Faktory ovlivňující proměnlivost záření dostupného pro fotosyntézu

Intermitentní záření

Teorie k experimentu LL /HL

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s využitím materiálů zahraničních autorů

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Fluktuující množství záření

Sunflecks	Caused by leaf movement in forest understory	Seconds to minutes	Dipterocarp seedlings	Leakey et al. (2002, 2005)
Flickering light	Underwater high-frequency light fluctuation resulting from lens effect on the water surface	High frequency Less than one second	endosymbiont photosynthesis of reef-building corals	Yamasaki and Nakamura (2008); Veal et al. (2010)
Fluctuating light	Sunlight focusing by short sea-surface waves; appears in peculiar form of irradiance pulses, termed 'flashes'	At depth of 1 m, up to 200 min^{-1}	Reef-building coral *Acropora digitifera*	Stramski (1986)
Intermittent light	Short flashes	In values of a few milliseconds. The critical flash time is a function of the incident intensity. The dark time must be 10 times as long as the flash time	*Chlorella pyrenoidosa* cultures	Kok (1953)
Flashing light		In photobioreactors, known as 'flashing light effect'		Myers (1953)

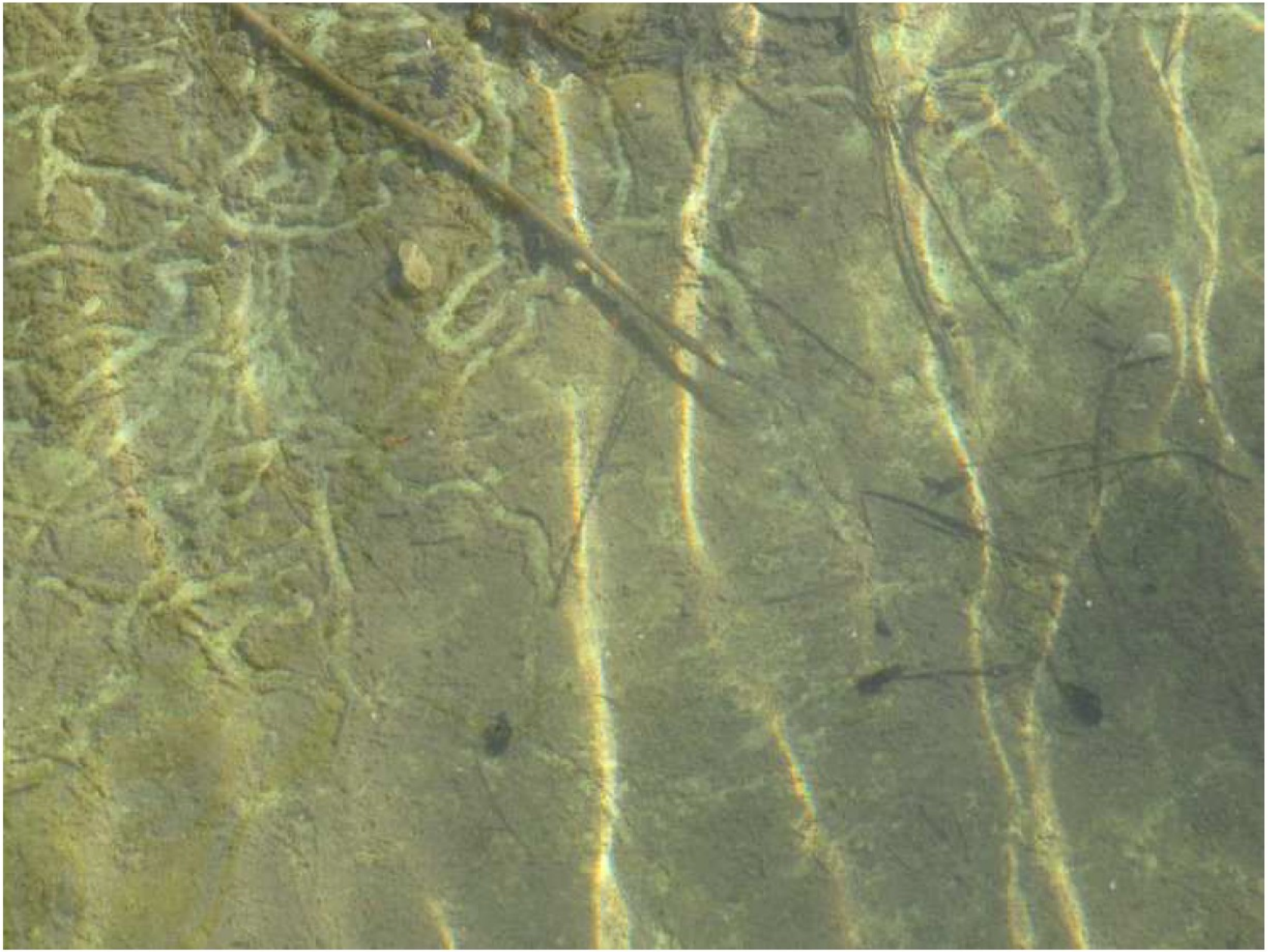


Fig. 1. Underwater light patterns on a shallow sandy bottom due to surface waves

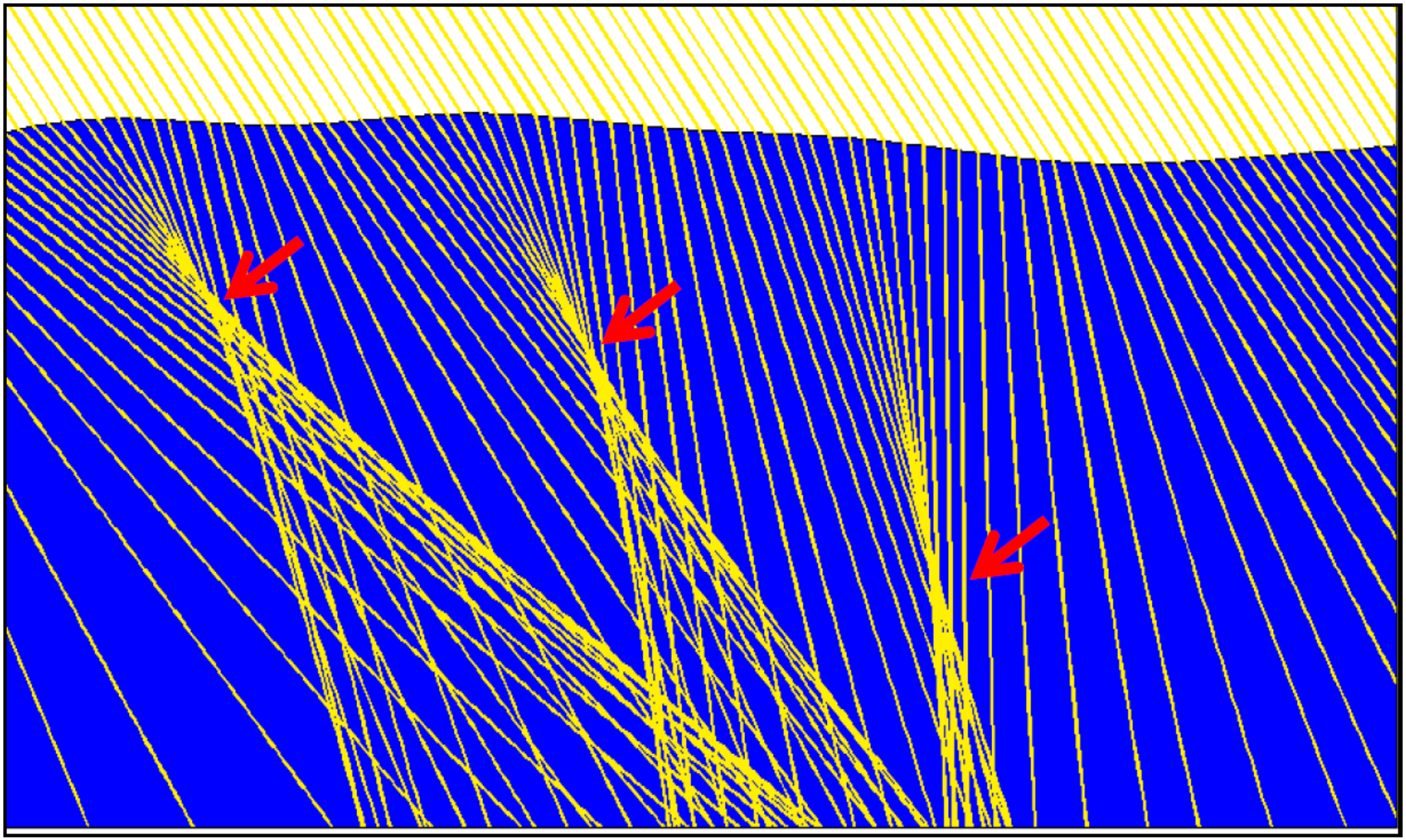
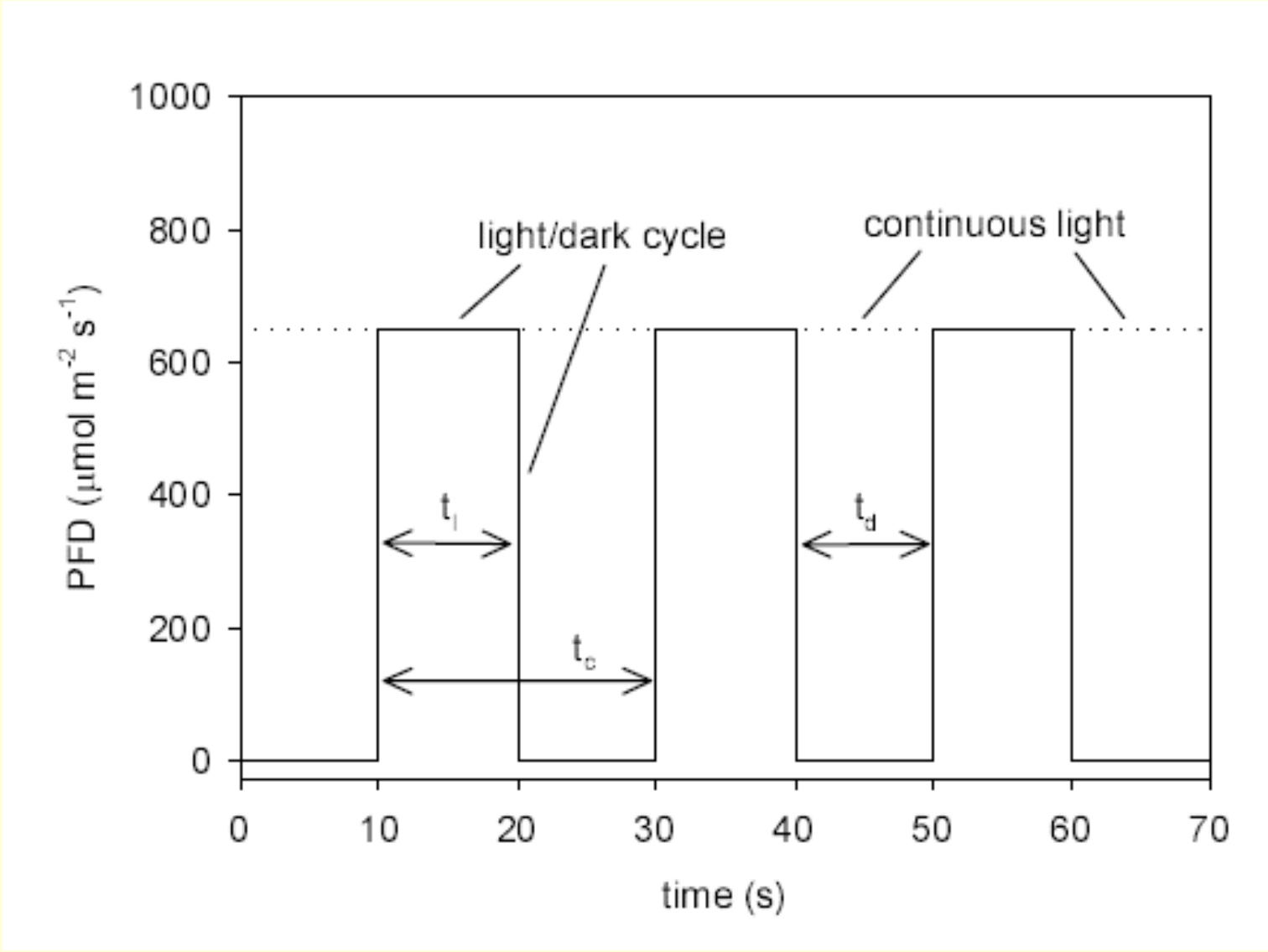


