

2021 Forest Herbicide Workshop

Advances in herbicide technology for
pine management

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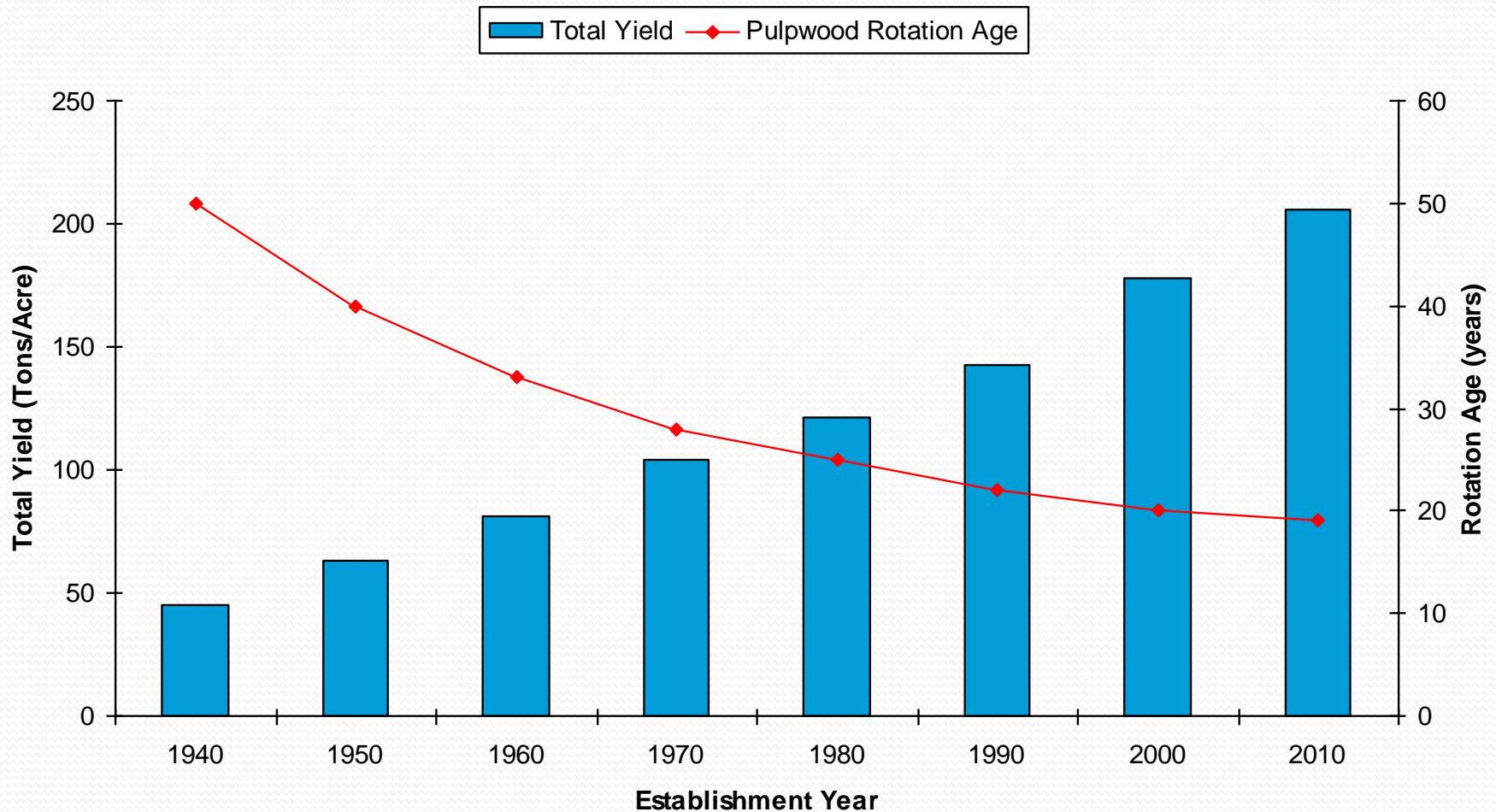
Greetings!

- Please use the Q & A function to ask questions, not the Chat. Questions will be answered after the presentation.

