MULCHING CONIFEROUS TRANSPLANT BEDS WITH SAWDUST

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Mulching coniferous transplant beds with sawdust is a fairly common practice in many nurseries. It may, therefore, be of interest to review the results from some of the work done by the staff of the Syracuse Experiment Station of the State University of New York College of Forestry.

Mulching was developed primarily in a effort to learn whether conifers could be transplanted in the fall without heavy losses from heaving during the following winter under the soil and climatic conditions of Syracuse, New York. As is true in most nurseries, the work that should be done during the spring is greater than the station staff can manage, consequently the possibility that some of the work of transplanting could be done in the fall was attractive. Past experience had shown that the mortality from heaving during the winter was usually high for fall transplants.

Fall transplanting of conifers and mulching with fresh sawdust was started in September of 1949. The soil of the nursery block was Palmyra sandy loam. Seedlings (either 2-0 or 3-0) were used with a 1 1/4 inch deep mulch spread by hand. The sawdust was approximately two-thirds hardwoods and one-third softwoods and was obtained from a local sawmill.

A tally of trees during September of 1950 provided the following data for 45 of mulched transplant bed row and 45' of unmulched row.

TABLE I

Percent of Fall Transplanted Trees Heaved During First Winter

Row	Species	Percent of Trees Heaved	
		Sawdust Mulch	No Mulch
1	Colorado Blue Spruce	1%	24%
2	Colorado Blue Spruce	1/2%	27%
3	White Spruce	0%	13%
4	White Spruce	2%	20%
5	Norway Spruce	1/2%	26%
6	Norway Spruce	0%	9%
7	Norway Spruce	0%	4%
8	Norway Spruce	0%	48%
9	Norway Spruce	0%	10%

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An attempt was also made to determine whether the mulch was beneficial for the growth of the trees. During the growing season a slight yellowing of the needles was noted on the mulched area but growth was not visibly affected. Heights of the transplanted trees (from samples taken at random from the mulched and unmulched areas) provided the following comparative heights:

TABLE II

Comparative Heights of Fall Transplanted Trees After One Growing Season

	Average Height	
	Mulched	Not Mulched
White Spruce (3-1)	10.1"	8.7"
Norway Spruce (3-1)	12.8"	11.5"
Norway Spruce (2-1)	9.6"	9.3"
Colorado Blue Spruce (3-1)	6.5"	5.5"

In the late summer of 1952 a somewhat more extensive transplanting and mulching project was set up. Six blocks, each approximately 40 feet long and 20 feet wide were laid out in a row across the transplant area. White spruce and Norway spruce seedlings of the same age were transplanted through the six blocks, and a 1 1/4 inch mulch of sawdust was applied to blocks numbered 1, 3 and 5. A tally made in July of 1953, following one winter, provided the following data pertaining to heaving losses:

TABLE III

Proportion of Transplanted Trees Heaved During First Winter

	Norway Spruce			White Spruce		
	Total (Live Trees Unheaved & Heaved)	No. Trees Heaved	% of Total Heaved	Total (Live Trees Unheaved & Heaved)	No Trees Heaved	% of Total Heaved
Unmulched	4262	809	18.98	3450	986	28.58
Mulched	4668	71	1.52	4691	186	3.97

The effect of the mulching is clearly shown in reducing losses from heaving. In addition to taking the above data, an attempt was made to measure the difference in amount of time required to hand weed the two areas. In one instance six hours and thirty-four minutes were required to weed the un-

mulched blocks as compared with two hours and six minutes to weed the mulched blocks. The weeds were firmly held by the soil in the untreated areas and many broke away from their root systems when an attempt was made to pull them. The weeds in the sawdust treated areas were pulled out with less effort and with the roots attached.

In the summer of 1954 comparative heights were obtained for the mulched and unmulched blocks. The following data were obtained:

TABLE IV

Average Heights of Transplanted Trees After Two Growing Seasons

	Norway Spruce		White Spruce	
Block'	Mulched	Unmulched	Mulched	Unmulched
1	10.4"		8.5"	
2		8.6"		7.4"
3	9.3"		8.1"	
4		8.8"		7.8"
5	8.8"		7.8"	
6		8.1"		7.2"

For each species the height of the trees on the mulched blocks was as high or higher than the height of the trees on the unmulched blocks. The evidence is conclusive that the mulching resulted in somewhat greater height growth at the end of two growing seasons.

Another attempt was made to determine the effect of sawdust mulch of various depths on survival and height growth of transplants. Samples of approximately 300 trees of each of several species were transplanted for each of three depths of mulch and no mulch. Unfortunately, mortality was high for the entire planting, apparently from causes but partly related to the mulching. Differences in mortality between the mulched and unmulched blocks were not consistent and no conclusions could be drawn, consequently, they are not reported here.

The effect of the mulch on height growth seemed to be rather clear and consistent. The table shown on the following page presents these data.

TABLE V

Effect of Depth of Mulch on Height of Transplants

SPECIES	No Mulch			3/4" Mulch			1 1/4" Mulch			2"Mulch		
	Hts. in in. 1953	Hts. in in. 1954	Hts. in in. 1955	Hts. in in. 1953	Hts. in in. 1954	Hts. in in. 1955	Hts. in in. 1953	Hts. in in. 1954	Hts. in in. 1955	Hts. in in. 1953	Hts. in in. 1954	Hts. in in. 1955
Norway Spruce	4.01	7.95	11.70	4.02	10.20	14.25	4.01	9.40	14.80	4.19	9.75	15.95
Hemlock	2.92	5.20	8.30	3.04	6.95	11.45	3.84	9.50	13.35	3.19	7.40	10.85
Douglas Fir (1)	2.27	3.67	5.05	2.39	5.95	8.95	2.51	7.55	10.40	2.66	6.25	7.55
Douglas Fir (2)	1.96	4.80	7.20	2.04	5.15	7.70	1.95	5.30	8.05	2.25	5.20	7.05
Douglas Fir (3)	1.93	5.10	7.50	2.21	6.20	9.30	2.15	5.55	8.15	2.04	5.50	7.95
White Pine	3.08	7.57	---	2.75	7.17	---	3.52	8.22	---	2.98	6.32	---

(1), (2), (3) represent three rows of Douglas fir of same age and seed source.

Comparisons among the samples for each species show greater heights and height growth for all depths of mulch (except Douglas fir (2) 2" mulch and white pine 3/4" and 2" mulch) than for no mulch. Heights for 2" mulch after three growing seasons were less for hemlock and Douglas fir than for 1 1/4" mulch. The 2" depth sawdust mulch proved to be too deep for some of the smaller transplants and retarded their development. It can be observed in the table that Norway spruce was taller after one growing season in the transplant bed than the other species used, consequently, the deeper mulch did not prove to be detrimental. In general, the 1 1/4" depth of mulch appeared to be most effective.

Summary

A series of mulching experiments carried on by the staff of the Syracuse Experiment Station of the State University of New York College of Forestry in which sawdust was applied to coniferous transplant beds showed the following:

1. That a 1 1/4" depth of sawdust placed on fall transplant beds effectively controlled heaving during the following winter for the species tested.

2. For the species tested the mulched transplants grew more rapidly in height, with few exception, than the unmulched transplants

3. The evidence suggests that a mulch 1 1/4" deep was more effective in increasing height growth than-depths of 3/4" or 2".