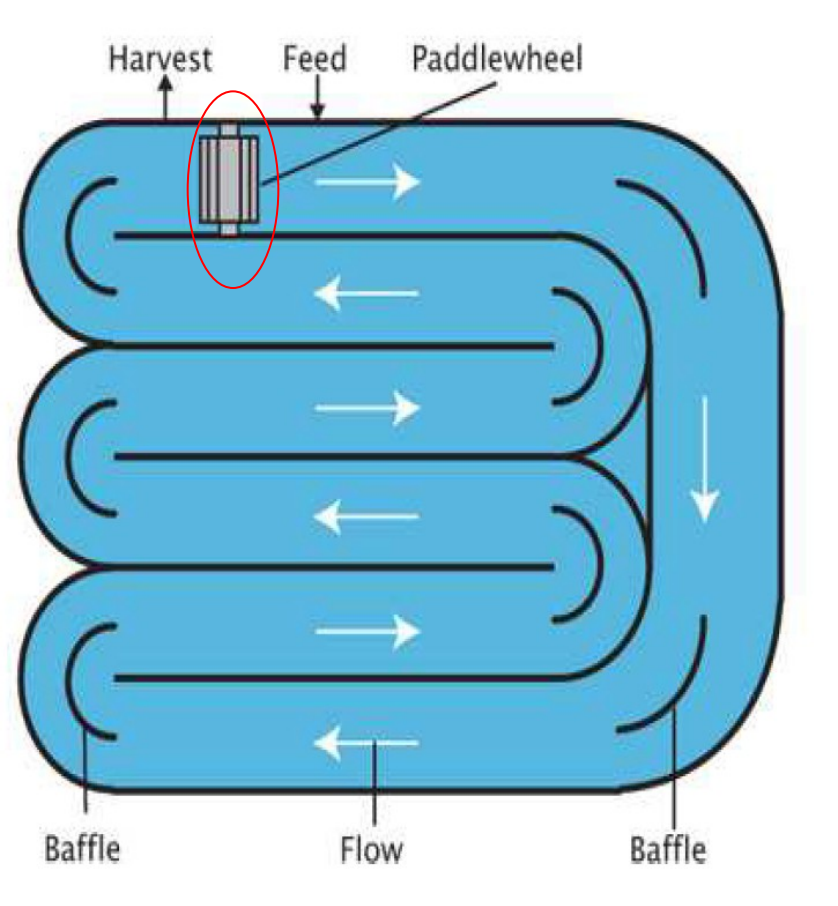
Fig. 2. Focusing beams beneath wave crests and scattering under troughs. The arrows indicate the dependence of maximal-effect depth on wave radius (after Grosser et al., 2008).

