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Assessment of the Nutritional Parameters of Tomato (*Solanum lycopersicum* L.) Genotypes Under Hedgerow Conditions, preliminary study

Running title: Hedges impact tomato nutritional content

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Introduction:

- Tomato (*Solanum lycopersicum* L.) is a highly important cultivated species belonging to the Solanaceae family and is the most-produced vegetable worldwide. Nutrients such as N, P, K, Ca, Mg, and S are essential for normal growth and reproduction, while micronutrients such as Fe, Cu, Zn, Mn, B, Mo, and Cl are only needed in trace concentrations (1,4).
- Hedgerows and other agroforestry methods can benefit sustainable agriculture systems by planting trees, shrubs, forbs, and grasses. Windbreak trees may modify the microclimate, lessen wind erosion, and protect crops from direct wind.
- This study aims to investigate the influence of hedgerow technology microclimate conditions on three tomato plants genotypes 'Szentlrinckáta', 'Roma VF' and 'Ace 55' on nutritional traits such as N, P, K, and chlorophyll and carotene levels.

Methodology:

- The experiment was conducted from May to September 2022 at the Soroksár experimental research farm. A hedgerow was planted in 1999 and 2000 using local woody plant species. Roma VF, Ace 55, and Szentlrinckáta genotypes were used in a randomized complete block design (RCBD) with 3 replicates and 5 plots in 2 rows. The soil was covered with wowen plastic fiber and plants were supported with bamboo poles.

NPK Content Determination of Tomato Plant Leaves

- The Kjeldahl formula was used to assess the total nitrogen (N) (3).
- Molybdenum-antimony anti-absorption spectrophotometry was used to measure samples' phosphorus (P) content.
- Flame atomic absorption spectrophotometry was employed for the measurement of potassium (K) content (3,4).

Discussion:

- The Roma variety had higher nitrogen content on the Exposed side, but no significant difference on the Protected side shown at **Figure 1**. However, Ace 55 and Szentlrinckáta had a significant interaction effect in nitrogen content on both sides at $p<0.05$.
- The Szentlrinckáta variety had the highest phosphorus content in distance 3 of the Protected side Shown at **Figure2**. while the lowest phosphorus content was in distance 1 of the Protected side at $p<0.05$.
- The Roma variety on the Exposed side had the highest potassium content compared to both sides and distance groups **Figure 3**. There was an interaction between the Roma and Ac 55 varieties in distances 1 and 3 on the Exposed sides, and a significant decrease in potassium content was observed in the Protected side distance 1 at $p<0.05$.
- Chlorophyll is important for plant growth due to its influence on photosynthetic ability. The Roma variety has the highest chlorophyll A value, while the Szentlrinckáta variety has the lowest shown at **Figure 4**. Chlorophyll B is decreasing in Protected sides, indicating that the Roma, Ace 55, and Szentlrinckáta varieties have significantly lower B chlorophyll content compared to other treatment sides and distances 1 at $p<0.05$.

Conclusion:

Hedgerow | Microclimate | Tomato

Investigation of the influence of hedgerow technology microclimate conditions on three tomato plant genotypes showed variations in nitrogen, phosphorus, potassium, chlorophyll, and carotene content. Roma had higher nitrogen, potassium, and carotene content than other varieties, while Szentlrinckáta had the lowest chlorophyll content. There were significant differences in phosphorus and potassium content, as well as an interaction effect between the Szentlrinckáta and Ace 55 varieties in nitrogen content.

Results:

