Tropentag, September 20-22, 2023, hybrid conference

"Competing pathways for equitable food systems transformation: Trade-offs and synergies"

Assessment of slow-growth treatments to develop an efficient *in vitro* medium-term conservation method for garlic (*Allium sativum* L.)

Stacy Denise Hammond Hammond[1], Hynek Roubik[2], Jiri Zamecnik[1], Bilavcik Alois[1], Olena Bobrova[1], Milos Faltus[1]

[1] *Crop Research Institute, Division of Plant Physiology and Cryobiology, Czech Republic*

[2] *Czech University of Life Sciences Prague, Fac. of Tropical AgriSciences, Dept. of Sustainable Technologies, Czech Republic*

Abstract

The study aimed at assessing various osmotic agents and plant growth regulators at varying concentrations to determine their effect on growth reduction to develop an efficient slow-growth storage protocol for the medium-term conservation of garlic (*Allium sativum* L.). Osmotic agents, sorbitol (20– 60 g l^{-1}), mannitol (20– 60 g l^{-1}), and sucrose (30– 150 g l^{-1}) and plant growth inhibitors chlorcholinchlorid (CCC) 200– 600 mg l^{-1} and abscisic acid (ABA) at 1– 5 mg l^{-1} were tested as media supplements in combination with 18±1°C cultivation temperature to determine their effect on growth reduction. Full-strength and ½ concentrated MS were used as basal culture media and control. Preliminary findings after a 5-month treatment time duration show that MS medium is more effective in reducing plant growth in combination with the tested media supplements, while ½ MS is not effective in further reducing plant growth, demonstrating a stimulating effect on growth even in combination with the tested media treatments. Overall, MS media +ABA treatments (1, 3 and 5 mg l^{-1}) proved to be the most efficient in inducing slow-growth, with plantlets reaching an average height of just 2.1 cm, 1.4 cm and 1.0 cm, respectively, almost 3 times lower growth compared to the control MS medium (4.7 cm) after the 5-month storage. However, the mannitol treatments proved ineffective and induced hyperhydration (HH) as a form of morphological abnormality. The other treatments also induced slow-growth but were less effective than the ABA treatments. Further research is being conducted to push the boundaries and assess the effect of the tested treatments in reducing the growth of garlic in time. This research will contribute to the development of an efficient medium-term *in vitro* conservation protocol for garlic, the second most important *Allium* species.

Acknowledgements: This research was funded by the Ministry of Agriculture of the Czech Republic, grant number MZE RO0423.

Keywords: Osmotic agents, plant growth regulators

Contact Address: Stacy Denise Hammond Hammond, Crop Research Institute, Division of Plant Physiology and Cryobiology, Drnovská 507/73, 16106 Praha 6 - ruzyně, Czech Republic, e-mail: hammond@vurv.cz