Background

This project aims to continue the research work of the **Research Group on AgroICT & Precision Agriculture – GRAP** [http://www.grap.udl.cat/en/] and, specifically, the previous research project **AgVANCE project (AGL2013-48297-C2-2-R)**. Measurement of the foliar architecture continues to be relevant for a modern fruit growing, now including as a novelty the detailed analysis of canopy lighting conditions by using the methods developed in the AgVANCE project and other newly developed ones. **Results of the AgVANCE project** [https://www.researchgate.net/project/2014-2017-AgVance-project-Photonic-based-tools-for-a-sustainable-agrono] (Use of photon-based sensors to characterize vegetation) have made it possible to gain expertise in canopy phenotyping. Thus, improved monitoring methods will be used in this project to better assess foliar architecture and the extinction of light in the canopy, and to assess canopy vigour and health status for addressing the current needs of the sector.

Concerning fruit detection, also previous tasks (although only as "proof of concept") constitute the 'know-how' to face, in this project, 3D modelling based on the combined use (sensor fusion) of photon-based sensors (RGB photogrammetry, RGB-D sensors, and LiDAR) and computer vision. By applying all this technology in combination with appropriate sampling methods, efficient yield estimates will be obtained as a practical approach.

Canopy spatial variability analysis is another area in which the GRAP worked in the previous AgVANCE project. Now, geostatistical analysis and advanced statistical methods are again crucial to assess spatial variability and the opportunity to apply map-based variable-rate application systems in fruit growing. From the agronomic point of view, spatial variability is important in that it interacts and influences decision making in canopy management, pesticide dosage and sampling within the plots. In this project, on-farm experimentation adapted to spatial variability will be fine-tuned to compare strategies of mechanical pruning, to improve pesticide dosing and for searching for efficient sampling methods.