Plant Gene Register

Isolation of a Full-Length cDNA Encoding Cytosolic Enolase from *Ricinus communis*

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In glycolysis and gluconeogenesis, enolase (2-phospho-d-glycerate hydrolase, EC 4.2.1.1) is a ubiquitous enzyme that catalyzes the conversion of 2-phosphoglycerate to PEP. Enolase has been purified and/or cloned from several nonplant sources, e.g. *Bacillus subtilis* (Verma, 1989), *Xenopus* (Segil et al., 1988), and yeast (Chin et al., 1981). In yeast, both cis- and trans-acting factors have been identified that govern the regulation and expression of the two structural genes, *ENO1* and *ENO2* (Cohen et al., 1986; Holland et al., 1987; Brindle et al., 1990). There are three different isozymes of enolase in higher vertebrates designated α, β, and γ, the genes for which are expressed in a tissue- and development-specific manner (Forss-Petter et al., 1986).

In contrast, relatively little is known about plant enolase. Biochemical analysis has demonstrated the presence of both plastid and cytosolic isozymes of enolase in developing castor seeds (Dennis and Miernyk, 1982). During endosperm development in these seeds, the plastid form represents 30% of total cellular activity during the period of maximum fatty acid biosynthesis. In other castor tissues, however, the ratio of plastid to cytosolic enolase has been shown to vary considerably, and there is no detectable enolase in the chloroplasts from mature leaves (Miernyk and Dennis, 1992). It has also been reported that *Arabidopsis* chloroplasts lack enolase activity (Van der Straeten et al., 1991).

Cytosolic enolase has been cloned from maize (Lal et al., 1991), and in tobacco and *Arabidopsis* the structures of the genes for this isozyme have been determined (Van der Straeten et al., 1991). Plastid enolase has not yet been cloned. A developing castor endosperm cDNA library was screened in an attempt to isolate cDNAs for both plastid and cytosolic enolase. We report here the sequence of a cDNA for the cytosolic isozyme of enolase from this tissue (Table I).

<table>
<thead>
<tr>
<th>Table I. Characteristics of the cDNA encoding cytosolic enolase from <em>R. communis</em></th>
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<tr>
<td><strong>Organism:</strong></td>
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<td><strong>Gene Product; Pathway:</strong></td>
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<td><strong>Gene Product:</strong></td>
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<td><strong>Gene Copy Number:</strong></td>
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<td><strong>Features of Gene Sequence:</strong></td>
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<td><strong>Features of the Protein Sequence:</strong></td>
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<td><strong>Subcellular Localization:</strong></td>
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The GenBank accession number for the sequence reported in this article is Z28386.

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**LITERATURE CITED**


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Verma M (1989) Primary structure of *Bacillus subtilis* enolase gene deduced from cDNA sequence. Biochem Int 18: 667–672