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Plant Gene Register

Nucleotide Sequence of a cDNA Encoding Soybean Bowman-Birk Proteinase Inhibitor

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In soybean (*Glycine max* L.), at least three different proteinase inhibitors have been identified. These include the Kunitz trypsin inhibitor and BBPI and a family of its isoinhibitors (Hwang et al., 1978). The genes for proteinase inhibitors of the Bowman-Birk type have great importance because these genes are for the sulfur amino acid-rich storage proteins of the soybean seed, and these proteinase inhibitors may serve a defensive function against insects and microorganisms (Green and Ryan, 1972; Goldberg et al., 1981; Graham et al., 1985). It is also possible to obtain considerable information about the evolution of these inhibitors from sequence analysis of cDNAs for BBPI and its isoinhibitors.

Hammond et al. (1984) have characterized the genomic clone encoding isoinhibitor C-II and a partial cDNA for BBPI in soybean. Also, cDNA clones for isoinhibitors D-II and C-II have been isolated and characterized from soybean (Joudrier et al., 1987). However, a full-length cDNA encoding BBPI has not been reported.

In this paper, we report the nucleotide sequence of the full-length cDNA clone encoding soybean BBPI, screened using oligonucleotides (Table I). The size of the cDNA clone is 488 bp and contains a 330-bp open reading frame. The deduced protein consists of a signal peptide containing 39 amino acid residues and a mature protein of 71 amino acid residues. In the 3′ noncoding region of the cDNA, there are two potential poly(A)$^+$ signals.

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The EMBL/GenBank accession number for the sequence reported in this article is X68704.

Table I. *Characteristics of soybean BBPI*

Organism:	*Glycine max* L., cv Paldal.
Gene Product:	BBPI.
Function:	Inhibition of trypsin and chymotrypsin.
Clone Type:	cDNA, full-length.
Source:	cDNA library in λgt11, constructed from poly(A)$^+$ RNA of soybean seeds.
Techniques:	cDNA screening using a 20-mer oligonucleotide probe, 5′-CAGCATGGTTTTGAAGACTC-3′, which corresponds to the N-terminal side (Glu-Ser-Ser-Lys-Pro-Cys-Cys) of BBPI.
Method of Identification:	Comparison of deduced amino acid sequence with identified BBPI of soybean (Odani and Ikenaka, 1972).
Features of cDNA Structure:	330-bp open reading frame, 24-bp 5′ untranslated region, 131-bp 3′ untranslated region; two polyadenylation signals (AATAAA); signal peptide of 39 amino acids.
(G+C) Content:	42.8%.
Structural Features of Protein:	Mature protein has 71 amino acids containing 14 Cys residues (20%), which make seven disulfide bonds and two active sites, Lys^{16}-Ser^{17}, and Leu^{43}-Ser^{44} (Odani and Ikenaka, 1972).
Tissue Specificity:	Seed-specific expression.

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Abbreviation: BBPI, Bowman-Birk proteinase inhibitor.