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**Construction and Exploitation of High Density DNA Marker and
Physical Maps in the Perennial Tropical Oil Crops Coconut and Oil
Palm: from Biotechnology towards Marker-Assisted Breeding**

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Abstract

The coconut palm (*Cocos nucifera* L.; $2n = 32$) and the oil palm (*Elaeis guineensis* JACQ.; $2n = 32$) are the two most important perennial oil crops of the tropics with the oil being the basis for both food production and industrial processing. The general objectives of a multinational project funded by the EC under the INCO-DEV programme are (i) to provide the methodological basis and molecular tools for improving the breeding efficiency in coconut and oil palm; and (ii) to develop DNA marker-based breeding strategies in collaboration with the most important countries in coconut and oil palm production and to directly transfer to developing countries small-scale technological solutions for the genetic improvement of these tropical oil crops. This is being achieved through the construction of high density molecular linkage maps in coconut and oil palm by developing SSR, AFLP and SNP markers, by performing comparative QTL analyses, by developing user-friendly molecular marker sets for future practical applications, by the generation of cosmid libraries for coconut and oil palm parents of the reference populations and physical mapping by SNP, and by synteny studies for coconut and oil palm in terms of comparative genome (microsequencing, SSR synteny) and QTL analyses. In the frame of these activities, cosmid libraries for coconut and oil palm representing some 4–5 genome equivalents were individualized, spotted onto filters and used in the isolation of important genes (oil biosynthesis, putative resistance genes). Different PCR-based DNA marker types were established to construct linkage maps for both coconut and oil palm. Polymorphic AFLP markers presented the majority of dominant DNA markers mapped. Currently, co-dominant SSR and SNP markers are being evaluated to serve as anchor markers for the integration of the available individual genotype-specific maps into general reference maps for coconut and oil palm. Mapping of QTLs related to flower morphology, nut production and oil content will be undertaken in the near future. The co-segregation of DNA markers with these QTLs will provide opportunities to breeders for marker-assisted selection in breeding programmes.

Keywords: DNA markers, genomics, linkage maps, synteny