

1985 ZALA

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BUD DEFECTS IN WINTER-DAMAGED COLORADO  
SPRUCE

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Bud defects were observed on 1985 winter-damaged Colorado spruce, *Picea pungens* Engelm. trees of marketable size in Alberta nurseries. Colorado spruce was also damaged in Saskatchewan and Manitoba nurseries. The trees had a history of winter damage (e.g. die back and bud kill) and random epicormic bud formation. Epicormic buds varied in number, shape, and size and formed individually, in pairs, and rosettes in lateral and terminal positions and on existing nodes.

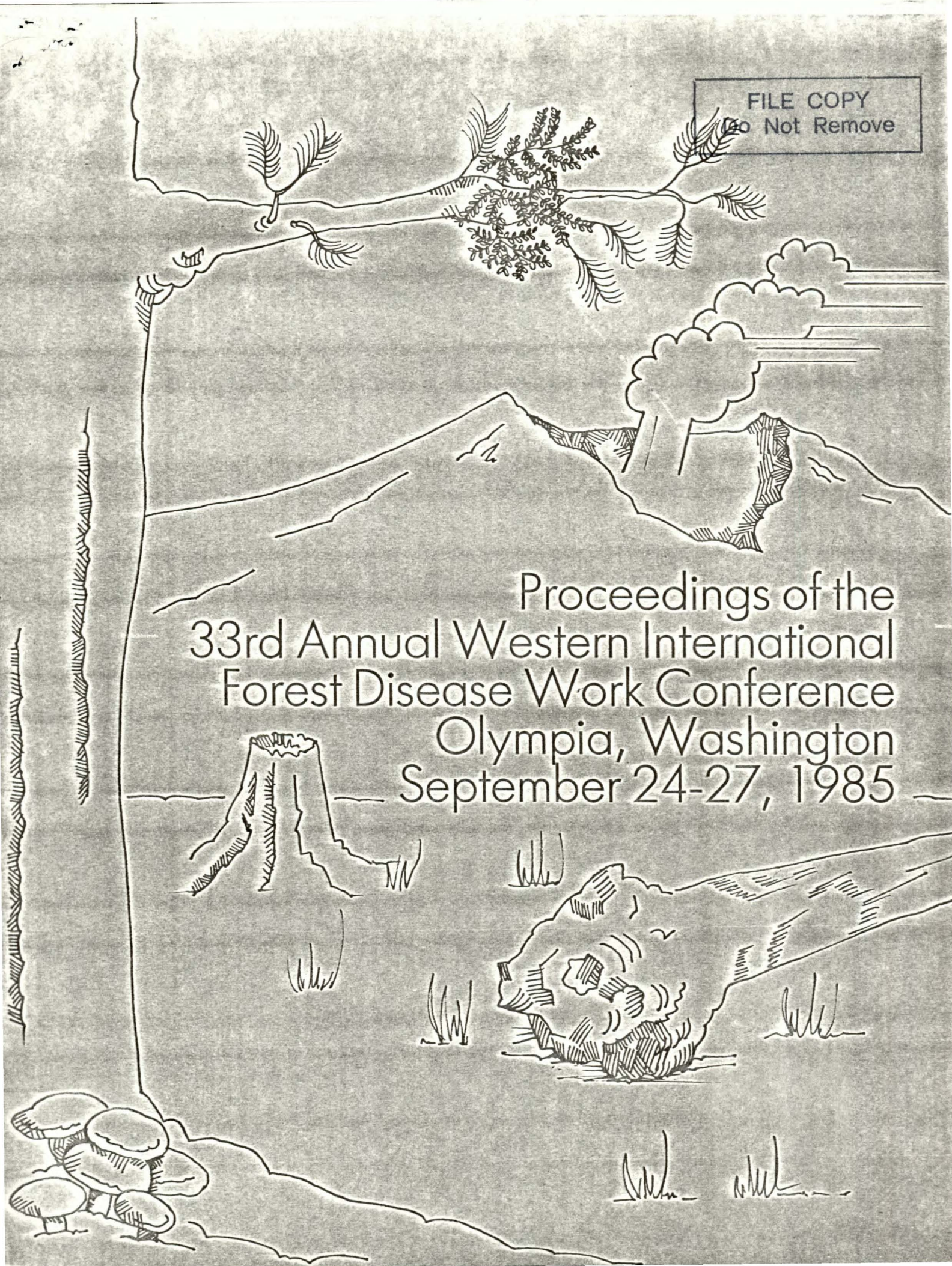
Bud dissections showed that two-out-of-three epicormic buds were winter-killed or defective in viability. Majority of the buds were defective (partially viable and non-viable). The partially viable ones had variable needle primordia and the non-viable ones had no primordia and in extreme cases no dome or bud trace. The partially viable one produced needle rosettes with little or no stem elongation, a reduced number and size of needles on spindly shoots, and deformed needles that remain permanently enclosed by scales. The number of buds that malfunctioned and reduced rejuvenation capability of trees varied from 38 to 56 percent within a standing crop of Colorado spruce.

Defects in epicormic buds were not caused as much by winter damage as by its after-effects on growth and development. Growth and development of buds was slower, random, and late season. Buds frequently failed to develop a bud trace and a full complement of primordia and scales. Defective buds with few needle primordia were slower flushing because of their inability to cast-off scales. Growth was stunted in leading and first order lateral shoots. Defective buds lacking needle primordia opened up without casting-off the outwardly curled scales. New epicormic buds developed and formed a rosette in the axes of the scales. Individual, paired, and rosette bud formation also occurred in the internodal areas of the shoot.

Past history of winter damage and subsequent formation of epicormic buds can be determined by examining nodal and internodal areas of living and dead shoots. Tree form and vigor can be improved by early diagnosis and corrective measures for winter damage and its after-effects.



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