FLC AND THE REGULATION OF FLOWERING TIME IN CHICORY

LOCASCIO A., V Annozz A., Parrini P., Lucchin M., Varotto S.

Department of environmental agronomy and crop production, University of Padova – Agripolis, Viale dell’Università 16, 35020 Legnaro (PD)

vernalization, Chicorium intybus, RNAi, FISH, ploidy

The transition from vegetative to reproductive development for a plant is a highly regulated process sensitive to environmental cues, as day length and temperature. Winters annuals and biennales typically require a prolonged exposure to cold to flower in the spring. The process by which the meristem gains the competence to flower after the experience of low temperatures is known as vernalization. In the model plant Arabidopsis thaliana, the ability to flower is related with the silencing of a floral repressor named Flowering Locus C. FLC is negatively regulated by vernalization, instead its expression is inducted by the gene FRIGIDA. The silencing of FLC is an epigenetic process, mitotically stable, but it seems reset after meiosis. Up to now FLC has been isolated only from species belonging to Brassicaceae family and from sugar beet.

Wild chicory (Cichorium intybus L.) is a biennial species, belonging to Asteraceae family. Chicory is a crop mainly cultivated in North Eastern of Italy and it shows a quite obligate request of cold to flower.

In our study, we are investigating the molecular bases that regulate the flowering in chicory by vernalization.

We isolated FLC homologues from chicory and characterized their expression patterns in plant tissues and in response to vernalization. Given the similarities of sequence, pattern of expression and localization of FLC observed between arabidopsis and chicory, a construct 35S::FLC was made to transform the mutant flc-3 of arabidopsis var. Columbia, with the purpose to complement the repressive mutation flc-3 and rescue the phenotype.

Furthermore the knock-down of FLC in chicory could be useful to verify if FLC is involved in the process of flowering repression mediated by vernalization as in Arabidopsis. RNA interference mediated by miRNA could be the strategy to induce the silencing of FLC. A specific construct to induce interfering was produced and the transformation of chicory has been carried out through Agrobacterium infection of leaf disks. Plant regeneration via organogenesis will be achieved and the selection of the transgenic plants carried out.

In Italy, different types of chicory were selected by breeders and these types show quite different flowering time, as well as morphological differences among them and from the wild chicory. Fluorescent In Situ Hybridization on chromosomes (FISH) will be used for checking the possibility of events of aneuploidy or polyploidy in the cultivated varieties. The investigations on ploidy level would also explain why the number of transcripts identified in the cultivar Treviso differed from the number identified in the wild type chicory.