Evaluation of vitamin C content in fresh and pickled cucumber fruits

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DOI: 10.31708/spi3.18/migt.cns18

Introduction

Cucumber (*Cucumis sativus* L.) belonging to the Cucurbitaceae, is one of the most popular and widely cultivated plants on the world (Wan, Kang, Wang, & Liu, 2010). They consist of water (about 95 %), sugars (about 3.6 %) and proteins (less than 1%). Though they have only 150 kcal per 1 kg of fruit mass, they are a good source of antioxidants and nutrients, such as magnesium: (1.3 mg·kg⁻¹), vitamin C (0.28 mg·kg⁻¹) or vitamin B5 (0.026 mg·kg⁻¹) 28 (Mohammadi, Hashemi, & Hosseini, 2016).

Observation of the chemical properties of cucumber fruits and their changes is important, especially in terms of storage durability, both in the fresh state and after processing. The aim of laboratory research was to monitor and analyze changes in vitamin C content in soil cucumbers in four measurement terms in the ensilage process from the start of fermentation, i.e. at 10, 30, 60 and 90 days of ensiling.

Materials and Methods

The examined material included 5 varieties of soil cucumbers: Izyd F1, Partner F1, Polan F1, Śremianin F1 and Śremski F1. The content of vitamin C was determined by titration using the Tillmans method. Due to the loss of vitamin C during the processing of the cucumber fruit, before the assay the sample was extracted in the presence of oxalic acid, blocking oxidation processes.

The analysis was performed in three replications on fruits immediately after harvest and 10, 30, 60, 90 days after the fermentation.

The amount of vitamin C in 100 g of tested varieties of fresh and pickled cucumbers was calculated according to the formula:

$$c = \frac{v * M * p_{km}}{p_p * m} * 100[\text{mg}\%]$$

c - the amount of vitamin C

v - DCPIP volume (cm³)

M - DCPIP titre

p_{km} - measurement flask volume (cm³)

p_p - filtrate volume (cm³)

m - weight of the sample

Results and Discussion

The C-vitamin is one of the most unstable compounds. It decomposes under the influence of oxygen, temperature, UV radiation and during processing. The content of L-ascorbic acid during the experiment (fermentation process) for the tested varieties was varied. There were differences between the content of vitamin C and ensilage time of analyzed varieties of ground cucumbers. The content of vitamin C in fresh fruit of cucumbers of the varieties studied was respectively from 12.05 mg / 100 g to 10.17 mg / 100 g.

On the 10th day of the measurement, a decrease in the content of vitamin C in the examined raw material was on average by 2 mg / 100 g, regardless of the analyzed variety of soil cucumbers. The increasing acidity, and thus the decreasing pH of the product, protects against excessive losses due to a decrease in the ascorbase enzyme responsible for the breakdown of the vitamin. Similar conclusions were drawn by Grzelakowska et al. who analyzed the rate of changes in vitamin C content in fresh cucumbers and after ensilage (Grzelakowska, Cieśliewicz, & Łudzińska, 2013).

In subsequent measurement dates, the value of the analyzed parameter was systematically decreasing. On the 90th day of the process, the content of vitamin C in the fruits of pickled cucumbers of the analyzed varieties ranged from 2.47 mg / 100 g to 1.61 mg / 100 g. The obtained data coincide with the results obtained by Pierzynowska et al. Fresh cucumbers proved to be the most susceptible to vitamin loss, which is related to the high amount of oxidizing enzymes in the raw material (Pierzynowska, Prędką, Drywien, & Ostrowska, 2007).

Conclusions

The highest content of vitamin C was recorded in fresh ground cucumber fruits - from 10.17 mg / 100 g to 12.05 mg / 100 g. Along with the time of the ensiling process, the value of the analyzed parameter was significantly reduced. On the 90th day of fermentation, the content of vitamin C in pickled cucumber fruit was from 1.61 to 2.47 mg / 100.

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