

High Resolution Imaging applied to high Throughput Field Apple Phenotyping (HiRI-FAP)

Improving high-resolution multispectral and thermal images acquired from unmanned aerial vehicles (UAVs) for high-throughput field phenotyping

ABSTRACT

Keywords : Agroecosystem, Ecophysio, Architecture, Phenotyping, Method, Tool, Technic, Phosphorus, Spectroscopy, Apple

Year : 2012

Project number : 1202-070

Type of funding : AAP OS

Project type : AAP

Research units in the network : ITAP QUALISUD

Start date : 2013-02-01

End date : 2015-02-15

Flagship project : no

Project leader : Jean-Luc Regnard

Project leader's institution : InstitutAgro

Project leader's RU : AGAP

Budget allocated : 87932 €

Total budget allocated (including co-financing) : 87932 €

Funding : Labex

RESULTS

The HiriFAP project made it possible to develop a methodology of high-throughput phenotyping based on airborne high-resolution imagery performed by UAV flights over apple plant groves submitted to variable hydric regimes. The HiriFAP project allowed us to validate (i) a flight procedure and image harvesting, thanks to programming RGB and NIR snapshots, and thermal-IR video; (ii) extraction of fix thermal IR images from video files, geometric and radiometric corrections of images, geolocation and mosaicking; (iii) extraction of multispectral data from image files; (iv) computation of vegetation and stress indices from these data; (v) relation of indices to the phenotypic variables acquired at ground level, in planta. The potential added value of an image post-treatment, consisting in image supervised classification is currently studied. Publication of the project results has been actively undertaken in front of different scientific audiences.

PERSPECTIVES

Since Hiri-FAP project produced real methodological breakthrough, transfer in professional context is currently undertaken. This consists of Aliage-fruits Casdar program (2014-2017), which aims at achieving a pre- and post-treatment pipeline dedicated to images acquired and assessing feasibility of imagery procedures in professional context.