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Herbicide Options for Longleaf Pine Management

Forest herbicide development has had a tremendous impact on managing 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 option available to land managers working to establish it 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 been invaluable for forest managers in their regeneration efforts.

Managers attempting to regenerate longleaf pine often face problems resulting from the presence of onsite vegetative competition. This competition can prolong 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 proper chemical site preparation. However, compared to other southern pine species, some special considerations are warranted when prescribing herbicide applications in longleaf pine.

Herbicide use has been proven beneficial in longleaf pine management by lowering establishment costs, shortening the grass stage, increasing growth, and reducing mortality. This publication informs readers of the herbicidal options available for treatment of undesirable vegetation in longleaf pine systems. 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 inclusive list of treatment options, it reviews product names, rates, and application timings proven to have the greatest effect in both operational forest herbicide work and research.

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

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

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

Chemical Site Preparation

Chemical site preparation involves applying herbicides to control competing vegetation before planting. At this point, crop trees have not been planted, and unintended damage is not a concern. Consequently, there is greater flexibility in herbicide selection 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 to control 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-leafed species commonly dominate the competing species complex in longleaf pine systems and their presence often dictates using 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 extra 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 percent. 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-leafed species (such as wax myrtle, yaupon, gallberry) comprise a significant portion of targeted onsite species. In situations where waxy-leafed 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-leafed 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) involves 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.)

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

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

However, in situations where growing season HWC was not considered and not included in the tank mix for the site-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 some combination of hexazinone and sulfometuron methyl 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. The following is the most commonly prescribed:

- **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 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). The 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.

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

- **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 percent vol/vol or a nonionic surfactant at 0.5 percent vol/vol.
  - Apply underneath canopy only.
  - This is a mid to late growing season application.

Conclusion

While planning herbicide use in longleaf pine systems is somewhat different than planning for other pines, it is still relatively 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., Taylor, E., Barber, B., Holley, G., & Blazier, M. (2019). Forestry herbicide prescriptions: Western Gulf region. University of Arkansas Cooperative Extension Service Publication MP553.

Dickens, D., Minouge, P., Clabo, D., & Moorhead, D. (2020). A guide to using imazapyr for chemical site preparation in southern pine plantation establishment. *Bugwood*. https://www.bugwood.org/publications.cfm

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