

# Master thesis: Evaluation of leaf area estimation methodologies for determining Eco physiologically relevant parameters in orchards.

**Starting date:** Flexible, ideally from February 2026  
**Duration:** 6 Months  
**Working Place:** Tänikon (TG) with fieldwork in central Switzerland and/or Thurgau  
**Language:** French, German or English  
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Leaf area (expressed in m<sup>2</sup> per plant or tree) is an important trait that is constantly measured across multiple crops. This enables further calculations to be made as for example sap flow and photosynthesis at the level of the individual plant. These calculations can be then used to predict production and water usage efficiency, helping to optimise plant breeding programmes and research. As technology quickly evolves, new methodologies are becoming available that facilitate the calculation of leaf area. These technologies need to be constantly evaluated and validated.

The main goal of this project is to **determine the capacity of traditional and new methods to predict leaf area in apple orchards**, where it is well known that, due to high-density planting, new methods struggle to outperform traditional methods. To this end, the candidate will:

- Work in the field to determine the baseline leaf area using two traditional methods.
- Evaluate new technologies to predict leaf area in apple orchards based on open-source software (peripheral images and LiDAR).
- Characterise leaf morphology using traditional methods and high-quality 3D scanners with sub-millimetre resolution.
- Merge previously collected data to create a publishable dataset.
- If time allows, study the effect of hydric stress on the methodologies used.
- Summarise the work in a report.

We are looking for a candidate with a background in ecology or agriculture and basic knowledge of coding in any programming language (R or Python are welcome). As a candidate, you should be passionate about spending time outdoors but not averse to spending time on the computer. You will then be supported directly by our “Digital Production” team in the field and in the analysis of the generated data. At the Digital Production group at Agroscope, the Swiss centre of excellence for agricultural and food research, we provide a social working environment and take a highly multidisciplinary approach, where new ideas are always welcome and you can express your creativity within the project.