- SAF Continuing Forestry Education Credit (CFE's), & FL DACS Pesticide Applicator CEU's:
 - 1.0 Cat. 1 CFE approved
 - 1.0 FDACS Pesticide Applicator CEU in the categories of: Forest Pest Control, Natural Areas Weed Mgmt., Private Applicator, or ROW Pest Control.
- For FDACS CEU, email cdemers@ufl.edu with pesticide applicator license #

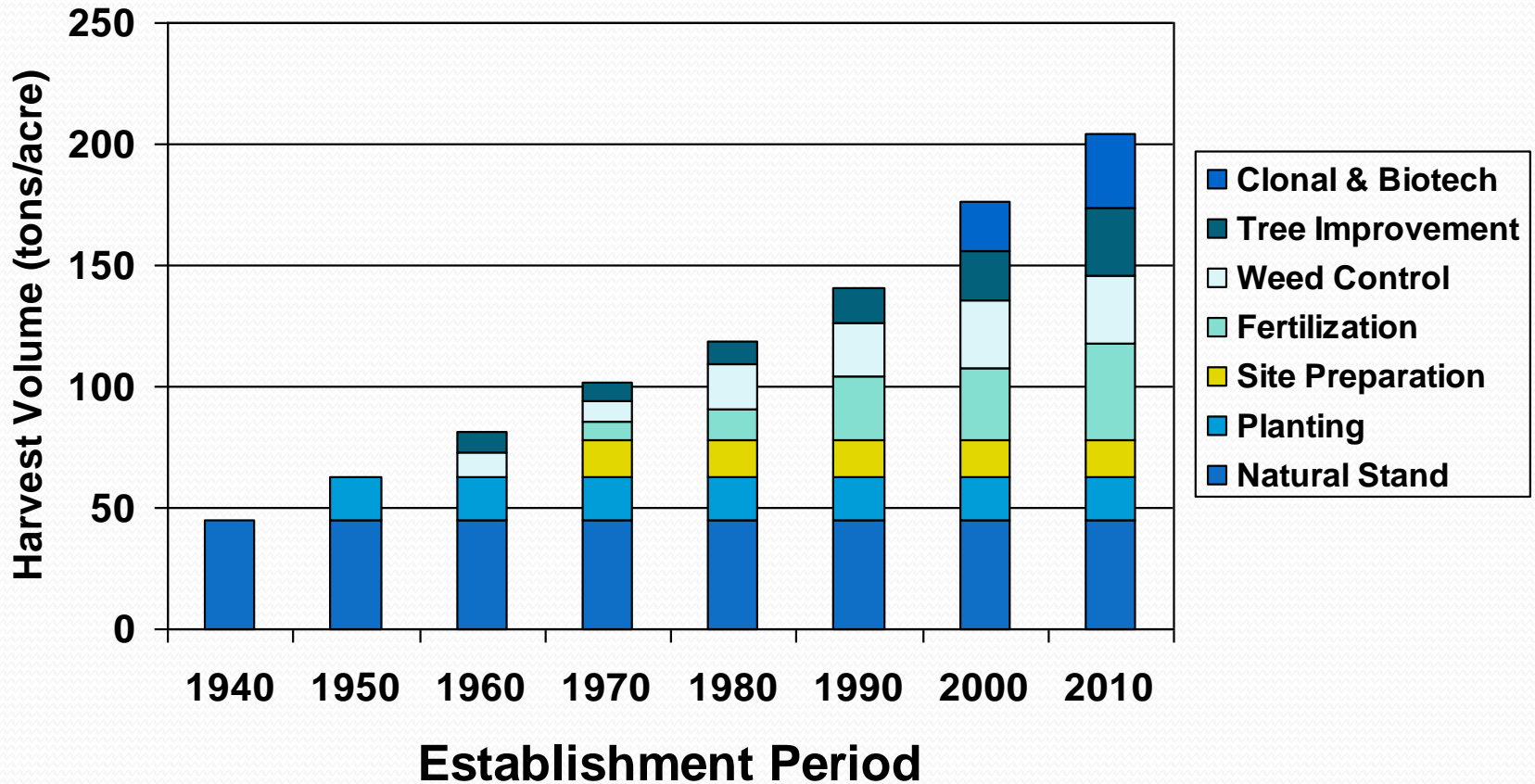
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- Please complete the very short evaluation at end of the webinar – *Thanks!*
 - Presentation slides and other reading materials for this webinar are available online at:
 - <https://programs.ifas.ufl.edu/florida-land-steward/>

