Intelligent sun protection

Biology

UVR8 - plant photoreceptor

UV-B

Dark: Dimer

UVR8-TetRDBD - A novel transcription factor binds to the Ptet promoter in absence of UV-B

UV: Monomer

Decoder

- Blue light receptor: LovTnp (lox and TryR)
- Red light receptor: Cph8 (Fusion Cph1 and EmZ kinase)
- Also inducible with IPTG (“blue light”) and Act (“red light”)
- Proof of principle

Red light: Blue light

Output: Source

0 0: -

Red Pigment: classical tungsten light bulb

Green: Blue and Red-Violet pigment

PREP: Violet pigment

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References


Photoinduction

The photoinduction model calculates the activity of light receptors upon light exposure. It takes emission spectra of the light source and absorption spectra, quantum yield and extinction coefficients of the receptors and returns the activation constants for the given light conditions.

\[ k = \sum N_i \sigma_i \lambda k_{act} = \sum N_i \sigma_i \lambda k_{deact} \]

Photoinducer (dark)

Outlook

- Induce the UVR8-TetRDBD with UV-B
- Test the hybrid promoters (FACS) and implement them into the decoder
- Build up the decoder step by step
- Measure PABA production using HPLC