DAMAGE TO PINE SEEDLINGS BY SANTOMERSE SX

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Severe stunting and needle distortion of slash, loblolly, and shortleaf pine seedlings were observed in experimental plots sprayed regularly and somewhat heavily with ferbam[3] and Santomerse SX[4] in the spring of 1960. Unsprayed seedlings in adjacent plots showed no damage. Most of the seedlings recovered after spraying was stopped but they were smaller and had more branches than nonsprayed plants.

In an experiment conducted to find out the cause of this abnormality, slash pine seedlings in south Mississippi were sprayed with various concentrations of ferbam and Santomerse SX (table 1). Each treatment was applied with a back-type pressure sprayer to 5-10 seedlings growing in each of three pots. Spraying started on May 31 when the seedlings were 3 weeks old. Successive sprays were made on June 2, 6, 8, 10, 13, 15, 20, 22, and 24 for a total of 10 applications in a 4-week period. The pots were kept in partial shade until June 8, when they were moved into direct sunlight for the remainder of the experiment.

Symptoms of stunted and distorted needles were first observed on June 20, 3 weeks after the

Table 1.--Effect of ferbam and Santomerse SX in various concentrations on slash pine seedlings

Concentration per 75 gallons of water		Proportion of plants injured[1]
Ferbam	Santomerse SX	
Pounds	*Pints*	*Percent*
2.....	1	0
4.....	1	0
8.....	1	6
2.....	2	74
2.....	4	100
0.....	1	0
0.....	2	31
0.....	4	100
[2]0.....	[2]0	0

[1] Symptoms of injury were distorted needles and stunted seedlings, illustrated in figure 1.
[2] Control.

initial spray. The damage visible on July 5 is shown in table 1 (fig. 1). Santomerse SX at 2 and 4 pints per 75 gallons, whether alone or with ferbam, severely injured seedlings. One pint alone or with 2 and 4 pounds of ferbam was not phytotoxic. However, 1 pint of the surfactant with 8 pounds of ferbam resulted in slight injury. Either 8 pounds of ferbam was mildly toxic or it increased the toxicity of Santomerse SX; the latter seems more likely because the addition of 2 pounds of ferbam to 2 pints of Santomerse SX more than doubled the amount of injury.

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3 Ferbam is ferric dimethyl dithiocarbamate.
4 Santomerse SX is a surfactant manufactured by Monsanto Chemical Company.

The usual spray mixture for control of fusiform rust in southern pine nurseries is 2 pounds of ferbam and 1 /2 to 1 1/2 pints of Santomerse SX in 75 gallons of water. This is sprayed under high pressure at the rate of 75 gallons per acre, usually with two applications a week during the peak of the infection period. The combination has not been reported to damage pine seedlings in extensive nursery and experimental use.

The maximum amount of Santomerse SX that can be safely used in the field was -not determined because the volume applied per seedling with the hand sprayer was probably greater than in usual nursery practice. Then too, frequency of spraying and weather conditions may influence toxicity. It was our impression that bright sunlight increased the damage, but this point was not tested.

In this experiment, Santomerse SX damaged young slash pine seedlings when used excessively. Nurserymen are cautioned to use no more of the surfactant than is necessary for good spray coverage.

Figure 1.--The slash pine seedling at left is normal, that at right has been damaged by Santomerse SX. Both are 2 months old.

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