Plant Gene Register

Nucleotide and Protein Sequences of 60S Ribosomal Protein L17 from Tobacco (Nicotiana tabacum L.)

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More than 70 different proteins form two subunits of eukaryotic ribosomes and are major components of the total cellular protein. It has been reported that in various living organisms the biosynthesis of the different ribosomal proteins is regulated coordinately (Mager, 1988). Although some information concerning the primary structure of plant ribosomal proteins is available by isolating cDNA clones encoding the small subunit ribosomal proteins S11, S13, S14, S16, and S19 (Larkin et al., 1989; Ganitt and Thompson, 1990; Lebrun and Freyssinet, 1991; Warskulat et al., 1991; Taylor et al., 1992; Joanin et al., 1993) and the large subunit ribosomal proteins L3 and L7 (Kim et al., 1990; Taylor et al., 1992), little is known about structure and regulation of most of the cytoplasmic ribosomal proteins in plants. Isolation of additional clones that code for other ribosomal proteins would facilitate the studies concerning whether plant ribosomal proteins are coordinately regulated during growth and development and whether their expression is controlled by any environmental factors.

A cDNA library of mRNA from 3-d-old suspension-cultured tobacco (Nicotiana tabacum L.) cells was constructed in the XZapII vector (Stratagene, La Jolla, CA). The library was screened for highly expressing clones by the plaque hybridization method. A cDNA clone, TSC81, was present in the library at the frequency of about 1.4%. DNA sequencing revealed that the cDNA clone is 573 bp long and contains an open reading frame of 420 bp, which is flanked by a 18-bp leader and a 135-bp 3' untranslated region (Table I). The amino acid sequence deduced from the open reading frame showed 85% identity with the 50s ribosomal protein L14 from various prokaryotic organisms. The length of the tobacco protein is identical with the 60s ribosomal protein L17.

Most of the differences between the mammalian ribosomal protein L17 and tobacco protein are due to neutral substitutions. The length of the tobacco protein is identical with the mammalian ribosomal protein L17. The tobacco protein is composed of a high amount of basic amino acids, which is typical of ribosomal proteins. These results strongly suggest

Table I. Characteristics of the ribosomal protein L17 gene from tobacco

| Cloning Techniques: | Sequence identification: Sequence identity to the ribosomal protein L17 from rat, human, and yeast. |
| Expression Characteristics: | Expression characteristics: Abundant mRNA of approximately 0.6 kb present at stage when cells are actively growing. |
| Protein: Ribosomal protein L17. | Features of cDNA structure: Deduced translation start site at nucleotide 19 and stop site at nucleotide 441. |

that the tobacco clone TSC81 encodes the 60S ribosomal protein L17. Southern blot analysis indicated that there are several copies of the gene in the tobacco genome (data not shown). Northern blot analysis showed that, although the clone is expressed in all of the tissues examined, the gene is most strongly expressed in 3-d-old suspension-cultured cells that are at the early exponential stage (data not shown). The expression level was much weaker in 7-d-old suspension-cultured cells that are at the stationary phase and in mature leaves, root, and flowers. These observations are in agreement with the previous report that ribosomal proteins are most strongly expressed when the rate of cell division is highest (Joanin et al., 1993).

Received June 4, 1993; accepted June 11, 1993.

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The GenBank accession number for the sequence reported in this article is L18915.

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