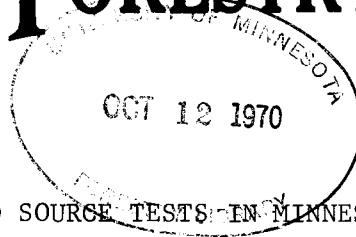


# MINNESOTA FORESTRY NOTES

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NC-51 JAPANESE LARCH SEED SOURCE TESTS IN MINNESOTA <sup>1/</sup>

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Japanese larch (*Larix leptolepis* (Sieb. and Zucc.) Gord.) is a rapid-growing conifer which may prove valuable in forest plantings in the North Central region of the United States. Systematic testing of the adaptability of this species to localities within the region began with the establishment of a series of provenance tests in conjunction with the regional forest tree improvement project, NC-51 (Forest Tree Improvement through Selection and Breeding). In 1960, as a part of this study, 2-0 Japanese larch was shipped from Michigan State University and planted in Itasca and Dakota Counties in Minnesota. The Dakota County planting was damaged by herbicides shortly after it was established and abandoned. The Itasca County planting has been maintained. Mortality and seven year heights are reported below.

Six seed sources (seed lot numbers 1,3,4,5,6 and 7, Table) were used in the 1960 planting. The plantation was established following a randomized complete block design with 57 replications of 1-tree plots. Spacing was 10 x 10 feet. A single row of 2-0 European larch (*Larix decidua* Mill.) was planted as a border. The European larch, of unknown seed source, was obtained from the Knife River Nursery of the Kimberly-Clark Corporation near Two Harbors, Minnesota.

Mortality counts made in the spring of 1964 indicated that 46 percent of the Japanese larch originally planted had died. Mortality by seed source is given in the Table. A chi-square test indicated that mortality among the six provenances was not significantly different. During the same period (1960-1964) only 15 percent of the European larch in the border rows had died. Observations made during the spring of 1962 indicated that most of the mortality had occurred by that time.

In the spring of 1962 a partial replacement of dead trees was made using 2-2 stock that had been lined-out in the North Central Experiment Station Nursery in 1960. A shortage of planting stock resulted in the use of seedlings from an additional seed source (seed lot 2 in the Table) which had been received in the original shipment and lined-out in the nursery. Even with the additional seedlings from seed lot 2, all dead trees could not be replaced.

Heights of the surviving trees from the 1960 planting and the replacements made in 1962 were determined to the nearest centimeter in December, 1964. The Japanese larch averaged 256 cm. (8.4 feet) and the European larch in the border rows averaged 230 cm. (7.5 feet) in height. Japanese larch commonly exceeds European larch in height growth and these data, while they do not provide critical evidence, suggest that the relative growth rate of the two species in this area is similar to that observed in other tests.

Mean heights of the seven Japanese larch provenances are given in the Table. The high mortality precludes analysis of height data on the basis of the original design. However, on the assumption that the seed lots (including lot 2) were randomly distributed over the test area, analysis was made on the basis of a completely randomized design. Significant differences in heights were found among the provenances. Individual means were compared

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using Duncan's multiple range test with adjustments for varying numbers of trees per seed lot. The multiple range test indicated that the mean height of lot 6 was significantly less than that of the other six lots.

The rapid growth of Japanese larch indicates that the species has considerable potential for use in plantings in Minnesota. Mortality during the first four years of out-planting was higher than is normally considered satisfactory. Part of the mortality may be attributed to the relatively poor condition of stock which, at the time of planting in 1960, had been stored for a period of about two weeks following lifting and shipment from Michigan. Mortality among the replacements made in the spring of 1962 was less than 7 percent after two years in the out-planting. The low mortality among replacements may reflect the use of 2-2 stock, which was in excellent condition at the time of planting, and elimination of individuals which were poorly adapted to the rigorous climatic conditions in the transplant beds. There is no evidence that gains in survival can be made by selecting the best geographic origins; however, selection within origins and cultural practices may both be effective means of increasing survival.

The significant differences in height found among seed lots indicates that selection of the best geographic origins may increase production. Selection, however, will have to be based on complete provenance testing since no apparent relationship between growth and latitude, longitude, or elevation of parent stands was found. A random pattern of geographic variation is not unexpected since the native range of the species is restricted to approximately 140 square miles on Honshu Island, Japan, where it is found in small discontinuous populations.

Table. Seven-year heights and mortality after five years in field.

Seed Lot	Origin			Mortality (1960-1964)	Height <sup>1</sup> (Dec. 1964)		# trees <sup>1</sup> (Dec. 1964)
	Latitude	Longitude	Elevation (meters)	(percent)	(cm)	(ft)	
1	36°47'N	139°32'E	1700	38	271	8.9	37
2*	36°28'N	138°29'E	1750		265	8.7	27
3	35°36'N	138°41'E	1500	51	247	8.1	31
4	35°36'N	138°19'E	1450	44	263	8.6	39
5	35°27'N	138°06'E	2000	54	267	8.8	32
6	36°24'N	137°41'E	1400	50	225	7.4	33
7	35°54'N	137°34'E	1400	41	251	8.2	44

\* Not included in original planting.

<sup>1</sup> Includes surviving trees planted in 1960 and replacements made in 1962.

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