

Capturing the Light: The New Wave in Food Production



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Milk production

- Bovine somatotropin
- Milking more than twice per day

Light: Temporal and duration

- SDPP during dry period (less than 12h)
- LDPP during lactation (16-18h)

Noninvasive method to increase milk production by ~5 lbs/cow/day (Dahl et al 2005).



T8 Fluorescent



White LED



New Wave in Crop Production: Light Emitting Diodes

Signalling and Sensing

Regulation and Control



Sky Greens, Singapore



Mirai Co., Japan



Gotham Greens, Brooklyn, NY



Gotham Greens, Brooklyn, NY



Swedeponic, Orust, Sweden



Courtesy of Dominic Kamp

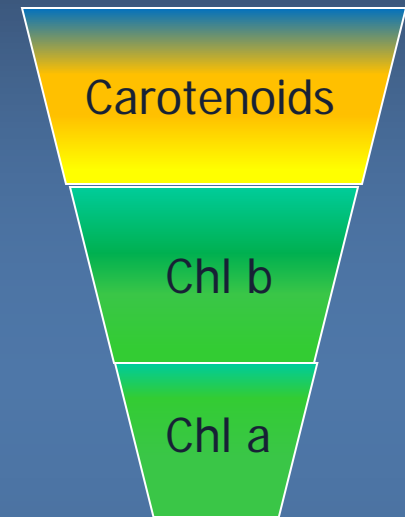
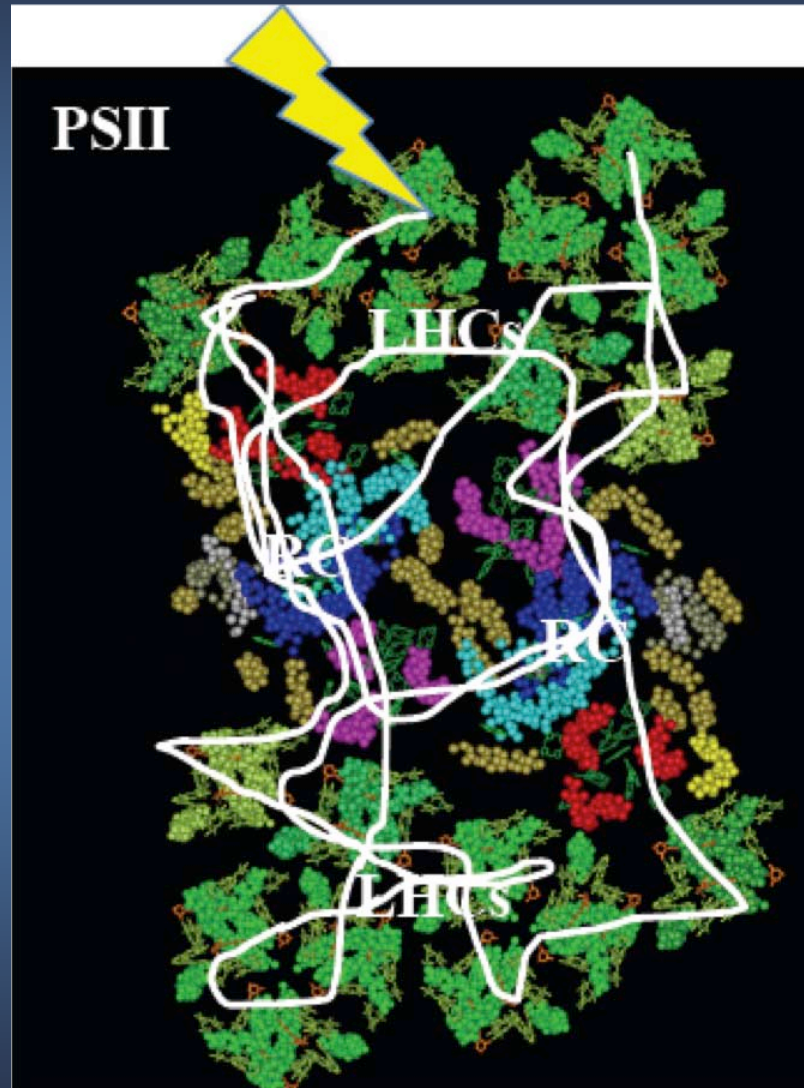
Fine regulation of plant growth and metabolism