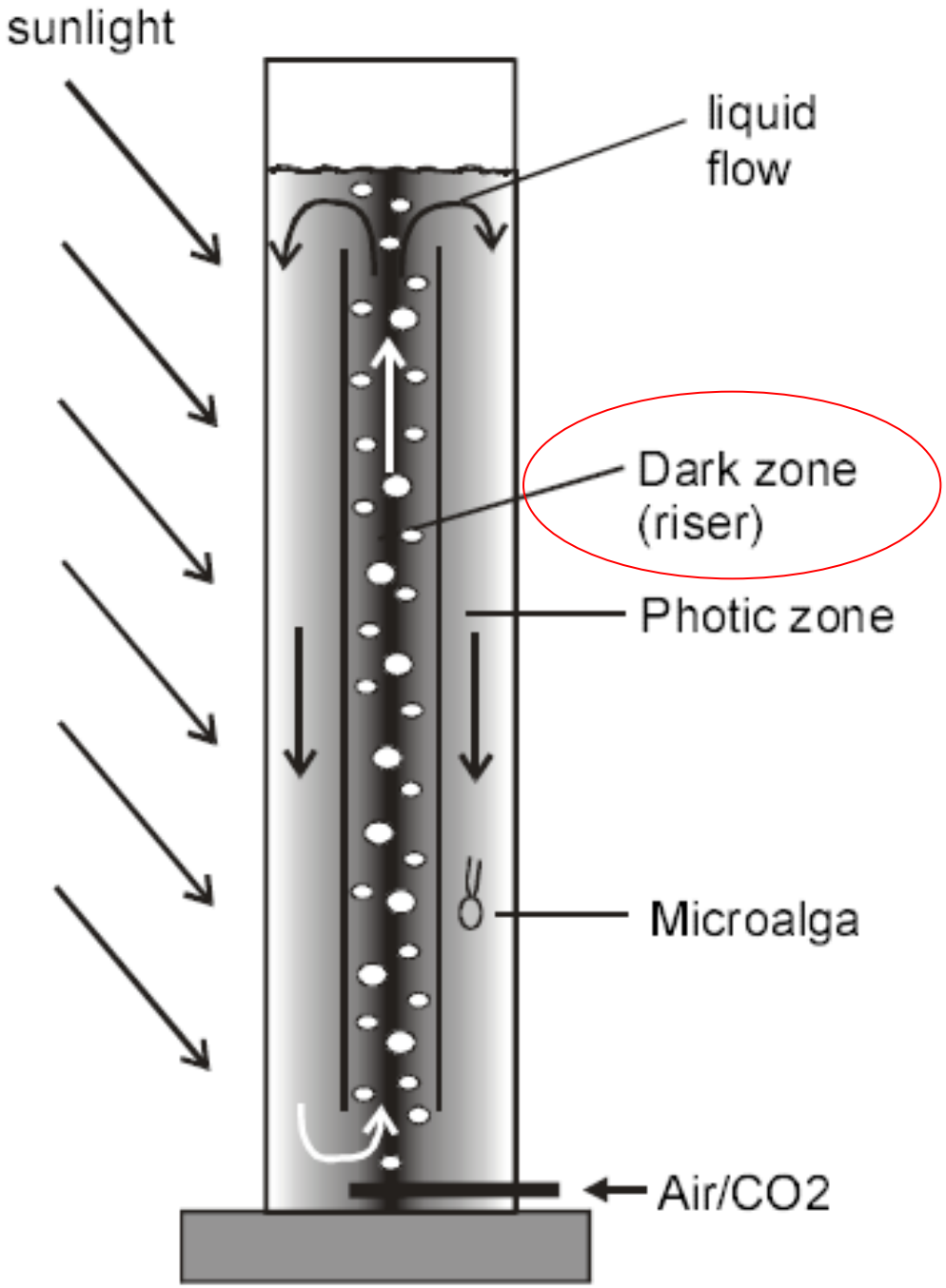
Intermitentní světlo



Střídání světlé a tmavé fáze ve fotobioreaktorech

Bioreaktor „open pond type“ pod otevřeným nebem





Intermitentní záření

Různé typy uspořádání intermitentního světla

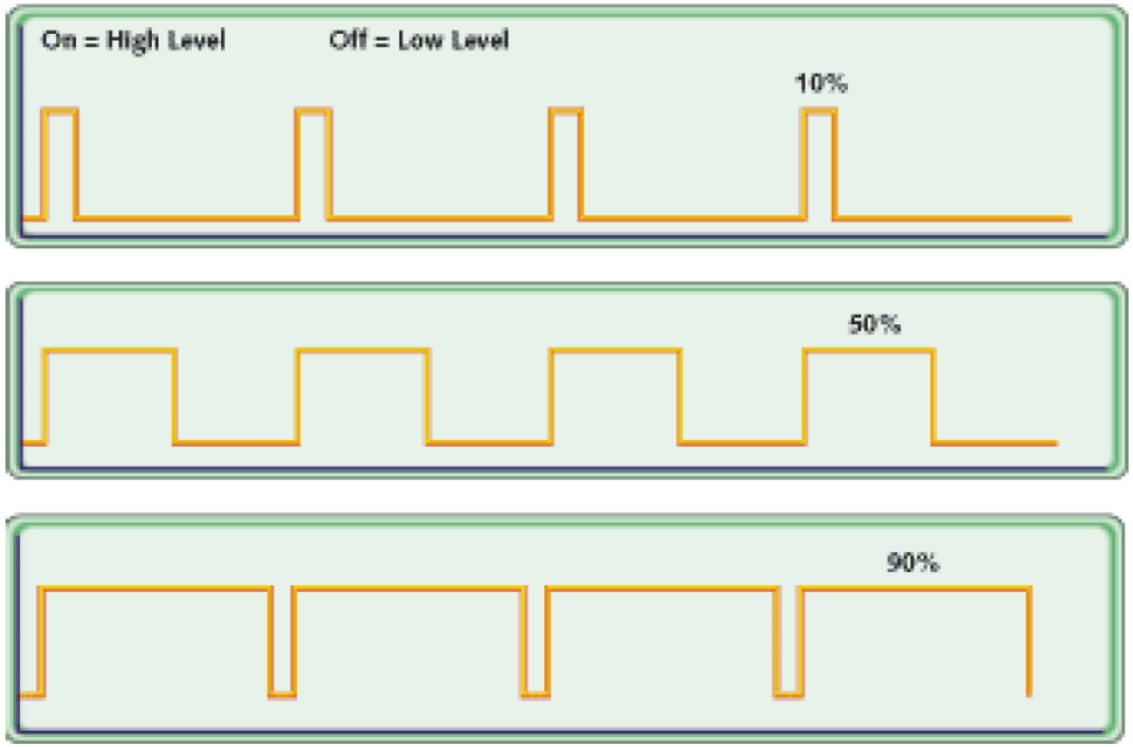


Fig. 8. The duty cycle indicates the 'on' or 'off' time in percent, ranging from 0% to 100% of period for repetitive