Trends in Total Yield and Rotation Age for Southern Pine Plantations



Fox, Jokela, and Allen, 2004

Southern Pine Productivity Increases



Fox, Jokela, and Allen, 2004

Silvicultural Herbicide Uses

- Site Preparation
- Herbaceous Weed Control (HWC)
- Pine Release (brush)
- Mid-Rotation Release
 - Aerial Broadcast
 - Pine Understory
- Timber & Habitat Improvement

Oust® promotes broomsedge and wiregrass.



Photo: Pat Minogue

Herbicide Terminology

- Know generic and trade names
- Foliar or soil active
- Pre- Post-emergence
- Persistence
- Selectivity
- Toxicity
- Environmental Fate
- Mode of Action

Trade name “Arsenal”

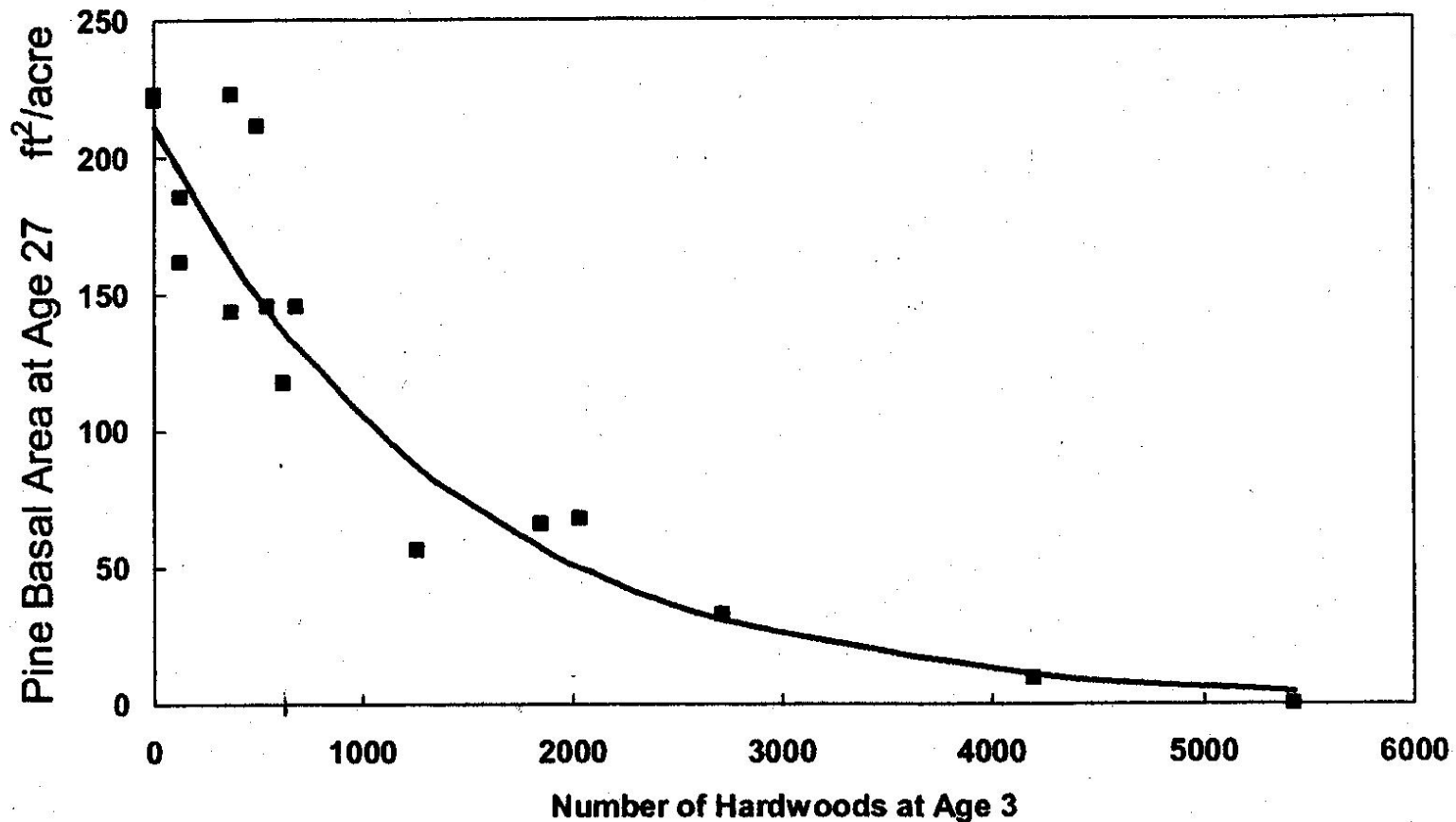


Generic name “imazapyr”

Objectives of Site Preparation

- Ameliorate soil conditions
 - Compacted soils
 - Poorly drained soils
- Manage competition and *promote* desired species
- Important in *natural* and *artificial* regeneration systems, many objectives

A small amount of hardwood at stand age 3 greatly reduces yield



Herbicide Site Preparation

“Get to the root of the problem”

- Manage brush and herbaceous weeds
- Options with and without burning
- Planting by hand or machine options
- Spring, summer, and fall treatment options
- Often combined with mechanical treatments on poorly drained (bedding) or compacted sites (disking or ripping).



Before



After

Site Prep Herbicides- Most Common

Herbicide Generic Name	Trade Name (Many other generics)	Loblolly	Slash	Longleaf
		Product Rates Applied per Acre		
Glyphosate	Accord® XRT II Roundup® Pro	4-8 quarts 2-5 quarts	4-8 quarts 2-5 quarts	4-8 quarts 2-5 quarts
