METHYL BROMIDE GAS CONTROLS WEEDS, NEMATODES, AND ROOT ROTS IN SEEDBEDS [1]

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In 1947 at the Saratoga Tree Nursery one of the blocks previously used far transplants was converted into seedbeds. Very poor survival and growth of seedlings in parts of this block were noted. Seed of another species was sown in the block in 1950 and the same pattern of poor survival and growth was observed. A study of air photos and management maps revealed that some 4-0 or 5-0 white pine seedlings had been plowed under during World War II in the areas where the seedlings were not showing good growth. All of the observations pointed to a soils problem, either nutritional or biological.

In 1952 soil analyses and fungus studies were made, and the area was treated experimentally with methyl bromide gas. During the years 1952 through 1954, 128 seedbeds (48 square feet each) were treated with methyl bromide gas on this and other areas at the Saratoga and Lowville Tree Nurseries. Five different species of conifers (Scotch pine, red pine, Norway spruce, white spruce, and Japanese larch) were seeded in these areas.

The first year methyl bromide gas was used, before sowing, four seedbeds were treated at 1 pound per 48 square feet. The same amount of seed was sown in the treated and untreated areas, and the germination in these beds was about equal. The untreated had been sown and maintained just as the gassed beds. At the end of the first year an inventory was taken of the seedlings in the treated beds as well as in the untreated beds adjacent to them. The first-year survival figures are shown in Table 1.

Table 1.--Effect of seedbed treatment with methyl bromide gas on first-year survival of seedlings.

Species	Seedling survival		Production increase
	Treated beds	Untreated beds	
	Number	Number	Percent
White spruce	10,992	2,328	372
Norway spruce	4,584	2,352	95
Scotch pine	4,320	236	1,730
Red pine	2,064	792	161

1/ Tests were made at the direction of E. J. Eliason, Assistant Superintendent of Forest Tree Nurseries, N. Y. State Conservation Department.

First year survival in the beds treated with methyl bromide gas was from 95 to 1, 730 percent better than that in the untreated beds. Also, the trees in the treated beds were greener and had better roots and stems than those in the untreated beds.

In 1953 tests with methyl bromide gas were increased; 104 seedbed.; were treated, and control beds were laid out adjacent to them. Methyl bromide gas was applied at the rate of 2 and 4 pounds per 100 square feet. Seedbeds tested included those in areas with normal seedling growth as well as those in areas where growth was poor. Results were as follows:

1. Application of methyl bromide gas at the rate of 4 pounds per 100 square feet resulted in lower germination and first-year survival. However, application of methyl bromide gas at the rate of 2 pounds per 100 square feet had little if any effect on seed germination but greatly increased first- and second-year seedling survival.

2. Treatment with methyl bromide gas was extremely effective on areas with a sparse stand of seedlings with poor growth. However, seedbeds with normal density and normal seedling growth showed little or no benefit from treatment with methyl bromide gas. Treatment of such seedbeds would not be economically feasible. Treating seedbeds with methyl bromide gas costs about $600 per acre.

3. Methyl bromide treatment resulted in very good weed control for 2 or 3 weeks after seedling germination.

4. Spring treatments with methyl bromide gas were more effective than fall treatments.

Some problems in the use of methyl bromide gas were encountered in the 1953 tests. Therefore, additional tests were made the following year. In the spring of 1954, 20 seedbeds were treated before they were sowed. Results were as follows:

1. No injury was sustained by conifer seeds sowed 3 days after the seedbeds were treated with methyl bromide gas.

2. For good seed germination the soil should be in good tilth. However, the tilth of the soil was not exceptionally important in relation to penetration of the gas.

3. Methyl bromide gas, applied at the rate of 2 pounds per 100 square feet, killed all of the white grubs and prevented further invasion by grubs.

4. On areas where there was no soil biological problem, use of methyl bromide gas resulted in an increase of 14 to 17 percent in seedling production during the first growing season. Larger increases resulted in areas where there was a soil biological problem (table 1).

Late in 1954, Professor Stegeman of the N. Y. State College of Forestry found that nematodes were present in vast numbers in the area on which white pine 4-0 or 5-0 seedlings were plowed under during World War II. Soil and fungous analyses had previously been made on these areas and no nutrient deficiencies or unusual fungous activity had been found. Therefore, the poor seedling growth and survival on these particular areas were attributed to nematode damage. Methyl bromide gas proved to be excellent as a control for the nematodes in these seedbeds. In other areas where root rot fungi were causing poor growth and survival, treatment with the gas was very beneficial but not as spectacular as in the areas infested with nematodes.

After three years of testing with methyl bromide gas on normal and problem areas the inventories taken at the end of the first growing season and at the end of the second growing season were analyzed to determine the effect of the gas treatment on survival of the seedlings. Average losses in treated beds for the period were just about half what they were in the untreated beds. Table 2 shows first- and second-year survival in an area infested with nematode.

Table 2.--First- and second-year seedling survival, following methyl bromide gas treatments of seedbeds in an area heavily infested with nematodes.

Species	Untreated Beds			Treated Beds		
	1-0 seedlings per bed	2-0 seedlings per bed	Loss	1-0 seedlings per bed	2-0 seedlings per bed	Loss
	Number	Number	Percent	Number	Number	Percent
White spruce	2,328	221	90.5	10,992	8,668	21.1
Norway spruce	2,352	987	58.0	4,584	2,439	46.8
Scotch pine	236	80	66.1	4,320	2,620	39.4
Red pine	792	463	41.5	2,064	1,713	17.0
Average			64.0			31.1

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 a chlorotic color during the growing season, and in the fall they 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. A representative of one of the manufacturers of methyl bromide gas inspected these stunted trees but was unable to explain the reason for the stunting. 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. Therefore, attempts will be made to eliminate the spots that are already in the seedbeds by adding fertilizers such as superphosphate, ammonium sulfate, and/or muriate of potash. More beds are being treated in 1955, with different rates of gas. 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

In future tests some seedbeds will be treated before white spruce seed is sown. This will be done in an attempt to eliminate a serious root rot problem that has occurred in the white spruce seedbeds during the first and second years.

In 1955, more seedlings from seedbeds treated with methyl bromide gas will be field planted along with seedlings from untreated beds, to test the field survival of these 2- and 3-year-old seedlings. Last year about 100 2-year-old seedlings from the beds treated with the gas were field planted along with controls, and at this time, there are no apparent differences in survival between the treated and untreated seedlings.

References

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