The chloroplast genome exists in multimeric forms

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Abstract

Chloroplast DNA conformation was analyzed by pulse-field gel electrophoresis. We found that spinach leaf chloroplast DNA molecules exist in at least four distinct forms with the apparent molecular weights of monomer, dimer, trimer, and tetramer. Two-dimensional gel analysis of DNA after UV nicking and in the presence of ethidium bromide indicates that they are not isomers that differ in superhelical density. DNA gyrase decatenation analysis demonstrates that the majority of the DNA molecules are oligomers rather than catenanes. The relative amounts of monomer, dimer, trimer, and tetramer forms, quantitated by molecular hybridization, are 1, 1/3, 1/9, and 1/27, respectively, and do not change during leaf maturation. The possible mechanisms of chloroplast DNA oligomer formation are discussed.