbaceous weed control in longleaf pine plantation 6 months after treatment. Note the undamaged free-to-grow seedlings. (Photo by Brady Self)

preparation application, a few options are available. While imazapyr products are commonly used in this treatment, those formulated for site preparation (Chopper® GEN2) should not be used, as damage to planted pines will occur. Longleaf is sensitive to imazapyr, and many land managers prefer to use a combination of hexazinone and sulfometuron methyl (Oustar®) for HWC, especially if imazapyr was used in site preparation. These applications should occur during March or April after planting, and surfactants should not be used. Following are the most commonly prescribed:

- **10–13 ounces per acre of Oustar®**
- **4 ounces per acre of Arsenal® AC + 2 ounces per acre of Oust® XP (Consider soil pH.)**
- **4 ounces per acre of Arsenal® AC**
- **4 ounces per acre of Arsenal® AC + 7 ounces per acre of aminopyralid (Milestone®)**

Early Rotation Woody Release

Woody release is the practice of controlling woody species that are in direct competition with young pines. Due to economic considerations, this competition has to be substantial to warrant woody release. The quantity of competing stems present has to be at a level that threatens successful establishment and survival of planted pines. Typically, this level of competition happens only if chemical site preparation was not performed or failed to yield satisfactory vegetation control. If necessary, woody release should be performed as early as possible after you



Figure 5. Example of MRBC application results. The area on left side of photograph received MRBC, while the area on right side did not. (Photo by Brady Self)



Figure 4. Example of released naturally regenerated longleaf pine seedlings. (Photo by Brady Self)

determine that competing woody species are likely to cause plantation failure, or if failure of site preparation is noted. Woody-release applications should occur between years one and five while the stand is precommercial in size.

Longleaf pine presents a different set of circumstances and constraints than other southern yellow pines. Due to the presence of prescribed fire typical in longleaf systems, woody release is usually a secondary option. While imazapyr is commonly used in woody release for other species of pine, it should be avoided for this use on longleaf pine. There are also herbicide options for directed-spray, woody-release applications that carry a significant risk to longleaf seedlings if foliage contact is made. However, for the purposes of this publication, the only commonly prescribed woody-release option available for use in longleaf systems uses hexazinone (Velpar® DF, Velpar® L, Pronone® Power Pellets). Following are recommended rates of hexazinone:

- **1.5 pounds per acre of Velpar® DF or Pronone® Power Pellets**
This rate is for medium-textured soils only (loams, sandy clay loams, silts, and silt loams). Consult the label for rates on other soil types.
- **72 ounces per acre of Velpar®**
This rate is for medium-textured soils only (loams, sandy clay loams, silts, and silt loams). Consult the label for rates on other soil types.

Application should occur early in the growing season after bud break of hardwood species but before temperatures rise above 80° Fahrenheit. Consult the herbicide label to establish the appropriate rate of hexazinone for use on various soil textures.

Mid-Rotation Brush Control

Mid-Rotation Brush Control (MRBC) is similar to woody release, but it is performed later in the rotation. Typically, treatment occurs a year after a first thinning operation. However, if delayed, an application should be performed no later than 5 years after the thin. MRBC is not always necessary and should only be performed if woody competition is sufficient to negatively affect growth and vigor of crop pines to a point where the application becomes economically beneficial. The presence of yaupon holly, which often grows in a large enough quantity to suppress longleaf systems, can necessitate MRBC and require the use of a triclopyr product. The most common MRBC prescriptions for longleaf pine include the following:

- **48 ounces per acre of Chopper® GEN2 + 38 ounces per acre of Garlon® 4 + MSO (1% vol/vol)**
APPLY UNDERNEATH CANOPY ONLY.
This is a growing season application.
- **24 ounces per acre of Arsenal® AC + 24 ounces per acre of Garlon® XRT + MSO (1% vol/vol)**
APPLY UNDERNEATH CANOPY ONLY.
This is a growing season application.
- **20 ounces per acre of Arsenal® AC + 3 quarts per acre of a 4-pound, forestry-labeled glyphosate product + MSO (1% vol/vol)**
Saflufenacil (Detail®) may be added at 2 ounces per acre to increase effectiveness.
APPLY UNDERNEATH CANOPY ONLY.
This is a growing season application.
- **16 ounces per acre of Arsenal® AC or 32 ounces per acre of Chopper Gen2**
Add MSO at 1% vol/vol or a nonionic surfactant at 0.5% vol/vol.
APPLY UNDERNEATH CANOPY ONLY.
This is a mid to late growing season application.

Conclusions

While planning herbicide use in longleaf-pine systems is somewhat different than planning for other pines, it is still straightforward. Herbicide treatment increases pine growth and survival, and it is affordable in today's markets. Most undesirable competition can be controlled through careful consideration of effective herbicides and appropriate application timing. Land managers should be cautious when using herbicides in forest management, but current herbicide options make suppressing unwanted vegetation both efficient and cost-effective.

Additional Reading

Cunningham, K., E. Taylor, B. Barber, G. Holley, and M. Blazier. 2019. *Forestry Herbicide Prescriptions: Western Gulf Region*. University of Arkansas Cooperative Extension Service publication MP553.

Dickens, D., P. Minouge, and D. Moorhead. 2012. *A Guide to Using Imazapyr for Chemical Site Preparation in Southern Pine Plantation Establishment*. https://www.bugwood.org/imazapyr_site_prep_6-2012.pdf

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