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The Effect of 1-MCP Treatment on Carotenoids Content and Postharvest Ripening in 'Cherry' Tomatoes Fruits

INTRODUCTION

Tomato is one of the most popular species, which is grown in greenhouse (Kowalczyk and Gajc-Wolska, 2011). Tomato fruit has high content of micronutrient (iron, phosphorus) and it is rich in vitamins (B and C), carotenoids, essential amino acids, sugars (mainly fructose and glucose, small amount of sucrose (Malundo *et al.*, 1995; Georgelis *et al.*, 2004)) and dietary fibers. It allow for providing healthy and well-balanced diet (Naika *et al.*, 2005). 1-methylcyclopropene (1-MCP) (Photo 2), as an ethylene (Photo 3) action inhibitor, is a new tool to improve storability of some vegetables. Between 1-MCP-treated and untreated ripe tomato fruits are not any differences for pH, solouble solids, titratable acidity and fructose and glucose content. One 16 hours application of 1-MCP effect on inhibition ripening and delay loss of firmness for pink fruits about 3 days (Mir *et al.*, 2004).

MATERIALS AND METHODS

The experiment was conducted in 2011 and 2012 in the greenhouse and laboratories of the Department of Vegetable and Medicinal Plants of Warsaw University of Life Sciences. The seeds were sown in January seedlings were planted in February. The plants were grown in coconut fibre slabs and fruits were harvested in September at pink stage (3rd stage, USDA standard chart), treated with 1-MCP (1 ppm for 12 hours at 18°C) and stored for three weeks at 12°C. Before and after storage chemical analyses were carried out. There were determined carotenoids content by HPLC. Before and after storage were physical traits: colour in CIE L*a*b* and fruit firmness. The aim of the study was to determine the effect of 1-MCP treatment on changes of carotenoids content and physical features of 'Pareso F1' 'cherry' tomatoes (*Solanum lycopersicum* L. var. *cerasiforme)* during storage.

The factor of this experiment was concentration of 1-MCP using to treatment. The results were analysed with one-way ANOVA using ANOVA1 v. 3.0 and Tukey's HSD test at α=0.95 using Statgraphics Plus for Windows v. 4.1 software.

RESULTS

The content of lycopene in fruits of 'Pareso F1' harvested in 3rd stage of maturity was 12.7 and 11.3 after treatment and 13.4 (untreated) after three weeks of storage (Figure 1). The content of β-carotene in the same fruits was 0.44 and 0.39 for treated fruits and 0.55 for fruits without treatment in comparison to fesh fruits, which have 0.16 (Figure 2). The parameter *a* was changed during storage, but the change was the lowest during storage after treatment with higher concentration of 1-MCP (20.1) while in control fruits this change was the highest (18.3) compare to fresh fruits (18.6) (Figure 3). The fruits after treatment by 1-MCP with lower concentration (38.7) have had higher firmness than untreated fruits (37.9) (Figure 4).

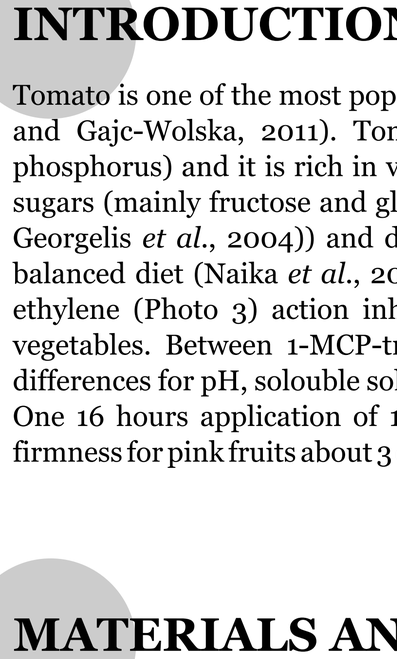

Photo 1. Fruits in the 3rd stage of maturity

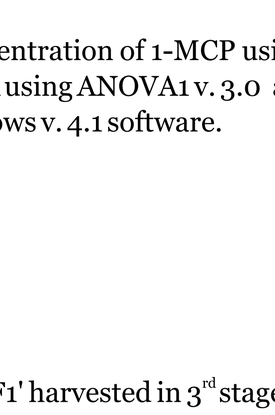

Photo 2. The 1-MCP molecule

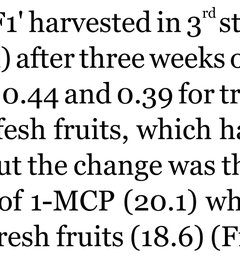

Photo 3. The ethylene molecule

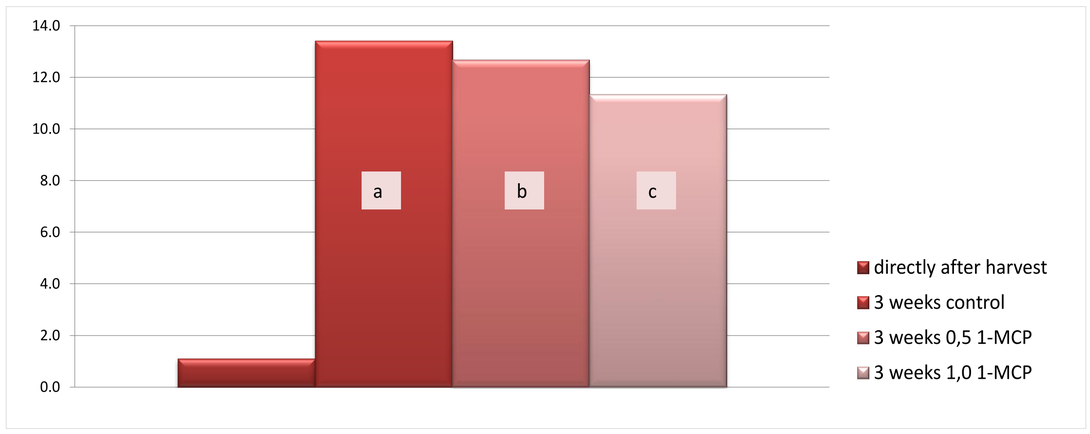

Figure 1. Lycopene content in 'cherry' tomato fruits (mg 100 g^{-1} DW)

