

Influence of different spectra of visible light on the antioxidant activity of plants

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Abstract

Growing plants under conditions of closed soil using various technologies allowed physiologists to influence their metabolism. The most "environmentally friendly," and not fully studied, are technologies using light of various spectral composition that affects growth, leaf anatomy, secondary plant metabolites and chloroplast ultrastructure. The problem of directed regulation of components of the production process of phytocenoses during artificial irradiation is an urgent task. The authors have previously published data on the effect of ultraviolet radiation on the biochemical properties of plants. As a continuation of these studies, the purpose of the present work was to study the effect of various spectra of visible light on the antioxidant activity of plants. Influence of monochromatic LED irradiation of different wavelength at equal power of radiation on seed germination and change of total antioxidant activity of Abyssinian and sugar beets is studied in the paper. The level of antioxidant activity during sprouting in the light decreased by 17.8-26.7% compared to dark sprouting, which can serve as an indicator of a decrease in the level of stressful effects. At the same time, with an increase in the level of stress (in the red light version – a decrease in the biomass of 100 sugar beet sprouts by 41.8%), there was an increase in the total antioxidant activity by 8.6%, which, according to the literature, may be associated with the activation of plant antioxidant systems as an adaptive reaction to stress. The stimulating effect of irradiation of seeds and sprouts with green light (520 nm) is shown – increase of biomass of 100 sprouts by 45.8% of sugar beet compared to the recommended GOST dark germination, in nougat – by 27.8%. Genetic differences in the reaction of germination of seeds of two crops to monochromatic radiation of different wavelength are established and the need to develop differentiated modes of radiation of seeds when growing microzelenium is justified.

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