Investigating the Origin of Descent for the North American Variation of Picea abies using the Mitochondrial nad1 Gene Intron

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Two populations of Norway Spruce (Picea abies) exist in Europe: Central and Northern. A 33-base pair insertion is present in a mitochondrial nad1 gene intron in the Central population. The Northern population has an earlier bud set, protecting it from frost damage. Timing of bud set is an adaptive trait; the phenotype does not necessarily reflect the genotype of the tree. The purpose of this project was to investigate the origin of descent of the North American variety of Picea abies, compared to Norwegian (Northern) and German (Central) trees. We hypothesized: the nad1 gene would distinguish between the three spruce varieties; American spruce would be more closely related to Central European trees; allopatric speciation has occurred in European populations, not within the American population. We extracted DNA from Norwegian, German, and American seeds. We amplified the gene using PCR, added restriction enzyme and used gel electrophoresis to determine that the insertion was present in German seeds. No evidence of the intron was found in North American spruces. We concluded we cannot determine the American Spruce's country of origin using this intron, and Allopatric speciation is occurring between the two European, and the American populations. Accurate genotype identification can prevent problems. Central seeds planted in cold climates result in lower timber quality. If bud set of planted and native trees don't overlap fully, time available for pollination is reduced. For effective gene conservation and research, identification of descent is necessary.