

Testing Alternatives to Methyl Bromide Fumigation in Southern Forest Tree Nurseries

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In the southern United States, most bareroot forest tree seedlings are produced in nurseries with average annual productions of over 21 million seedlings. Just two species of southern pine, Loblolly (*Pinus taeda*) and Slash (*P. elliotii*) account for more than 90% of these seedlings (Carey and Kelley 1993). Most of these nurseries regularly use soil fumigation with methyl bromide (MBr) to control specific, persistent, disease and insect pests, weeds, and a spectrum of usually unidentified agents that otherwise reduce seed efficiency and seedling size in non-fumigated beds.

The Auburn University Southern Forestry Nursery Management Cooperative, with the cooperation of Hendrix & Dail Inc., has over the last three years installed 11 trials in which the efficacies of registered, alternative, fumigants were compared. Our primary concern has been to determine which alternatives most economically enhance production of seedlings with characteristics correlated with good survival and growth after outplanting. Because larger seedlings consistently survive and grow better after outplanting (South and Mexal 1984) both numbers and the size distribution of seedlings should be evaluated. Populations of selected soil microorganisms were also evaluated as indicators of the possible causes for differences in seedling growth among treatments.

In all trials, alternative fumigants were compared to beds fumigated with 235 lbs/ac MBr plus 115 lbs/ac chloropicrin (350 lbs/ac MC33) and to non-fumigated beds. The treatments evaluated, with the number of comparisons in parentheses, are as follows; chloropicrin (8), metham sodium (2), dazomet (6), 1,3 dichloropropene plus chloropicrin (6), metham sodium plus chloropicrin (3), and dazomet plus chloropicrin (1). Seedbeds fumigated with chloropicrin or with 1,3 dichloropropene plus chloropicrin yielded similar sizes and numbers of seedlings and also generally effected the populations of the surveyed soil fungi (primarily *Trichoderma* and *Fusarium*) similarly to beds fumigated with MC33. None of the tested treatments controlled weeds as well as MBr.

There was little post-germination mortality in either fumigated or not fumigated beds in our trials. However, because these trials have been in soils fumigated few rotations ago with MBr, these results could underestimate potential differences over a longer term. Nevertheless, even without differences in mortality, the better fumigants increased seedling sizes enough to have been cost effective (based on the expected differences for growth and survival after outplanting).

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