

# Carrot alternative oxidase gene *AOX2a* demonstrates allelic and genotypic polymorphisms in intron 3

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## ABSTRACT

Single nucleotide polymorphisms (SNPs) and insertion–deletions (InDels) are becoming important genetic markers for major crop species. In this study, we focus on variations at genomic level of the *Daucus carota* L. *AOX2a* gene. The use of gene-specific primers designed in exon regions on the boundaries of introns permitted to recognize intron length polymorphism (ILP) in intron 3 *AOX2a* by simple polymerase chain reaction (PCR) assays. The length of intron 3 can vary in individual carrot plants. Thus, allelic variation can be used as a tool to discriminate between single plant genotypes. Using this approach, individual plants from cv. Rotin and from diverse breeding lines and cultivars were identified that showed genetic variability by *AOX2a* ILPs. Repetitive patterns of intron length variation have been observed which allows grouping of genotypes. Polymorphic and identical PCR fragments revealed underlying high levels of sequence polymorphism. Variability was due to InDel events and intron single nucleotide polymorphisms (ISNPs), with a repetitive deletion in intron 3 affecting a putative pre-miRNA site. The results suggest that high *AOX2a* gene diversity in *D. carota* can be explored for the development of functional markers related to agronomic traits.

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