pulse train. The duty cycle is the proportion of time in which the pulse is 'on', and is expressed as a percentage: duty cycle = 100% * (pulse time high)/(total pulse period).(http://www.dprg.org/tutorials/2005-11a/index.html)

- Vliv frekvence intermitentního světla na parametry světelné křivky fotosyntézy

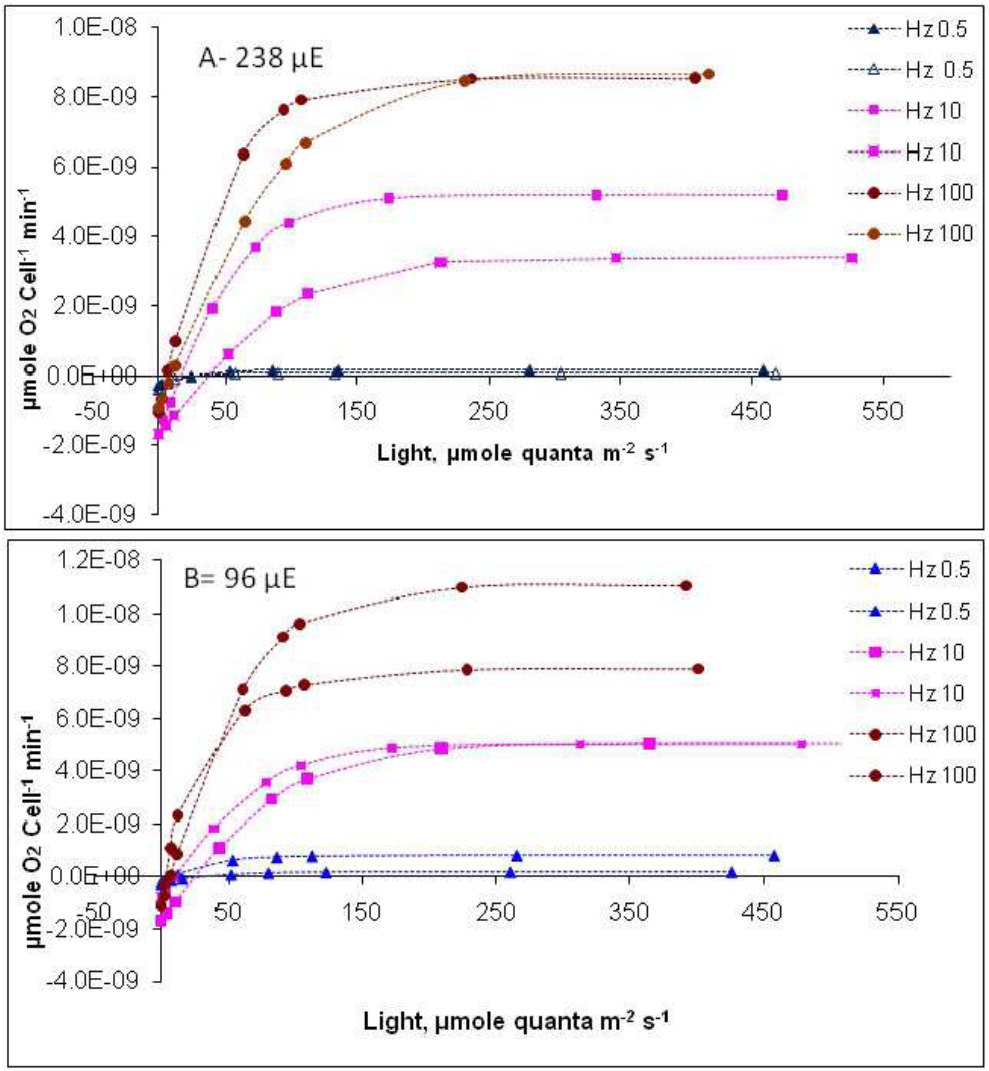
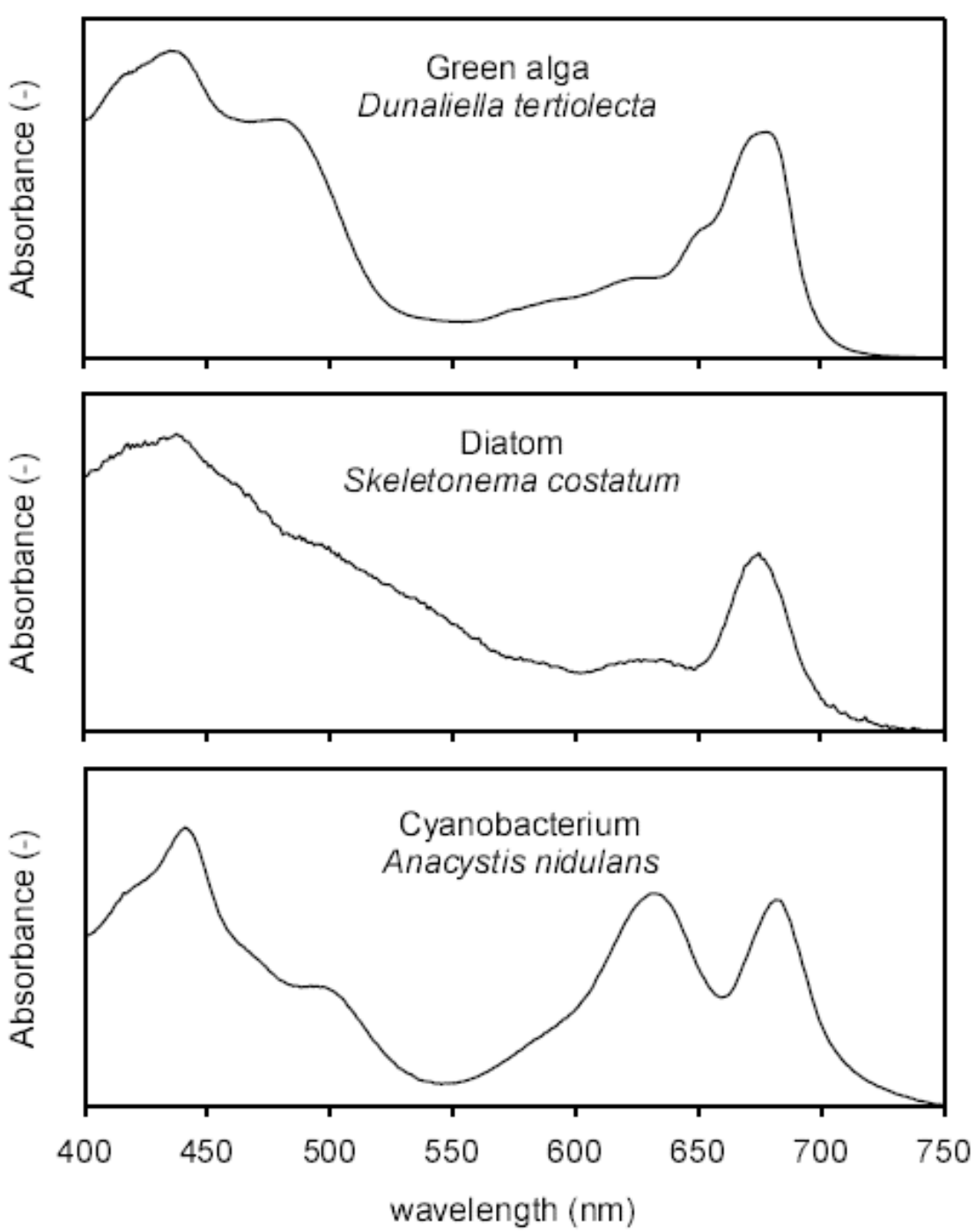


