Germination of polyram treated white spruce seeds from various provenances

Yves Lamontagne and B.S.P. Wang

Provincial Forest Tree Nursery, Berthierville, P.Q. Forest Tree Seed Centre, Chalk River, Ontario.

Polyram is not recommended for coating white spruce seeds with the possible exception of one or two provenances.

Coating seeds with a repellent against birds and small rodents and a fungicide against damping-off is a current practice in forest tree nurseries in Quebec. The repellent is always used; the fungicide only when the seedbeds have not been fumigated.

Hundreds of kilograms of seeds are so treated and sown annually in Quebec nurseries. For efficiency and speed of treatment, liquid forms of the chemicals are preferred to powder. This note reports on the effect on germination of a liquid repellent-fungicide mixture used to coat white spruce seeds from various provenances in Quebec.

Materials and Methods

Sixteen provenances of white spruce *(Picea glauca* (Moench) Voss) were used in this test. Empty seeds were removed by winnowing prior to the treatments.

The mixture used was prepared by blending 142 ml of latex with 4.54 l of the liquid fungicide Polyram (thiuram disulphide) to which 227.5 g of the repellent Dieldrin 25W (hexachloro epoxy octahydro dimethano naphthalene) had been added. Seeds were treated by mixing with the compound until all seeds were covered.

For each provenance the treatments were:

- T.1- Seeds stratified for 3 weeks at 4° C (check).
- T.2- Seeds coated with the mixture (Dieldrin 25W/Polyram) and stratified for 3 weeks at 4° C.
- T.3- Seeds stratified for 3 weeks at 4° C and then coated with the mixture (Dieldrin 25W/Polyram).

Four replicates of 100 seeds each were used in each treatment and sown in Petri dishes filled with unfumigated nursery soil, in a greenhouse at a temperature ranging from 16.0° to 27.7°C. All seedlings emerging from the dishes were extracted and counted at irregular intervals during the 48 days of test. Total germination data transformed to arcsin were submitted to analysis of variance.

Results and Discussion

When looking at total germination, the analysis of variance reveals no significant differences among provenances but a highly significant difference among treatments. As expected, untreated seeds from all provenances germinated much better than the other two treatments (table 1) and these differences are quite noticeable (table 2).

If only total germination is considered, coating seeds with the mixture followed by stratification would result in an average loss of 26.39 percent in germination for all provenances. However, there is a great variation among provenances; in two instances, Treatment 2 was as good as Treatment 1. These large differences might be due to the fungicide Polyram, since coating with Dieldrin 25W alone resulted in a loss of only 9 percent (1).

These results emphasize the need for testing such chemicals on many provenances of the same species. Suppose, for example, that the test is conducted using the McGill prove-

Table 1.—Mean total germination percent, per treatment, for all provenances and range o f variation among provenances.

Treatments	Mean total germination	Range of variation
T.1 check	78.21	59.50-92.50
T.2 coated and stratified	51.82	21.25-85.00
T.3 stratified and coated	62.95	32.75-90.50

Table 2.—Mean total difference in germination percent among treatments, for all provenances and range of variation.

Treatments	Mean difference	Range of variation
T.1-T.2	26.39	0.75-61.75
T.1-T.3	15.26	1.75-41.25
T.3-T.2	11.13	0.50-67.00

nance only; one would find a difference of only 6.25 percent between Treatments 1 and 2. However, this difference would increase to 46.50 percent with the Boutet provenance. The practical implications will not be the same in both cases.

Coating seeds after stratification (Treatment 3) , which is not a standard practice in our nurseries, resulted in a drop of 15.26 percent in total germination when compared to the checks. However, this treatment was superior by 11.13 percent over Treatment 2. Here again, much variation is encountered among provenances. Four provenances in Treatment 3 did better by 3.25 to 15.00 percent than Treatment 1, and also four provenances in Treatment 2 outclassed Treatment 3 by 13.00 to 24.5 percent.

