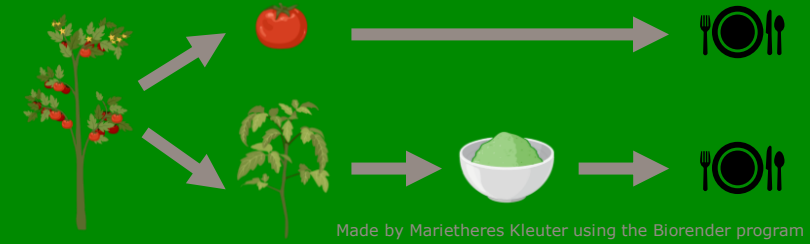


The role of plant and leaf age during protein extraction from tomato leaves¹

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Made by Marietheres Kleuter using the Biorender program

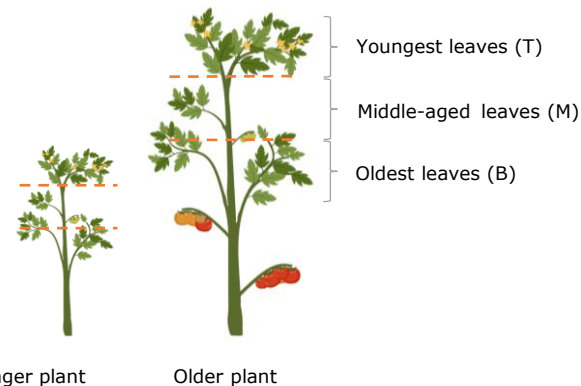
Background



- Tomato leaves are largely available and contain considerable amount of proteins.
- Tomato leaves can be harvested at different plant and leaf age (pruning).
- Leaf age is associated with the position of the leaves on one plant.

Method

Tomato leaves were harvested with different plant and leaf age and freeze dried. Protein extraction was performed on leaves with water and 50-50% ethanol-water. The aim was to create protein fractions that are free of phenolic compounds.



Younger plant Older plant

Figure 1. Schematic demonstration of **tomato leaves collection**.

Results

- Leaf age largely determined leaf protein content and extraction yield.

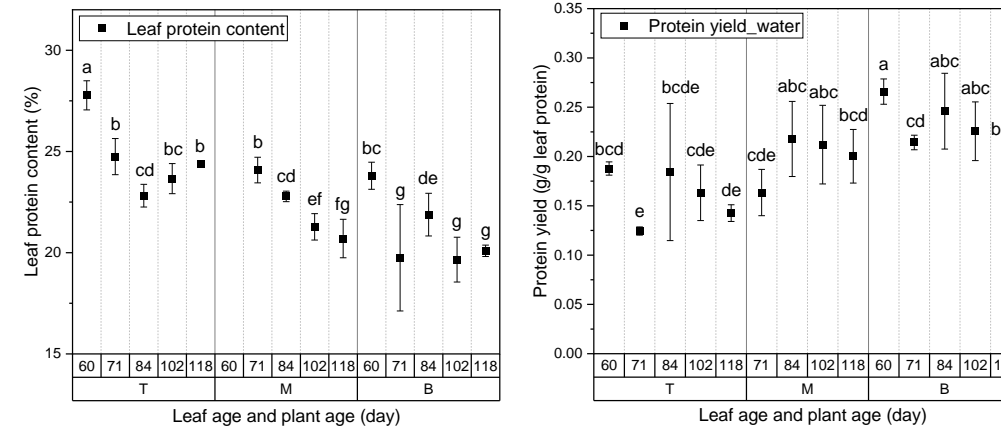


Figure 2. **Protein content** of leaves with different plant and leaf age.