Fig. 10. Photosynthetic rates of the green microalga *Chlorella* sp. subjected to increasing frequencies of light in relation to constant light. Following two weeks of growth, measurements were made at each frequency, two replicates = algae at high light intensity (238 µmole quanta m^{-2} s^{-1}) (A), and B = algae at low light intensity (96 µmole quanta m^{-2} s^{-1}).

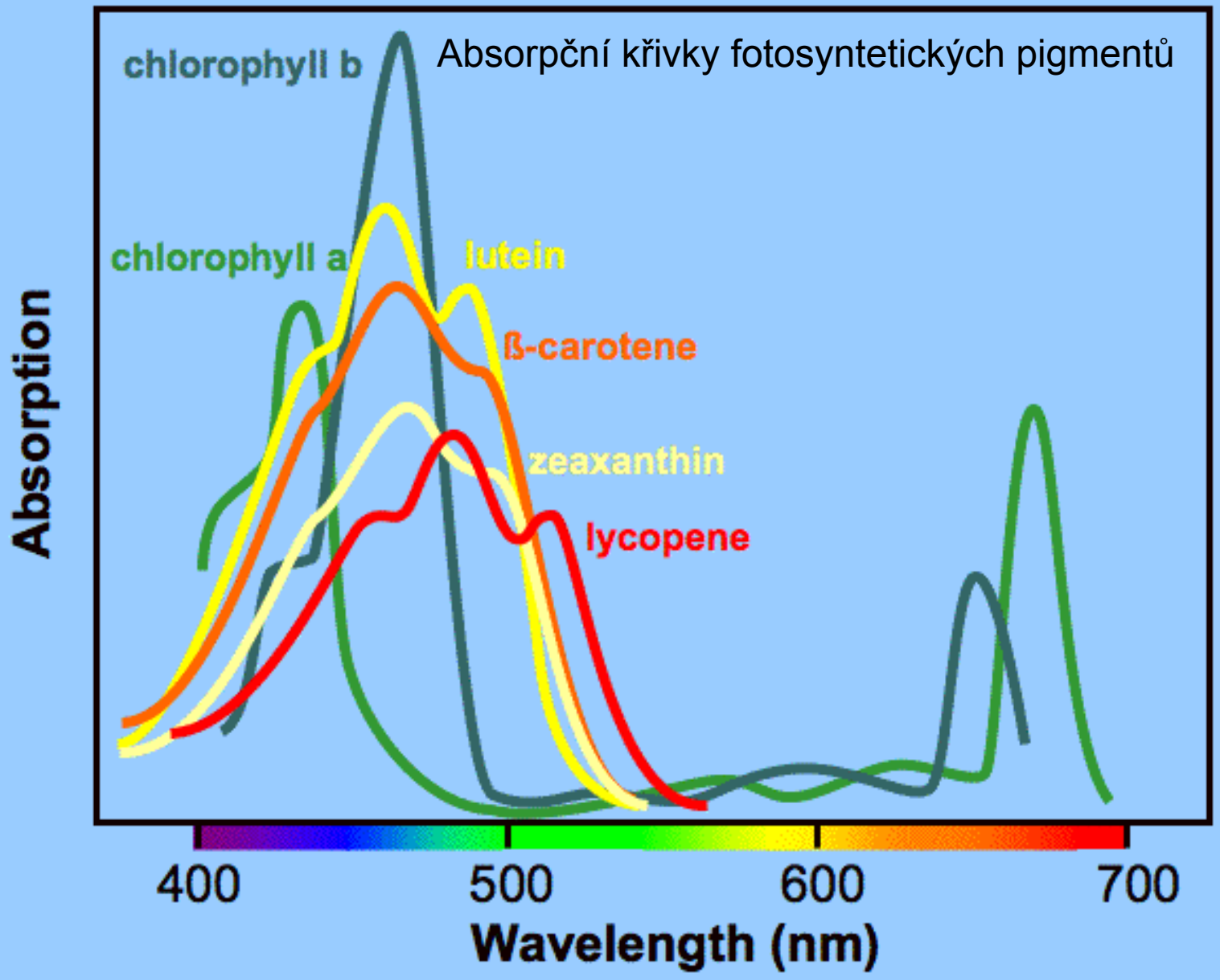
Základy založení experimentu zaměřeného na vliv záření na fotosyntetické parametry rostlin

