

## What Research Has Found about Establishing Loblolly Pines in Cogongrass Infestations

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**Considerable research on controlling cogongrass has been performed over the past two decades, with some of this research including the reestablishment of loblolly pine plantations in cogongrass infestations.** It was initially learned from international research, especially by the Dutch in Indonesia, that planting trees and cover crops following cogongrass suppression was required to convert lands most efficiently (MacDicken et al. 1997). The availability of high quality seedlings from genetically improved lines that exhibit fast juvenile growth makes loblolly pine a logical species to use in our region, especially since it has high timber value.

**Control and suppression of cogongrass has been researched using all the tools of integrated vegetation management.**

- **Prescribed fire**
- **Mechanical**
- **Herbicides**
- **Biological Control**

Specific treatments in each of these tool categories are useful, or have potential, for site preparation treatments to suppress cogongrass before planting loblolly pine seedlings.

**Prescribed fire has been found useful for reducing thatch and stimulating new grass regrowth for herbicide spray treatments.** Prescribed burning combined with herbicide applications is a common treatment used for site preparation before planting loblolly pines in the region. On cut over sites, winter or fall burning usually follows late summer herbicide applications. With cogongrass treatments, burning prior to herbicide treatments is a common recommendation seen in extension bulletins, along with cautionary statements about the severe burns that cogongrass produce. The Florida Environmental Protection Agency recommends herbicide applications 90 days after burning. Combined with fall herbicide applications, this presents the obvious problem of needing to burn in the high risk mid-summer fire season.

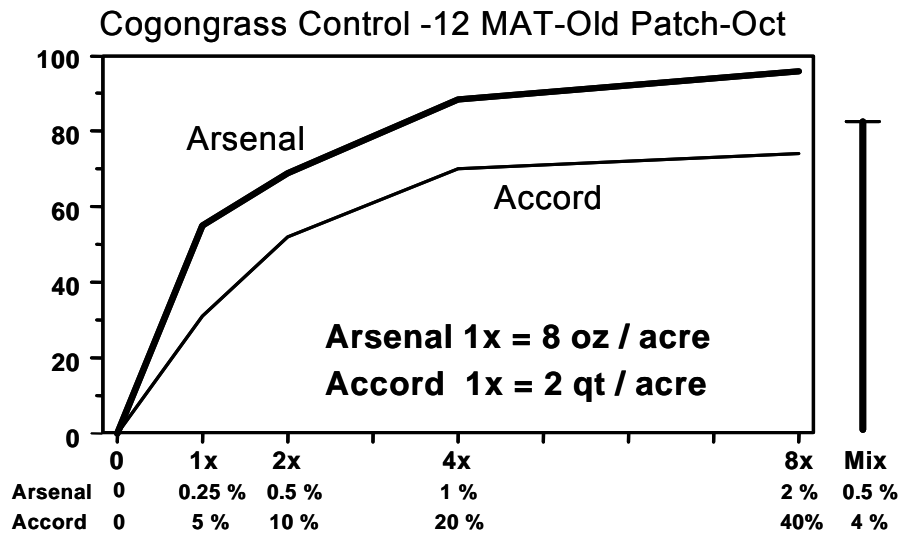
It is readily observed that underground rhizomes of cogongrass and older rootcrowns are not affected by burning; while only the leaves are consumed. Burning can slow revegetation efforts, can kill woody species in the stand that can be useful for slowing invasion and can produce bare areas conducive to cogongrass seed germination (Lippincott 2000, Yager 2007). Thus, prescribed fire may have more negative than positive results in a restoration project aimed at establishing loblolly pine stands.

**Disking combinations with herbicides have been shown to result in greater cogongrass rhizome control than either treatment used singly (Ramsey et al. 2003, Johnson 1999a, Johnson et al. 1999b, Shilling et al. 1997).** Johnson (1999a) found on Florida sites that burning followed by disking the next day then split applications of imazapyr (each equivalent to 1 quart of Chopper per acre) 44 and 90 days after burning provided greater than 90% control. Another effective combination was the use of disking one day after burning, followed 43 days later with an imazapyr application (equivalent to 1 quart of Chopper per acre), and then another disking 44 days after the application.

Single or frequent, repeated mowing of the grass at any time of year and has not been found effective for decreasing cogongrass rhizomes (Faircloth 2004).

