3. Nursery Soil Fertility and Soil Fumigants, Homer Ward, Chairman

Review of the Fertilizer and Fumigant Studies at the Webster Nursery

By Homer Ward

"First, I'd like to express gratification for being allowed the privilege of filling such a panel as we have here with us today, and I'd like to introduce them. They will present their topic a little later. On my left is Jack Fisher of Dow Chemical who will cover the field of soil fumigants. On my right Roger Scott of Giegy Chemical. He has some very interesting results on the use of herbicides. Todd Tremblay of the National Plant Food Institute will cover fertilization. As a brief review of the work we are doing at the Webster Nursery, we're always searching out new means of nursery management. In the preliminary studies in the field of fertilizers, we had a very complex fertilizer study set up. It entails some 108 plots. It's all boiled down to our particular soil. Nitrogen was the only deficiency or the only nutrient we could add and get positive performance. Actually, we obtained negative results from phosphorus and no significant difference in magnesium or calcium. We are always testing our soils. As the need becomes apparent, we will make different additions. This might be a matter of interest to some of the nurserymen who have heard me before describe late fall applications of nitrogen.

Dr. Geese, of the University of Washington outplanted some trees at the Patch Forest at LeGrande from low, medium and high elevations. In all cases, at the end of four years, the trees are still holding a superiority in growth rate. The 59 leader measurements show an average of 1.20 feet of leader growth as opposed to 1.04 for controls. And that's at the end of four years in the outplanting. We should always be looking for some new material. We don't have any particular soil problem at the moment at our nursery, no nematodes or simplids, but as an aid to learning more about soil fumigants and as a possibility of weed control, in cooperation with Jack and the Dow Chemical people, and Floyd Hutchins and the Neil McClean Company, we did put in quite a series of fumigant tests in the nursery at different levels. The results, as far as weed control goes, show that we do get some weed control, in fact about a 50 percent reduction in the weeding of treated plots. However, it still leaves a little bit to be desired from the cost standpoint of using fumigants strictly as a weed control measure. But it certainly is very interesting from all aspects. The materials we have tested have been Vapam, Telone, Trifume, Pathofume-- all in various amounts and in combinations. We feel that we have progressed a great deal. In working with Roger and Howard Bedoin, I'd like to ask Howard if he wouldn't stand up and be recognized on this. Howard was doing the field development work at the onset of our endeavors in herbicide. He has been followed up recently by Roger Scott. This again emphasized the need for each nursery to test all these different materials. We have screened out several candidate materials that I won't take time to list. We

are looking primarily for a material that we can apply to our 1-0 beds and germinating seedlings. So let's take here a mass of soil such as you would have in cross section in the field. You enlarge this and you see small soil particles like that. You enlarge that even more and you see the particles here with the film of water around them. In between the soil particles is what we call the air space. This is soil and this is soil air. But you enlarge this even further and you have in essence a tube with a film of water on either side of the soil particles. This is another picture of that last drawing, and here we have put in blue molecules of a fumigant that's been applied to this soil. You can see a nematode for instance, in the soil water in the film of water around the soil particles. That's where your nematodes live. That's where weed seeds are found as well as out in the soil air. And that's where disease, spores and things like that are found. Now when you put a soil fumigant in a soil mass it goes in as a liquid. It changes in that liquid stage or goes into solution in the soil water; and as it moves in the water, not very greatly, it will go out into the soil air and move far greater, a thousand times more, distance--wise,. in the soil air. In the next slide I believe it will show the numbers of molecules you have in this soil water, the red dots being the molecules of water. These other dots here are the molecules of air in the soil air. Here's your fumigants--the blue ones--follow those through now through the whole picture. So you can see how much more easily your fumigants will move through the soil air than through the soil water. Next slide, please. These are two typical fumigants. This is the same active ingredient as Shell D.D. and this is MC-2 which we call Methylbromide or vice versa. We call it MC-2; but it's actually Methylbromide. Here I want to show the difference of the volatility of these two fumigants. There are many more molecules of Methyl-bromide in the soil air than you have in the case of Telone. Therefore, it moves more easily, more quickly, through the soil air. We feel that the quicker we can get in there with a good strong weed control, the better off we are. Semazine at the 2$_9$ 4, and 8 pound levels knocked our seedlings. That did not hold true in the older trees, that is in the two-year-old trees and the transplants. The Propozine which is entirely new material has given us some very excellent weed control and very little seedling damage even at the 8 pound level. We did not have time to take measurements, but it appeared that there may be just a little stunting or a falling down of germinating seedlings at the 8 pound level. The .2 and the 4 pound level gave adequate weed control. Without trying to bore you too much with what we have been trying to do, we have some of the material ready that we will have written up and it can be distributed to anyone of you who would like to see the results. I've been rather vague and inconclusive on this, but I didn't want to detract from the panel, so I think at this time we will start right out and hear some of our panel members. First, on the use of fumigants in nursery management, is Jack Fisher."