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WESTERN HEMLOCK SEED GERMINATION AFTER EXPOSURE TO VARYING TEMPERATURES AND HUMIDITIES

by

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INTRODUCTION

Western hemlock (Tsuga heterophylla) seed is frequently exposed to a wide range of physical conditions after being removed from cold storage and prior to use in seeding projects and nursery work in the Pacific Northwest.

The purpose of the experiment reported here was to determine if exposure to any one of a range of temperatures and humidities, after removal from cold storage, would prove deleterious to the germinative capacity of the seed.

METHOD

Seed used in this experiment was collected at several locations in the Cascades and Coast Range in Oregon and Washington in the fall of 1954. The cones were air dried and the seed extracted and de-winged by hand. The seed was cleaned on a "Clipper Mill" set at low wind and sixty r.p.m. To insure a reproducible lot of seed, the seed was further cleaned on a "South Dakota Blower" set at a gate opening of 25 for 30 seconds. The residual seeds were divided with a mechanical divider to secure a sample for a cutting test. This test produced the following datum: sound seed 197; blank seed 3.

The temperature and humidity controls were achieved by employing constant temperature chambers and glass dessicators. A saturated solution of $MgCl_2.6H_2O$ was employed in four of the dessicators to maintain a humidity of approximately 30% and a similar solution of KNO_3 was placed in four other vessels to achieve a relative humidity of 93%. The data obtained from the completed tests indicated that the expansion of the experiment to include the intermediate range of humidities was not necessary.

The germination tests were performed at the Oregon State Seed Laboratory, Corvallis, Oregon. The following procedure was employed for all the tests:

1. Immediately upon removal from the constant temperature and humidity chambers, each lot of seed was divided into groups of one hundred seeds each and soaked in water for 24 hours at 20°C.

2. After soaking, the seeds were planted in glass dishes filled with moist sand. The dishes were placed in "Minnesota" type germinators set to maintain 30°C. with light for eight hours, and 20°C. without light for sixteen hours each day.

3. Number of germinated seedlings was tallied each week for five weeks. The germination per cent is based on 400 seeds for each test.

RESULTS

The following data table fully summarizes the effects of the tested temperatures and humidities on the germinative capacity of western hemlock seed.

Analysis of the data indicates the following:

(1) Exposure to 30% relative humidity with temperature up to 20° C. (68° F.) for eleven weeks produced no deleterious effects on the germinative capacity of the western hemlock seed.

(2) Exposure to 30% relative humidity and 30° C. did not reduce the viability of the seed until it had been stored for eleven weeks.

(3) Exposure to 93% relative humidity and temperature up to 10° C. (50° F.) for eleven weeks did not harm the seed.

(4) Exposure to 93% relative humidity and 20° C. (68° F.) and 30° C. (86° F.) was sufficient to reduce the germinative capacity of the seed after exposure to these conditions for only three weeks.

PER CENT OF WESTERN HEMLOCK SEED GERMINATION*

Length of Exposure	Storage Condition							
	30% relative humidity				93% relative humidity			
	1°C.	10°C.	20°C.	30°C.	1°C.	10°C.	20°C.	30°C.
1 Week	90	87	87	87	85	85	78	82
3 Weeks	91	88	89	87	85	83	64	52
5 Weeks	88	92	90	80	89	84	28	0
7 Weeks	89	92	86	77	85	86	0	--
11 Weeks	87	90	86	62	83	85	0	--

* When the storage experiments were initiated, a portion of the lot of seed which was stored in the constant temperature and humidity chambers was placed in the germinators. This lot of seed provided a check germination per cent so that the effects of the various storage conditions could be determined more accurately. The check lot of seed had a germination per cent of 89.5%.

CONCLUSIONS

Such humidities, temperatures, and lengths of exposure as are necessary to reduce significantly the germinative capacity of western hemlock seed after removal from cold storage are not reached during the normal handling of the seed in artificial regeneration work.

It may be assumed that the present methods of handling and shipping seed in the Pacific Northwest do not damage the seeds.