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Plant Gene Register

Nucleotide Sequence of a Complementary DNA Clone Encoding Stearoyl-acyl Carrier Protein Desaturase from Castor Bean, *Ricinus communis*

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Stearoyl-ACP[1] desaturase (EC 1.14.99.6) catalyzes the initial desaturation in the biosynthesis of unsaturated fatty acids in plants and plays a role in the regulation of fatty acid composition of plant membranes and seed oils (1) (Table I). We report the isolation of a cDNA clone encoding the stearoyl-ACP desaturase of castor bean (*Ricinus communis*). A cDNA library constructed from immature castor endosperm tissue was probed with an 800-base pair fragment of a safflower stearoyl-ACP desaturase cDNA (3). The nucleotide and deduced amino acid sequence of a purified clone is in Figure 1. The sequence surrounding the methionine codon at base 27 (Fig. 1, underlined) is an exact match with the proposed plant translational start site consensus (2). Because stearoyl-ACP desaturase is a soluble, plastid-localized protein (1), we would expect the cDNA clone to encode a precursor protein containing a transit peptide. Based on homology with the safflower stearoyl-ACP desaturase clone (3), we believe that the castor stearoyl-ACP desaturase cDNA encodes a 33-amino acid transit peptide and that the alanine at position 34 (Fig. 1, boldface type) represents the amino terminus of the mature form of the protein. The portion of the safflower stearoyl-ACP desaturase cDNA clone encoding the mature form of the protein (3) has 78 and 90% identity at the nucleotide and amino acid levels, respectively, with the analogous portion of this castor clone.

[1] Abbreviation: ACP, acyl carrier protein.

Table I. *Characteristics of Stearoyl-ACP Desaturase cDNA from Castor Bean, Ricinus communis*

Organism:
Ricinus communis
Gene Product, Pathway:
Stearoyl-ACP desaturase (EC 1.14.99.6); fatty acid biosynthesis (1).
Techniques:
cDNA isolation using heterologous probe; complete dideoxy sequencing of both strands.
Method of Identification:
Comparison of deduced amino acid sequence with functionally identified stearoyl-ACP desaturase clone from safflower (90% identity to mature form of safflower enzyme) (3).
Expression Characteristics:
Polyadenylated transcript of ~1600 nucleotides in immature castor endosperm; 5′-terminus of transcript not determined; member of a small gene family.
Features of Gene Structure:
Consensus plant translational start site (Fig. 1, underlined) (2).
Structural Features of Protein:
ORF 396 amino acids; 33-amino acid transit peptide based on homology to safflower clone (mature N-terminal alanine in boldface type, Fig. 1) (3).
Antibodies:
None available.
Subcellular Location:
Plastid; soluble protein (1).
EMBL Accession No.:
X56508.

LITERATURE CITED

1. **Harwood JL** (1988) Fatty acid metabolism. Annu Rev Plant Physiol Plant Mol Biol **39:** 101–138
2. **Lutcke HA, Chow KC, Mickel FS, Moss KA, Kern HF, Scheele G A** (1987) Selection of AUG initiation codons differs in plants and animals. EMBO J **6:** 43–48
3. **Thompson GA, Scherer DE, Foxall-Van Aken S, Kenney, JW, Young HL, Shintani DK, Kridl JC, Knauf VC** (1991) Primary structures of the precursor and mature forms of stearoyl-acyl carrier protein desaturase from safflower embryos and requirement of ferredoxin for enzyme activity. Proc Natl Acad Sci USA **88:** 2578–2582

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   1 AAAAGAAAAAGGTAAGAAAAAAAACAATGGCTCTCAAGCTCAATCCTTTCCTTTCTCAAACCCAAAAGTTACCTT
                                 M  A  L  K  L  N  P  F  L  S  Q  T  Q  K  L  P  S   17

  76 CTTTCGCTCTTCCACCAATGGCCAGTACCAGATCTCCTAAGTTCTACATGGCCTCTACCCTCAAGTCTGGTTCTA
       F  A  L  P  P  M  A  S  T  R  S  P  K  F  Y  M  A  S  T  L  K  S  G  S  K   42

 151 AGGAAGTTGAGAATCTCAAGAAGCCTTTCATGCCTCCTCGGGAGGTACATGTTCAGGTTACCCATTCTATGCCAC
       E  V  E  N  L  K  K  P  F  M  P  P  R  E  V  H  V  Q  V  T  H  S  M  P  P   67

 226 CCCAAAAGATTGAGATCTTTAAATCCCTAGACAATTGGGCTGAGGAGAACATTCTGGTTCATCTGAAGCCAGTTG
       Q  K  I  E  I  F  K  S  L  D  N  W  A  E  E  N  I  L  V  H  L  K  P  V  E   92

 301 AGAAATGTTGGCAACCGCAGGATTTTTTGCCAGATCCCGCCTCTGATGGATTTGATGAGCAAGTCAGGGAACTCA
       K  C  W  Q  P  Q  D  F  L  P  D  P  A  S  D  G  F  D  E  Q  V  R  E  L  R  117