Absorpční spektra jsou

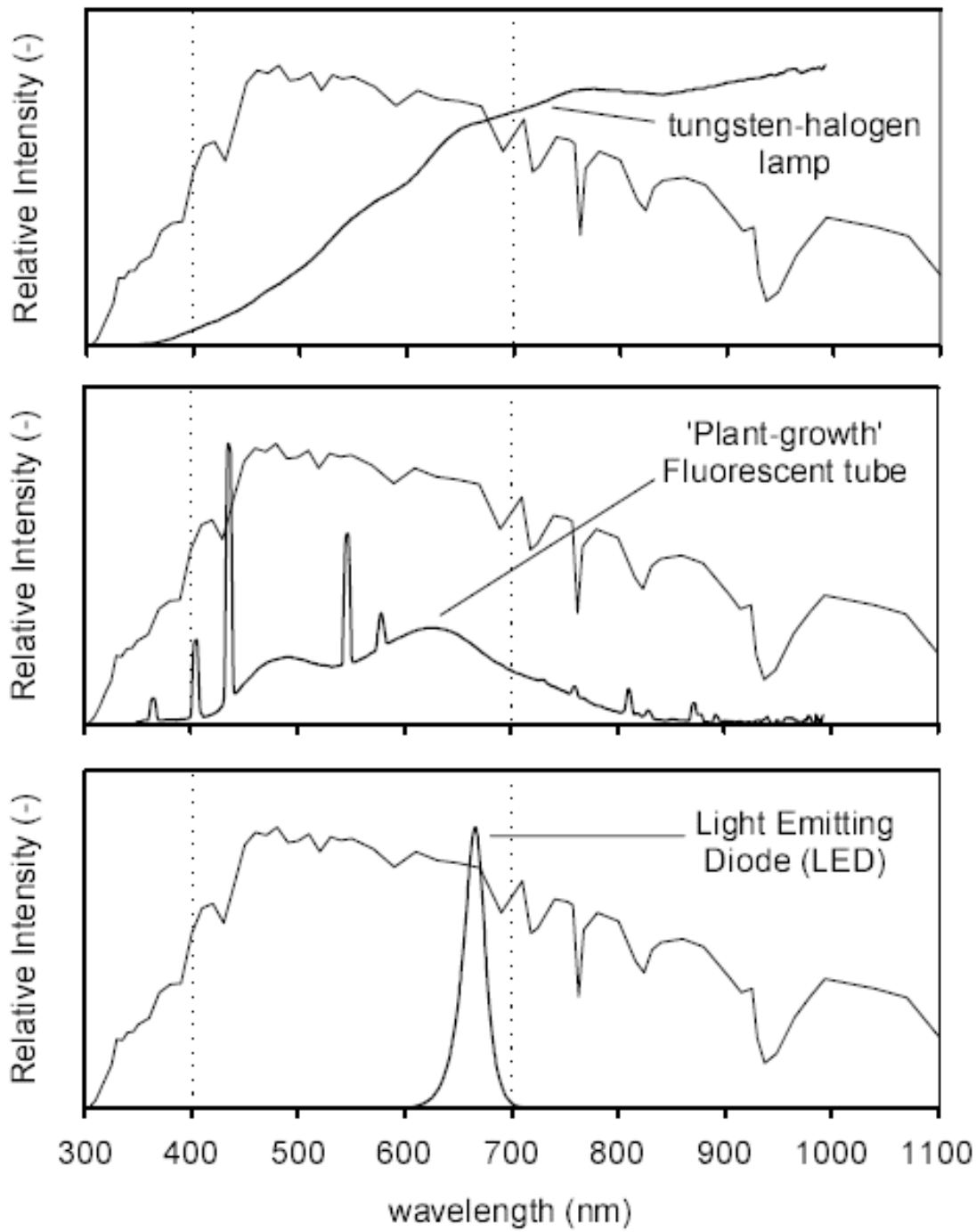
druhově-specifická



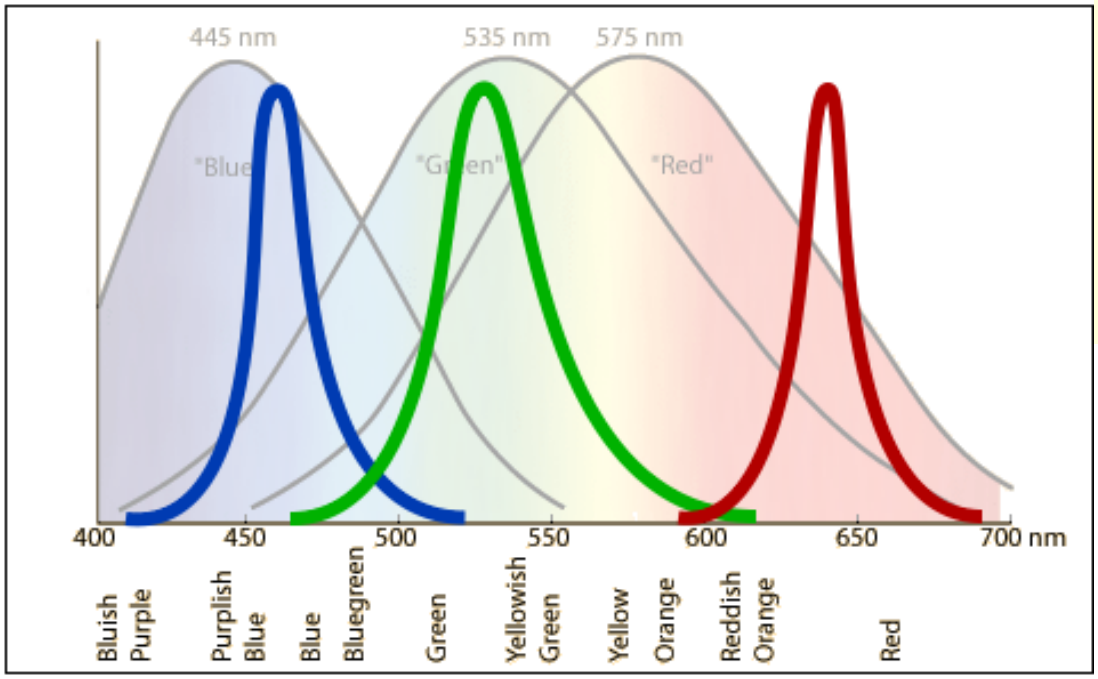
The photosynthetic pigments absorb much of the spectrum