Triclopyr	Garlon® 4 Ultra	4-6 quarts	4-6 quarts	4-6 quarts
*Hexazinone	Velpar® L; VU Velpar® DF VU	4 - 10 quarts 2.6 – 6.6 lb	4 - 10 quarts 2.6 – 6.6 lb	4 – 10 quarts 2.6 – 6.6 lb
*Imazapyr	Chopper® Gen2 Arsenal® AC	32-64 oz 24-40 oz	32-64 oz 20-32 oz	32-64 oz 24-40 oz
*Sulfometuron	Oust® XP	2-4.25 oz	2-4.25 oz	2-4.25 oz
*Metsulfuron	Escort® XP	4 oz Maximum	4 oz Maximum	NOT LABELED

**Persistent soil active herbicides.*

Herbicide Site Preparation

Spring treatment with Velpar® (hexazinone)

- Ideal for *sandy soils*, very effective on oaks.
- Soil active herbicide, root uptake, up xylem.
- Requires rainfall to activate soil uptake.
- Enhanced growth with spring timing.
- *Granule formulation needed, ULW gone.*



Old -
Aerial
ULW



New -
Ground
“Spotgun?”

Herbicide Site Preparation (rates/acre)

Foliar sprays in summer and early fall

- ***Upland sites:***

Oak, hickory, sweetgum...

40 oz **Chopper[®]** Gen 2
+ 2 qts **Accord[®]** XRT II/Ac.

- ***Flatwoods:***

Gallberry, Saw palmetto,
Lyonia, Titi, Yaupon,...

40 oz **Chopper[®]** Gen 2
+ 2 qts **Garlon[®] 4** Ultra/Ac. **Ground**

ADD 1-5% Methylated Seed Oil
(MSO) to improve absorption.



Aerial



Suggested highest imazapyr product rate/acre based on timing of application and planting **loblolly pine**

Planting	Herbicide Application Date				
	June	July	August	Sept.	October
	Chopper Gen II product rate, ounces per acre				
Nov.	52	48	44	36	NO
Dec.-Jan.	56	52	48	44	40*
Feb.	60	56	52	48	44

*Do not plant within 60 days after application of a 32-36 oz Chopper Gen II rate.

