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Application of peptidomimetics as a carrier of silver for growth acceleration of Stevia *in vitro* plants and assessment of antioxidant activity

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Introduction

Stevia rebaudiana Bertoni (Asteraceae) is a natural sweetener due to the rich content of steviol glycosides in the leaves. The high health benefits of stevia necessitate the development of effective methods for its cultivation. The application of nanoparticles in plant biotechnology provides tools to enhance plant growth and yield, improve the production of biologically active compounds, eliminate microbial contaminants in *in vitro* cultures, and increase plant tolerance to various stress conditions.

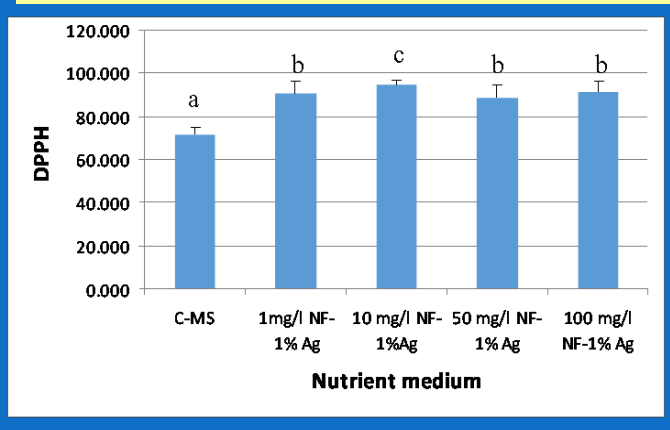
Material and methods

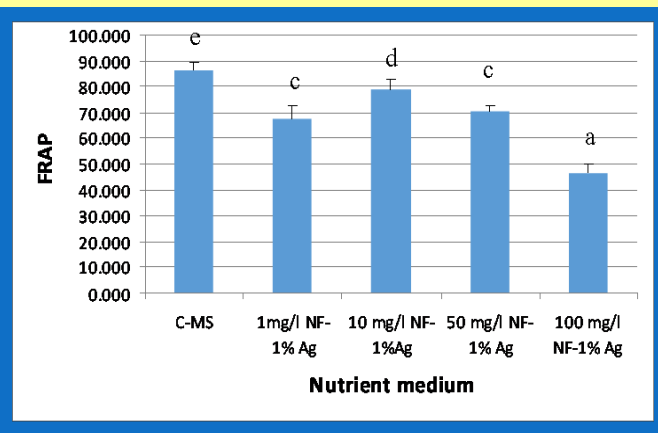
The effect of nanofibers formed by peptidomimetics enriched with 1% silver (NF-1%Ag) in MS nutrient media at different concentrations (1, 10, 50, 100 mg/l) on the growth and metabolites with antioxidant power content of in vitro micropropageted S. rebaudiana plants was tested.