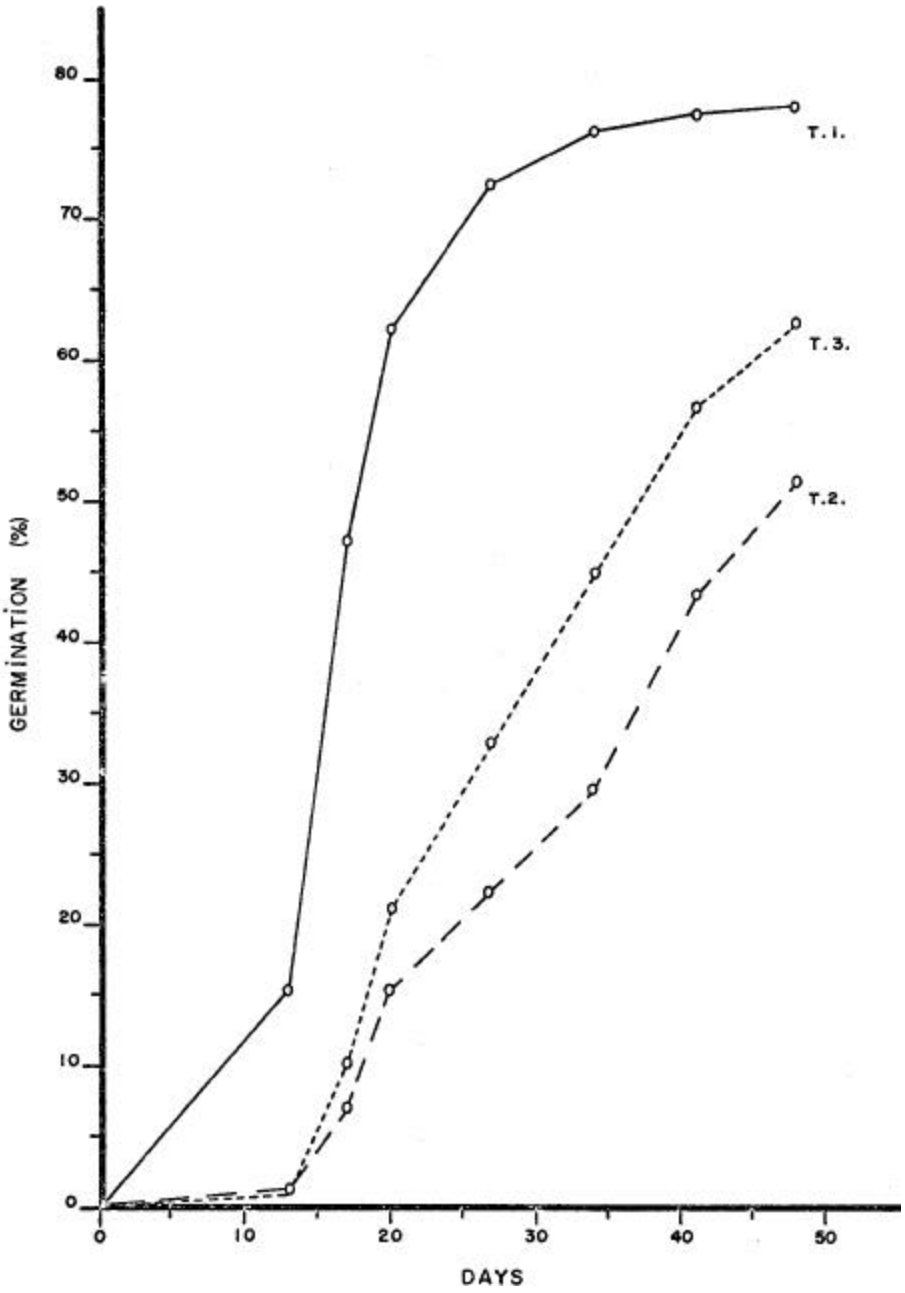

Figure 1.—Mean speed and total germination per treatment of 16 white spruce provenances.

When looking at the speed of germination (figure 1) for all treatments, untreated seeds germinated faster, on the average, than the other two treatments. However, Treatments 2 and 3 behaved similarly. The mean number of days required for all provenances to reach 50 percent in germination was about 17 for Treatment 1, 31 for Treatment 2 and 26 days for Treatment 3. For the standard treatment (T.2) in our nurseries, this prolonged germination period could result in uneven seedbeds, high mortality due to drought, and much shorter seedlings at the end of the first growing season.

With individual provenances, the pattern observed on figure 1 is much the same, except for two provenances where the speed of germination was about the same for all treatments. Also, in many cases, seeds that were stratified and then coated (T.3) germinated later but in higher number than Treatment 2.

Conclusion

This study clearly demonstrated that coating white spruce seeds from various provenances with the Dieldrin 25W/Polyram mixture retarded and reduced ; germination by up to 26.39 percent and that much of this loss might be due to the fungicide Polyram. This is almost twice the difference obtained with Arasan 42S (1) for the same species.

These results lead us to think that another method or product should be used instead of 'Coating seeds with Polyram. For example, would we get better results by not treating the seeds prior to sowing but instead spray a solution of a fungicide on seedbeds after emergence? Would this latter method be economical? Would it yield more 1-year-old seedlings per unit of area than the use of Polyram? Would the results obtained in the greenhouse, in nursery

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soil, correlate well with the field conditions? If so, there is no doubt that Polyram cannot be recommended for coating white spruce seeds. If the coating treatment is to be continued, other products should be tested to determine their suitability for practical application. Meanwhile, the practice of coating seeds with a repellent only against birds and rodents should be maintained, even if a reduction of 9 percent in germination can be expected (1). Without repellent treatment, total loss to small animals would be unacceptably large.

Literature Cited

Lamontagne, Y.

1974. Germination retarded but protection enhanced in conifer seed after coating. Tree Planters' Notes 25 (1): 14-16.