

Constitutively Active Phytochrome A Alleles that Accelerate Flowering of Long-Day Plants Under Non-Inductive Photoperiods

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ABSTRACT

Researchers at the University of California, Davis have developed novel phytochrome A variants that accelerate flowering in long-day plants under non-inductive short-day photoperiods.

FULL DESCRIPTION

This technology entails constitutively active, light-labile phytochrome A (phyA) polypeptides, encoded by mutated alleles which can be generated by direct editing the endogenous PHYA locus. Such modifications cause constitutive photomorphogenesis in darkness, enhance far-red light sensitivity and promote precocious flowering in long-day plants under non-inductive short-day conditions. The technology includes transgenic and gene-edited plants expressing these phyA variants and methods to modulate flowering time by restoring phyA signaling in darkness.

APPLICATIONS

- ▶ Crop improvement for long-day plants such as cereals, vegetables, and ornamentals.
- ▶ Development of cultivars with flexible flowering schedules adaptable to diverse photoperiods.
- ▶ Biotechnological tools for controlled modulation of flowering time in agriculture.
- ▶ Seed companies offering enhanced genetic traits for early flowering and yield optimization.
- ▶ Horticultural products tailored for off-season or controlled environment agriculture.

FEATURES/BENEFITS

- ▶ Enables early flowering of long-day plants under short-day and neutral photoperiods.
- ▶ Maintains performance despite changes in light intensity, supporting more consistent outcomes.
- ▶ Improves photomorphogenic growth under low-light conditions.
- ▶ Supports deployment via transgenic expression or gene-editing approaches.
- ▶ Eliminates delayed or failed flowering in long-day plants when grown under non-inductive short-day photoperiods.
- ▶ Reduces productivity losses caused by photoperiod sensitivity.
- ▶ Expands geographic and seasonal cultivation options by reducing dependence on day-length cycles.
- ▶ Enables flowering-time optimization without changing environmental conditions (e.g., lighting schedules).

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OTHER INFORMATION

KEYWORDS

accelerated flowering,
 constitutively active
 phytochrome A, gene
 editing, long-day plants,
 M423K mutation,
 photoperiod modulation,
 plant biotechnology,
 photomorphogenesis,
 transgenic plants,
 flowering time control

CATEGORIZED AS

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