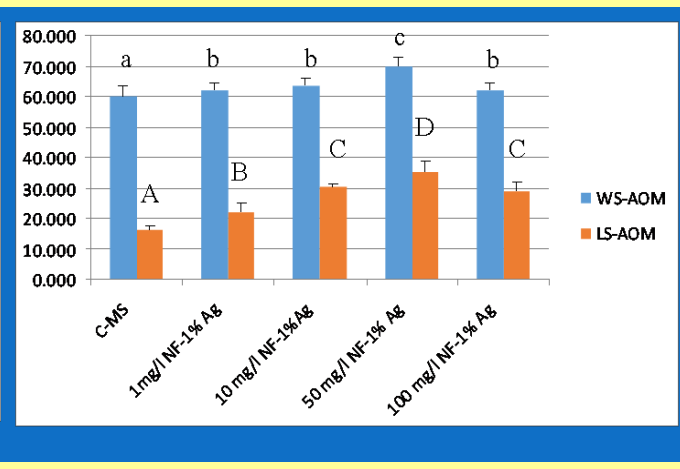
Results and Discussion

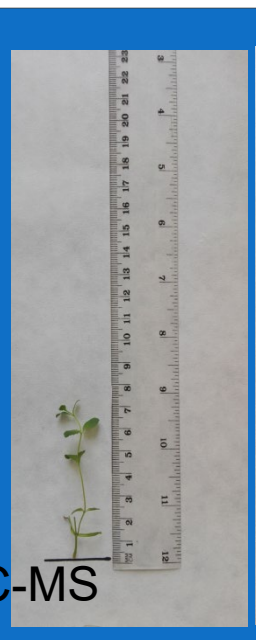
Nutrient medium	Shoots number per explant	Shoot height, cm	Shoots fresh weight, g	Rooting, %
Control	1.0±0.12a	5.97±0.29a	0.115±0.01a	1
1 mg/l NF-1% Ag	1.39±0.15b	6,83±0.34d	0.305±0.02b	16
10 mg/l NF-1% Ag	1.34±0.10b	7.30±0.37cd	0.334±0.02c	18
50 mg/l NF-1% Ag	1.45±0.13b	8.39±0.20e	0.371±0.01d	43
100 mg/l NF-1%Ag	1.44±0.15b	6.58±0.39b	0.285±0.01b	37

The addition of 50 mg/l NF-1%Ag in MS medium was optimal for accelerating growth, elongation (mean FW 0,371 g; average length 8.39 cm) and rooting (43%) of *in vitro* plantlets. The shoots grown on MS media supplemented with 1 to 100 mg/l NF-1% Ag showed higher total antioxidant activity measured by radical scavenging capacity (DPPH method) than control plants.







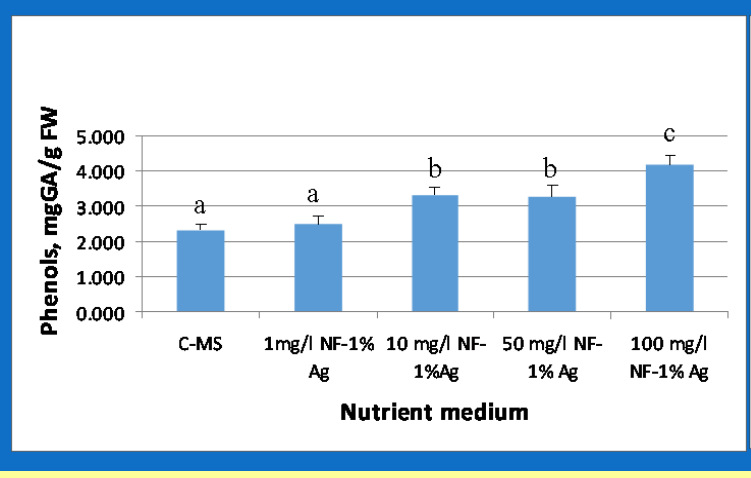


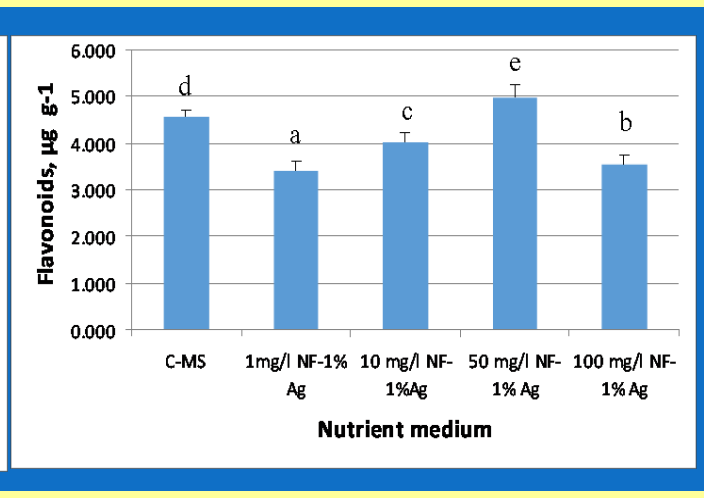
C-MS

50 mg/l NF-1% Ag

In contrast, the ferric reducing antioxidant power (FRAP method) and the total flavonoid content do not show a positive relationship with the rate of growth and production of water and lipid-soluble metabolites with antioxidant potential. The highest antioxidant activity levels measured by DPPH and FRAP methods were recorded in *in vitro* plants cultured on MS medium supplemented with 10 mg/l NF-1%Ag.

The adding of 50 mg/l NF-1%Ag to the MS medium caused the highest total flavonoid content, water- and lipid-soluble metabolites with antioxidant capacity in stevia plantlets.





The highest content of total phenols (4.170 mgGA/g) was obtained in plantlets grown on a nutrient medium supplemented with 100mg/l of NF-1%Ag.

Conclusions

The study demonstrates the benefits of using nanofibers to accelerate the growth and antioxidant potential of Stevia *in vitro* plants.

Acknowledgements

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