**Regional and international research has shown that imazapyr and glyphosate herbicides are the most effective active ingredients for cogongrass control (Shilling et al. 1997).** The team of researchers led by Dr. Donn Shilling has determined that these two herbicides are most effective when applied from September to November and December in South Florida. The most effective rates were the highest tested and equivalent to 1 quart per acre of Arsenal AC and 2 quarts per acre of Accord (4 lb active ingredient per gal for both) (Johnson 1999a). They found that mixtures of these herbicides were also effective; however, the best mixture was not determined. Their research tested volumes of total mix used in the foliar sprays and results were consistent with prior research findings for applying these active ingredients: 5-10 gal per acre for glyphosate and 25 gal per acre for imazapyr.

**An expanded range of rates was tested for both imazapyr and glyphosate by my team at two locations in south Alabama: a relatively young infestation in a 3-yr old loblolly pine plantation and an older infestation under 50-yr old slash pine.** Multiple plot applications of imazapyr and glyphosate were made by foliar sprays in September and October with 10 gal per acre for Accord (4 lb ai per gal) and 25 gal per acre for Arsenal AC (4 lb ai per gal) with 0.5% surfactants. The dose-response curve for the older infestation (both sites had similar results) is presented below, as percent control one year after treatment relative to untreated plots.



**Findings:**

- **Imazapyr (aka Arsenal) is the more effective active ingredient, which is consistent with all other research.**
- **Increasing the rate to high levels of a single application did not achieve eradication by either herbicide at either location. Even using as high as a half gallon per acre of Arsenal AC or 4 gallons per acre of Accord did not achieve complete eradication. Half these rates were more cost-effective.**
- **The level of control fell to about half of these values two years after treatment, as found by all other research. Excavation with a backhoe three years after treatment found that most regrowth came from surviving rhizome fragments within the plots. Herbicides had killed some segments while others survived and resprouted.**

**Total spray volume to use when using mixtures of imazapyr and glyphosate**

A mixture of the herbicides was also tested at these sites: Arsenal at 16 oz plus Accord at 4 quarts per acre. These were applied at 10, 25, and 40 gallons total mixture per acre to determine if these volumes made a difference. No differences in cogongrass control were consistent, with all volumes being about

the same. The control of cogongrass was more cost-effective with the mixtures versus either herbicide alone and yielded 80 to 99% control after one year.

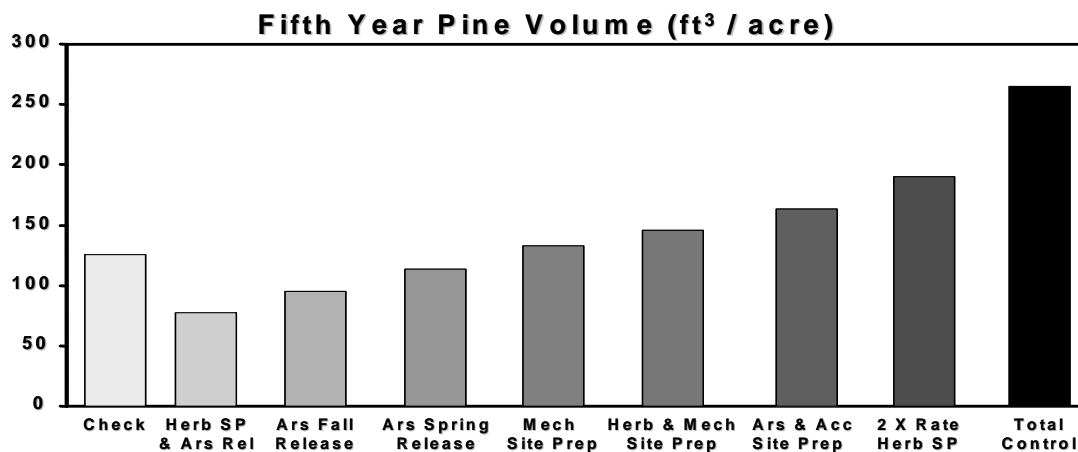
**Loblolly pine establishment using combinations of row scalping, herbicide site preparation, and over-the-top release was tested in Mobile County, Alabama (a field tour site) (Faircloth 2004).** Replicated plots were installed in a uniform 10 yr old cogongrass infestation. The treatments were:

