

## DETERMINATION OF NITRATES IN LETTUCE (*LACTUCA SATIVA* VAR. *CAPITATA*) FROM VARIOUS PRODUCERS BY ION-SELECTIVE ELECTRODE

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### Abstract

Growers are trying to meet the requirements for low tolerance of nitrates in cultivated crops through appropriate management of cultivation practices, paying attention to the timing, speed and form of nitrogenous substances used. However, external conditions during crop development are also crucial, such as light intensity and quality or air temperature, as well as the method and daily timing of harvest. Traders also pay attention to the quality and health safety of the sold vegetables, including salads. The goal of the study was to analyze the content of nitrate ( $\text{NO}_3^-$ ) in lettuce (*Lactuca sativa* var. *capitata*).

Samples from various producers were collected during six months (all seasons) from four various retail chains, some came from domestic Slovak growers. Presence of  $\text{NO}_3^-$  in selected samples was determined by using an ion selective electrode (ISE). All data were first tested for normality using the Shapiro Wilk test. The tested data did not have a Gaussian distribution, so the Kruskal-Wallis test was used to test statistical differences in nitrate content in individual months. Spearman's correlation was used to determine the relationship between the months. All calculations were performed using the statistical program R Studio, version 1.2.5033.

Results showed, that all samples met the conditions set out in Commission Regulation (EU) No. 1258/2011 [6], relating to maximum permitted levels for nitrates in fresh lettuce. The highest average nitrate content of 2038.99  $\text{mg} \times \text{kg}^{-1}$  was identified in November, while in May was found the lowest average level of 774.78  $\text{mg} \times \text{kg}^{-1}$ . Interesting were the differences when comparing samples with the same country of origin, which were obtained from different retail chains in the same month. When comparing samples obtained from domestic growers, we did not notice a significant difference in the average nitrate content (May 1085.82  $\text{mg} \times \text{kg}^{-1}$  and June 1098.95  $\text{mg} \times \text{kg}^{-1}$ ), and however, the values from domestic samples in both months were higher compared to the results obtained in the analysis of lettuce from commercial chains. Statistically significant differences in nitrate content were recorded in the four evaluated months evaluated, but of different statistical significance: January and February ( $p < 0.01$ ), June ( $p < 0.001$ ) and May ( $p < 0.0001$ ). In contrast, no statistical differences in nitrate content in salads were recorded in October and November ( $p > 0.05$ ).

The results showed that lettuces available on the market either in the colder or warmer months, domestic or imported from abroad, do not pose a risk to health in terms of nitrate content.

**Key words:** Lettuce, Nitrates, Analyse, Ion selective electrode, Vegetable.