AN ANALYSIS OF NURSERY STOCK PRODUCTION COSTS IN RELATION TO THE USE OF MINERAL SPIRITS

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The use of mineral spirits at the Mason State Tree Nursery was a very important factor in meeting the postwar demand for planting stock for reforestation.

The area producing nursery stock at the Mason State Tree Nursery was increased from 85, 800 feet of 4-foot-wide bed in 1946 to 189, 673 feet in 1951. The first year, conifer seedbed area was increased from 30, 500 lineal feet to 66,420. Annual grasses will destroy first year conifer seedbeds in central Illinois unless they are controlled promptly. The shortage of labor for hand weeding during the critical -period would have prevented such a great increase of production area. This large increase was possible only through the use of mineral spirits.

This use for weed control commenced in 1947 in the Mason Nursery anti increased very year until 1952. Methods of application have improved from the use of 3-gallon hand sprayers to that of a power sprayer with an 18-foot boom. Control of the spray has improved with better equipment, resulting in less injury to nursery stock, savings in material used due to more uniform application, and a reduction in labor required to apply the mineral spirits.

As a matter of record and interest I have compiled some cost data relating to our use of mineral spirits from 1947 through 1951. These data may give some indication of the value of mineral spirits used under similar circumstances. As already mentioned, some achievements would not have been possible without this chemical. Since 1951 methyl bromide soil fumigation has been used extensively. Mineral spirits are still important to the nursery program, but values are more difficult to assign.

It is unfortunate that area and cost records are not available for operations at the Mason State Tree Nursery prior to 1946, which was the last year before spraying with mineral spirits was introduced. The labor cost of producing the various classes of stock upon which mineral spirits were used is shown in table 1. The labor cost per foot of 4-foot seedbed represents all production activities such as bed preparation, seeding or transplanting, shading, shade removal, damping-off control, fertilizing, taking inventory, and weed control by hand weeding, cultivating, and weed spraying. It will be noted that wages increased from 53 cents per hour in 1946 to 73cents per hour in 1951.

Table 1 - Labor cost per foot of tree bed

Year	Mineral spirits	Seedlings First year	Seedlings Second year	Transplants First year	Transplants Second year	Average wage in June
1946	None used	.15	.05	.16	.04	.53
1947	Used	.10	.08	.10	.03	.55
1948	"	.11	.03	.09	.01	.54
1949	"	.06	.03	.13	.03	.60
1950	"	.08	.04	.14	.01	.72
1951	"	.08	.02	.15	.04	.73

Unit costs were reduced about 50 percent in spite of the 38-percent increase in wages, except for transplant stock. It is known that as transplants were put out on new areas that had been idle or in cover crops a dense growth of biennials and annual lespedeza, which are resistant to mineral spirits, developed in a number of places. These resistant weeds were costly to control by hand weeding.

Savings were achieved during the 5-year period through the use of more equipment and improved methods of performing various operations. This saving was possibly offset to some extent by the increased cost of more intensive methods and greater care in producing the stock. This, in turn, resulted in better stands and greater production per unit of area and lower costs per thousand plants.

I have attempted to determine the theoretical savings effected. In calculating the labor cost of caring for the areas in production each year I used 1946 costs, when mineral spirits were not used, adjusted for periodic wage increases from year to year. This gave the theoretical yearly labor cost based on the larger areas, 1946 methods, and prevailing wages. I then subtracted the actual labor cost when mineral spirits were used from the theoretical labor cost without mineral spirits. The difference represents the saving in labor. A large part, if not all, of this saving can be attributed to the use of mineral spirits. I then deducted the cost of the mineral spirits used. This gave the net amount saved. Table 2 summarizes these data for the major classes of stock on which mineral spirits were principally used during the 5-year period.

