PRELIMINARY TESTS WITH SURFACTANTS FAIL TO SHOW INCREASE IN EITHER GROWTH OR SURVIVAL OF SCOTCH PINE SEEDLINGS

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It has been theorized that the addition of a small amount of surfactant, a wetting agent, to the nutrient medium reduces the surface tension of the water and results in increased penetration, spreading, and dispersion of the nutrients. It also might be expected to lower the energy requirements involved in absorption and translocation by the plant, resulting in plant growth stimulation.

In recent years a number of agricultural workers have investigated the possibilities of using surface active agents to give increased yields of forage, field, and vegetable crops. Results at the University of Wisconsin 1- indicated greatly increased production of vegetable and field crops the year of application as well as the year following application.

A 1954 report from the University of Illinois 2/ indicated that the addition of the surfactant, in most cases, did not result in increased yields of dry matter. It did indicate, however, that less water is evaporated from soil treated with a surfactant and that root growth of small seedlings seemed to be stimulated in surfactant-treated soils. The author. found no published reports of effect of surfactants upon forest trees.

To determine if these results are applicable to forest-tree seedlings, two preliminary tests were made. The objectives of these tests were as follows: (1) To determine whether a surfactant added to a nursery bed at the time of seeding would increase the first-year height and/or diameter growth of Scotch pine seedlings. (2) To determine whether a surfactant side dressing could be used to prolong the spring planting season by increasing the survival of forest-tree seedlings planted toward the end of the normal spring planting season. Theoretically, the surfactant would compensate for the lack of available moisture during extremely dry summers by reducing evaporation.

1 / Berger, K. C., and L. G. Nelson. Yields of Several Crops as Influenced by Soil Applications of a Surface Active Agent. Agronomy Abstracts. 1954.

2/ Spurrier, E. C., and J. A. Jackobs. The Effect of Surfactants Upon Plant Growth. Agronomy Abstracts. 1954.

A test consisting of two parts was set up. In the first part of the test a 100 percent active non-ionic type surfactant, ethylene -oxide -thioether condensate, was applied in a water solution to 4 x 4 feet completely randomized plots of a seeded nursery bed. The soil consisted of a silt loam topsoil over a well-drained gravelly silt loam subsoil. The surfactant was applied at concentrations of 0, 10, 50, 200, and 400 pounds per acre. Three replications were used. The test beds thereafter were handled in the normal nursery operation, including overhead irrigation at the equivalent rate of not less than 1 inch of rainfall per week.

In the second part of the test, eight blocks consisting of two rows often Scotch pine seedlings (1-0) were planted in the field. In each block one row was randomly treated with a 60 percent active surfactant, sodiumalkyl-aryl-sulfonate. Application of the readily soluble surfactant was made in powder form at the rate of 5. 5 grams (2 level tablespoons) per tree, placed in bands 3 inches in radius around each seedling. This rate of application was approximately equivalent to 8 pounds of active surfactant per acre. The planting was made on two old fields consisting of approximately 6 inches of silt loam topsoil over intermediately to poorly drained claypan subsoils. The vegetative composition on both areas consisted of a moderate cover of perennial weeds and grasses. Planting was made April 26, which is rather late for southern Illinois conditions. The trees were side dressed with the surfactant at the time of planting.

No observable differences in height or diameter growth were noted among the treated plots of Scotch pine in the nursery.

The results of the field planting are shown in the table below. The mean number of live seedlings was approximately the same for the treated and untreated plots. It is concluded that, under the conditions and rates of application used in this test, the two surfactants did not result in either increased first year growth of nursery seedlings of Scotch pine, or better first year survival of field-planted 1-0 Scotch pine seedlings.

Block No.	Live trees (10 per plot) after 1 growing season	
	Treated (number)	Untreated (number)
1	8	9
2	9	8
3	0	1
4	4	0
5	3	4
6	5	5
7	3	4
8	2	5
Total Live Trees	34	36
Mean per Plot	4.3	4.5