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CHARACTERIZATION AND GENETIC CONTROL OF CINNAMYL ALCOHOL DEHYDROGENASE IN LOBLOLLY PINE

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Cinnamyl alcohol dehydrogenase (CAD) is the enzyme which catalyzes the final step of the biochemical pathway which produces coniferyl alcohol, the monomeric precursor of the lignin polymer in softwoods. Two isozymes of CAD are found in loblolly pine. One of these, CAD-2, has very high levels of activity in lignifying xylem using coniferyl alcohol as substrate. CAD-2 also occurs in cambium and both the embryo and megagametophyte of seeds. This isozyme is electrophoretically variable and highly polymorphic in loblolly pine. CAD-2 variants segregate in simple Mendelian ratios and show patterns typical of dimeric enzymes. We have purified CAD-2 approximately 650-fold from germinating loblolly pine seeds. The dimeric structure of the enzyme was confirmed by comparison of the molecular weight estimates for denatured and nondenatured enzyme. Further characterization of the enzyme will include amino acid sequencing, which will provide crucial information needed for cloning the gene for CAD-2. CAD-2 appears to be an enzyme through which the properties of wood could be genetically engineered.