



Antioxidative mechanism of *Nepeta nuda* L.

Nadezhda Stefanova¹, Daniela Dragolova¹, Ani Kercheva¹, Dariana Valova¹,
Veneta Kapchina-Toteva¹, Ganka Chaneva¹, Miroslava Zhiponova^{1*}



¹ Department of Plant Physiology, Faculty of Biology, Sofia University "St. Kliment Ohridski", Bulgaria

*e-mail: miroslava_zhiponova@abv.bg

1. Introduction

Nepeta nuda L. is a herb from genus *Nepeta* (catmints), *Lamiaceae* family, with valuable essential oil and high antioxidant activity. Recent studies highlighted the role of the plant growth regulator brassionide (BL) as a signal molecule mediating the plant oxidative response (Kang and Nam, 2016).

2. Aim

We aimed at investigating whether BL plays role in *N. nuda*'s growth and antioxidative mechanism via phenolic compounds in particular.

3. Materials and methods

Nepeta nuda spp. *nuda* L. plants were propagated in in vitro conditions (under 16h light/8h dark photoperiod, at 22°C) on basal growth medium (MS) supplemented with the BL growth regulator for 3 weeks. The effect

of a range of BL concentrations (0-5 nM) was tested on morphometric parameters, total antioxidant activity (Singleton et al., 1999), and total phenol content (Prieto et al., 1999).

4. Results

It is known that BL acts in a concentration-dependent manner and higher BL level (e.g. above 5 nM up to 1 µM) could have inhibitory effect. Addition of a series of relatively low BL concentrations promoted the *N. nuda*'s height (Fig.1 and 2), while the shoot number increased significantly only at 0.5 nM BL (Fig.1 and 3). Correspondingly, the antioxidant activity raised at 0.5nM BL (Fig.4). The phenolic content became higher after administration of BL with a pick at 0.5 nM BL (Fig.5). Correlation analysis showed strong interdependence between TAA and TPC (Fig.6).



