

Production of Very Long-Chain n-3 and n-6 Polyunsaturated Fatty Acids in Plants

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New challenges for rapeseed breeders are besides the amelioration of agronomy and adaptation of cultivars, the introduction of new traits to improve the nutraceutical quality of oil and meal derived products. A particular focus has been the development of new products devoted to more willing healthier living population. New rapeseed cultivars called HOLLi (High oleic, low linoleic acid) or LowSat (low saturated fatty acids) are being developed, but the most exciting varieties will definitely be the new generations with long chain polyunsaturated fatty acids (LCPUFA), like arachidonic (ω 6-C20:4, ARA), eicosapentaenoic (ω 3-C20:5, EPA) and docosahexaenoic (ω 3-C22:6, DHA) acids within the oil. Human physiology depends in various ways on these ω 6- and ω 3-fatty acids, either as constituents of membrane phospholipids or as precursors for the synthesis of different classes of eicosanoids. LCPUFA are not only required for the development of the fetal nervous system but also contribute via a multiplicity of beneficial effects to the maintenance of health with increasing age, particularly by reducing the incidence of cardiovascular diseases. LCPUFA enter the human diet mainly in the form of marine and freshwater fish. In view of the increasing world population and the problem of overfishing marine resources, transgenic rapeseed might constitute a sustainable source of LCPUFAs. Therefore, the elucidation of LCPUFA biosynthesis, the cloning of new genes and their expression in transgenic oilseeds for implementations of different biosynthetic sequences, are scientifically and commercially interesting goals. Results from different strategies will be discussed.