MAPPING OF GENES INVOLVED IN PHENYLPROPANOID BIOSYNTHESIS AND QTL ANALYSIS IN *C. CARDUNCULUS* L.


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The complex *Cynara cardunculus*, includes the globe artichoke (var. *scolymus* L.), the cultivated cardoon (var. *altilis* L.) and the wild cardoon (var. *sylvestris* (Lamk) Fiori). Globe artichoke contributes significantly to the Mediterranean agricultural economy, with an annual production of about 750Mt (more than 60% of global production) from over 80kha of cultivated land; Italy is the leading world producer (FAO data 2006: http://faostat.fao.org/). A better knowledge of artichoke and cardoon genetics will be essential to move to a crossing strategy for breeding. In particular, it will be advantageous the establishment of frameworks of linkage relationships to allow the identification and localization of genes controlling important yield traits.

*C. cardunculus* is also a source of biopharmaceuticals and its leaf extracts have been widely used in herbal medicine as hepatoprotectors and choleretics since ancient times. The chemical components of the leaves have been found rich in compounds originating from the metabolism of phenylpropanoids and the major species present are the di-caffeoylquinic acids (e.g. cynarin), and their precursor CGA, a soluble phenolic which is widespread throughout the plant kingdom.

We generated the first genetic maps of globe artichoke by analysing an F1 population created by crossing a clone of ‘Romanesco C3’ (a late-maturing, non-spiny type) with ‘Spinoso di Palermo’ (an early-maturing spiny type), using AFLP, M-AFLP, SSR and retrotrasposon based SSAP markers. Moreover we identified and characterized two acyltransferases: HCT (hydroxycinnamoyl-CoA: shikimate/quinate hydroxycinnamoyltransferase) and HQT (hydroxycinnamoyl-CoA quinate: hydroxycinnamoyltransferase) which are involved in the synthesis of caffeoylquinic acids, substrates of compounds such as cynarin.

Here we report on SNP analyses in HCT and HQT sequences of the two mapping parents to place the genes on the globe artichoke genetic linkage map. Furthermore, we report on the development of new genetic maps based on F1 progenies obtained by crossing the same clone of ‘Romanesco C3’, previously used as female parent, with either a cultivated cardoon (‘Altilis 41’) and a wild cardoon (‘Creta 4’) genotypes used as pollen sources. Wide cross populations of this type are suitable for investigating the genetic control of quantitative characters in exotic genetic backgrounds; both wild and cultivated cardoon represents the most straightforward resource to exploit for globe artichoke improvement, since they are full cross-compatible to it. Since *C. cardunculus* is easily vegetatively propagated, the mapping populations are immortalised, and thus were grown in contrasting environments to investigate genotype x environment interaction for important commercial traits.