 376 GGGAGAGAGCAAAGGAGATTCCTGATGATTATTTTGTTGTTTTGGTTGGAGACATGATAACGGAAGAAGCCCTTC
       E  R  A  K  E  I  P  D  D  Y  F  V  V  L  V  G  D  M  I  T  E  E  A  L  P  142

 451 CCACTTATCAAACAATGCTGAATACCTTGGATGGAGTTCGGGATGAAACAGGTGCAAGTCCTACTTCTTGGGCAA
       T  Y  Q  T  M  L  N  T  L  D  G  V  R  D  E  T  G  A  S  P  T  S  W  A  I  167

 526 TTTGGACAAGGGCATGGACTGCGGAAGAGAATAGACATGGTGACCTCCTCAATAAGTATCTCTACCTATCTGGAC
       W  T  R  A  W  T  A  E  E  N  R  H  G  D  L  L  N  K  Y  L  Y  L  S  G  R  192

 601 GAGTGGACATGAGGCAAATTGAGAAGACAATTCAATATTTGATTGGTTCAGGAATGGATCCACGGACAGAAAACA
       V  D  M  R  Q  I  E  K  T  I  Q  Y  L  I  G  S  G  M  D  P  R  T  E  N  S  217

 676 GTCCATACCTTGGGTTCATCTATACATCATTCCAGGAAAGGGCAACCTTCATTTCTCATGGGAACACTGCCCGAC
       P  Y  L  G  F  I  Y  T  S  F  Q  E  R  A  T  F  I  S  H  G  N  T  A  R  Q  242

 751 AAGCCAAAGAGCATGGAGACATAAAGTTGGCTCAAATATGTGGTACAATTGCTGCAGATGAGAAGCGCCATGAGA
       A  K  E  H  G  D  I  K  L  A  Q  I  C  G  T  I  A  A  D  E  K  R  H  E  T  267

 826 CAGCCTACACAAAGATAGTGGAAAAACTCTTTGAGATTGATCCTGATGGAACTGTTTTGGCTTTTGCTGATATGA
       A  Y  T  K  I  V  E  K  L  F  E  I  D  P  D  G  T  V  L  A  F  A  D  M  M  292

 901 TGAGAAAGAAAATTTCTATGCCTGCACACTTGATGTATGATGGCCGAGATGATAATCTTTTTGACCACTTTTCAG
       R  K  K  I  S  M  P  A  H  L  M  Y  D  G  R  D  D  N  L  F  D  H  F  S  A  317

 976 CTGTTGCGCAGCGTCTTGGAGTCTACACAGCAAAGGATTATGCAGATATATTGGAGTTCTTGGTGGGCAGATGGA
       V  A  Q  R  L  G  V  Y  T  A  K  D  Y  A  D  I  L  E  F  L  V  G  R  W  K  342

1051 AGGTGGATAAACTAACGGGCCTTTCAGCTGAGGGACAAAAGGCTCAGGACTATGTTTGTCGGTTACCTCCAAGAA
       V  D  K  L  T  G  L  S  A  E  G  Q  K  A  Q  D  Y  V  C  R  L  P  P  R  I  367

1126 TTAGAAGGCTGGAAGAGAGAGCTCAAGGAAGGGCAAAGGAAGCACCCACCATGCCTTTCAGCTGGATTTTCGATA
       R  R  L  E  E  R  A  Q  G  R  A  K  E  A  P  T  M  P  F  S  W  I  F  D  R  392

1201 GGCAAGTGAAGCTGTAGGTGGCTAAAGTGCAGGACGAAACCGAAATGGTTAGTTTCACTCTTTTTCATGCCCATC
       Q  V  K  L  .                                                              396

1276 CCTGCAGAATCAGAAGTAGAGGTAGAATTTTGTAGTTGCTTTTTTATTACAAGTCCAGTTTAGTTTAAGGTCTGT

1351 GGAAGGGAGTTAGTTGAGGAGTGAATTTAGTAAGTTGTAGATACAGTTGTTTCTTGTGTTGTCATGAGTATGCTG

1426 ATAGAGAGCAGCTGTAGTTTTGTTGTTGTGTTCTTTTATATGGTCTCTTGTATGAGTTTCTTTTCTTTCCTTTTC

1501 TTCTTTCCTTTCCTCTCTCTCTCTCTCTCTCTCTCTCTTTTTCTCTTATCCCAAGTGTCTCAAGTATAATAAGCA

1576 AACGATCCATGTGGCAATTTTGATGATGGTGATCAGTCTCACAACTTGATCTTTTGTCTTCTATTGGAAACACAG

1651 CCTGCTTGTTTG
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Figure I. Nucleotide sequence and deduced amino acid sequence of castor bean stearoyl-ACP desaturase. For an explanation of symbols, see Table I.