The phytochromes are a family of photoreceptors that modulate plant growth and development according to cues from the light environment. The phytochrome apoproteins of Arabidopsis are encoded by a small family of divergent genes called PHYA, PHYB, PHYC, PHYD, and PHYE (Sharrock and Quail, 1989; Quail, 1991). PHYA encodes the apoprotein component of the well-characterized light-labile phytochrome A (Quail, 1991). Phytochrome A-deficient mutants of Arabidopsis display an elongated hypocotyl in continuous far-red light, although not in continuous white light or red light (Nagatani et al., 1993; Parks and Quail, 1993; Whitelam et al., 1993). These mutants also exhibit an elongated hypocotyl and altered photoperiodic response in day/night cycles of white light/dark (Johnson et al., 1994). PHYB encodes the apoprotein component of the light-stable phytochrome B (Quail, 1991; Somers et al., 1991). Phytochrome B-deficient mutants display an elongated hypocotyl in continuous white light and red light but not in continuous far-red light. Adult phytochrome B-deficient plants are slender, have enhanced apical dominance, and are pale green (Reed et al., 1993).

We isolated an Arabidopsis genomic DNA clone containing PHYC (designated XPHYC51) from a genomic DNA clone library (described by Whitelam et al., 1993) (Table I) and determined the DNA sequence of PHYC and approximately 100 bp of its 5' flanking DNA. The PHYC gene encodes a polypeptide of 1111 amino acid residues (see also Sharrock and Quail, 1989). The PHYC coding sequence is interrupted by two introns of 37 and 49 nucleotides. These introns are part of a BamHI fragment containing PHYC, together with upstream and downstream flanking DNA.

Table I. Characteristics of the PHYC gene from A. thaliana

| Organism: Arabidopsis thaliana, Landsberg erecta, gai mutant. |
| Gene: PHYC; phytochrome C apoprotein. |

Phytochrome C-deficient plants are pale green (Reed et al., 1993).

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Table I. Characteristics of the PHYC gene from A. thaliana

| Organism: Arabidopsis thaliana, Landsberg erecta, gai mutant. |
| Gene: PHYC; phytochrome C apoprotein. |

Source: Genomic DNA library in λFX II (Stratagene; Whitelam et al., 1993).

Techniques:
Screening of the A genomic DNA library using a degenerate 44-mer oligonucleotide containing a region of sequence strongly conserved between PHYA, PHYB, and PHYC (encoding amino acids 301–315 in the sequences shown by Sharrock and Quail, 1989; Whitelam et al., 1993) as probe. \( \lambda \)XPHYC51 was initially recognized as a clone containing PHYC by restriction mapping. Complete dideoxy sequencing of both strands of part of a BamHI fragment containing PHYC, together with upstream and downstream flanking DNA.

Method of Identification: PHYC sequence shares 99% homology with the published cDNA sequence (Sharrock and Quail, 1989). Intron positions were also identified by comparison with this cDNA sequence.

The phytochromes A and PHYB in that PHYC lacks the third intron, the position of which is conserved between PHYA and PHYB. Thus, it seems likely that either PHYC has lost or PHYA and PHYB have gained an intron during evolutionary divergence from their presumed progenitor gene.

LITERATURE CITED


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