

Growth acceleration and antioxidant potential of micropropagated *Arnica montana* L. using biotic elicitor yeast extract

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Introduction

Arnica montana L. (Asteraceae family) is an alpine herbaceous plant that grows in nutrient-poor grasslands. More than 150 biologically active compounds were extracted and identified from *A. montana* - phenolic compounds, terpenoids, and pyrrolizidine alkaloids. The plant exhibits antiseptic, anti-inflammatory, antibacterial, antisclerotic, antifungal, and antioxidant activities. *A. montana* is currently listed in the IUCN Red List and the Red Data Books and Red Data Lists of many European countries and is protected as a species under the EU Habitats Directive and the EU regulation of trade in fauna and flora. Developing biotechnological methods for *in vitro* cultivation of arnica is very important for its sustainable use. Elicitation of plant cells and tissue culture is an excellent strategy for enhanced accumulation of secondary metabolites. Yeast extract, as an elicitor is rich in vitamins of the B-complex, chitin, N-acetyl-glucosamine oligomers, β -glucan, glycopeptides, and ergosterol.

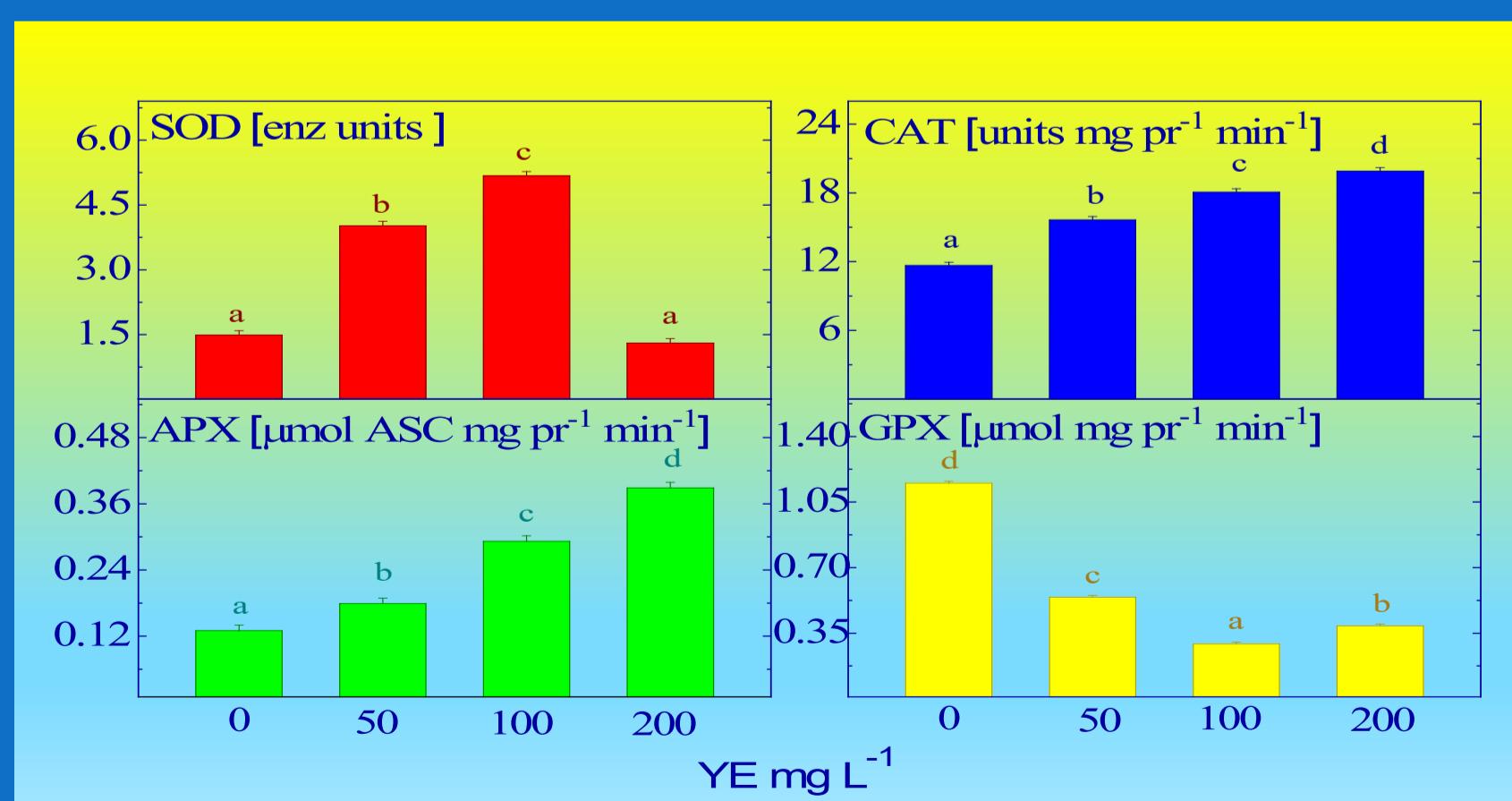


Figure. The activity of antioxidant enzymes superoxide dismutase (SOD), catalase (CAT), ascorbate peroxidase (APX), and guaiacol peroxidase (GPX) in *Arnica montana* plantlets *in vitro* propagated on MS medium (control) and on MS medium supplemented with YE in various concentrations (50, 100 and 200 mg L⁻¹).

Material and methods

The effect of YE applied in MS media at different concentrations (0, 50, 100, and 200 mg L⁻¹) on the growth and the antioxidant power of *in vitro* micropropagated *A. montana* plantlets was tested.

Table. Morphological parameters of *Arnica montana* plantlets grown on MS medium supplemented with 0, 50, 100 and 200 mg L⁻¹ YE.

YE mg L ⁻¹	Number of shoots explant ⁻¹	Height cm	Fresh weight g plant ⁻¹
0	3.9	1.73	0.32
50	4.4	2.09	0.44
100	5.2	2.10	0.58
200	4.1	1.65	0.38

Conclusion

The YE included in the nutrient medium positively affected the morphogenetic potential of *A. montana*. An increase in the number of shoots per explant was observed at all YE concentrations tested, against the control. The best results were obtained in plants treated with 100 mg L⁻¹ YE. Upon Arnica plants' exposure to YE, dose-dependent antioxidant enzyme activity was observed. The study demonstrates the benefits of using YE to accelerate arnica plants' *in vitro* growth and antioxidant potential.