When a tomato (*Lycopersicon esculentum*) leaf cDNA library was screened with a cDNA fragment from a polymerase chain reaction that was based on the amino acid sequence of tomato systemin (Pearce et al., 1991), a clone (LCYP-2) was obtained of 1295 bp, not including the 3′-terminal poly(A) tail (Table I). It is surprising that when sequenced the clone appeared not to correspond to systemin but to encode a protein with amino acid sequence similarity to Cys proteinases of plants and animals (H.J.M. Linthorst, C. van der Does, F.Th. Brederode, and J.F. Bol, unpublished data). The clone contains one large reading frame that is already open at the 5′ end of the coding strand but lacks a Met initiation codon. The protein encoded by clone LCYP-2 is 34% identical with papain from *Carica papaya* (Cohen et al., 1986), 38% identical with human cathepsin H (Ritonja et al., 1988; Fuchs and Gassen, 1989), and 85% identical with tobacco (*Nicotiana tabacum*) leaf Cys proteinases (H.J.M. Linthorst, C. van der Does, F.Th. Brederode, and J.F. Bol, unpublished data). The high similarity to the tobacco proteinase clones suggests that probably only the first two codons are lacking.

Cys proteinases like the mammalian cathepsins are typical housekeeping enzymes, present in lysosomes and involved in degradation of intracellular proteins. The similarity to other animal and plant Cys proteinases implies that the protein encoded by LCYP-2 is a pre-pro-domain with domains possibly involved in targeting to the vacuole (Holwerda et al., 1992). The similarity predicts that the hydrophobic N-terminal part is a signal peptide for translocation through the ER. This signal sequence is completely cleaved off between Ala^16^ and Ile^17^.

A subsequent removal of the N-terminal domain by cleavage between Asp^127^ and Leu^128^ would result in the mature protein, having a molecular mass of 25 kD. The active site residues (in clone LCYP-2 they are Cys^152^ and His^194^), as well as the Cys residues involved in disulfide bridge formation in papain and other Cys proteinases, are conserved in the tomato protein. We have recently shown that the genes for the tobacco Cys proteinases are expressed in a circadian-regulated manner and are induced by incision wounding (H.J.M. Linthorst, C. van der Does, F.Th. Brederode, and J.F. Bol, unpublished data). The putative proteinase encoded by clone LCYP-2 is different from an earlier identified Cys proteinase that is induced in tomato fruit upon cold treatment (39% identity; Schaffer and Fischer, 1988).

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