

Photosynthetically Active Radiation

What is Photosynthetically Active Radiation (PAR)?

Photosynthetically active radiation (PAR), as the name implies, refers to the radiation absorbed by plants to carry out the photosynthesis process.

Photosynthetically Active Radiation Range

The solar radiation absorbed for the photosynthesis process is in the range of 400-700 nm wavelength, i.e. the visible light spectrum. It is the optimal range, which is not harmful for living organisms.

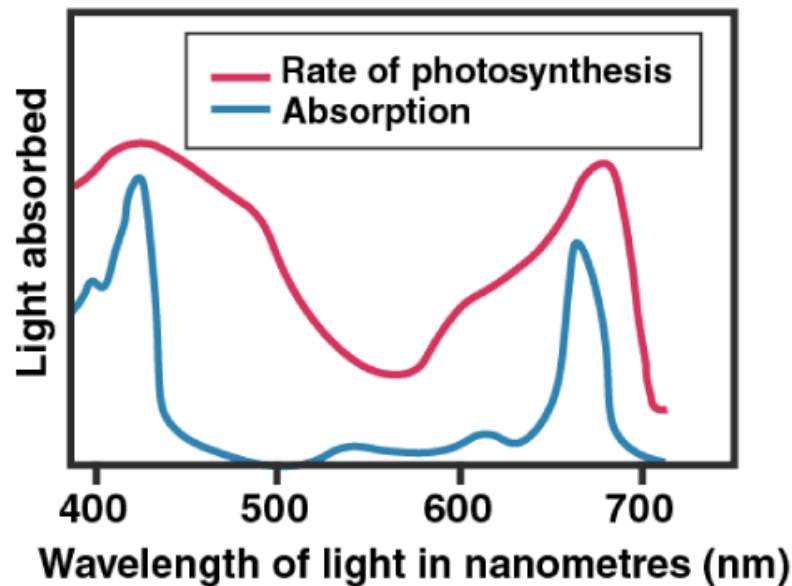
Shorter wavelengths are damaging to cells and are filtered by the ozone layer and longer wavelengths have less energy to carry out photosynthesis.

Some bacteria like cyanobacteria can utilise extended spectral regions.

Pigments Absorbing Photosynthetically Active Radiation

Chlorophyll is the main light-absorbing pigment present in algae and other higher plants. Other than chlorophyll, accessory pigments are also present in plants, e.g. Carotene and Xanthophylls.

Chlorophyll 'a' and chlorophyll 'b' are the two most important photosynthetic pigments present in higher plants. Chlorophyll absorbs blue and red light. Chlorophyll 'a' chlorophyll 'b' show a slightly different absorption pattern. The rate of photosynthesis is also higher at these wavelengths.



The Light-harvesting complexes (LHC) have hundreds of pigments, which absorb all the different wavelengths to make photosynthesis more efficient. One chlorophyll 'a' molecule is present in the centre forming the reaction centre.

These LHCs comprise Photosystems I and II (PS I and PS II). PS I is also called P700 as it shows the absorption peak at 700 nm. PS II shows the absorption peak at 680 nm, so it is also called P680.

Photosynthetically Active Radiation Measurement

The process of photosynthesis is a chemical process, which is dependent on the number of photons available in the specified time. Therefore, PAR is measured as Photosynthetic Photon Flux Density (PPFD).

PPFD is measured in moles per m² per second.

The other measurement of PAR is Yield Photon Flux (YPF). It takes into account the different weightage for different wavelengths.

PAR measurement is very important to evaluate agricultural land. Adequate PAR is a prerequisite for productive farmland. Photosynthesis rate can be measured using PAR measurement. It is also used in forestry and oceanography.

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