Dickens, D., P. Minogue, D. Clabo, D. Moorhead. 2020. A guide to using imazapyr for chemical site preparation in southern pine plantation establishment. University of Georgia, Cooperative Extension Service. 8 pp. <https://bugwoodcloud.org/bugwood/productivity/pdfs/20-95BNov2020.pdf>

Tank mixes to enhance fuels for prescribed site prep burning

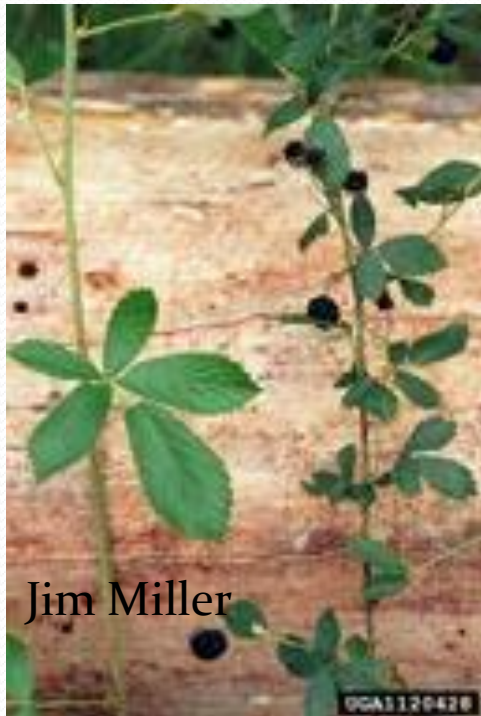
- Accord[®] XRT II (glyphosate products) increases brownout of *grasses*.
- Garlon[®] (triclopyr products), 2,4-D, or Milestone[®] VM Plus (aminopyralid + triclopyr) increase fuels in *broadleaves*.



Special Situations in Site Prep

- **Blackberry Control**

Add 1 oz **Escort**® XP or
1.5 qts **Garlon 4**® or
7 oz **Milestone**® (24-C)



- **Pine Control**

Add 5 qts **Accord** or
2-3 qts **Krenite**® or
7 oz **Milestone**® (24-C)



Flatwoods bedding following Shear-Pile

- Poorly drained soils of lower Coastal Plain - “Spodosols”
- Two pass bedding or 1 pass w/herbicide
- Done in summer months to allow beds to settle prior to planting



Herbaceous Weed Control

in newly-established pine plantations



- Widely adopted in the 1980's
- **Spring** application (Feb.-May)
- **6-foot-wide band** over rows
- Broadcast where rows are not present or have vines, grass sod, difficult access, large area
- Wait **at least 1 month** after planting for best tolerance.

COMP 15 Year Gains Over Non-Treated

Treatment	Height (ft)	DBH (in)	BA (ft ² /Ac)	Merch. Vol. (tons/Ac)
Woody Control	2.6	0.6	20	18
Herbaceous Control	3.0	0.3	10	13
Total Control	6.3	1.3	46	45

Total control averaged 3 tons/Ac/Yr more than non-treated.

Herbaceous Weed Control Herbicides

Generic Name	Trade Name (Many generics)	Product Rates/Acre
Hexazinone	Velpar[®] L VU Velpar[®] DF VU	4-8 pts 1.3-1.8 lb
Imazapyr	Arsenal[®] AC Chopper[®] Gen2	4-6 oz (6-10 Lob.) 12-20 Lob only
Metsulfuron	Escort[®] XP	0.5-1 oz Lob, Slash
Sulfometuron	Oust[®] XP	2-4.25 oz
Sulfometuron (12%) + Hexazinone (63%)	Oustar[®]	10-24 oz
Sulfometuron (56%) Metsulfuron (15%)	Oust[®] Extra	Loblolly 2.23-4 Slash 2.23-3

Herbaceous Weed Control Slash Pine (product rates acre)

- Apply February to mid-April
 - 2 oz **Oust**® XP+ 4 oz **Arsenal**® AC
 - 2 oz **Oust**® XP + 24 oz **Velpar**® L
 - 10-12 **Oustar**® VM
-
- **Arsenal**® AC is most effective on sites with heavy perennial grasses.
 - Do not add surfactant to Arsenal.
 - Use lower labeled rates of **Velpar**® on sandy soils.