1. Check: seedlings planted in abundant cogongrass with no treatment
2. Herbicide site preparation: Accord Concentrate at 4/5 gallon per acre (4 lb ai glyphosate per ac) plus Arsenal AC at 12 oz per acre were applied in October using 40 gal total mixture per acre that included a surfactant (0.5%)
3. Mechanical site preparation: Row scalping (2 ft wide to 6 inches deep) in December. using a fire plow
4. Release after planting applied in 4-ft bands centered over the rows: Arsenal at 6 oz per acre in different combinations with Oust XP and Escort applied in May or October of the first growing season.
5. Herbicide site prep + Mechanical site prep
6. Herbicide site prep + Release
7. Mechanical site prep + Release
8. Double the rate of herbicide site prep + Release in Oct with Arsenal + Oust XP+ Escort..

Second generation "improved" loblolly 1 year old pine seedlings (bare root) were culled in the field (greater than ¼-inch root collar diameter) and planted in January, 2001, in spots that had been heel kicked into the grass to expose soil on a 8.2- x 8.2-ft spacing. Wet weather preceded and followed planting.

**Findings:**

- **Pine survival exceeded 90% on all plots including the Check.**
- **Cogongrass was suppressed by herbicide treatments but reinvasion occurred more slowly with higher rates and the higher rates had more species of both woody shrubs and herbaceous plants.**
- **Scalping cleared the grass from the planting row and held water during wet periods.**
- **Treatment effects on pine growth were evident by year two and by year five, pine volumes were:**



For comparison, the above graph also shows loblolly pine growth on plots that had "Total Control" of all plant competition for the first 5 years on a study 60 miles north (i.e., greatest potential growth).

### Findings (continued)

- **The “2X Herbicide Site Preparation with Release” increased pine volume growth by about 50% more than the non-treated check plots, and yielded the most increase in pine volume of any treatment tested.**
- Release alone or after herbicide site preparation was not a beneficial long-term treatment. However, in the first growing season, Spring release treatments did control 17% more cogongrass than Fall treatments. Also, the addition of Oust (sulfometuron) increased control by 10%, while additions of Escort (metsulfuron) did not.
- Row scalping did not result in improved pine growth after five years.
- Pine volume on the uncontrolled cogongrass (check) treatment plots was about one-half the potential pine growth achieved with the most intensive competition control on the “Total Control.”
- Suppression of cogongrass is underway as pine cover develops, while a second canopy of waxmyrtle, yaupon, or privet enhances suppression.

### Biocontrol using grazing

Dr. Greg MacDonald explains the approaches examined using insects and diseases for biocontrol and these advance will not be readdressed here. One other form of biocontrol that has been used with other invasive plants such as kudzu is grazing. Several of the initial importations of cogongrass were for grazing trials and the results have not been widely reported, the general conclusion being that it was unsuitable for cattle. The low nutrient content and high silicates in the foliage were the reasons given and it is commonly observed that most varieties of cattle will not graze it. Still, a wide number of the newer imported heartier breeds have not been tested and deserve further study.

Conversion of a cogongrass infestation has been observed in Mobile County, Alabama where initial suppression with an application of glyphosate herbicide was followed with drilling of bahiagrass seed into this cover. Fenced horses were used to finish the conversion to a bahiagrass pasture.

This one example give promise that in some situations, conversion to pastures for a variety of grazing animals, and possibly conversion to other species, including loblolly pine, could be achieved with appropriate development of procedures.

### What we have learned:

- **Burning and disking used with herbicide site preparation can increase cogongrass suppression but will not completely eradicate the grass.**
- **Burning may have negative effects on restoration by killing desirable woody plants and baring soil for cogongrass seed germination.**
- **Loblolly pine can be planted in and survive in cogongrass either with or without site preparation treatments given good quality seedlings, good planting into spots that have been heel kicked to reveal bare soil, and fortuitous weather with ample rainfall. Cogongrass is suppressed by loblolly pine canopies but not eradicated.**
- **High rates of imazapyr (greater than 0.5 lb ai per acre) and glyphosate (greater than 4 lb ai per acre) can be applied as site preparation in the fall (September and October) before planting to increase loblolly pine growth.**

- **Over-the-top release treatments applied alone after planting, with the three herbicides tested, did not improve pine growth after five years, but in fact decreased it.**
- **Greater suppression of cogongrass at year 5 occurred on plots that had an added cover of shrubs below the pine canopy.**
- **Further research on grazing suppression of cogongrass is warranted.**

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