



The 2nd International Seed Science and Technology Conference of Iran

“Seed 2024”

(Medicinal Plant, Crop, Horticulture, Pasture & Forest)



seed2024.razi.ac.ir

Investigating the effect of growth regulators and light on the rooting of the medicinal plant *Dracocephalum kotschy* Boiss *in vitro*

Fatemeh Deris¹, Maryam Zolfaghari², Mousa Mousavi^{3*}

¹ M.Sc of Medicinal Plants, Faculty of Agriculture, Department of Horticultural Sciences, Shahid Chamran Ahvaz University of Ahvaz, Ahvaz, Iran

² Assistant Professor, Department of Horticultural Sciences, Faculty of Agriculture, Shahid Chamran University of Ahvaz, Ahvaz, Iran

³ Associate Professor, Department of Horticultural Sciences, Faculty of Agriculture, Shahid Chamran University of Ahvaz, Ahvaz, Iran

Introduction

Dracocephalum kotschy Boiss is a perennial plant that belongs to the mint family and is native and endemic to Iran. The essential oil obtained from the genus *Dracocephalum* has high antioxidant properties and is used in the treatment of stomach pain and flatulence due to its antibacterial and antiseptic properties (Dastmalchi et al., 2007). The traditional propagation of this plant is through seeds, which is limited due to germination problems, so the use of tissue culture technique to propagation of this plant is very importance.

At the present, many plants are produced worldwide through tissue culture, and micropropagation has become an important technique to improve the modern agriculture. In micropropagation of some plants, rooting of regenerated shoots is often a challenge and its rate is low. Therefore, it is important to examine different hormonal treatments, especially auxins, to induce rooting in regenerated shoots *in vitro* and produce a sufficient number of roots with appropriate size without forming callus and have good performance after transplanted in the soil (Bady, 2018).

Materials and methods

This research was done in the Tissue Culture Laboratory, Horticulture (Department, Shahid Chamran University of Ahvaz in 2024. First, to induce callus on the explants (stem pices) of *Dracocephalum kotschy* Boiss, the half strength MS (Murashig and Skoog, 1962) containing 1 mg/L of 2,4-D and 3 mg/L BAP was used. Then the regenerate shoots were obtained by using the hormonal combination, 1 mg/L NAA and 4 mg/L BAP. In this research, in order to optimization of root induction on the regenerated shoots *in vitro*, a factorial experiment was conducted in a completely randomized design with 3 replications. The treatments were including: four NAA concentrations (1, 2, 3, 4 mg/L) alone or in combination with 0.2 mg/L IBA, 0.5 mg/L IBA and 3 g/L activated charcoal. Also, each of the treatments were examined under light and darkness. At the end of the experiment, root induction percentage, number of lateral roots (branching), root length, fresh and dry weights of roots were measured.

The SAS 9.3 software was used for statistical analysis

Results and Discussion

The variance analysis of this experiment (Table 1) showed that there is a significant difference among the treatments at the (1%) level. The means comparison showed that the highest percentage of root induction, number of lateral roots, root length, fresh and dry weight of roots were related to the treatment of 2 mg/L NAA and in the presence of light.

The results of this experiment showed that only the cultures with NAA treatments were rooted. The high amount of auxin compared to cytokinin induces rooting in the samples (Gordon et al., 2007). Among other plant hormones that are used for root induction, NAA has been more successful (Mohajerani, 2012).

In this research, MS ½ culture medium was used, because this reduction of mineral salts in the culture medium improves the stage of transfer to the soil and root adaptation. Also, by reducing the osmotic pressure of the medium, the plant is forced to produce roots and improve absorb nutrients and salts (Dostalek et al, 2010). Nordine et al. (2013) reported that they succeeded in rooting the seedlings of *Thymus hyemalis* in 0.4 NAA environment. Also, in *Lavandula dentata*, they used a medium containing 0.5 mg/L of NAA for root induction (Pinto et al., 2006). In different sources, auxin or various hormonal compounds with auxin have been used to induce rooting. Feng et al. stated in a research that 95% of rooting was achieved in ½ MS medium with 2.69 µmol of NAA for jujube plant.

keywords

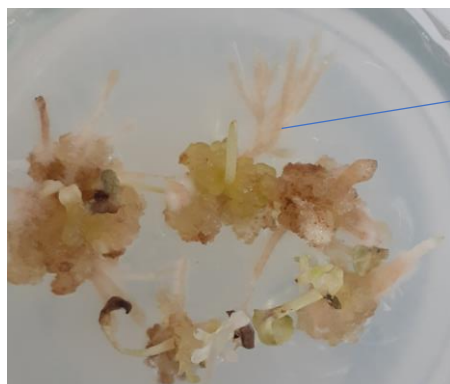
Dracocephalum kotschy Boiss, rooting, growth regulators, tissue culture

Conclusion

Dracocephalum kotschy Boiss is one of the plants with medicinal value. Its medicinal properties can be used to treat uncomfortable diseases, strengthen the body's immune system, and also use other drugs that can be called medicinal substances in the pharmaceutical industry and extract them with value. The induction of rooting in tissue culture shoots of this was investigated in this study with different growth regulators, and the results of this experiment are very promising for the development of a protocol for the regeneration and saving of this plant from extinction.

References

- [1] Bady, S. (2018). Plant tissue culture. *International Journal of Agriculture and Environmental Research*, 4(4), 17-25. 977-990. [10.1007/978-1-4939-8594-4_1](https://doi.org/10.1007/978-1-4939-8594-4_1)
- [2] Dastmalchi, K., Damien Dorman, H.J., Laakso, I., & Hiltunen, R. (2007). Chemical composition and antioxidative activity of Moldavian balm (*Dracocephalum moldavica* L.) extracts. *LWT - Food Science and technology*, 40(9), 1655-1663. <https://doi.org/10.30495/medherb.2021.679008>.
- [3] Dostalek, T., Munzbergova, Z., & Plackova, I. (2010). Genetic diversity and its effect on fitness in an endangered plant species, *Dracocephalum austriacum* L. *Conservation Genetics*, 11(3), 773-783. <https://doi.org/10.1007/s10592-009-9879-z>.
- [4] Nordine, A., Bousta, D., El Khanchouf, A., & El Meskaoui, A. (2013). An efficient and rapid *in vitro* propagation system of *thymus hyemalis* Lange, a wild medicinal and aromatic plant of mediterranean region. *International Journal of Pharma Bioscience and Technology*, 1(3), 118-129.



Root induction