<http://www.divilabs.com/2013/04/leds-how-to-make-them-work.html>

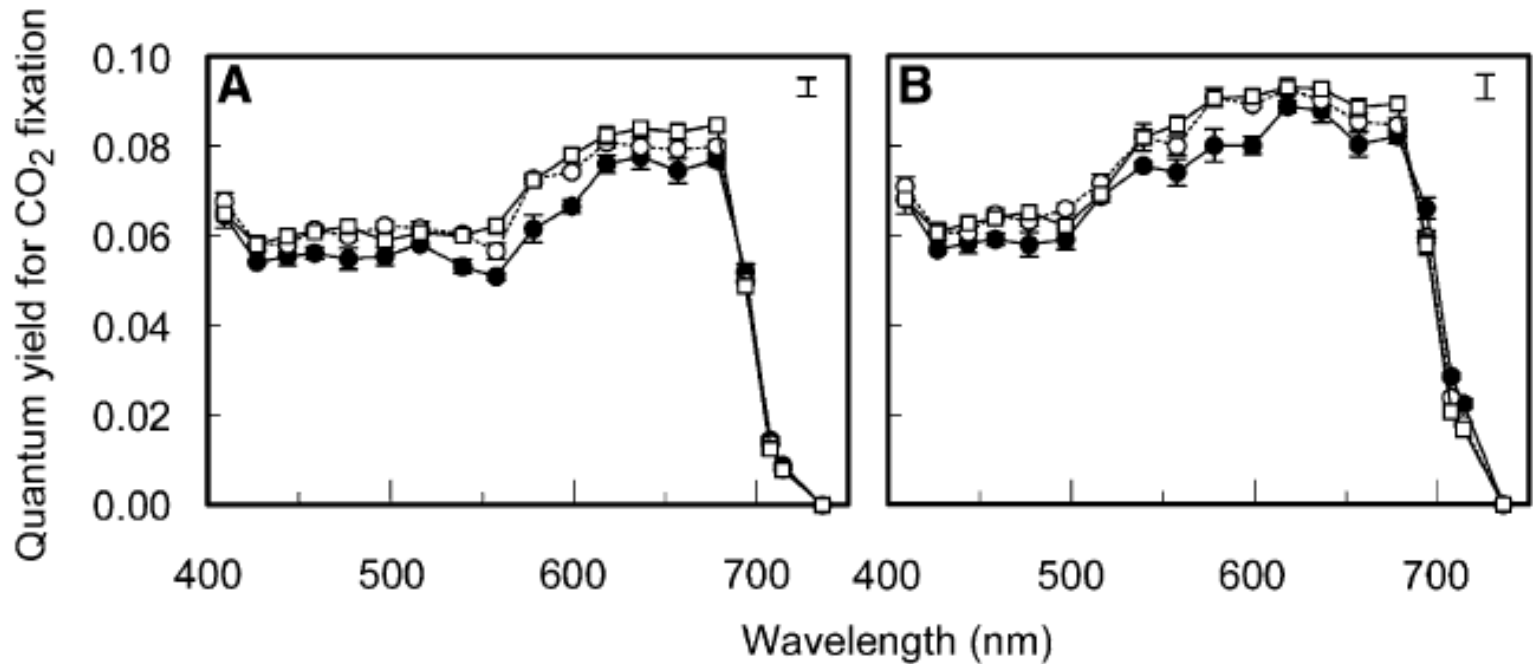
Photosynthesis is light regulated: Chloroplast Sensing

