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Plant Gene Register

Nucleotide Sequence of a cDNA Clone Encoding a Dehydrin-Like Protein from *Stellaria longipes*[1]

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The expression of many different genes is regulated by ABA and osmotic stress (Skriver and Mundy, 1990). These genes and their products have been characterized in several plants, and they include dehydrins in barley, corn (Close et al., 1989), and *Arabidopsis thaliana* (Rouse et al., 1992); proteins responsive to ABA (RAB) in rice (Mundy and Chua, 1988; Yamaguchi-Shinozaki et al., 1989); TAS and *le* proteins in tomato (Godoy et al., 1990; Plant et al., 1991); late embryogenesis-abundant proteins in cotton (Baker et al., 1988); and osmotin in tobacco (Singh et al., 1987). Many of these proteins share a certain degree of structural similarity.

Stellaria longipes Goldie (Caryophyllaceae) is a dicotyledonous herbaceous perennial (Chinnappa and Morton, 1984). As part of a project on evolutionary studies of the *S. longipes* complex, a leaf cDNA library was constructed from a natural population in the Kananaskis Valley, Alberta, Canada. A random cDNA clone (H26) was isolated (Table I), which, on sequencing, resembled previously reported dehydrins from barley and *A. thaliana* (Close et al., 1989; Rouse et al., 1992) and RAB from rice (Mundy and Chua, 1988; Yamaguchi-Shinozaki et al., 1989). It was used to probe northern blots of total leaf RNAs from plants receiving different treatments. The hybridization showed that the H26 mRNA levels in leaves were inducible by treatments of ABA, PEG, or drought, whereas stems seemed nonresponsive. Although the overall structure is very similar to many other dehydrins, the *S. longipes* dehydrin exhibits certain different structural features (Table I). To our knowledge, this is the first DNA sequence ever reported from the genus *Stellaria*.

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The accession number from the EMBL, GenBank, and DDBJ Nucleotide Sequence Data Bases for the sequence reported in this article is Z21500.

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Table I. *Characterization of a cDNA encoding a dehydrin-like protein of Stellaria longipes*

Organism:
Stellaria longipes Goldie (Caryophyllaceae; common name: long-stalked chick weed; genotype 6D).
Source:
cDNA library in λZAP II vector (Stratagene) constructed from leaf poly(A)$^+$ RNA.
Techniques:
Double-stranded plasmid clone H26 (pBluescript in *Escherichia coli* strain XL-1 Blue) sequencing; synthetic oligonucleotides as primers and dideoxy sequencing of both strands.
Method of Identification:
Sequence comparison shows high similarity to other dehydrin genes. Deduced protein sequence shows typical characteristics of dehydrins (Close et al., 1989).
Features of the cDNA Clone:
The H26 sequence contains 68 nucleotides of 5′ flanking region, 522 nucleotides of coding region, and 310 nucleotides of 3′ flanking sequence including a 52-nucleotide poly(A) tail. The putative polyadenylation signal sequence AATAA appears 117 bp downstream of the termination codon TAA.
Features of the Deduced Protein:
Open reading frame predicts a highly hydrophilic protein of 173 amino acids with calculated M_r 19,000 and isoelectric point of 10.4. The protein contains the amino acid motifs KKKGITEKI-KEKFPG and EKIKDKLPG, which are also found in other ABA- or osmotic stress-inducible proteins. Like other dehydrins, the *S. longipes* dehydrin does not contain Cys or Trp. There are two clusters of Ser in the sequence but not the consensus sequence D(E)E(Q,A)Y(F)GN(Q)P(H)V(T,I,F), which is found near the N termini of most other ABA-inducible proteins of this kind (Godoy et al., 1990). There is no neutral or hydrophobic domain between amino acids 22 to 50, as found in monocotyledonous rice (Mundy and Chua, 1988), barley (Close et al., 1989), and dicotyledonous *A. thaliana* (Rouse et al., 1992).
Expression Characteristics:
Northern hybridization showed that the H26 mRNA levels in leaves were much higher when treated with ABA (50 μM), PEG (water potential of −1.4 MPa for 3 and 6 h), or drought (for 3 d) than those when treated with normal watering or flooding conditions. No significant change in the mRNA level was observed in stems after similar treatments.
Gene Copy Number:
Multicopy (two–four copies).
Antibodies:
Not available.