Herbaceous Weed Control

Loblolly Pine (product rates/acre)

- Apply February to mid-April
- 2 oz **Oust[®] XP** + 4-6 oz **Arsenal[®] AC**
- 2 oz **Oust[®] XP** + 24 oz **Velpar[®] L**
- 10-12 oz **Oustar[®]**
- Loblolly is most tolerant pine to **Arsenal[®]**



Herbaceous Weed Control

Longleaf Pine (rates/Ac.) Check for new roots

- Apply mid-April to mid-May.
- **Do not add surfactant.**
- 2 Oust[®] XP + 24 oz Velpar[®] L
- 10-12 oz Oustar[®]

Pasture Conversion

- 4 oz Arsenal[®] + 2 oz Oust[®] XP
applied mid-May
- ***Bermuda***- Site prep first!



Pine Release: Selective control of shrubs and hardwood trees

- *Selective* herbicides, pines are *tolerant*
- *Shift* species composition - *Selectivity*
- Pine release age 2-5 yr.
- Mid-rotation release
- Broadcast applications
 - Aerial by helicopter
 - Ground sprayers



Selective Pine Release Herbicides

Generic Name	Trade Name	Manufacturer
2,4-DP	Weedone [®] 2,4DP	Syngenta
Glyphosate	Accord [®] XRT II Roundup Pro	Corteva Bayer
Imazapyr	Arsenal [®] AC	BASF
Hexazinone	Velpar [®] L	Bayer
Hexazinone	Velpar [®] DF	Bayer
Aminopyralid + Triclopyr amine	Milestone [®] VM Plus	Corteva

Pine Release – Arsenal® AC Label Rates

- *Loblolly pine* 12-20 oz/Ac.
- *Virginia pine* 12-20
- *Shortleaf pine* 12-16
- *Slash pine* 12-16
- *Longleaf pine* 12-16

- Mid-August to mid-October best application timing.
- Slash and longleaf pine ages 2-5 or after 10, no surfactant, usual rate 12 oz product/A in sandy soils of Coastal Plain.
- Loblolly 16 oz/A rate usual.
- Very broad-spectrum control.
 - Elm, redbud, locust, blackberry not controlled.
 - Add 0.5-1.0 oz Escort for locust, mimosa, blackberry control.



Photo: Jim Miller

UGA0016311

Backpack directed foliar sprays

- Best for **targeted** applications on low brush, **less than 4 feet** tall.
- **Less than 1,500 rootstocks** per acre.
- **Use low volumes, 10-20** gallons spray per acre (GPA).
- **Common Herbicides:**
 - Arsenal[®], Chopper[®] Gen II
 - Garlon[®] 4, Garlon[®] 3A
 - Accord[®] XRT II
 - Milestone VM Plus



Proper Personal Protective Equipment

Soil Basal and Spot Treatments

Spring applications



- Undiluted *Velpar*® *L*
- Exact delivery handgun application to the **base of woody vegetation**
- For *trees* use 2-4 ml product **per inch** of stem diameter at breast height.
- For **brush** apply 2-4 ml product **per 3 feet** canopy width.

Mid-Rotation Release – Aerial, Selective

Favors pine diameter growth

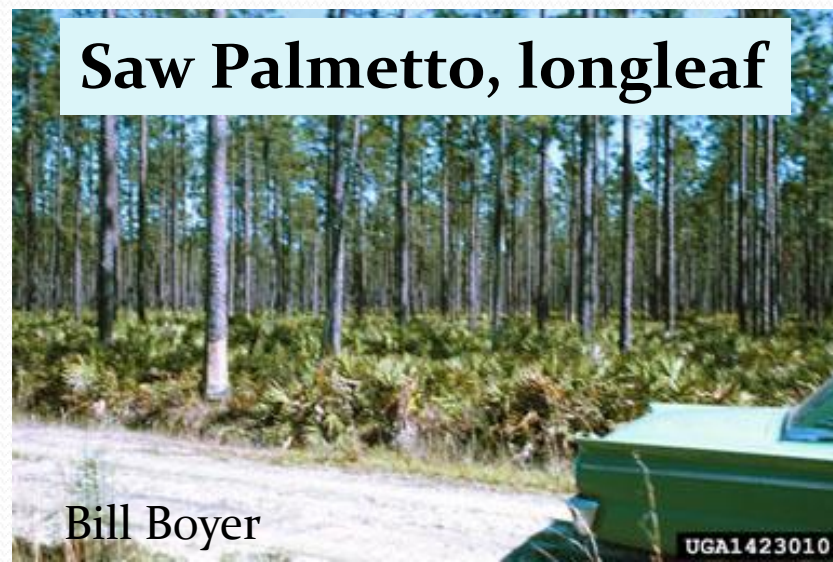
- 10 to 20-year-old stands
- Selective control of hardwood trees and shrubs in older pine stands.
- Good return on investment in many situations.
- Late summer, early fall:
Arsenal[®] AC
- 12-16 oz/A *Slash and longleaf pine,*
- 16-20 oz/A *Loblolly pine*