Energy



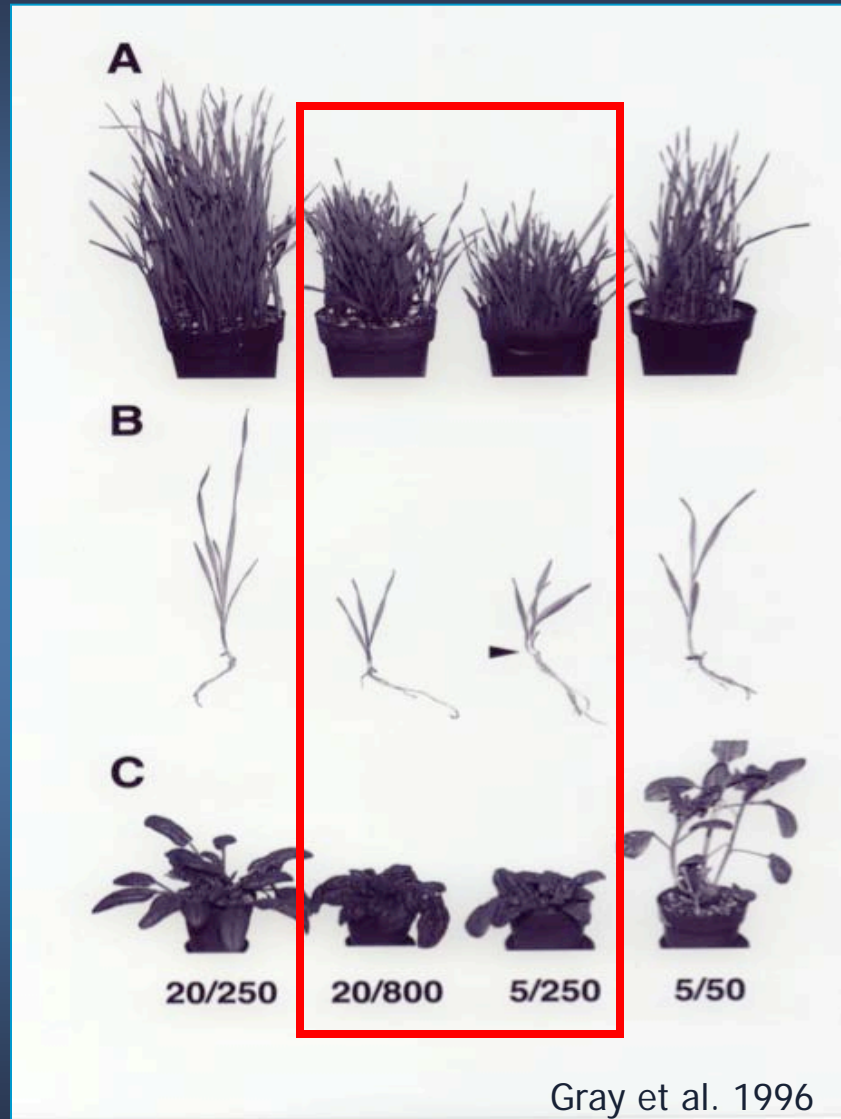
http://www.cchem.berkeley.edu/grfgrp/pages/Question_Pages/NPQ.html

