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CHANGES IN BIOMETRICS AND ACTIVITY OF ANTIOXIDANT ENZYMES IN *IN VITRO* CULTIVATED ARNICA MONTANA L. AFTER ELICITATION WITH METHYL JASMONATE

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OBJECTIVE *Arnica montana* L. (*Asteraceae*) is a valuable medicinal plant with strong anti-inflammatory properties due to its rich content of antioxidants and specific metabolites. Elicitation is a common strategy to induce physiological changes and defense responses in plants, thereby increasing their antioxidant potential and the synthesis of specific biologically active substances. Methyl jasmonate (MeJA), as a plant growth regulator that modulates plant growth and development from morphological to molecular level is increasingly used as an elicitor.

This study aims to assess the growth and antioxidant enzyme activity of *in vitro* cultivated *A. montana* after 3- and 7-day treatment with different concentrations of MeJA (0, 50, 100 and 200 µM).

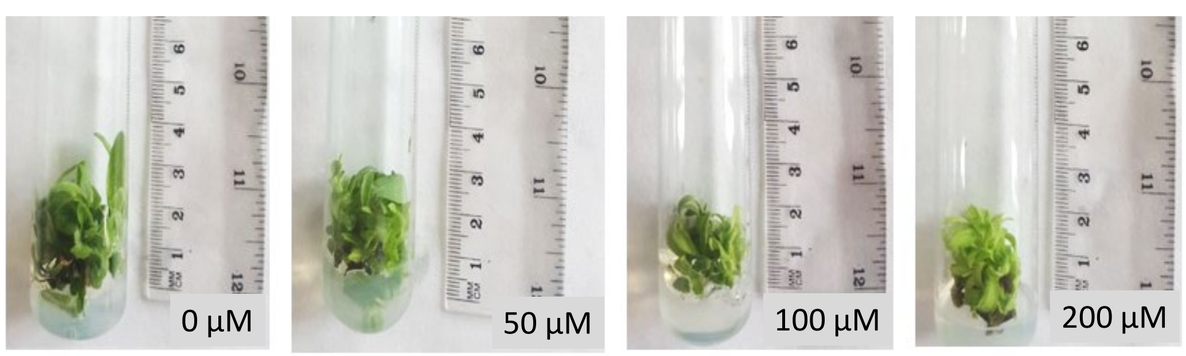

Figure 1. *A. montana* on the 3rd day of MeJa treatment *in vitro*

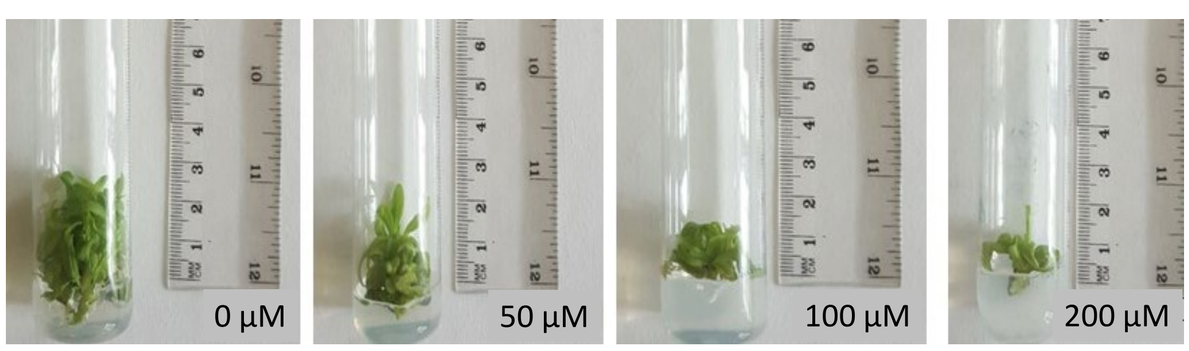

Figure 2. *A. montana* on the 7th day of MeJA treatment *in vitro*

MeJA [µM] for 3 days	Number of rosettes per explant	Rosette height, cm	FW, g
0	4.4±0.30a	1.61±0.09a	0.56±0.02a
50	4.1±0.31a	1.40±0.07ab	0.48±0.04ab
100	4.2±0.29a	1.53±0.14ab	0.51±0.03ab
200	3.9±0.26a	1.31±0.09b	0.44±0.03b

Table 1. Biometric characteristics of *A. montana* on the 3rd day of MeJa treatment *in vitro*

MeJA [µM] for 7 days	Number of rosettes per explant	Rosette height, cm	FW, g
0	4.65±0.30a	1.91±0.06a	0.62±0.03a
50	4.0±0.20ab	1.58±0.04b	0.54±0.04a
100	3.8±0.27b	1.50±0.07b	0.43±0.04b
200	3.5±0.25b	1.30±0.05c	0.37±0.03b

Table 2. Biometric characteristics of *A. montana* on the 7th day of MeJa treatment *in vitro*

