

Structural peculiarities and polymorphism of the SQS-gene controlling the synthesis of squalene in amaranth

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Amaranth (genus *Amaranthus*) is a unique dicotyledonous plant with great potential as a grain, vegetable and fodder crop. Oil from amaranth grain is enriched with valuable lipid compounds, in particular, squalene, the content of which (2.2–10 %) significantly exceeds the content of squalene in other plant oils [1]. Squalene is widely used in medicine: as an adjuvant in vaccines, immunomodulator and antioxidant in the complex therapy of a such diseases as diabetes, ischemic disease, etc., as part of cosmetics [2]. The key gene in squalene biosynthesis is the gene encoding the enzyme squalene-synthase (SQS), which catalyzes the final stage of the formation of a squalene molecule. The aim of our work is to study the polymorphism of SQS-gene in different species of *Amaranthus*, as well as to search for those features in its structure that may determine the variation of squalene concentration in amaranth tissues. On the basis of the reference genomic sequence of *A. hypochondriacus*, available in the GoGe database (id40120; <https://genomeevolution.org/coge/>) we have established a nucleotide sequence of the SQS-gene and designed specific primers for the promoter (~1 kbp upstream ATG-codon) and coding regions of this gene. As the latter, a region between exons 5 and 9 was taken, containing 3 functionally conservative domains. Using these primers, isolation and analysis of primary structure of the SQS-gene in various species, the representatives of the “grain” amaranth (*A. hypochondriacus*, *A. cruentus*, *A. caudatus*) and their wild predecessors was carried out. The association of revealed structural polymorphism of SQS-gene with squalene concentration in amaranth grain tissue was analyzed.

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References

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