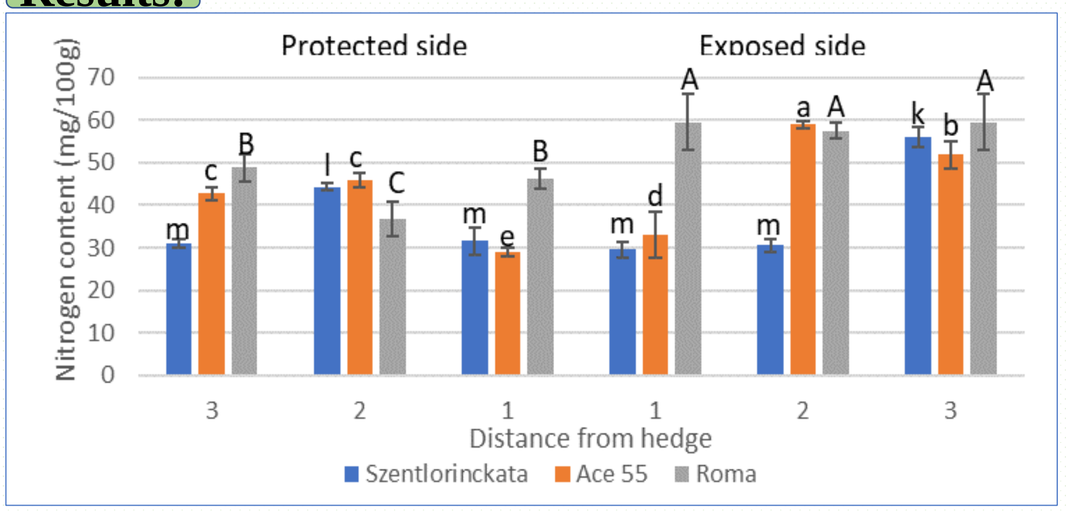

Figure 1. Nitrogen content (mean + SD) of tomato fruit samples produced on a hedge's protected and exposed side, at various distances. Ascending numbers mean higher distances. Differing letters mean significant difference ($p<0.05$) among samples of the same variety.

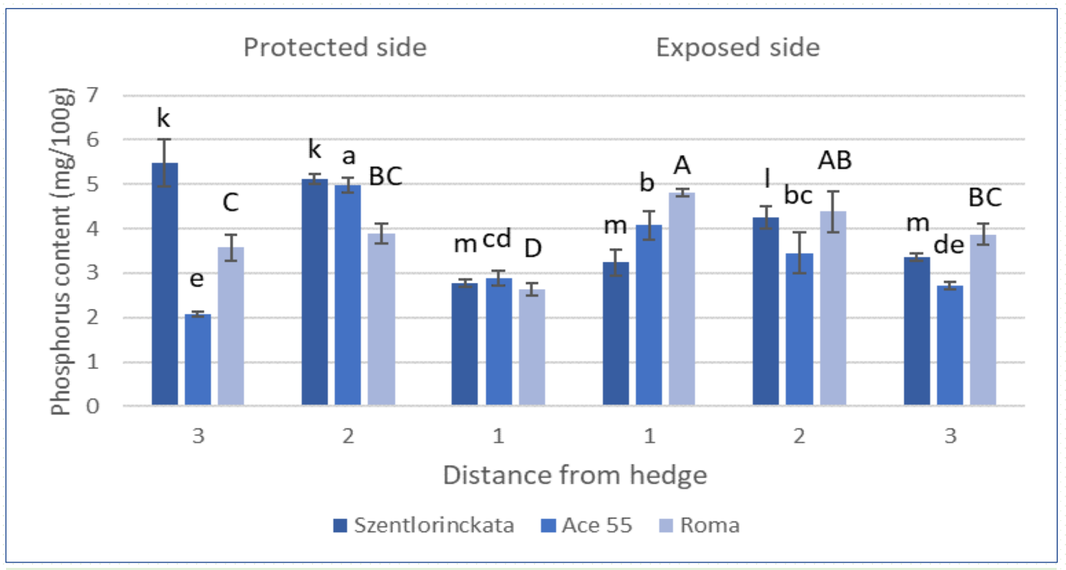

Figure 2. Phosphorus content (mean + SD) of tomato fruit samples produced on the protected and the exposed side of a hedge, at various distances. Ascending numbers mean higher distances. Differing letters mean significant difference ($p<0.05$) among samples of the same variety.

