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Equipment to Apply Herbicides to Enhance Pine Straw Production by Minimizing Competition in Loblolly, Longleaf and Slash Pine Stands after the Establishment Phase

E. David Dickens and David J. Moorhead[1]

BACKGROUND

Pine straw, the uppermost forest floor layer of undecayed needles, is raked, baled, and sold as landscaping mulch in the southeastern U.S., and has become a valuable forest commodity. Annual pine straw income to forest landowners in Georgia has ranged from $15.5 million in 1999 to $81 million in 2007 – 2009 and in 2012 was estimated to be $60 million. Income from pine straw amounts to one dollar (average of $72.3 million/year) for every six and one-half dollars of wood income (average of $469.6 million/year) in Georgia annually in 2008 through 2012. Pine straw can be sold by the bale or by the acre. Current average per acre reported prices in the southeastern U.S. range from $50 to $200 or more per acre for each raking. Pine straw can also be sold by the bale. Per bale prices range from $0.3 per bale for loblolly, $0.65 per bale for slash, and $0.90 per bale for longleaf paid to the forest landowner. A number of factors affect pine straw production rates: pine species, site productivity, stand density and age, percent rakeable stand, raking intensity (semi-annual, annual, or periodic) and interval between rakes, competition control and the use of fertilizers. Pine stands that are weed free are more attractive to pine straw contractors so the use of herbicides, mowing and prescribe fire are important tools to get these pine stands attractive and ready to rake. This paper will address equipment used to apply herbicides in loblolly, longleaf, and slash pine stands to control unwanted vegetation post establishment phase to first thinning stage.

INTRODUCTION

The herbicide purchaser and applicator need to look closely at the herbicide label to make sure that the herbicide product used is: (a) labeled for the particular use site (e.g. “for use in forest sites”, “for use in conifer plantations”, etc.) (b) labeled for the pine crop species (or genus in some cases), and (c) labeled for the particular application (“herbaceous weed control in pine plantations”, “ herbaceous release”, etc.). Herbicide products, even those with the same trade name (such as “Roundup”), may have different amounts of the active ingredient per gallon, so always follow the rates specified on the label of the particular container being used.

Herbicides for herbaceous weed control early post-plant (age 1-3 years-old) for loblolly, longleaf, and slash pine can be found in papers on http://www.bugwood.org/weeds.html by Moorhead, Minogue, and Dickens.

This paper will focus on equipment used to apply labeled herbicides for use in loblolly, longleaf, and slash stands that may have primarily woody (hardwoods or shrubs) vegetation to be controlled. A companion paper; “Herbicides to Enhance Pine Straw Production by Minimizing Competition in Loblolly, Longleaf and Slash Pine Stands after the Establishment Phase” by Moorhead and Dickens (2014) lists the labeled herbicides used for each application.

EQUIPMENT FOR HERBICIDE TREATMENTS

I. INDIVIDUAL HARDWOOD PLANT TREATMENTS

A. Hack & Squirt Treatments

If woody vegetation is too tall or large (diameters greater than 3-4 inches measured at 4.5 above groundline or over 20 feet tall) to properly cover with a foliage active herbicide, then a hack & squirt treatment from August to early-February will work on most hardwood species. Avoid periods of heavy sap flow (March to early May in Georgia).

Supplies – chemical resistant spray bottle, a hatchet or brush ax. The photo below (Photo 1) shows a hack & squirt operation. Check label for recommended spacing of hacks and amount of herbicide to apply per hack.

Photo 1. An example of hack & squirt

B. Cut Stump

Like hack & squirt, cut stump treatments are used when woody competition is too tall and large diameter to foliar spray with low stem numbers per acre. Cut the stump with a chainsaw or hand saw (be careful with saws and use proper safety equipment) and immediately treat the cut stump with one of the following herbicides applying the herbicide over the cut surface emphasizing the cambium area just inside the bark. Cut stump herbicide treatments can be made anytime of the year. Photos 2 and 3 illustrate a freshly cut stumps treated with a herbicide.

Supplies – (1) a 3-4 inch wide paint brush and herbicide solution container with top or a 3 or 4 gallon backpack hand pump sprayer or a small spray bottle, (2) a chainsaw, brush saw, or a sharp hand saw. Always wear proper protective clothing when using a chainsaw or saw as well as proper clothing for applying herbicides.

Photo 2 and 3. Examples of cut stump treatments where the hardwood is cut with a saw close to groundline and a herbicide is sprayed immediately after cutting directed to the cambium layer just inside the bark (wipe off sawdust from stump before spraying). With small diameter stems it is easier to spray the entire cut surface.

C. Basal Bark Treatments

Basal bark treatments are used on hardwoods that are less than 4 inches dbh for thick bark species or less than 6 inches dbh for thin or smooth barked species. Basal bark treatments are used when stem counts per acre are relatively low making other control options less attractive. Basal bark treatments are done applying the herbicide solution to the lower 15 inches of the stem completely around each stem spraying to the ground. This treatment is done from October to early February (before bud swell) in Georgia.

Supplies–a 1 gallon hand pump sprayer to a 3 or 4 gallon backpack hand pump sprayer (Photo 5).


Photo 4 (left photo) illustrating a basal bark October treatment using Garlon on wild pear with effective control and Photo 5 (right photo) showing a backpack sprayer used to apply the herbicides for the basal bark treatment (can be used for spot treatments as well).

