A GENE CODING FOR CYTOSOLIC GLUTAMMINE SYNTHETASE IN LENTIL

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Glutammine synthetase (GS) is an enzyme which catalyses the first step of the fixation of ammonium into organic molecules. Its isoenzymes are coded by a small gene family, whose members are differently expressed on the basis of the plant age, organ, tissue and nitrogen nutrition. Two forms of the GS are known in plants: the cytosolic GS, usually coded by different nuclear genes, and the chloroplast GS coded by a single nuclear gene.

In leguminous plants, cytosolic GS is abundant in roots and its function is related to fixation of ammonia into amino acids.

With the aim at isolating and characterising GS genes in lentil, a preliminary study was started taking the pea GS as a reference.

In pea, three classes of GS have been identified differing for function, localisation and chromosome location. The GS3 class includes two twin genes (GS3A and GS3B) coding for cytosolic GS. These two genes are very similar, but they differ especially in the length and sequence of introns 5 and 10, located in different positions of the genes.

In order to verify the presence of corresponding twin genes in lentil, and to evaluate the variation existing in the genepool of lentil, primers were designed in the coding regions flanking the two introns.

After amplification and gel separation, a single band was observed for each primer combination used. These results may indicate that, differently from pea, the gene coding for GS3-like protein is present in a single form in lentil.

In order to assess the genetic structure of the GS3 gene, similar amplifications were carried out in other species of Lens and in the related species Lathyrus sativus. The analysis of the sequences obtained in these species allowed to identify intron length variation, in particular in Lens ervoides and Lath. sativus. The present data are also useful to assess relationships within the genus Lens.