Tree Grafting

1. Copes, D.L. 1980. Effect of root stock vigor on leader elongation, branch growth, and plagiotropism in 4- and 8-year-old Douglas-fir grafts. Tree-Planters' Notes 31(1): 11-14.

Keywords: genetic tree improvement
tree grafting
growth
tree morphology

Abstract: In treatment (a) 2-yr-old seedling rootstocks were planted in containers in 1969 and scions from Oregon and Washington plantations grafted on in April 1970. The grafted trees were moved to transplant beds in Nov. 1970 and finally to field positions in Oregon in Dec. 1979. In treatment (b), rootstocks of the same age were bare-root planted in Nov. 1970 and scions grafted in April 1974. Graft growth was examined in May 1978. Field-grafted trees (b) showed upright tree form, significantly greater leader growth p.a. and longer branches in the 1976 whorl. Some 61% of container-grafted trees (a) showed a noticeable lean from vertical compared with none of the field grafted trees.

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2. Copes, D.L. 1983. Failure of grafted Douglas-fir planted at Monterey, Calif. Tree-Planters' Notes 34(3): 9-10.

Keywords: genetic tree improvement
tree grafting
growth
tree/stand health
tree phenology

Abstract: Trees were grafted onto established rootstocks (grown from rooted cuttings from Oregon or seedlings from California) in Oregon in April 1979, and in Dec. 109 of these were transplanted to a site on the Monterey Peninsula, California. Grafts were examined in July 1981. More than 30% of the transplanted grafts had died of early incompatibility and the cumulative 1980 and 1981 leader growth of the survivors averaged 12 cm. Identical grafts in Oregon showed 2-10% death due to incompatibility and av. leader growth of 1-2 m. It is suggested that the atypical unreliable budflush and reduced leader elongation in Monterey was due to winter temperatures that were not cool enough to satisfy bud dormancy requirements. It had been hoped to establish seed orchards out of range of pollen contamination from local Douglas fir stands.

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3. Copes, D.L. 1989. Bark scoring problem grafts in five Douglas-fir seed orchards: a case history. Pacific-Northwest-Research-Station,-USDA-Forest-Service. Research-Note PNW-RN-487. 12 p.

Keywords: genetic tree improvement

tree grafting
tree/stand health
tree physiology

Abstract: Grafted seed orchards of Douglas fir (Pseudotsuga menziesii) often suffer tree losses caused by delayed graft incompatibility. Bark scoring (to improve translocation across the graft union) was performed in April, June and August 1983 and 1985 on 379 trees, 5-16 yr old, in 5 seed orchards in western Oregon. Cuts were made with a small chainsaw every 3.1 to 4.3 cm across the defective union. Effects of scoring were assessed in 1984 and 1986. Many trees showed improved vigour after treatment and annual mortality was only 1.6% when all defective grafts were treated. The greatest improvement in average compatibility occurred in trees treated in April, when the youngest grafts responded most favourably. Inherent and induced incompatibility was found, with brownline round the entire or part of the circumference of the union, respectively. Wound tissue in induced incompatible grafts was usually free of brownline, but brownline appeared in all wound tissue of inherently incompatible grafts. These latter grafts will require bark scoring every 2-3 yr to maintain a live cambium at the union.

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4. Copes, D.L. 1999. Breeding graft-compatible Douglas-fir rootstocks (Pseudotsuga menziesii (MIRB.) FRANCO). Silvae-Genetica 48(3/4): 188-193.

Keywords: genetic tree improvement
tree grafting
tree/stand protection
growth
tree phenology
tree/stand health
genetic relationships

Abstract: A study encompassing 24 years was conducted to determine if a breeding programme could produce highly graft-compatible rootstocks for P. menziesii. A total of 27 trees of apparent high graft compatibility were selected and crossed to produce 226 control-pollinated families. Seedlings were grown, field planted and grafted with test scions. Graft unions from field tests were evaluated anatomically for internal symptoms of incompatibility. Average compatibility of progeny from the 226 crosses was 90.6%, compared with 65% in native populations. Breeding values were calculated for each parent by the best linear prediction (BLP) procedure. Average compatibility resulting from crossing among the top 10 parents was estimated by breeding values as 95.4%. Field-test results of progeny from 34 crosses among the 10 most compatible parents showed 96% compatibility. In addition to field-tests for graft compatibility, nursery tests of seedlings from 124 crosses were evaluated for second-year vegetative bud flush and seedling height. It was possible, while maintaining adequately high levels of graft compatibility, to breed both for resistance to spring frost damage and for increased seedling height.

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