ALTERNATIVES TO METHYL BROMIDE IN SOUTHERN FOREST TREE NURSERIES

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Forest tree nurseries in the southern US are growing an average of 1.2 billion seedlings per year or about 80% of the total seedling production in the US. This annual nursery production supports a planting program of approximately 1.8 million acres-an area about the size of the states of Delaware and Rhode Island combined.

Fumigation is practiced by 89% of these nurseries for both disease and weed control. The chemical of choice has been methyl bromide, applied every year by some nursery managers and every second year by others. A few nurseries have used fumigation only on an "as-needed" basis to deal with chronic disease problems. One nursery has successfully grown high quality annual seedling crops without fumigation for 16 years. This nursery has emphasized intensive soil management with bark mulch and aggressive weed control.

With the loss of methyl bromide in the year 2001 it will be essential for southern nursery managers to practice Integrated Pest Management as well as state-of-the-art nursery management. An important key to growing seedling crops without fumigation will be concentrated soil management with emphasis on increased soil organic content.

INCREASED SOIL ORGANIC CONTENT

The benefits of increased soil organic content include:

-Improved soil physical properties resulting in better soil structure, and improved internal drainage, aeration and moisture-holding capacity.

-Improved chemical properties producing higher cation exchange capacity buffering the soil solution against pH changes and holding nutrients in the soil. Increased carbon dioxide concentrations will suppress some of the common damping-off fungi Rhizoctonia spp).

-Improved biological properties may also include the suppression of certain pathogenic soil micro-organisms and the improved development of mycorrhizal fungi. A recent study in Florida and South Carolina nurseries indicated that pine seedlings can be successfully grown in nursery soils with organic supplements and without fumigation, even in compartments with a recent history of charcoal root rot (Macrophomina phaseolina). This study also highlighted the benefits of pine bark as compared to composted material. Other studies have pointed out the effectiveness of pine bark in suppressing pathogenic fungi such as Pythium and Fusarium species.

Southern nursery managers have been creative in their acquisition of organic supplements since sawdust and bark have become increasingly hard to find in recent years. Peanut hulls, rice hulls, municipal yard waste, and cotton gin waste have been used both in raw and composted form. Hurricane "Fran" provided the North Carolina coastal nursery with an unprescedented quantity of organic material in the form of storm-damaged timber. This has been chipped and will be composted and added to the nursery soil.

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Concentrated programs of soil organic matter management often involve the use of cover crops in rotation with seedling crops and the use of organic mulch and soil amendments. Cover crops in the South include the sorghum-sudan hybrids, corn and milo. Winter wheat and rye are often used on fall-sown hardwood seedbeds to stabilize and protect the beds through the winter. Herbicides are then used to kill the "green mulch" prior to seedling germination in the spring. All of these sources of organic material contribute to the overall soil organic composition.

An essential element of nursery management without methyl bromide will be intensive and agressive weed control. New herbicides are urgently needed for persistent weeds such as nutsedge (Cyperus spp.). Good sanitation must be practiced in riser lines, alleys and other non-production areas to prevent weed dispersal into seedbed areas. Mulches and organic amendments must be carefully selected and/or treated to prevent the introduction of weeds into the nursery.

In the future forest nursery managers must use all of the "tools" available for the production of high quality seedlings. Careful site selection, land levelling, drainage, and fertilization must be used in conjunction with state-soil management and aggressive weed control. Alternative fumigation chemicals may be developed in the future, but until then the nursery manager will be challenged to practice the very best art and science possible.

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