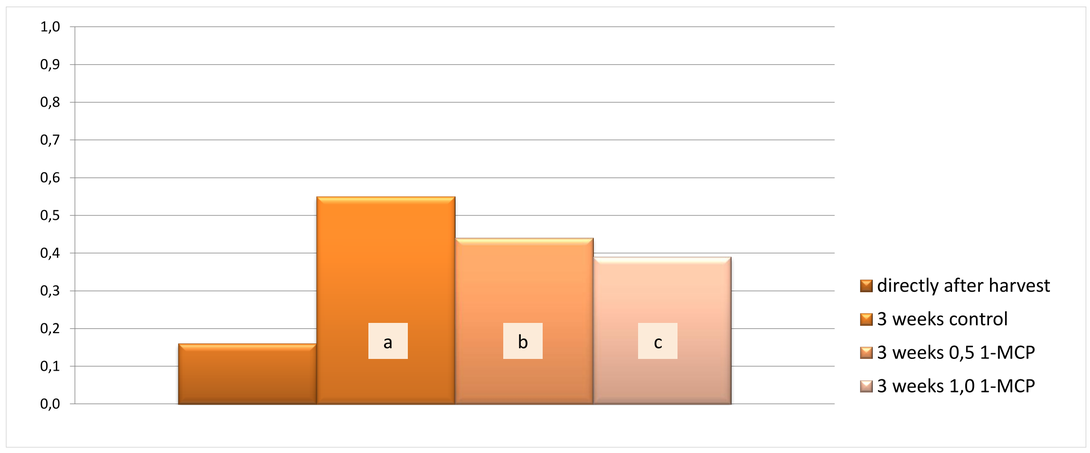

Figure 2. β-carotene content in 'cherry' tomato fruits (mg 100 g^{-1} DW)

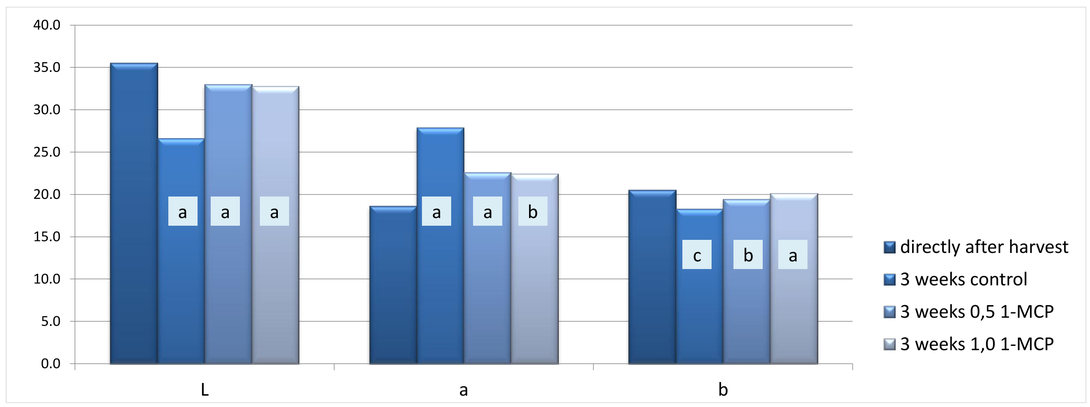

Figure 3. Colour of 'cherry' tomato fruits before and after storage in CIE L*a*b*

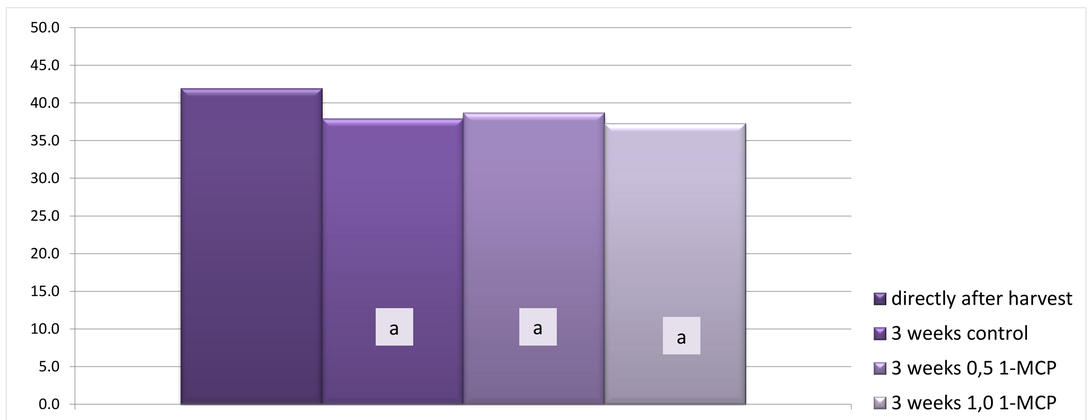

Figure 4. Firmness of 'cherry' tomato fruits before and after storage

CONCLUSIONS

1. **The 1-MCP treatment significantly reduced colour change during storage.**
2. **The 1-MCP treatment delayed decreasing of fruit softening during storage.**
3. **The 1-MCP treatment is effective in delaying ripening of the fruits and may contribute to extend storability for fruits harvested at 3rd stage of maturity.**

ACKNOWLEDGMENT

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