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Isolation and characterization of the organ-specific and light-inducible promoter of the gene encoding rubisco activase in potato (*Solanum tuberosum*)

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ABSTRACT. Constitutive promoters have been widely used in crop biotechnology applications. Tissue-specific or inducible promoters, however, have advantages in some cases. We isolated the 731-bp 5' flanking sequence of a potato (*Solanum tuberosum*) gene, encoding ribulose-1,5-bisphosphate carboxylase/oxygenase (rubisco) activase (*RCA*), which was isolated by genome walking. By using GUS as a reporter and with Northern blot analysis, the 702-bp fragment (referred to as *StRCA*p), ranging from nt -731 to -30 relative to the initiation code of the *RCA* gene, was analyzed in transgenic tobacco plants. The activity of *StRCA*p in leaves was 0.4-fold less than that of cauliflower mosaic virus 35S promoter, and was expressed throughout the green part of the light-grown transgenic T_1 seedlings, including cytoledons, leaves and young stems, but not roots. Further deletion analysis revealed that a shorter fragment (nt -249 to -30, *StRCA*p2) retained light-inducible features in cytoledons and leaves, but showed

no detectable activity in young stems and roots. Although the activity of *StRCA*p2 in leaves was reduced significantly compared with that of *StRCA*p, the overall data indicated that *cis*-elements sufficient to regulate organ-specific and light-inducible transcription are within the 220-bp fragment. There is potential for application of *StRCA*p in plant genetic engineering.

Key words: *Solanum tuberosum*; Organ-specific and light-inducible; Promoter; Rubisco activase