D. Spot Treatments

Spot treatments are used mostly where unwanted woody vegetation is scattered, stem densities are low, stem diameters are small (less than 2-3 inches), and vegetation heights are less than 10-12 feet tall. This is a direct spray application applying the labeled herbicides on the unwanted hardwood and other woody vegetation, keeping these foliar active herbicides OFF the pine foliage. Best application timing in Georgia is mid-July to mid-October (prior to first frost) for the

Glyphosate products and from mid-September to late-October for the Triclopyr products (temperature needs to be less than 86 degrees F when using ester formulations of Triclopyr to minimize volatilization and movement of the product into pine canopies or off site). Photo 6 illustrates a fall spot treatment using foliar active herbicides and a backpack sprayer to control low (less than 500 stems per acre) hardwood levels on a small acreage (15 acres).

Supplies – A 3 to 4 gallon hand pump backpack sprayer (Photo 4) or an ATV or tractor mounted 12 volt or PTO driven 15 to 100 gallon sprayer.

Photo 6. A fall spot treatment using foliar active herbicides to control unwanted hickories, oaks, and black cherry in a 1-year-old longleaf pine stand (less than 500 hardwood stems per acre and 15 acres made the spot treatment possible with a 4 gallon backpack sprayer).

II. BROADCAST HARDWOOD CONTROL TREATMENTS; NON – DIRECT SPRAY – Using primarily soil and soil + foliar active herbicides

A. Spring Soil Active Herbicides Use

Primarily soil active herbicides such as Velpar® L and Velpar® DF (active ingredient is Hexazinone) are used mostly in the Coastal Plain and Sand Hills on loamy sands, sandy loams and sandy well to excessively well drained soils to control primarily oak species.

Velpar L (liquid) and DF (dry flowable powder) can be used in loblolly, longleaf and slash pine stands after age 4-years-old on coarse textured soils to control hardwoods. This

primarily soil active herbicide is best used when hardwood leaves are in half to full leaf expansion, typically from late March into early May in Georgia.

Equipment to apply Velpar – (1) An ATV with a 15 to 25 gallon 12-volt operated boom or boomless sprayer with some ATV speed control devise or (2) a tractor and PTO driven or 12-volt powered 50 to 100 gallon tank keeping the tractor in a constant range, gear and engine RPM to keep constant speed.

B. Mid-Summer into Fall Soil and Foliar Active Herbicides Use

Arsenal (53% Imazapyr) is both soil and foliar active and is very effective in controlling a wide variety of woody, herbaceous and vine plants and can be used (1) in slash and longleaf stands when applied over-the-top at age 2 through 5 years-old after 15 August and (2) in loblolly stands after 15 July of the first growing season. Arsenal can be used in slash and longleaf stands after age 5 years-old when using ground equipment and care is taken to keep the product off pine foliage.

Loblolly pine stands – Arsenal can be applied over-the-top of the pines or with ground equipment at 12-20 ounces per acre with ¼ percent surfactant starting in the first growing season but after 15 July to control hardwoods, herbaceous weeds, grasses and vines.

Longleaf and slash stands – Arsenal can be applied over-the-top of these stands at 12-16 ounces per acre with NO surfactant after 15 August in stands age 2 through 5 years-old only. Arsenal can be applied in these stands after age 5 years–old with ground equipment at 12-16 ounces per acre to control many hardwood species, herbaceous weeds, grasses and vines.

Arsenal's label does state "to prevent the possibility of conifer injury, DO NOT apply Arsenal herbicide AC when conifers are under stress from drought, animal or winter injury, or other stress reducing conifer vigor." "Some minor conifer growth inhibition may be observed when release treatments are made during periods of active conifer growth." "To minimize potential conifer height growth inhibition, broadcast release treatments may be made late in the growing season." Arsenal does not control most legumes (including wisteria, kudzu) and blackberry.

Equipment to apply Arsenal – (1) An ATV with a 15 to 25 gallon 12-volt operated boom or boomless sprayer with some ATV speed control devise or (2) a tractor and PTO driven or 12-volt powered 50 to 100 gallon tank keeping the tractor in a constant range, gear and engine RPM to keep constant speed.

***It is important to not over apply soil active herbicides. This includes not overlapping spray on passes or going slower in the treated area than the calibration area (it best to calibrate using water in area to be treated first). Proper sprayer calibration and keeping a constant speed is very important to ensure over-application does not occur.

III. HARDWOOD CONTROL TREATMENTS; <u>DIRECT SPRAY</u> – Using foliar active herbicides

Mid-summer into fall Foliar Active Herbicide Use as DIRECTED Spray to control hardwoods, shrubs, herbaceous plants and vines

This final section deals with two major foliar active herbicides that are most frequently used in cleaning up pine stands for pine straw harvesting. These two herbicides; Glyphosate and Triclopyr need to foliar applied to the unwanted vegetation foliage and NOT on pine foliage. These two herbicides, which do not have soil activity, are usually preferred in cleaning up pine stands.

The key is to have pine stands with the lower crown (lowest live branches) above the boom or boomless nozzles spray height. This lower live crown height occurs when most vigorously growing loblolly and slash pine stands (Photo 7) are 6-9 years-old and longleaf at about age 10-12 years-old. The herbicides that follow list the dosages, timing and other factors.

Photo 7. Spraying a foliar active herbicide after mowing in an unthinned slash pine stand in Wayne County, GA to get it ready for pine straw collection. The stand will need one more mowing by waiting two months after the herbicide application (for the herbicide to work through the entire plant system) before the stand is attractive for pine straw raking.


Photo 8 and 9. An ATV (L photo) set up to spray in the understory of a pine stand and a tractor (Rt photo) spraying in the understory of a pine stand to control competition. Both set up with boomless nozzles that can spray from 10 feet to 35 feet swaths.

ABOUT THE AUTHORS

Professors, UGA Warnell School of Forestry & Natural Resources.

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Warnell School of Forestry & Natural Resources
Athens, Georgia 30602-2152
Phone: 706.542.6819 • fax: 706.542.5073
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