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PONDEROSA PINE SEED GERMINATION AFTER EXPOSURE
TO VARYING TEMPERATURES AND HUMIDITIES

by

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INTRODUCTION

Ponderosa pine (*Pinus ponderosa*) 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 near Crescent, Oregon in the fall of 1954. The elevation of the collection area is approximately 4400 feet above sea level. The cones were dried with forced hot air. The seed was dewinged by hand and cleaned in a "Clipper Mill". To insure a reproducible lot of seed, the seed was further cleaned with a "South Dakota Blower" set at a gate opening of "100" 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 data: sound seed, 266; blank or shriveled seed, 3.

The temperature and humidity controls were achieved by employing constant temperature chambers and glass dessicators. A saturated solution of $MgCl_2 \cdot 6H_2O$ was employed in four of the dessicators to maintain a relative 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 followed 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 16 hours at 20°C.
2. After soaking, the seed were stored at 5°C. for four weeks.
3. Subsequent to the chilling, 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.
4. Number of germinated seedlings was tallied each week for four 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 ponderosa pine seed.

Analysis of the data indicates the following:

- (1) Exposure to 30% relative humidity with temperature up to 30°C. (86°F.) for eleven weeks produced no deleterious effects on the germinative capacity of the ponderosa pine seed.
- (2) Exposure to 93% relative humidity and temperature up to 10°C. (50°F.) for eleven weeks did not harm the seed.
- (3) Exposure to 93% relative humidity and 20°C. (68°F.) temperature did not damage the seeds until they had been exposed to these conditions for more than seven weeks.
- (4) Exposure to 93% relative humidity and 30°C. (86°F.) temperature for five weeks was sufficient to reduce the germinative capacity of the seed.

PER CENT OF PONDEROSA PINE 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	89	89	89	88	90	93	84	86
3 Weeks	85	87	81	88	85	81	83	90
5 Weeks	92	94	91	88	89	89	91	76
7 Weeks	87	90	90	90	93	92	91	29
11 Weeks	94	93	91	93	96	93	69	2

* 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 85.

CONCLUSIONS

Such humidities, temperatures and lengths of exposure as are necessary to reduce significantly the germinative capacity of ponderosa pine seed after removal from cold storage are not reached during the normal handling of 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.