

COMMENTS ON VEGETATIVE PROPAGATION RESEARCH CONDUCTED IN
THE GENETICS DEPARTMENT AT THE UNIVERSITY OF WISCONSIN

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Investigations relative to the development of satisfactory techniques for vegetative propagation of selected breeding material have been in progress in the Genetics Department at the University of Wisconsin for several years, Unfortunately, until the winter of 1954-55 local greenhouse facilities were not available, necessitating the use of greenhouse facilities quite distant from the Madison offices. This procedure did not lend itself to close observation of the material with the result that detailed experiments and the attending necessary observations could not be made, Trials which were undertaken have been of real value, however, in helping to discover techniques which could be used in the tree improvement work here in Wisconsin,

VEGETATIVE PROPAGATION BY MEANS OF CUTTINGS

Earlier work by a number of investigators has shown that this type of vegetative propagation is possible but quite unpredictable. Results in Wisconsin on white pine have shown a great range in percent of cuttings to strike root even though cuttings from the same trees were used in the trials in consecutive years, Trials with red pine have, generally speaking, given poor results. Trials established in late August with freshly gathered material yielded little or no rooting response for any and all treatments. The best response often was observed on the untreated controls. Basal heat was noted to stimulate callus and some root formation, Cuttings from 4-year-old trees gathered in early February were treated and "planted" in the greenhouse in a 50-50 mixture of sand and vermiculite. Again very little rooting was observed. One-half of the cuttings were stored in moist sphagnum moss for a period of 6 weeks before "planting," There was evidence of good callus formation on this material, However, in spite of this callus, there was no increased response in rooting, A high proportion of the cuttings had basal rot. Faulty mechanism in the watering system at times permitted the beds to become saturated, which may account for some of the poor results.

Outdoor cutting trials, started in the second week of May in northern Wisconsin with young cuttings (from 4-year-old trees), have shown promise.

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Readings made during the following fall indicate that there was a definite rooting response to 1 or 2 of the treatments. Further trials are anticipated.

VEGETATIVE PROPAGATION BY GRAFTING

Greenhouse grafting of various hard pines has been in progress since the winter of 1949-50. The results have been poor with the percent of take running from zero to about 40 percent for some scion lots. Various understocks have been used, including red pine, jack pine, Japanese red and black pines, mugho pine, white pine, Scotch pine, and a few Austrian pine. Varying results have been obtained, and for some of the species sufficient numbers of the understock were not available to yield results of statistical significance. Increased daylength has also been attempted by means of artificial illumination with no appreciable increase in grafting "take" response being noted. For the past two field seasons, field grafting in the early spring has been attempted. The results have been encouraging. Of material grafted in the spring of 1954 onto transplant stock of red pine, 74 percent was still alive after 15 months. Incidentally, the scions used in this trial were shipped into Wisconsin from the Maritime provinces of Canada and, according to earlier trials, should have given us our poorest results because of delayed handling in shipment, etc.

The grafting done in the field during the spring of 1955, at this time, is from 8 to 65 percent successful. Various treatments were applied, including dipping the scions in a 25-percent solution of liquid latex prior to grafting, enclosing the graft and understock top in a polyethylene bag and enclosing this in a brown kraft bag. This procedure was followed until the early spring forced abandonment of bagging, after which we used liquid latex dipped scions exclusively. Although it is too early to determine definitely, the response of the scions that had a latex dip only was not too much different from those which had the polyethylene and kraft bags. Should further tests verify this observation, the use of latex dipped scions with no bagging would greatly accelerate the grafting work. The side or veneer graft was used exclusively during the past grafting season,

VEGETATIVE PROPAGATION BY MEANS OF AIR-LAYERING

Air-layering trials have been undertaken on red, jack, white, and Scotch pines. The trials during the summer of 1954 were applied too late in the season although a few rooted branches were observed. On most of the branches treated, the girdled band was not large enough, with the result that a callus bridge was observed to have been formed across the girdled area. Wind and precipitation caused treated white pine branch tips to break off at the point of application. Readings which were made during early September on the 1955 trials for survival of the branch tips showed 46 to 92 percent still alive even after the rather hot, dry summer which followed application of the treatments.

SUMMARY

Cutting trials to date have given poor results for red pine although a definite rooting response has been observed during the 1955 season. Basal heat is beneficial in increasing callus and root formation. The percent of successful greenhouse grafts has been increasing gradually over the years. However, field grafting results have been most encouraging, with the percentage of success being nearly double that of greenhouse grafts. The possible use of air-layering as a vegetative propagation tool in the Lake States is being investigated. Research on all phases of the vegetative propagation problem is continuing.

DISCUSSION--PANEL ON VEGETATIVE PROPAGATION PROBLEMS

The effects of environment and local conditions on the effectiveness and success of various vegetative propagation methods were emphasized. Techniques for particular areas and particular species under a certain set of environmental conditions must be developed for each area. Ground temperature, air temperature, and relative humidity appeared as important factors in rooting. Very good results in the rooting and grafting of horticultural plants have been obtained under very high greenhouse temperatures of 110 to 115 when a continuous spray was provided. In Canada, there was little difference in grafting success with relative humidities ranging from 70 to 100 percent in the grafting chamber, but success was determined largely by the condition of the material, including both rootstock and scions.

In Canada, grafting rather than rooting of cuttings has been employed because of the selection and propagation of old trees. There they propagate all year round with the exception of 2 summer months. In many cases growth of red pine scions on Scotch pine rootstocks was better than red pine on red pine. Hence, it appears that Scotch pine can perhaps be used as a standard rootstock. A search is being made for such a standard rootstock for use in propagating spruce.