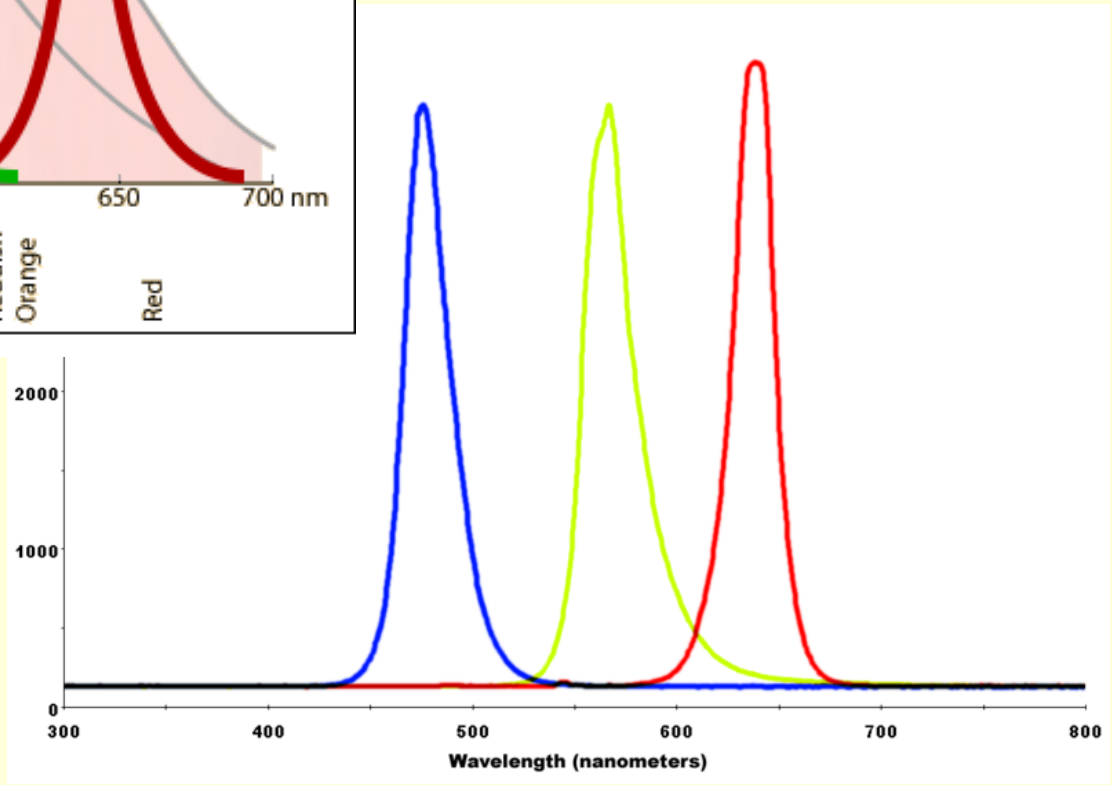


Spektrum zdroje záření

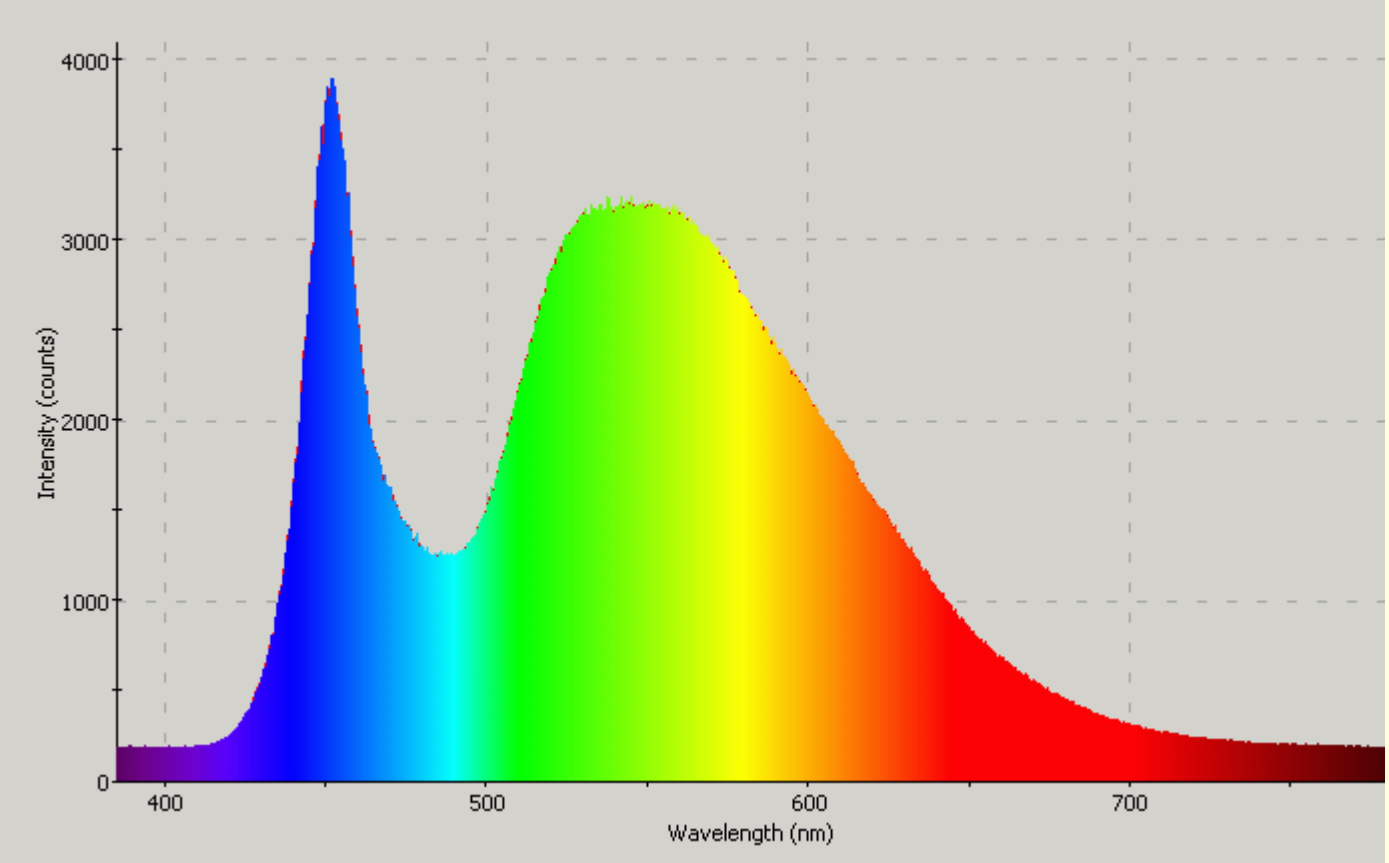


LED (R, G, B)


445 nm
535 nm
575 nm
"Blue"
"Green"
"Red"
400
450
500
550
600
650
700 nm
Bluish Purple
Purplish Blue
Blue
Bluegreen
Green
Yellowish Green
Yellow
Orange
Reddish Orange
Red


2000
1000
0
300
400
500
600
700
800
Wavelength (nanometers)

Bílá LED


4000
3000
2000
1000
0
Intensity (counts)
400
500
600
700
Wavelength (nm)

Photosynthesis Research **59:** 63–72, 1999.

