

## **Mid-Rotation Woody Control Trial to Test Various Herbicides, Tank Mixes, Rates, and Methylated Seed Oil Amounts on Hard to Control Waxy Leaf Species in a Thinned Loblolly Pine Stand in Wayne County, Georgia**

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### **Abstract**

Many private non-industrial forest landowners (NIPFLs) in Georgia and the southeastern U.S. question the benefits of mid-rotation woody and shrub control in their thinned loblolly and slash pine stands. A number of UGA Forestry School studies have shown that early (ages 5-9 years) to mid-rotation (ages 10-16 years) woody and shrub control can increase slash and loblolly and slash pine growth by an average of 1.3 and 0.9 tons/ac/yr, respectively with the growth benefit lasting for 8 to 14 years. Less is known on what herbicides, rates, tank mixes and the addition of methylated seed oil will best control waxy leaf woody shrubs, vines and ferns of the Atlantic and Gulf Flatwoods. The main objective of this study was to determine what herbicides, rates, tank mixes, and methylated seed oil treatment(s) gave the competition control two years after treatment. UGA WSF&NR and CAES faculty installed a replicated mid-rotation herbicide trial in a recently thinned loblolly pine stand on typical Flatwoods bedded land in Wayne County, Georgia with a moderate to heavy understory of the following woody shrub plants (in order of their site presence and dominance): gallberry, wax myrtle, saw palmetto, red maple, sweet bay, blackberry, grape vine, broomsedge, water oak, vaccinium sp., lyonia, and ty-ty. The treatments consisted of various dosages of imazapyr (as Chopper Gen II or Polaris SP) with and without triclopyr ester (as Tahoe 4E) and two levels of methylated seed oil applied 5 October 2010 and evaluated for control in October 2011 and October 2012. Two year results indicate that five herbicide treatments gave fair to excellent control of most competition with the exception of saw palmetto which is considered hard to control.

### **Methods**

The study area is located in Wayne County, Georgia in a 1996 planted, 2008 thinned loblolly pine stand with a thick understory of primarily gallberry (Photo 1). The herbicide treatments are listed in Table 1 with three replications for each treatment. Treatments were assigned randomly to the plots. The herbicides were mixed on site (on a dirt road away from any sensitive trees, drainage ditches, or body of water) into a 25 gallon boomless sprayer mounted on a four wheel drive all terrain vehicle (ATV). The ATV mounted boomless sprayer (two nozzles fitted at 8 feet above groundline) was calibrated using water prior to any herbicides being added to the spray tank. The boomless sprayer swath width was approximately 33 feet. The ATV average speed in the thinned plots was 2.5 miles per hour. Average gallons per acre (gpa) application rate was 33.75. Plot dimensions were 66 x 66 feet (1/10 acre) so an “up and back” pass gave us 100% plot coverage. All herbicide treatments were applied on 5 October 2010 to the fifteen treated plots (3 randomly assigned plots were left untreated to serve as controls). The

spray tank was rinsed with 3 gallons of water between each treatment. The water used was tested for pH and hardness with an average pH of 7.0 and with a moderate to high hardness so Choice Extra, a water conditioner and softener, was added to each treatment at 2 oz/tank. The order of tank filling was: 5 1/3 gallons water, the water softener, the herbicides, the MSO, and 5 1/3 gallons water. The tank was stirred with a de-barked stick and agitated prior to each treatment application.

UGA faculty came back to the study area on October 2011 and October 2012 to take ocular estimates of control of the shrub and woody competition present in each plot. Branches and stems were broken at various distances from the base of plants to determine if the cambium was brown, brittle and dead or if some of the cambium was still living to verify "control". Control ratings were as follows for each plant species or genus present: poor (P) with < 40% control, fair (F) with 40-60% control, good (G) with 60-80% control, and excellent (E) with > 80% control.