Table 2 - Effect of mineral spirits on classes of stock and theoretical savings during the 5-year period

Year	Class of stock	Feet of bed	Labor cost per foot of bed 1946	Average wage in June	Wage increase factor	Labor Cost			Cost of mineral spirits [1]	Net savings due to mineral spirits
						Without mineral spirits	With mineral spirits	Saved through mineral spirits		
1947	1-year seedlings	30,500	$0.15	$0.55	1.0377	$ 4,747.48	$ 2,996.15	$ 1,751.33	- - - - -	- - - - - -
	2- & 3-year seedlings	28,100	.05	.55	1.0377	1,457.97	1,833.15	- 375.18	- - - - -	- - - - - -
	1-year transplants	39,600	.16	.55	1.0377	6,574.87	5,832.55	742.32	- - - - -	- - - - - -
	2-year transplants	16,200	.04	.55	1.0377	672.43	726.15	- 53.72	- - - - -	- - - - - -
	- - - - - - - - - - - -	114,400	- - -	- - -	- - - -	$13,452.75	$11,388.00	$ 2,064.75	$386.58	$ 1,678.17
1948	1-year seedlings	40,700	.15	.54	1.0188	6,219.77	4,320.60	1,899.17	- - - - -	- - - - - -
	2- & 3-year seedlings	25,500	.05	.54	1.0188	1,298.97	863.36	435.61	- - - - -	- - - - - -
	1-year transplants	42,900	.16	.54	1.0188	6,993.04	3,915.11	3,077.93	- - - - -	- - - - - -
	2-year transplants	26,100	.04	.54	1.0188	1,063.63	232.77	830.86	- - - - -	- - - - - -
	- - - - - - - - - - - -	135,200	- - -	- - -	- - - -	$15,575.41	$ 9,331.84	$ 6,243.57	$450.84	$ 5,792.73
1949	1-year seedlings	61,900	.15	.60	1.1320	10,510.62	4,544.25	5,966.37	- - - - -	- - - - - -
	2- & 3-year seedlings	36,600	.05	.60	1.1320	2,071.56	1,025.85	1,045.71	- - - - -	- - - - - -
	1-year transplants	19,100	.16	.60	1.1320	3,459.39	2,492.30	967.09	- - - - -	- - - - - -
	2-year transplants	45,700	.04	.60	1.1320	2,178.77	1,178.90	999.87	- - - - -	- - - - - -
	- - - - - - - - - - - -	163,300	- - -	- - -	- - - -	$18,220.34	$ 9,241.30	$ 8,979.04	$465.40	$ 8,513.64
1950	1-year seedlings	58,300	.15	.72	1.3584	11,879.21	4,583.30	7,295.91	- - - - -	- - - - - -
	2- & 3-year seedlings	57,100	.05	.72	1.3584	3,878.23	2,392.38	1,485.85	- - - - -	- - - - - -
	1-year transplants	37,580	.16	.72	1.3584	8,167.78	5,133.43	3,034.35	- - - - -	- - - - - -
	2-year transplants	13,440	.04	.72	1.3584	730.28	156.34	573.94	- - - - -	- - - - - -
	- - - - - - - - - - - -	166,420	- - -	- - -	- - - -	$24,655.50	$12,265.45	$12,390.05	$657.22	$11,732.83
1951	1-year seedlings	66,420	.15	.73	1.3773	13,722.04	6,140.65	7,581.39	- - - - -	- - - - - -
	2- & 3-year seedlings	61,125	.05	.73	1.3773	4,209.37	1,301.32	2,908.05	- - - - -	- - - - - -
	1-year transplants	21,328	.16	.73	1.3773	4,700.01	3,248.94	1,451.07	- - - - -	- - - - - -
	2-year transplants	23,800	.04	.73	1.3773	1,311.19	309.86	1,001.33	- - - - -	- - - - - -
		172,673	- - -	- - -	- - - -	$23,942.61	$11,000.77	$12,941.84	$753.36	$12,188.48
Total net savings due to mineral spirits										$39,905.85

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[1] Gallons of mineral spirits used in 1947, 1,740; 1948, 2,084; 1949, 2,204; 1950, 2,640; 1951, 2,915.

There was an estimated net saving in wages of $39, 905.85 for the 5-year period after deducting the cost of the mineral spirits. This saving is equivalent to 41.6 percent of the estimated labor cost of growing the stock without mineral spirits.

The total estimated saving in labor amounts to $42, 619. 25. `This saving is 44.5 percent of the estimated labor cost had mineral spirits not been used. Actually wages would have had to be much higher to attract sufficient labor to care for the large area involved. Sufficient labor probably would not have been available at any wage. This may offset the fact that the basic 1946 figures may not be typical, and the fact that all of the saving claimed may not have been due to mineral spirits. At any rate, this is the best estimate that can be compiled because of the lack of cost figures prior to 1946 and the lack of figures for labor costs of weed control alone for the period covered.