Photosynthesis Action Spectrum Quantum yield of CO₂ Assimilation

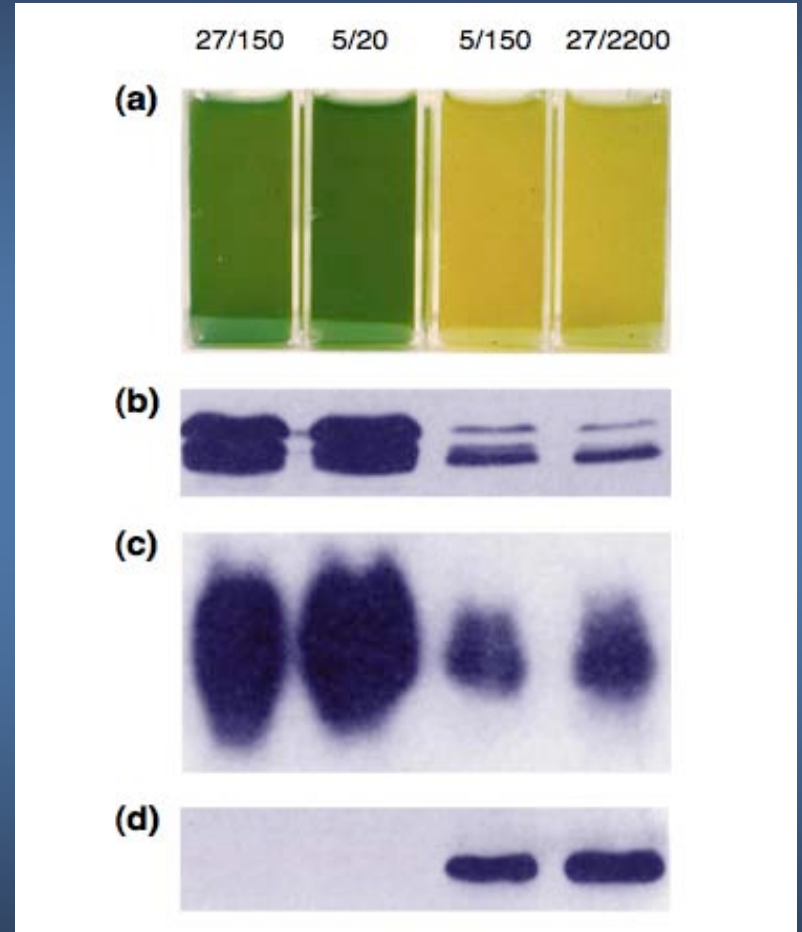
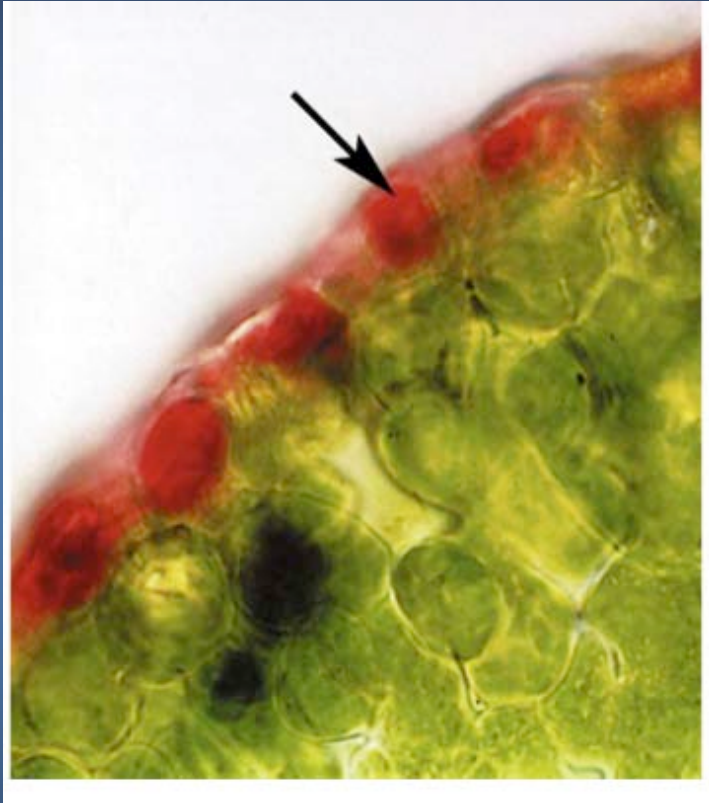


