CA catalyzes the reversible hydration of CO2 (Table I). In C3 plants, CA is localized in the chloroplast stroma where it presumably facilitates CO2 fixation by Rubisco (Graham et al., 1984). A genomic CA clone was isolated from an Arabidopsis thaliana library in λEMBL4 using spinach CA cDNA as a probe (Fawcett et al., 1990).

Comparison of the genomic sequence with the cDNA sequence reveals nine exons and eight introns (Raines et al., 1992). All splicing junctions between exons and introns are well conserved and follow the GT-AG rule (Mount, 1982). The intron between the first exon, which encodes the transit sequence, and the second exon is the largest, consisting of 946 nucleotides. The remaining seven introns are approximately 100 nucleotides in length. The deduced amino acid sequence of the encoded protein has 74% similarity with that of spinach CA when conservative changes are taken into account.

The 5' flanking region of the CA gene contains sequences with homology to the G box, GT box, and I box. These motifs play roles in tissue-specific and light-modulated expression of the small subunit of Rubisco (Green et al., 1987; Giuliano et al., 1988).

Received December 6, 1993; accepted December 16, 1993.

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The GenBank accession number for the sequence reported in this article is L14750.

**LITERATURE CITED**


This work was supported by Louisiana Education Quality Support Fund (grant No. [1991–93]-RD-A).

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Abbreviation: CA, carbonic anhydrase.


