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PHOTOSTIMULATION WITH LEDS MODULATE THE OXIDATIVE STRESS CAUSED BY 2,4-D IN *Plectranthus neochilus*

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2,4-dichlorophenoxyacetic acid (2,4-D) is a herbicide used on large scale in local agriculture. Its incorrect use leads to contamination of wastewater, which can be mitigated through phytoremediation with *P. neochilus*. Oxidative stress (OS) induced by the herbicide changes its redox balance, affecting its performance. This process is based on the activity of antioxidant enzymes, which through photo-stimulation can be modulated, reducing the levels of reactive species and consequently their damage. In this way, we aim to protect P. neochilus from oxidative damage caused by 2,4-D using LEDs to change the quality of irradiated light. To assess the influence of LED in combating OS in the plant by 2,4-D, we built chapels in boxes lined with aluminum sheets, and LED strips in different colors. The experimental groups were divided into 4 treatments: LED in white, blue and red colors, and a control group in natural light. Each treatment contained Group 2,4-D (*P. neochilus* in water fortified with 2,4-D) and Control Group (*P. neochilus* only in water). The treatments were carried out in bottles with 500 mL of the 2,4-D concentration of 2,418 kg / ha (Aminol 806) solution, 12 h light-dark cycle with two seedlings per bottle in triplicate (in each light treatment), for 28 days. At the end of the treatment, the seedlings were divided into root, stem and leaf, and were homogenized for the analysis of lipid peroxidation (TBARS), reactive oxygen species (ROS) and antioxidant response parameter to catalase activity. The results were expressed as mean ± standard deviation and compared by two-way ANOVA with Bonferroni's post-test. We observed an increase in ROS levels in all 2,4-D treatments compared to their respective controls ($P < 0.05$ - 0.01), on leaves, roots and stem, except for leaves in natural light and in root in the treatment with red LED. Meanwhile, there was no tendency to increase lipid peroxidation. The only group that showed a difference was in the leaves of the treatment with blue LED ($P < 0.01$). Catalase activity showed a reduction compared to the control for all LED

treatments on leaves ($P < 0.01 - 0.05$). The roots and stems showed no differences, apart from the stem in the treatment with red LED ($P < 0.05$) and in the stem in white LED ($P < 0.05$). We can observe that the LED treatment influences the oxidative balance of the plant, mainly in the leaves because photosynthesis is the major producer of ROS in plants. The red LED decreases the production of ROS, in contrast, the blue LED presents a high production of ROS, because it is a more energetic wavelength and greater energy dissipation is necessary. The reduction in catalase activity demonstrates the inhibition of OS propagation on the red and white LED treatments. Different from the blue LED treatment, as it has high levels of lipid peroxidation. In this way, the red LED helps protect against OS caused by 2,4-D in the leaves.

Keywords: Phytoremediation; 2,4-D; Boldo Gambá.

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