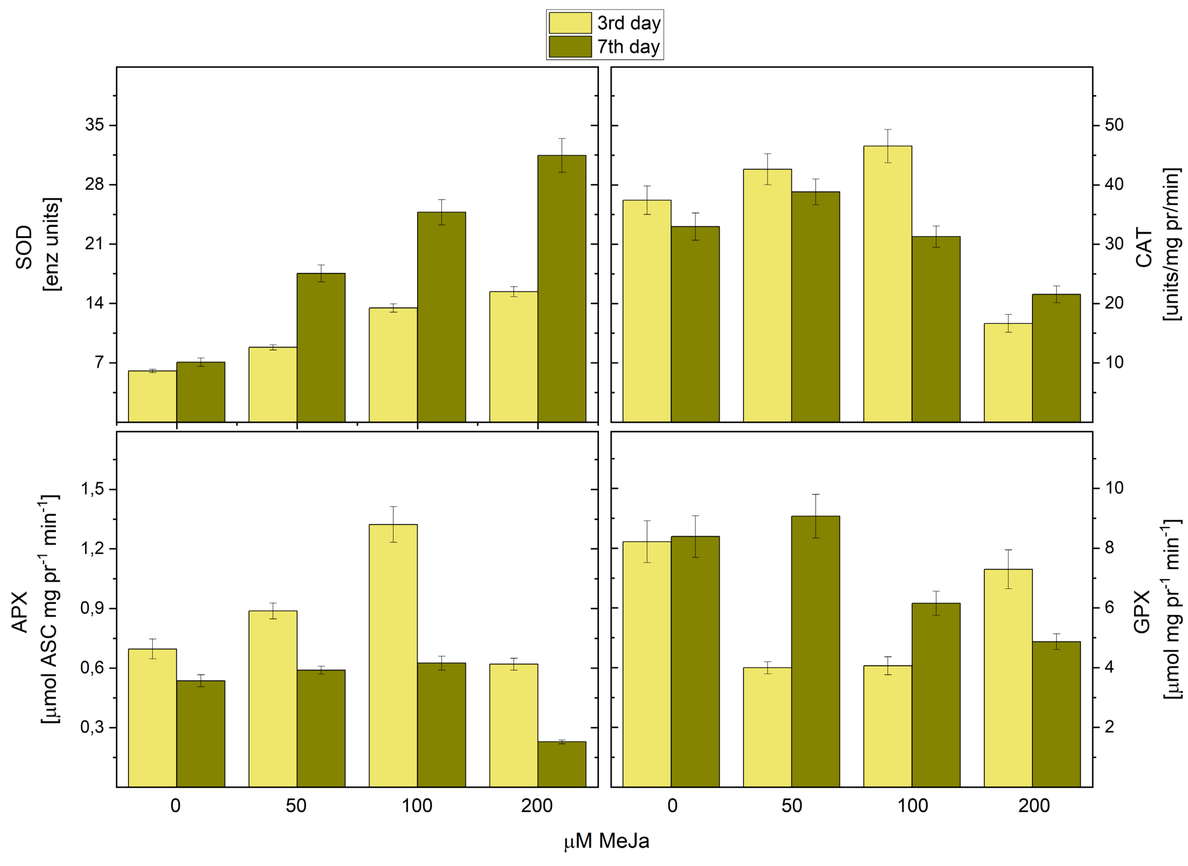

Figure 3. SOD, CAT, APX, and GPX activities in *A. montana* on the 3rd and 7th day of MeJA treatment *in vitro*

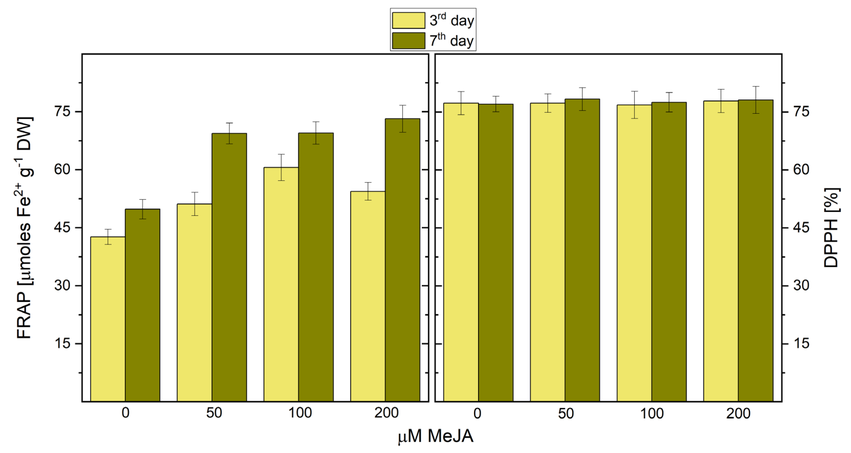

Figure 4. Total antioxidant activity (measured by FRAP and DPPH assays) in *A. montana* on the 3rd and 7th day of MeJA treatment *in vitro*

ACKNOWLEDGMENTS

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CONCLUSION

Methyl jasmonate (MeJA) exerts differential effects on the biometric parameters and antioxidant enzyme activities in *in vitro* cultivated *Arnica montana* depending on the concentration and duration of treatment. On the third day of treatment, no statistically significant differences were observed in the number of shoots per explant, plant height, and fresh weight, except at the highest MeJA concentration (200 µM), which led to a reduction in plant height. After seven days of treatment, all three biometric parameters were significantly decreased.

Regarding the activity of the main antioxidant enzymes, three distinct trends were observed: SOD activity increased with both MeJA concentration and treatment duration; CAT and APX activities peaked at 100 µM MeJA on the third day; GPX activity was negatively affected by MeJA. Total antioxidant activity, measured by the FRAP assay, increased at all tested MeJA concentrations, with higher values recorded on the seventh day compared to the third. The results from the DPPH assay do not show significant differences between variants.

These findings highlight the complex role of MeJA in modulating physiological responses in *A. montana* and suggest that both concentration and exposure time are critical factors for achieving desired outcomes.