Re-allocate available resources

Understory shrub and brush control

- Broadcast treatments made *below the pine canopy*
- 2-3 qts Garlon[®] 4 Ultra per acre
- 4-7.5 pints Accord XRT II plus 1-2% MSO seed oil
- 1.5-2 qts Garlon[®] 4 Ultra plus 32-40 oz Chopper Gen 2 for control of waxy leaf species: gallberry, yaupon, titi, etc.
- 2-3 oz Escort XP plus 32-40 oz Chopper Gen 2 for saw palmetto control.



Timber & Wildlife Stand Improvement

- Remove diseased trees, those of poor form.
- Provides dead wood for wildlife.
- Promote desired species for wildlife.
 - Red + White Oaks
 - Persimmon
 - American Beautyberry
 - Preferred Forbs



Hack & Squirt (Cut Stem)

- Used on **taller vegetation**, greater than 4" diameter
- Make cuts at a **downward angle** around the tree
- See labels regarding solution concentration, spacing between "hacks".
- Apply 1 ml herbicide per hack
- **Common Herbicides:**
 - Arsenal[®] AC
 - Garlon[®] 3A
 - Weedar[®] 64 (2,4-D)



Basal Stem Treatment

- Spray bark of **small diameter stems**, < 4”d
- May be applied in **dormant season**
- Apply from **ground to 12-15 inches high**
- Use with “**basal oil**” or oil emulsion carrier
- **Common Herbicides**
 - Garlon[®] 4 Ultra
 - No residual effect
 - Chopper[®] Gen II
 - Residual soil activity



Cut Stump

- Best for a **few targeted** trees
- Spray just the **cambium**
- Best on **freshly cut stumps**
- Treat all the stumps!
- **Common Herbicides**
 - **Chopper[®], Stalker[®]**
 - **Garlon[®] 4 Ultra (ester),
Garlon[®] 3A (amine)**
 - **Pathfinder[®] II (RTU)**
 - **Accord[®] XRT II**



New Forestry Herbicide Labels

2021 Highlights

Common Name	Product Name	Manufacturer
Aminopyralid/ triclopyr	Milestone [®] VM Plus	Corteva
indaziflam	Espalande [®] F	BAYER
saflufenacil	Detail [®]	BASF

Milestone[®] VM Plus – (Corteva)

- Combination 1 lb triclopyr amine + 0.1 lb aminopyralid ae/gal
- For **selective control** of **broadleaf** weeds and **woody plants** in conifer forests during **site prep, directed spray, & IST**
- Site prep broadcast: up to 9 pts/Ac, 10-30 gal, add surfactant
- Directed spray: use solution 9 pts/100 gal for pine release, **selective brush and established broadleaf control**
- **IST**: i.e., cut-stump or cut-stem (hack and squirt, frill, etc.)
- Potential drift, volatile (vapors), see FL Organo-Auxin Rule
- Milestone[®] VM (aminopyralid alone) has State FL 24-C label for selective release in longleaf plantings

Esplanade® F - indaziflam (Bayer)

- **Selective Preemergence**, conifer and hardwood production areas, for site prep and post plant herbaceous weed control
- Not a stand-alone, mix with a postemergence herbicide
- Low use rates 3.5-7 oz/Ac; 10 oz product max per year
- **Wide-spectrum** control grasses and broadleaf weeds
- **Long residual**, half-life >150 days (WSSA 2014)
- Good tolerance to many conifer and hardwoods: Lob, Slash, Longleaf, Shortleaf, VA Pine; Sweetgum, Oak plantations
- Site Prep mixtures with imazapyr, sulfometuron, triclopyr
- HWC mixtures Velpar® DF, Oust®, Oustar®
- Toxic to fish, potential for leaching, aerial by helicopter only
- Inhibits cellulose synthesis, adds different mode of action
- Low toxicity, LD50 >2000 mg/kg