Table 1. Herbicide treatments applied 5 October 2010 in a thinned loblolly pine stand for the mid-rotation shrub control study in Wayne County, Georgia

Plot #	Treatment	Methylated seed oil (MSO) amount (qts/ac)	Herbicide active ingredient(s)
1, 8, 15	Control (no herbicide)	None	None
2, 10, 14	48 oz/ac Polaris SP	5	Imazapyr <sup>†</sup> (2lb/gal a.e.)
4, 11, 17	48 oz/ac Polaris SP	2.5	Imazapyr
3, 12, 18	48 oz/ac Polaris SP + 1 qt Tahoe 4E	2.5	Imazapyr + Triclopyr ester <sup>††</sup> (4 lbs/gal a.e.)
6, 9, 13	32 oz/ac Polaris SP + 3 qts Tahoe 4E	2.5	Imazapyr + Triclopyr ester
5, 7, 16	48 oz/ac Chopper Gen II	5	Imazapyr (2 lb/gal a.e.)

Imazapyr<sup>†</sup> is both soil and foliar active

Triclopyr<sup>††</sup> is foliar active only (and basal bark active when applied with penetrating oil)

### Two Year Post Treatment Control Results

Two year post herbicide treatment results for each plant are listed in Table 2 and 3. There were some rated plants that were not present in some of the treatment plots so the cell control ratings for these plants were left blank in Table 2. There were cases of potential coverage issues, low sample number (< 4) in some plots for some plants, re-sprouting, and variable control. These issues were noted in Table 2 and footnoted at the bottom of Table 2. The two best treatments for gallberry control were 48 oz/ac Polaris SP + 2.5 qts MSO and 32 oz/ac Polaris SP + 3 qts Tahoe 4E + 2.5 qts MSO achieving good to excellent control (Table 2). All the herbicide treatments had fair control of wax myrtle except for the 40 oz/ac Polaris SP + 3 qt/ac Tahoe 4E + 2.5 qts MSO treatment that had a fair to good rating. Bracken fern control was good for the 48 oz/ac Polaris SP + 5 qts/ac MSO treatment and fair to good for the 48 oz/ac Polaris SP + 2.5 qts MSO and 40 oz/ac Polaris SP + 1 qt/ac Tahoe 4E + 2.5 qts MSO treatments and fair for the 32 oz/ac Polaris SP + 3 qts Tahoe 4E + 2.5 qts MSO and the 48 oz/ac Chopper + 2.5 qts MSO treatment. The only treatment that got a rating higher than poor for saw palmetto control was the 32 oz/ac Polaris SP + 3 qts Tahoe 4E + 2.5 qts MSO treatment. Herbicide trials on saw palmetto control done in Florida have shown that a broadcast application of 2 qts/ac triclopyr ester and 2 oz/ac metsulfuron or 3.3 oz/ac Chaparral (62% aminopyralid + 9.5% metsulfuron) + 1 to 2 qts/ac triclopyr ester work well as tank mixes give 85 to 90% control after 12 months. Red maple control was rated as



excellent for the 40 oz/ac Polaris SP + 1 qt/ac Tahoe 4E + 2.5 qts MSO and the 48 oz/ac Chopper Gen II treatments and fair for the 32 oz/ac Polaris SP + 3 qts Tahoe 4E + 2.5 qts MSO treatment. Red maple was not present in the other two herbicide treatments so no rating could be assigned. Sweetbay control was excellent for the 40 oz/ac Polaris SP + 1 qt/ac Tahoe 4E treatment and good for the 40 oz/ac Polaris SP + 5 qts MSO and the 48 oz/ac Chopper + 2.5 qts MSO treatments. Blackberry control was poor for all imazapyr treatments and fair for the 32 oz/ac Polaris SP + 3 qts Tahoe 4E + 2.4 qts MSO treatment. Blackberry control can best be achieved with the addition of 1 to 2 oz/ac of metsulfuron (Escort) in slash and loblolly stands but not in established longleaf stands. The best broomsedge control rating was fair to good for the 32 oz/ac Polaris SP + 3 qts/ac Tahoe 4E + 2.5 qts MSO with the other herbicide treatments having a fair rating. Grape vine control was excellent for the two Polaris SP + Tahoe + MSO treatments. Water oak control was excellent for the 48 oz/ac Chopper + 2.5 qts MSO treatment and good for the two Polaris + Tahoe + MSO treatments. Vaccinium sp control was fair to good using the 48 oz/ac Chopper + 2.5 qts MSO, fair for the 48 oz/ac Polaris SP 5 qts MSO treatment, and poor for the 40 oz/ac Polaris SP + 1 qt/ac Tahoe 4E + 2.5 qts MSO treatment. Lyonia control was good using the 48 oz/ac Polaris SP + 5 qts MSOP and the 40 oz/ac Polaris SP + 1 qt/ac Tahoe 4E + 2.5 qts MSO treatment. Ty-ty control was excellent using the 32 oz/ac Polaris SP + 3 qt/ac Tahoe 4E + 2.5 qts MSO treatment and poor for the 48 oz/ac Chopper + 2.5 qts MSO treatment.

