Reduced oxygen intermediates are produced in plant tissues from mitochondrial and chloroplastic electron transport pathways and from electron-saturated photosynthetic pigments (Bowler et al., 1992). For instance, the Mehler reaction is a primary source of reduced oxygen intermediates in chloroplasts in which dioxygen is reduced by Fd on the reducing side of PSI to produce $\cdot$O$_2$$^-$$. The dismutation of $\cdot$O$_2$$^-$ to H$_2$O$_2$ occurs spontaneously or is catalyzed by superoxide dismutases (Neubauer and Yamamoto, 1992). Efficient scavenging of H$_2$O$_2$ is critical, since it can damage membranes and deactivate enzymes. In addition, H$_2$O$_2$ can react with $\cdot$O$_2$$^-$ to produce the highly reactive and dangerous hydroxyl radical (·OH). The reduction of H$_2$O$_2$ by ascorbate is catalyzed by APX (EC 1.11.1.11). This enzyme is considered to be an indispensable part of the electron-scavenging pathway (Nakano and Asada, 1987). APX is a heme-containing homodimer found in all higher plants (Asada, 1992). Plant APXs include soluble cytosolic isoforms (Mittler and Zilinskas, 1991) and chloroplast-localized isoforms that may be stromal or thylakoid bound (Miyake et al., 1993).

We report here the isolation of a full-length cDNA from spinach (Spinacia oleracea) that encodes a cytosolic APX subunit (Table I). The cDNA is 1102 bp in length with a 750-bp open reading frame, along with 46 bp of 5′ and 306 bp of 3′ untranslated sequences. The nucleotide sequence of the spinach cytosolic APX open reading frame shows 74% identity with the open reading frame of a cytosolic APX cDNA from pea and 72% identity with one from Arabidopsis. The derived amino acid sequence identity among spinach, pea, and Arabidopsis is 83%.

Table 1. Characteristics of cDNA clone pSOAPX

| Organism: | Spinacia oleracea immature leaves. |
| Techniques: | A full-length pea cDNA library was used to screen for homologous clones from a A-ZAP spinach leaf library (Clontech, Palo Alto, CA). The longest cDNA was sequenced by dideoxy chain termination. |
| Features of the cDNA: | Contains an open reading frame with putative translation start codon at nucleotide 46 and stop codon at nucleotide 796. Putative polyadenylation signal at nucleotide 1045. |
| Features of the Derived Polypeptide: | 250 amino acid residues, estimated subunit pl of 5.26, and estimated subunit molecular weight of 27,625. |
| Expression: | High levels of cytosolic APX were seen in immature leaves and shoots. |

Received December 27, 1994; accepted January 31, 1995.
Copyright Clearance Center: 0032-0889/95/108/1325/01.
The EMBL accession number for the sequence reported in this article is L20864.

LITERATURE CITED


1 This work was supported by the U.S. Department of Agriculture Plant Responses to the Environment Program, the Texas Advanced Technology Program, and the Texas Tech University Plant Stress Institute.

* Corresponding author; e-mail brrda@ttacs.ttu.edu; fax 1–806–742-2963.

Abbreviation: APX, ascorbate peroxidase.