582

MORPHO-PHYSIOLOGICAL RESPONSES OF LEMON BALM (*MELISSA OFFICINALIS* L.) TO COLCHICINE

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The induction of polyploidy using mutagenic chemicals is one of medicinal plant breeding methods to enhance the production of secondary metabolites [1]. In the current research to induce polyploidy in Lemon balm plants,the seeds were grown on MS medium.The internodes at the 4 to 6 leave stages were separated from cultivated plant and were then treated with different concentrations of colchicine with 4 levels (0, 25, 125, 250 mg/L) in three different exposure times (24, 48, and 72). In this regard, a factorial experiment was carried out based on randomized complete block design withtwo factors; colchicine concentrationswith four levels (control, 0.05%, 0.1% and 0.2%) and exposure times with three levels (24, 48 and 72 h) and threereplicates. The obtained plants from treated internodes were evaluated in terms of morphological and physiological traits. Analysis of variance indicated that the different concentration of colchicine had significant effect on some traits such as plant height, number of internodes, number of branches, average leaf length and leaf width, distance of internodes, chlorophyll a, chlorophyll b, carotenoids, polyphenols, flavonoids, rosmarinic acid, and increasing in colchicine concentration in the treated plants, some traits such as phenol (at a concentration of 25 mg/L), flavonoids (at a concentration of 125 mg/L), fresh and dry weight of roots, fresh and dry weight of shoots, and leaves (at a concentration of 250 mg /L) significantly increased in comparison to the control. The results showed that the exposure times of colchicine was significant on plant height (at 24 h), number of internodes (at 24 h), number of branches (at 48 h), chlorophyll a, chlorophyll b and carotenoids (at 48 h), polyphenols (at 24 h), flavonoids (at 48 h), and rosmarinic acid (at 24 h). Therefore, according to the gramineous produced internodes in the media culture and destructive effects of long-term treatment on internode tissue, different concentrations of colchicine treatment is not recommended for 72 hours and the concentration of 250 mg/L for 48 hours due to better performance production in comparison to the control and other treatments is recommended.

References

[1] Dhooghe, E; Van-Laere, K; Eeckhaut, T; Leus, V; Van-Huylenbroeck, *Journal of Plant Cell Tissue*, **2011**. *104*: 359-73.