Hogewoning et al. 2012

Redox control: Morphology and Stress Resistance

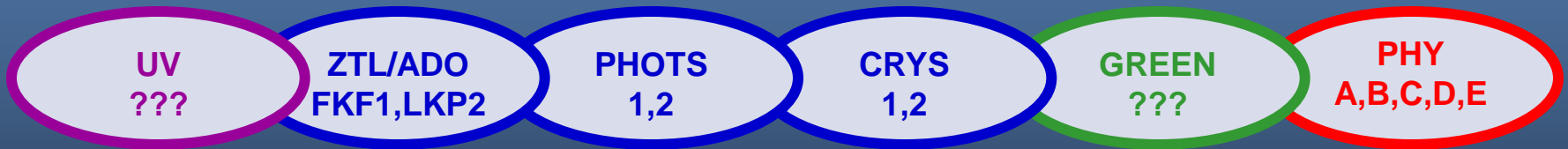
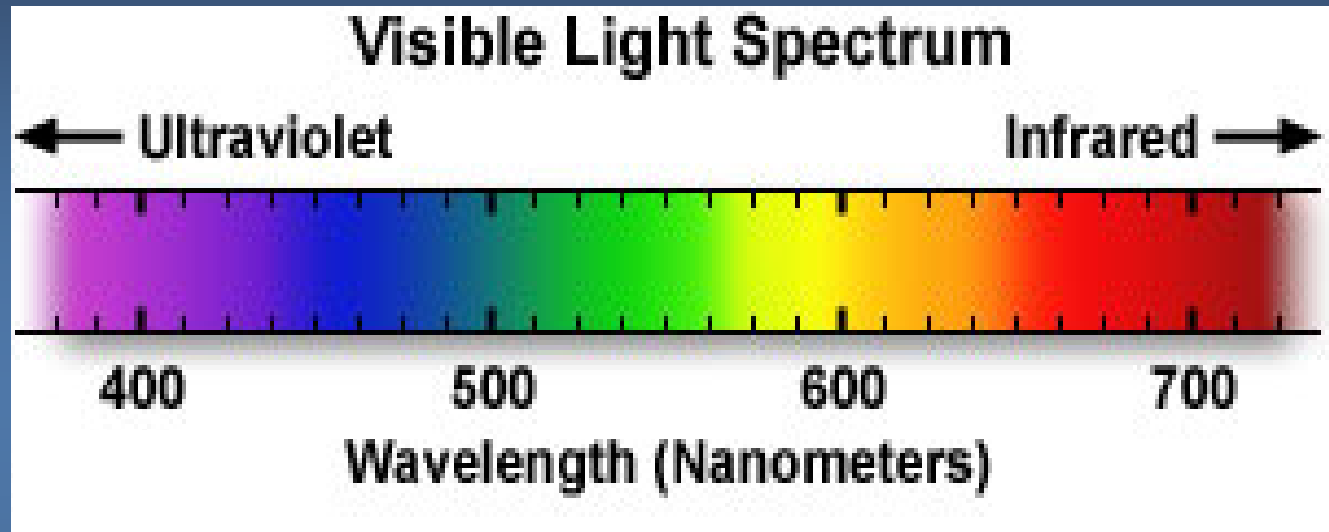


Redox control: Biochemistry and Gene Expression



Huner et al. 1998

Photomorphogenesis



Controlled Regulation through Light Basil cv Nufar



HS-B1

HS-B2

HS-B3

HPS

Photo courtesy of Heliospectra AB

BUT...Cultivar Specific

Basil cv Genovese



HS-B4

HS-B5

HS-B6

HS-B7

HS-B8

HPS

Photo courtesy of Heliospectra AB

Developmental Control Tobacco



HS3

HS4

HPS



HS-T1

HS-T2

HS-T3

HS-T4

Developmental Control *Arabidopsis* Landsberg



HS-A1

HS-A2

HS-A3

HS-A4

Seedling and Development in Dill



Photo courtesy of Heliospectra AB

Acknowledgements

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