EFFECT OF DAZOMET RATE AND INCORPORATION METHOD ON PINE PRODUCTION IN SOUTHERN PINE NURSERIES

L. D. Dwinell* and S.W. Fraedrich
USDA Forest Service, Southern Research Station, Athens, GA 30602

Southern forest-tree nurseries are growing an average of 1.2 billion seedlings per year or 80 percent of America's total seedling production. To control weeds and soil-borne pathogens, 89 percent of those nurseries fumigate, largely with methyl bromide. Dazomet (Basamid®) is a chemical alternative to methyl bromide-chloropicrin for soil fumigation. Although tests have demonstrated its usefulness in western and northern forest-tree nurseries, it has not gained widespread acceptance in the South. Recent studies suggest that method of incorporation may influence dazomet's effectiveness in controlling specific soil-borne pests (2). The purpose of this study was to determine if method of incorporation, as well as time and rate of application of dazomet, would affect pine seedling production and quality, and control soil-borne fungi, nematodes, and weeds.

This study was established at a Georgia Forestry Commission (GFC) nursery near Byromville, GA and at a North Carolina Division of Forestry Resources (NCDFR) nursery located in Morganton, NC. Spring and fall applications of dazomet were evaluated at each. Dazomet was applied at rates of 0, 250, 500 lbs per acre. Two methods of incorporation were tested: a rototiller with 8-inch tines and a Gramegna spading machine. Each treatment combination was replicated three times at the NCDFR nursery and four times at the GFC nursery. The study also included a spring treatment with methyl bromide. Study plots were approximately 80' long and 3 beds wide. All plots were sown with slash pine seeds at the GFC nursery and with loblolly pine seeds at the NCDFR nursery. All cultural practices, including scheduled applications of fertilizer, water, and herbicides, were conducted as performed operationally in each of the nurseries.

Seedling quality was assessed at the end of the growing season. We determined the final bed density, lifted the seedlings, and brought samples to the laboratory for processing. Seedling diameter were recorded for 45 seedlings per plot. The roots and tops of the seedlings were then dried at 80^{0}C for 48 hours. In 1997, we presented a preliminary report based on seedling bed density and weed data (1).

Georgia Forestry Commission Nursery. Where dazomet had been applied in either fall- or spring-fumigated plots at the GFC nursery, there were no major differences in the production and quality of the slash pine seedlings (Table 1). The average seedling dry weight and root collar diameter was 4.4 g and 4.4 mm, respectively. Final bed density was not influenced by treatments and averaged 29.7 seedlings per ft^2. Dazomet did not provide the same level of control of purple nutsedge as methyl bromide (1). There were no disease outbreaks, so the efficacy of dazomet to control fungal pathogens and nematodes could not determined.

North Carolina Division of Forest Resources Nursery. There were no major differences in the production and quality of the loblolly pine seedlings among treatments or incorporation methods for dazomet at the NCDFR nursery in either the fall- or spring-fumigated plots (Table 2). The average seedling dry weight and root collar diameter was 3.7 g and 4.7 mm, respectively. Final bed densities, which averaged 22 loblolly pine seedlings per ft^2, did not appreciably change from the 6-8 week data previously reported(1). Relative to the control, methyl bromide and the fall application of dazomet greatly reduced the number of weeds per plot. There were no disease outbreaks.

Conclusions. Seedling production and quality was comparable in the methyl bromide and dazomet fumigation treatments. The effects of dazomet on seedling quality was not markedly affected by rate, incorporation method or time of application. Dazomet, however, did not control purple nutsedge as well as methyl bromide (1). No significant disease outbreaks have been observed at either nursery. We are continuing to evaluate dazomet as an alternative to methyl bromide for managing pests in forest-tree nurseries. Its greatest potential may be in forest-tree nurseries that do not have a significant purple nutsedge problem.

Literature cited

Fraedrich, S.W. and L.D. Dwinell. 1997. Preliminary results of the effects of dazomet rate and incorporation method on pest management in southern forest-tree nurseries. Ann. Intl. Res. Conf. Methyl Bromide Alternatives and Emissions Reductions, San Diego, CA, November 3-5, 1997. Pp. 97-1,3.

Stenlund, D.L., J. Juzwik, and R.R. Allmaras. 1996. Conifer seedling production and soil-borne pathogen levels following dazomet incorporation by three tillage implements. Ann. Intl. Res. Conf. Methyl Bromide Alternatives and Emissions reductions, Orlando, FL, November 4-6, 1996. Pp. 102-1,2.

The use of trade names or firm names in this publication is for the reader's information and does not imply endorsement by the U.S. Department of Agriculture of any product or service.

This publication reports research involving pesticides. It does not contain recommendations for their uses, nor does it imply that the uses discussed here have been registered. All uses of pesticides must be registered by appropriate State and Federal agencies before they can be recommended.

Table 1. Mean slash pine seedling dry weights and root collar diameters in plots treated with dazomet and methyl bromide at the Georgia Forestry nursery at the time of lifting (December 1997).

		Fall fumigation		Spring fumigation	
Incorporation method	Fumigant treatment	Seedling dry wt. (g)	Seedling root collar dia. (mm)	Seedling dry wt. (g)	Seedling root collar dia. (mm)
Tiller	Control	4.8	4.6	4.2	4.2
	Dazomet (250 lbs/ac)	4.2	4.2	4.0	4.0
	Dazomet (500 lbs/ac)	4.4	4.2	4.2	4.3
	Methyl bromide[a]	4.7	4.3	5.0	4.5
Spader	Control	4.6	4.4	3.4	4.3
	Dazomet (250 lbs/ac)	4.8	4.6	4.0	4.3
	Dazomet (500 lbs/ac)	4.5	4.3	4.2	4.2
	Methyl bromide[a]	5.2	4.6	4.8	4.5

[a] Methyl bromide was applied in March, 1997.

Table 2. Mean loblolly pine seedling dry weights and root collar diameters in plots treated with dazomet and methyl bromide at the North Carolina Division of Forestry nursery at time of lifting (January 1998).

		Fall fumigation		Spring fumigation	
Incorporation method	Fumigant treatment	Seedling Dry wt. (g)	Seedling root Collar dia. (mm)	Seedling Dry wt. (g)	Seedling root Collar dia. (mm)
Tiller	Control	3.4	4.1	3.6	4.7
	Dazomet (250 lbs/ac)	4.4	4.6	3.7	5.0
	Dazomet (500 lbs/ac)	4.8	4.8	4.1	5.2
	Methyl bromide[a]	4.2	4.6	3.5	4.8
Spader	Control	2.6	4.0	3.2	4.7
	Dazomet (250 lbs/ac)	3.4	4.6	3.6	4.7
	Dazomet (500 lbs/ac)	3.7	4.6	3.4	4.8
	Methyl bromide[a]	3.8	4.6	3.4	4.8

[a] Methyl bromide was applied in March, 1997.