

# Morphological and physiological effects of two different light sources on *in vitro* multiplication of chestnut and prickled broom

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## **Abstract**

The morphology and physiology of plants grown *in vitro* are regulated by various environmental factors such as light, temperature, humidity and carbon dioxide. Light, in its various parameters such as spectral quality, photon flux and photoperiod, is an important factor among these and generally influences the overall growth and development of plants *in vitro*. Light sources commonly used for *in vitro* plant culture are fluorescent lamps, although some research and commercial laboratories also use sodium metal or incandescent metal halide lamps. The spectral of those lamps range from 350 to 750 nm and contain blend lights that differentially affect *in vitro* plant growth. Recently, light emitting diodes (LEDs) have been developed and are nowadays used as an alternative source of fluorescent light for the development of plants both in greenhouses and *in vitro* culture rooms. In order to test the influence of these two types of light during multiplication phase, a multiplicity experiment was carried out using two species: a chestnut hybrid (*Castanea sativa* x *C. crenata*), clone M2 and the prickled broom (*Pterospartum tridentatum* (L.) Willk.), Malcata ecotype. Two types of light were tested, "cool white" fluorescent light and LED light with blue and red colors. It was found that LED illumination exerted a significant positive effect on the differentiation of shoots in the case of prickled broom (5.6 instead of 4.9 split shoots under fluorescent light). In the parameters of shoot length, we found that this type of lighting favored the elongation in both species. Regarding the parameters of fresh and dry weight, LED lighting caused a greater effect on the chestnut than on prickled broom. Some physiological parameters (chlorophylls, carotenoids and proteins) were also analyzed and showed to be influenced by the type of light during the development of microplants.

**Keywords:** Chestnut; fluorescent light; *in vitro* multiplication; LEDs; prickled broom.

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