Table 2. Competition control estimates two years (October 2012) after a single herbicide treatments (applied 5 October 2010) in a thinned loblolly pine stand in Wayne County, Georgia

Treatment (rate/ac)	gall- berry	wax myrtle	bracken fern	saw palmetto	red maple	sweet bay	black- berry	broom- sedge	grape vine	water oak	vacc- inium sp	lyonia	ty-ty
Control	P			P	P			P					
48 oz Polaris SP + 2.5qts MSO	G- E	F	F <sup>d</sup> – G	P		F- G	P	F					
48 oz Polaris SP + 5qts MSO	G	F <sup>b</sup>	G	P		G <sup>b</sup>	P	F <sup>b</sup>			F <sup>b</sup>	G <sup>b</sup>	
40 oz Polaris SP + 1 qt Tahoe 4E + 2.5 qts MSO	G <sup>b</sup>	F <sup>b</sup> -G	F- G	P	E <sup>a</sup>				E	G	P	G	
32 oz Polaris SP + 3 qts Tahoe 4E + 2.5 qts MSO	G <sup>b</sup> - E	F <sup>b</sup>	F <sup>b,d</sup>	P- F <sup>b</sup>	F <sup>b</sup>	E	F <sup>b</sup>	F-G <sup>c</sup>	E <sup>b</sup>	G <sup>b</sup>			E
48 oz Chopper Gen II + 5 qts MSO	F- G <sup>b</sup>	F <sup>b</sup>	F <sup>b,d</sup>	P	E	G	P	F <sup>c</sup>	G	E	F-G <sup>c</sup>	F	P

P = poor (< 40% control), F = fair (40-60% control), G = good (60-80% control), E = excellent (> 80% control)

<sup>a</sup> low sample size (< 4 plants)

<sup>b</sup> some resprouting occurring

<sup>c</sup> variable control (possible coverage issue due to beds and ATV application)

<sup>d</sup> possible new plants (i.e. bracken fern)

Pictures were taken in each plot two years after treatment to note the level of control or lack thereof (i.e. the control plots). Note the control plots amount of gallberry, the most dominant plant species on the site. The level of gallberry control achieved by the five herbicide treatments two years after treatment are all acceptable with the percent bare ground being in the 40% (40 oz/ac Polaris SP + 1 qt/ac Tahoe 4E + 2.5 qts MSO) to 85% (32 oz/ac Polaris SP + 3 qts Tahoe 4E + 2.5 qts MSO) range based on the photos.





Photo 1 (left photo) and 2 (right photo). The control plot (Photo 1; the left photo) and the 48 oz/ac Polaris SP + 5 qts/ac MSO treatment (Photo 2; the right photo) 2 years after treatment.



Photo 3 (left photo) and 4 (right photo). The 48 oz/ac Polaris SP + 2.5 qts MSO treatment (Photo 3; the left photo) and the 40 oz/ac Polaris SP + 1 qt/ac Tahoe 4E + 2.5 qts MSO treatment (Photo 4; the right photo) 2 years after treatment.



Photo 5 (left photo) and 6 (right photo). The 48 oz/ac Chopper Gen II + 5 qts MSO (Photo 5; the left photo) and the 32 oz/ac Polaris SP + 3 qt/ac Tahoe 4E + 2.5 qts MSO treatment (Photo 6; the right photo) 2 years after treatment.



treatment.

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