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INVESTIGATION ON A (+)-GERMACRENE A SYNTHASE INVOLVED IN SESQUITERPENE LACTONES BIOSYNTHESIS IN GLOBE ARTICHOKE

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Cynara cardunculus, (+)-germacrene A terpene synthase, sesquiterpene lactones

Globe artichoke (*Cynara cardunculus* var. *scolymus* L., *Asteraceae*) is a perennial crop traditionally consumed as a vegetable in the Mediterranean countries and rich in nutraceutically and pharmaceutically active compounds. Its bitter taste is caused by its high content of sesquiterpene lactones (STLs), a class of compounds which have also been shown to be medicinally active as antihyperlipidemic, anticancer, antispasmodic and antimicrobial agents.

The biosynthetic pathways responsible for STL production remain largely unknown, but in other *Asteraceae* species the initial enzymatic step is known to consist in the cyclization of farnesyl diphosphate (FPP) by the terpene synthase (+)-germacrene A synthase (GAS).

Here, we have mined a set of ~19,000 globe artichoke unigenes to identify a putative globe artichoke *GAS* orthologue. An alignment of its sequence with those of other plant sesquiterpene synthase genes highlighted the conserved peptide motifs DDxxD and RxR, characteristic of the enzymatic family members. When heterologously expressed in *E. coli,* the putative globe artichoke GAS was able to convert FPP into ß-elemene, a rearranged version of (+)-germacrene A.

The level of expression of the isolated GAS gene was assayed by quantitative RT-PCR in globe artichoke tissues. Among various tissues of the plant assayed (2-6 and 20 weeks-old leaves, head bracts and receptacles and 'in vitro' calluses), the level of globe artichoke *GAS* expression was highest in mature (six week old) leaves. Moreover, a sequence polymorphism within a mapping population parent allowed the *GAS* locus to be placed on the genetic map we previously developed.