Fig.1 *In vitro*-propagated *Nepeta nuda* plants on medium supplemented with BL

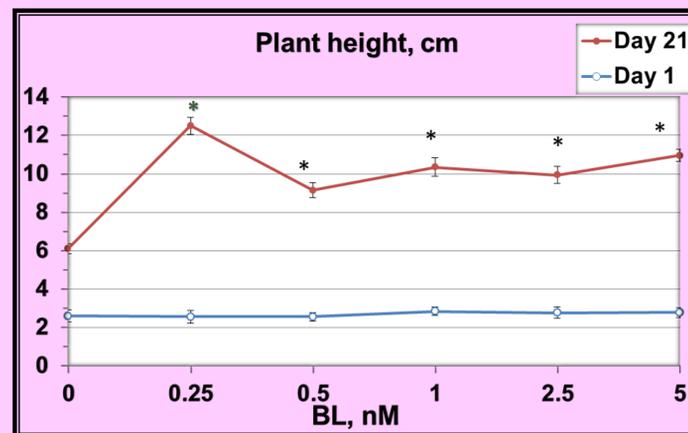


Fig.2 Plant height measured on days 0 and 21

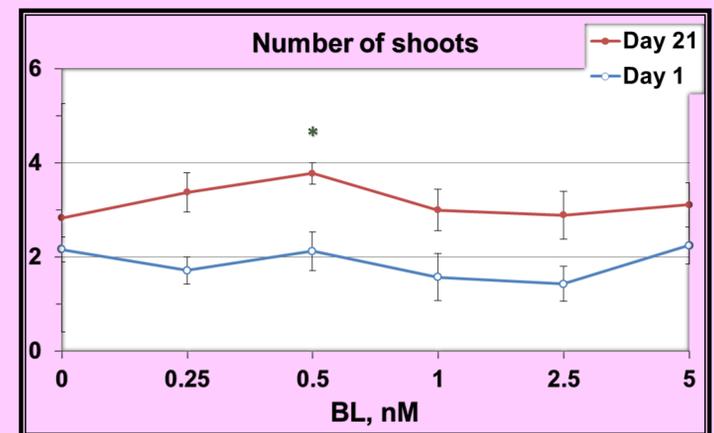


Fig.3 Number of shoots on days 0 and 21

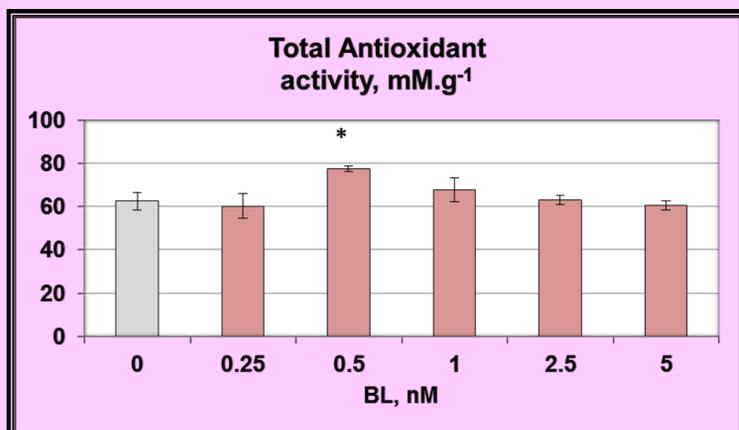


Fig.4 Total antioxidant activity in plants propagated on medium supplemented with BL

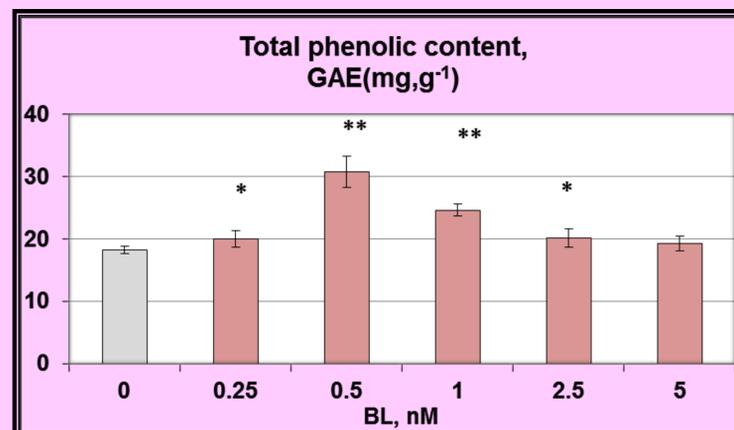


Fig.5 Total phenolic content showed by plants propagated on medium supplemented with BL

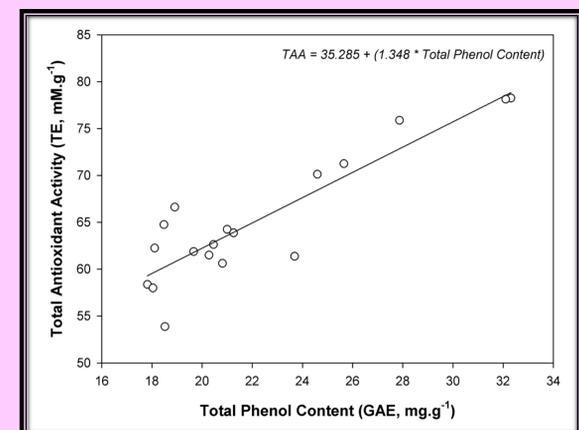


Fig.6 Correlation analysis between TAA and TPC

5. Conclusions

Addition of a low 0.5nM concentration BL is optimal for stimulation of growth and antioxidative capacity of *in vitro*-grown *N. nuda* plants. BL mediates the antioxidative mechanism of this herb including modulation of phenolics' content.

Acknowledgements

This work is supported by grant SU-№141/2016. We are also grateful for the useful discussions and help of the members of the Department of Plant Physiology, Sofia University St. Kliment Ohridski.

References

- Prieto P, Pineda M, Aguilar M (1999) Spectrophotometric quantitation of antioxidant capacity through the formation of a phosphomolybdenum complex: Specific application to the determination of vitamin E1. *Anal Biochem* 269:337-341.
- Singleton VL, Orthofer R, Lamuela-Raventós RM. (1999). Analysis of total phenols and other oxidation substrates and antioxidants by means of Folin-Ciocalteu reagent. *Method Enzymol* 299:152-178.
- Kang HK, Nam KH (2016) Reverse function of ROS-induced CBL10 during salt and drought stress responses. *Plant Science* 243: 49-55