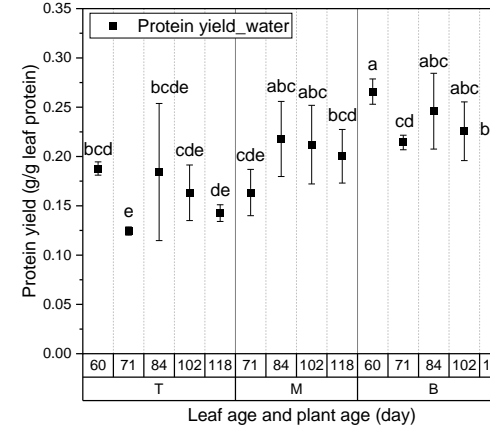


Figure 3. **Protein yield** of supernatants after extraction of leaves with different plant and leaf age.

- Rubisco and thylakoid membrane proteins were present in leaves; the effect of age on Rubisco concentration was observed.

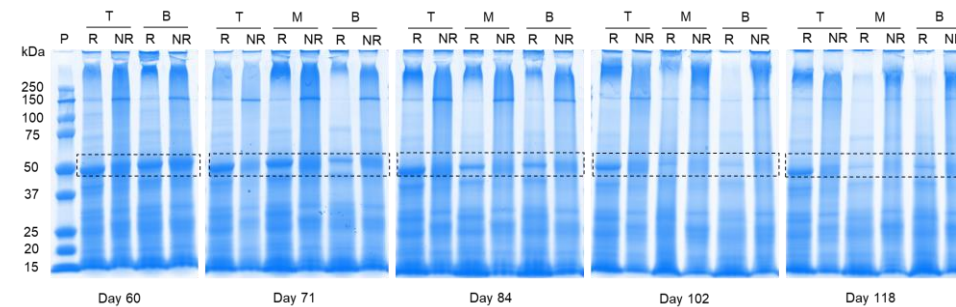


Figure 4. **Protein profile** of leaves with different plant and leaf age.

- Most of the proteins (>0.7g/g leaf protein) remained in the pellet after extraction, while the protein purity of the supernatants was not improved.
- Ethanol-water removed more phenolic compounds than water; more phenolic compounds were removed from young leaves.

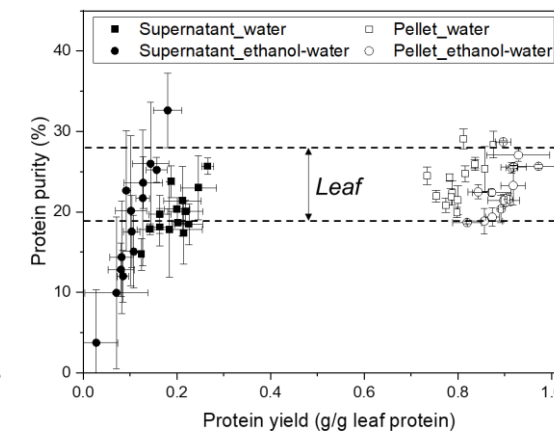


Figure 5. Protein **yield-purity** diagram with different plant and leaf age.

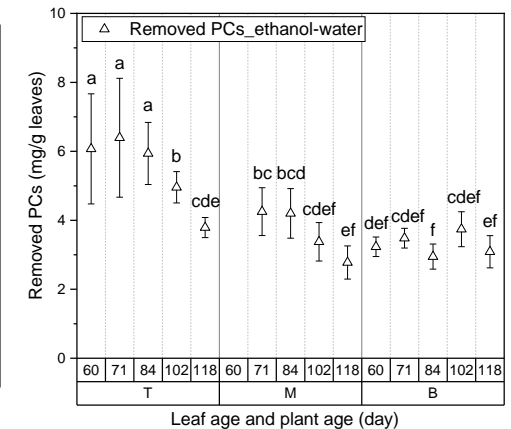


Figure 6. The amount of **removed phenolic compounds** in supernatants after extraction from leaves with different plant and leaf age.

Conclusions

- Tomato leaves are not homogenous mass.
- The highest extraction yield was found in older leaves, while younger leaves contained more proteins.
- Water and 50-50% ethanol-water did not create selectivity for protein extraction.
- Ethanol-water was efficient for phenolic compounds removal and can be used for the first pre-treatment before protein extraction.



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Reference:

¹Yu, et al. (2022). The role of plant and leaf age during protein extraction from tomato leaves. Manuscript submitted for publication.