White light spectrum and microalgae growth

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Microalgae are prokaryotic or eukaryotic unicellular photoautotrophic organisms living in a wide range of environmental conditions not only aquatic but also terrestrial. Biomass of microalgae is a natural source of many biocompounds such as chlorophyll, carotenoids, astaxanthin, antioxidants, long chain polyunsaturated fatty acids, proteins, etc. Production of microalgal biomass and content of biocompounds in it is species dependent and is influenced by many factors such as light, temperature, CO_2 supply, culture medium composition, pH, properties of bioreactor. Among them light is the most important factor for autotrophic growth of microalgae.

In natural habitats photoautotrophic growth of microalgae is supported by natural light which has diurnal and sezonal fluctuations, as well as whether conditions, geographic location and altitude position also influence light penetration. In open systems natural lighting is used for microalage cultivation, however, this source of light cannot be controlled. Artificial lighting used in closed photobioreactors makes microalgae cultivation more controllable. Illumination factors such as light intensity, duration of light period as well as spectral light composition can be adjusted to meet specific requirements for biomass/biocompounds production of particular microalgae species. Wavelength range from 400 to 700 nm represents photosynthetic active radiation (PAR) which is effective for photosynthesis. Artificial light sources used for microalgae cultivation offer different emitted light spectrum characteristics.

In this study growth of microalgae under different white light sources was compared. Three distinct model microalgae *C. reinhardtii* (biflagellate with positive and negative phototaxis), *D. quadricauda (*coenobium composed of 4- or 8- daughter cells) and *P. kessleri* (spherical) were grown providing the same amount of PAR at different spectral composition.