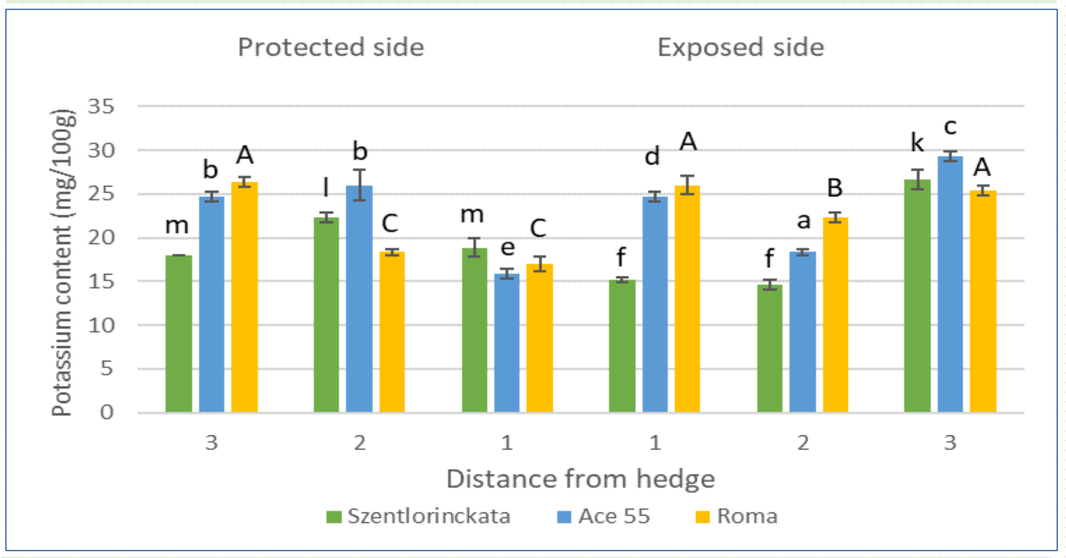

Figure 3. Potassium content (mean + SD) of tomato fruit samples produced on a hedge's protected and exposed side, at various distances. Ascending numbers mean higher distances. Differing letters mean significant difference ($p<0.05$) among samples of the same variety.

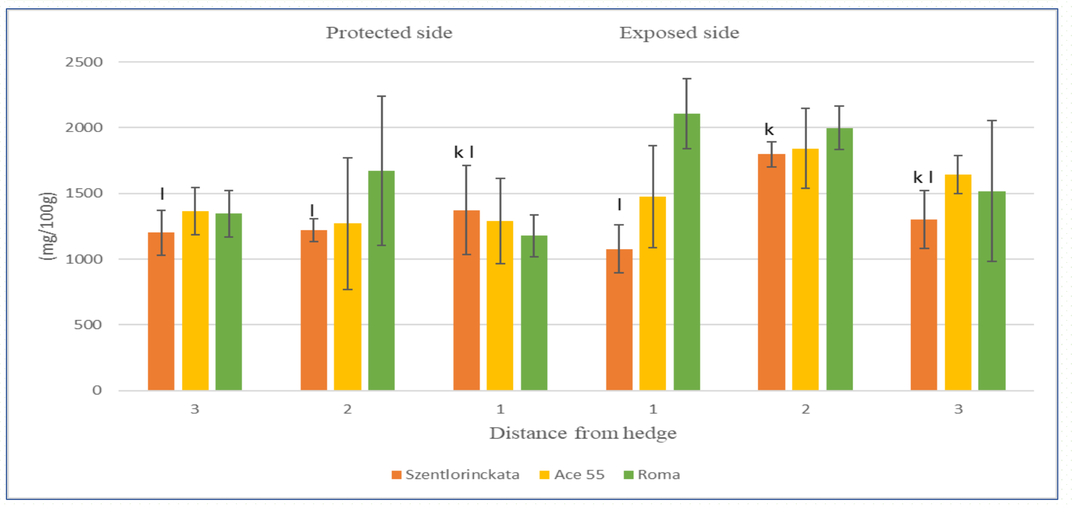

Figure 4. Chlorophyll A and B content (mean + SD) of tomato leaf samples produced on the protected and the exposed side of a hedge, at various distances. Ascending numbers mean higher distances. Differing letters mean significant difference ($p<0.05$) among samples of the same

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