

# EFFECT OF CHLOROPICRIN, VAPAM, AND HERBICIDES FOR THE CONTROL OF PURPLE NUTSEGE IN SOUTHERN PINE SEEDBEDS<sup>1</sup>

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## INTRODUCTION

Methyl bromide (MBr) controls purple and yellow nutsedge (*Cyperus rotundus* L. and *C. esculentus* L.) better than other soil fumigants. Chloropicrin is a good alternative to MBr for enhancing seedling growth but is inferior as a herbicide (South and others 1997). Nutsedge control with chloropicrin has been increased by adding Vapam® (metham) or selective herbicides such as Eptam® (Carey 1997). In this trial, loblolly (*Pinus taeda*) and slash pine (*Pinus elliottii*) production and growth, were measured and the number of nutsedge tubers were counted. Fumigated plots (chloropicrin or chloropicrin plus Vapam) were treated with either Tillam® (pebulate), Eptam® (EPTC) or Manage® (halosulfuron).

## METHODS

The trial was at the Georgia Forestry Commission's Flint River Nursery in Macon County, Georgia. The study area was divided into three equal blocks each with five pre-sow treatments and a control. All treated plots contained 300 lbs. per acre chloropicrin. One treatment received Tillam and one EPTC (both at 6 lbs ai/ac) incorporated to a six inch depth with a rototiller before being fumigated with chloropicrin. Two treatments contained Vapam (80 gal/ac), one of these with and one without 6 lbs ai/ac EPTC.

Five beds of loblolly and one bed of slash pine were sown across all treatments on May 5, 1997. Two beds of loblolly and the slash pine seedlings were selected for treatment with Manage. These treatments were applied over the fumigation study plots on June 15. Each of the three beds in each pre-sow-herbicide by fumigant plots were sprayed with a different rates of Manage (0, 0.5, or 1 oz ai/ac) applied over the seedlings. On November 5, 1997, seedbed densities were assessed at the center of each treatment plot. Seedlings (25 per plot) from the center six drills of each density plot were harvested to determine heights, rcd's and dry weights. Nutsedge tubers were collected from each harvested plot. Treatment effects were analyzed as a randomized complete block design.

## RESULTS

Table 1 presents the means for plots in the three Manage treated beds. The trends among plots with and without Manage treatments were similar. However, there was less separation between means when both species were combined (and the Manage treatments included). In plots not treated with Manage, chloropicrin fumigation reduced the production of nutsedge tubers and increased seedling height and plantable seedlings. The addition of Tillam had no benefit. However, the addition of EPTC or Vapam improved at least one measured variable (a=0.05).

Table 1-Effects of fumigant and pre-sow-herbicides on loblolly and slash pine seedlings and numbers of nutsedge tubers in beds treated with Manage

Fumigant*	Herbicide <sup>b</sup> pre-sow	Seedlings parameters			Stems/ft <sup>2</sup>		Nutsedge tubers	
		Height	RCD	Weight	All	>2.8		>4.7
		cm	mm	gms		mm	mm	
None	None	26 b	3.7 b	2.9 b	26 b	19 a	2.2 b	12 a
Chloropicrin	None	28 ab	3.8 ab	3.3 ab	26 b	21 a	3.3 ab	1 b
Chloropicrin	Tillam	28 ab	3.8 ab	3.1 ab	28 ab	21 a	3.7 ab	1 b
Chloropicrin	EPTC	30 a	4.0 a	3.5 a	27 ab	22 a	4.6 a	1 b
Chloropicrin + Vapam	None	30 a	3.8 a	3.4 ab	29 a	22 a	4.4 ab	4 b
Chloropicrin + Vapam	EPTC	31 a	4.0 a	3.4 ab	28 ab	22 a	4.9 a	1 b
	<i>lsd</i>	2.6	0.2	0.44	2.5	0.3	2.1	4

\* chloropicrin (300 lb/ac) treatments plastic tarped except those with Vapam (80 gal/ac) which were power-rolled.

<sup>b</sup> Tillam and EPTC at 8 lbs ai/ac and rototivated in to 6 inch depth.

<sup>1</sup>Carey, W.A.; South, D.B. 1999. Effect of chloropicrin, Vapam, and herbicides for the control of purple nutsedge in southern pine seedbeds. In: Landis, T.D.; Barnett, J.P., tech. coords. National proceedings: forest and conservation nursery associations-1998. Gen. Tech. Rep. SRS-25. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station: 39-40.

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Table 2-Effects of Manage treatment at 41 days after sowing on loblolly and slash pine seedling development and numbers of **nutsedge** tubers

Pine species	Manage rate Oz ai/ac	Seedling parameters			Stems/ft <sup>2</sup>			Nutsedge tubers
		Height cm	RCD mm	Weight gms	All	>2.8 mm	>4.7 mm	
Slash	0.0	32 a	4.1 a	4.0 a	28 a	22 a	7.7 a	4 a
Slash	0.5	24 b	4.1 a	3.2 ab	22 b	19 a	3.8 a	1 a
Slash	1.0	25 b	3.8 a	2.9 b	28 a	20 a	3.8 a	2 a
	<i>lsd</i>	3	0.5	0.8	3.7	6	4.5	5
Loblolly	0.0	31 a	3.8 a	3.2 a	30 a	23 a	2.8 a	2 a
Loblolly	0.5	29 ab	3.7 a	3.0 a	28 ab	21 ab	2.9 a	5 a
Loblolly	1.0	28 b	3.8 a	3.0 a	26 b	20 b	2.6 a	2 a
	<i>lsd</i>	2	0.2	0.3	2.2	1.5	1.5	4

Although we expected chloropicrin to increase seed efficiency and seedling growth (South and others 1997), the reduction in **nutsedge** was unexpected. **Tillam** was less effective than the chemically similar EPTC (which is already registered for use in pine seedbeds). The other three treatment combinations (EPTC, Vapam, and EPTC plus Vapam) performed similarly and are being tested at additional sites. It will be less expensive to treat with 6 lbs ai of EPTC than to treat with 80 gallons of Vapam to control nutsedge.

Table 2 presents means by Manage treatment for the plots summarized in table 1. Manage at the high rate reduced seedling growth for all measured variables without effecting the number of tubers. It did reduce seedling height more than diameter so might be useful when managers are not allowed to top-prune seedlings. At 1 **oz/ac**, seedlings taller than 14 inches were reduced from 36 percent to 1 percent

for slash pine and from 36 percent to 14 percent for loblolly pine. However, plantable seedlings were also reduced 10 percent (from 22 to **20/ft<sup>2</sup>**), so top-pruning would be a better choice if nursery revenue is important.

In this and other studies, chloropicrin has been an effective alternative to **MBr** for enhancing the nursery development of pine seedlings. Adding EPTC or Vapam to the chloropicrin as pre-sow treatments enhanced most of the measured variables. In this trial, applying Manage did not increase **nutsedge** control.

## REFERENCES

- Carey, W.A. 1997. Increasing weed control of methyl bromide alternatives. AUSFNMC Newsletter. Spring.
- South, D.B.; Carey, W.A.; Enebak, S.A. 1997. Chloropicrin as a soil fumigant in forest nurseries. The Forestry Chronicle. **73(4)**: 489-494.