Rapid light curves: A new fluorescence method to assess the state of the photosynthetic apparatus

Anthony J. White & Christa Critchley

Rapid light curves
White et Critchley (1999)

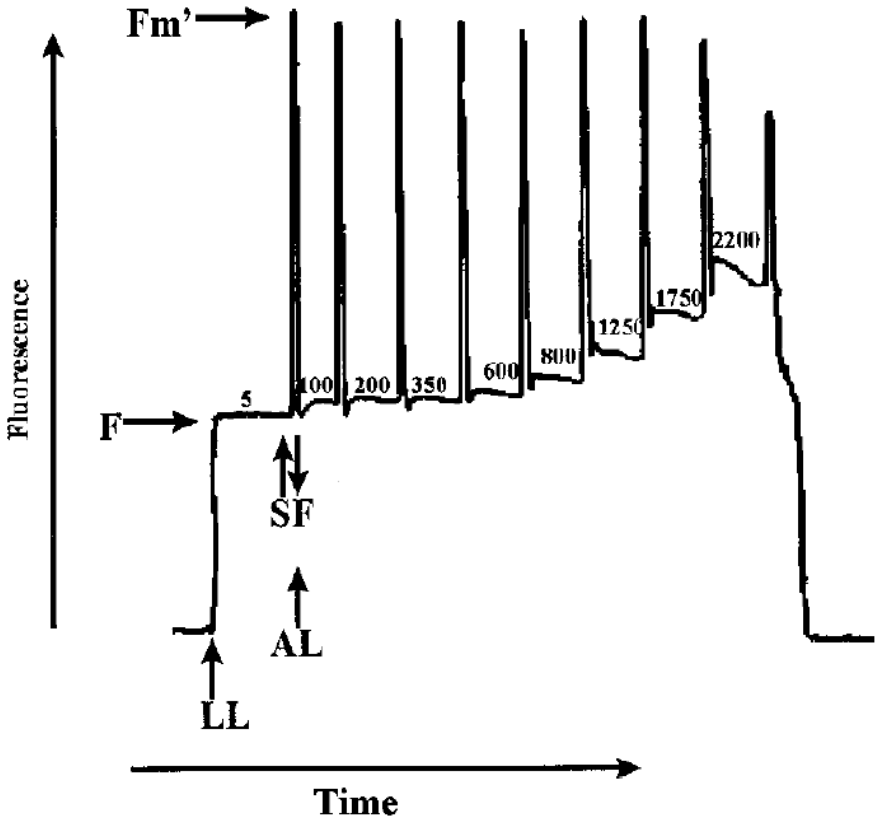


Figure 1. Typical fluorescence trace from a MINI-PAM Rapid Light Curve (RLC) recorded from a bean (*Phaseolus vulgaris*) leaf grown at 800 μmol m^{-2} s^{-1}. Low Light (LL) represents the point at which

lamp). The MINI-PAM records all relevant fluorescence parameters as well as actinic irradiance and leaf temperature, and calculates ETR.

The ETR values at a given actinic irradiance are calculated as:

$$\frac{Fm' - F}{Fm} \times PAR \times 0.5 \times 0.84$$

where $Fm'-F/Fm'$ is the photochemical yield in the light, PAR is the actinic irradiance in μmol quanta m^{-2} s^{-1}, 0.5 is a multiplication factor because transport of a single electron requires the absorption of 2 quanta, and 0.84 is the species specific fraction of incident quanta absorbed by the leaf. The standard factor of 0.84 for quanta absorbed was used because the absorbance of *Pisum sativum* leaves is not very different from spinach or bean leaves for which this value

Fernandes et al. (2010): **Photosynthetic efficiency of *Clusia arrudae* leaf tissue with and without Cecidomyiidae galls**

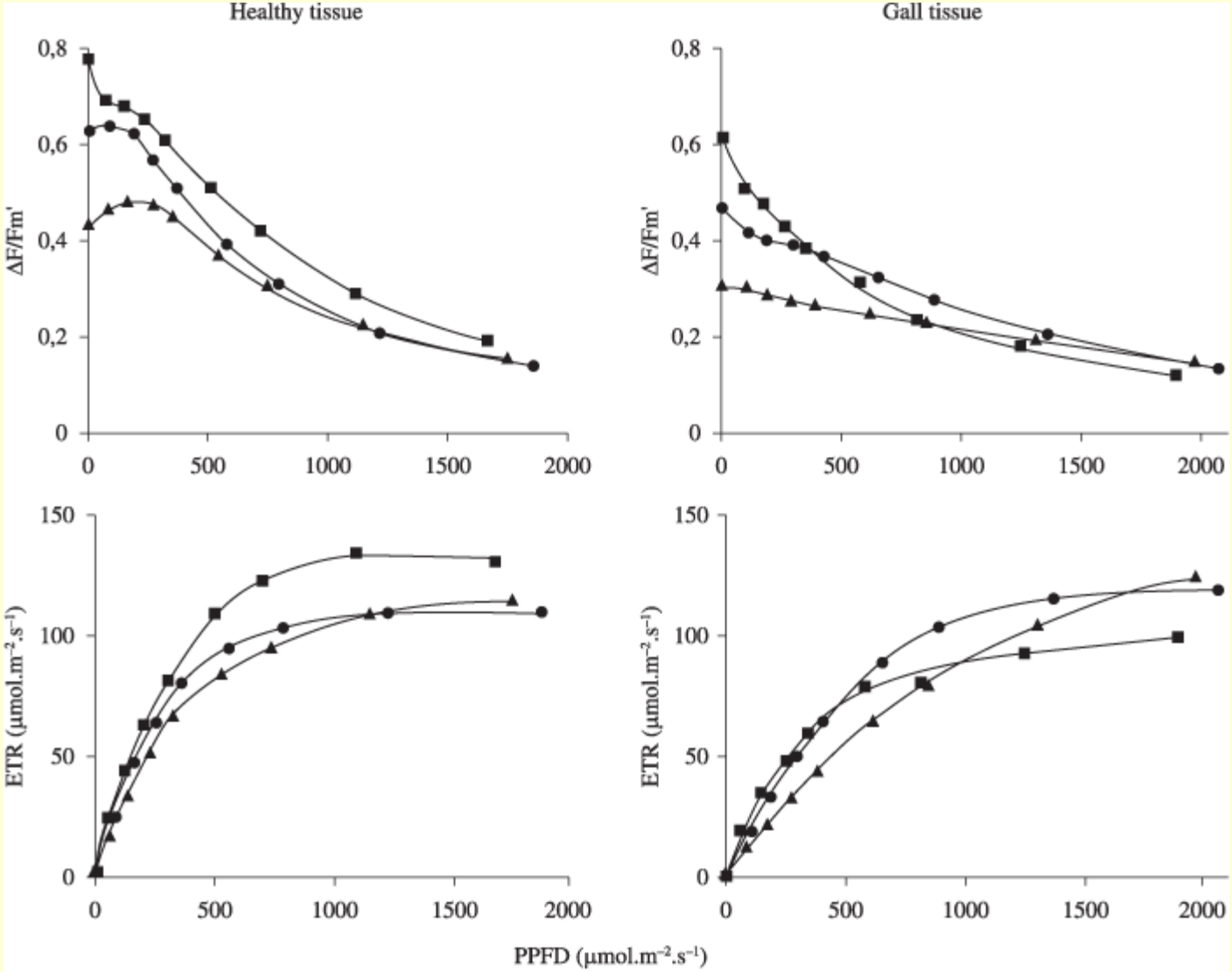


Figure 2. Light dependence (PPFD) curves of gall tissue and adjancent healthy tissue of *C. arrudae* with effective quantum yield ($\Delta F/F_m'$) of PSII and apparent photosynthetic electron transport rate (ETR).

Dámy a pánové, děkuji Vám za pozornost