

PLANT MOLECULAR BIOLOGY

Plant Molecular Biology 23 : 349 - 364, 1993

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Circadian and light-regulated expression of nitrate reductase in *Arabidopsis*

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The expression of a number of plant genes is regulated by an endogenous circadian clock. We report that the *Arabidopsis NIA2* (nitrate reductase) gene shows robust circadian oscillations in mRNA accumulation which persist for at least 5 days in plants that have been grown in a light-dark (LD) cycle and then transferred to continuous light (LL). We further show that *NIA2* mRNA accumulation oscillates in a circadian fashion in plants that have been grown in LD and then transferred to continuous darkness (DD). Results from nuclear run-on transcriptional analysis suggest that the oscillations in steady-state levels of *NIA2* mRNA abundance are not primarily due to changes in transcription but, instead, reflect post-transcriptional regulation. The circadian oscillations in *NIA2* mRNA abundance are paralleled by circadian oscillations in nitrate reductase enzyme activity (NR activity) in *Arabidopsis* plants that have been grown in LD and then transferred either to DD or to LL. Etiolated *Arabidopsis* seedlings express neither *NIA2* mRNA nor NR activity. However, both *NIA2* mRNA accumulation and NR activity are induced by exposure to white light. The inductive effects of light on *NIA2* mRNA accumulation are due, at least in part, to a very low fluence phytochrome-mediated response. However, the persistence of circadian oscillations in *NIA2* mRNA abundance for at least 5 days in LL demonstrates that the circadian clock is capable of overriding or gating the inductive effects of light on *NIA2* mRNA accumulation in *Arabidopsis* for an extended, continuous period of time.

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