Detail[®] - saflufenacil (BASF)

- **Site preparation** to control wildling pines and other plants prior to planting conifers or hardwoods
 - For pine control, combine with the labeled glyphosate rate and recommended adjuvant
- Labeled for understory applications in established plantations to emerged weeds and brush
 - Combine with glyphosate or imazapyr and add adjuvant
- Protox inhibitor, inhibits chlorophyll formulation
- Degrades rapidly in the environment (DT = 1-36 days)
- Low toxicity, LD₅₀ >2,000 mg/kg

American Tree Farm System (ATFS)

Certification

2021-2025 American Tree Farm System Standards of Sustainability

- Standard 4-G for 4.2.2
- Landowners must maintain and provide documentation of pesticide (including herbicide) use on their property. Documentation must include what was applied, when, and where.
- This change can have a direct effect on certification. During the transitional period to the new Standards, if a landowner has not retained this information, they should work with their forester to develop records based on the information they have available (i.e., firsthand knowledge of what/when/why a pesticide was applied).



Sources of Additional Information



- **Keyword search our Extension publications**
<https://edis.ifas.ufl.edu/>
- **For up-to-date labels see**
<http://www.cdms.net/LabelsSDS/>

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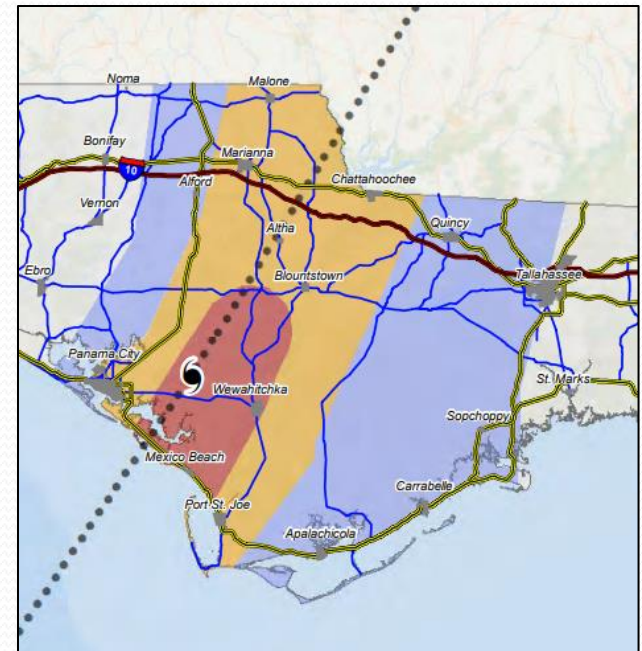


HURRICANE RECOVERY

Conditions vary, landowner objectives and resources differ – a range in approaches:

- **Heavy debris, poor access:**
 - Innovations in heavy equipment
 - Aerial vegetation management using herbicides, later prescribed burning
 - *TIME*, decay, planting over 2-5 years
- **Salvaged timber, good access:**
 - Similar to typical site prep, but more need for machinery, very site specific

Timber Loss > \$2 billion



Catastrophic Loss Due Hurricane



- Salvage opportunities are limited: roads blocked, bleu stain, shattered wood, decay in 3 months, markets saturated, etc..
- Fire hazard, pine beetle population growth...
- Timber does not qualify for causality loss.
- Reforestation challenges!

Mechanical site prep in hurricane recovery

- Much more expensive after hurricanes due to debris levels.
- For debris management on high debris sites (>75-100+ tons/ac) use D8's + anchor chaining to level debris.
- Lesser debris sites may involve V-blade shearing or saw-heading, root raking, and windrowing or piling.
- Smaller piles are better than windrows if burning is done.
- Poorly drained soils will usually require bedding (or use old beds?)....



Armored Shears





Post first V-blade shear pass



Econfina Hurricane Mathew recovery, near ready to plant!



Pine Release using imazapyr (Arsenal[®] AC)?