

INTENSIVE SOIL MANAGEMENT VS. FUMIGATION  
IN THE CONTROL OF WEEDS

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by

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The information that I wished to obtain from this meeting was the possibility of harm to a nursery soil through a program of continued soil fumigation for disease control. As it is almost impossible to fumigate for the control of weeds without disease control, the subjects seem to overlap. I will not attempt to separate the subjects.

I will agree that fumigation for disease, nematode, and weed control may be desirable on new nursery sites such as Placerville, Coeur d'Alene, Elkton, and Bend; but I question the continued use after the inherited problems are controlled.

George Harvey, Forest Sciences Laboratory, Corvallis, Oregon stated when I approached him, "Most available information describes a 1e or 2• shot affair and not fumigation as a continuing practice. The information you seek is important and should be studied intensively. The available information consistently indicates that if fumigants are used at the recommended rates, little or no permanent alteration of the beneficial soil microflora occurs."

I do not pretend to be an organic farmer that does not use commercial fertilizers or chemicals for the control of weeds or disease but I would like to know how many of our "friends" in the soil that we may be killing. How many bacteria and actinomycetes that may be doing us a lot of good are we killing? How many cellulose destroyers are we killing that have been decomposing our fresh organic matter? And how many so-called antagonistic fungi are we killing that have been controlling the development of disease-producing fungi?

At the Bend Nursery, we have settled on a "semi-organic" farming program using the addition of organic matter in the form of pine planer chips, rye, and oats cover crops. Commercial fertilizers are used to assist the organisms decomposing the cellulose. Our disease problems have been greatly decreased and through a program of controlling weeds before they go to seed, our weed problems have been reduced. Through the use of additions of organic matter, our soil is cooler during the summer with better aeration and the water-holding capacity is greatly increased. We do mechanical weeding which also serves to cultivate the soil between the tree rows.

Fumigation with methyl bromide as MC•2 and Trizono have been tried at the Bend Nursery but have not proved to be economically feasible for the reduction

of disease losses or for weed control. We have not experimented with the many other combinations of methyl bromide and chloropicrin so therefore do not have an evaluation of their value at our nursery.

Methyl bromide has been used quite extensively in several nurseries without reported ill effects. Some caution is voiced in some of the reports. 1/ Methyl bromide fumigant may be used safely in nursery operation if the manufacturer's instructions are followed explicitly with good judgement and caution. \* \* \* Fumigation may depress the growth of plants, requiring nitrate nitrogen, due to the mortality of nitrifying soil organisms" \* \* \*. 2/ "There is one drawback to the wide-scale use of methyl bromide gas at the N. Y. State nurseries at the present time. In most of the beds that have been treated with the gas in the past 3 years, spots of stunted and off-color seedlings from a few inches to a foot or more in diameter have appeared. The seedlings usually have chlorotic color during the growing season, and in the fall turn purple. The stunting effect continues on through the second and third years, although as the beds fill in during these years the stunting is not so noticeable as it is during the first growing season. \* \* \* It is possible that the gas is tying up some of the elements in the soil or that the rates of application are too high. \* \* \* Perhaps lower rates of application or the addition of fertilizers will give some clues as to the cause. of the stunting and discoloration of the seedlings."

Mylone is used as a weed control material in some nurseries and is considered a fumigant by some users. Here are a few reports on Mylone: 3/ "Mylone added with the nitrogen sources completely suppressed nitrification for 30 days, and at this time the treated soils contained less nitrate than the unamended soils. The toxic influence of the fungicide on nitrification was, however, considerably decreased by 30 days incubation prior to the addition of nitrogen sources. The depressive effect was still marked in each soil after 45 days, but by 60 days part of this depressive effect was overcome. \* \* \* Under field conditions favorable for crop growth it is likely that nitrate formation would be suppressed for at least 30 days, and perhaps retarded for another 30 days."

Another report on Mylone states: 4/ "The most significant adverse features of stock produced on herbicide-treated beds are as follows: (1) Excessive height-diameter ratio predisposing seedlings to lodging and damages by snow. (2) A very abnormal top-root ratio of 6.5 and very low titration values of roots, suggesting inadequate drought resistance of seedlings. (3) A drastic decrease in the specific gravity of herbicide-treated stock, further aggravating the vulnerability of seedlings that are already affected because of their unbalanced height-diameter ratio. (4) The scarcity of mycorrhizal roots, which may handicap the uptake of nutrients by seedlings during their initial growth under field conditions. \* \* \* It was noted that the seedlings lifted from herbicide-treated beds lost most of their needles within a few days upon air-drying, whereas seedlings from untreated beds retained their foliage for 3 to 4 weeks."

The makeup of a nursery soil is very complex and any alteration of the organisms will have some effect upon the growth potentials of the soil. I believe research to determine the effects of fumigation upon the soil is needed.

1/ Wycoff, Hugh B., Journal of Forestry, Vol. 53, No. 11, Nov. 1955.

2/ Hill, Joseph A., TP Notes No. 21.

3/ Chandra, Purna and Bollen, Walter B., Soil Science, Vol. 92, No. 6, Dec. 1961.

4/ Iyer, J. G., TP Notes No. 66.