

Vineyard pruning weight assessment by machine vision

Évaluation du poids de bois de taille des vignes par un système de vision par ordinateur

Javier Tardaguila

Professor of Precision Viticulture
University of La Rioja. Spain



UNIVERSIDAD
DE LA RIOJA





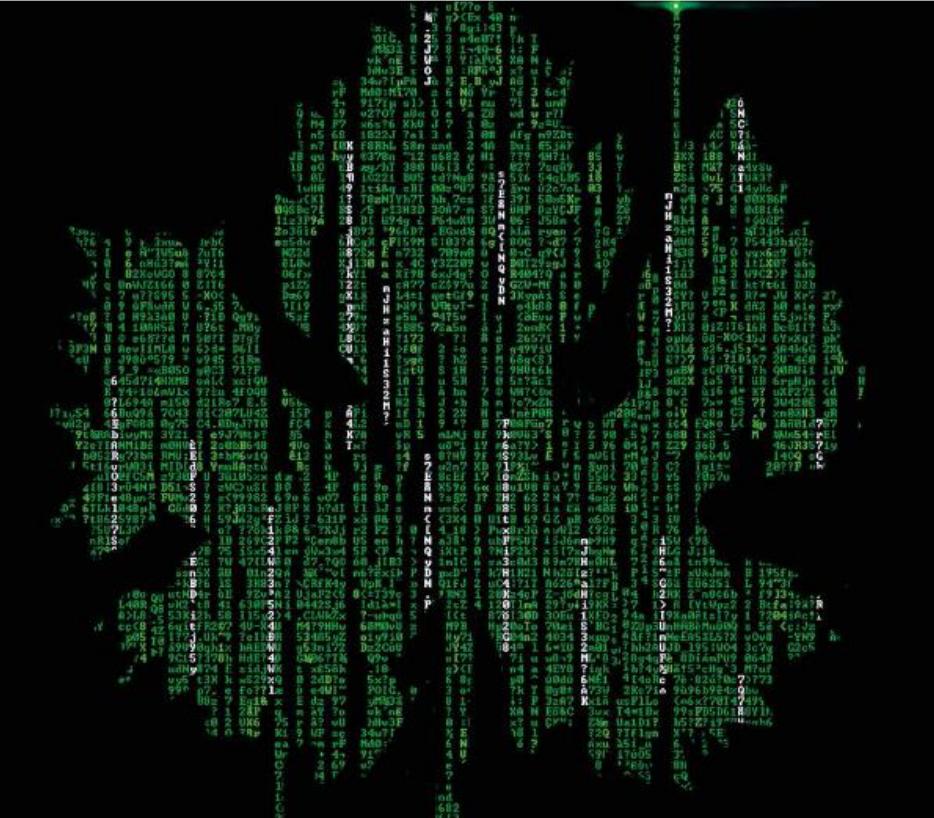
UNIVERSIDAD
DE LA RIOJA

Televitis
DATA-DRIVEN VITICULTURE

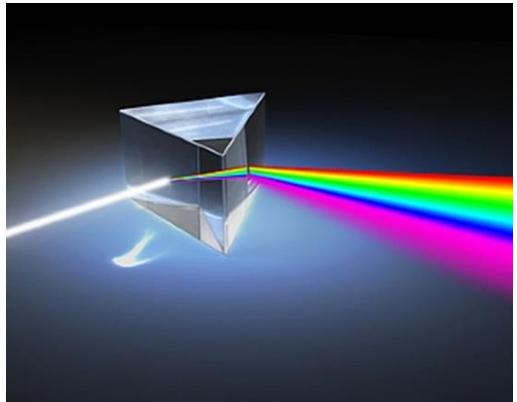


televitis.unirioja.es

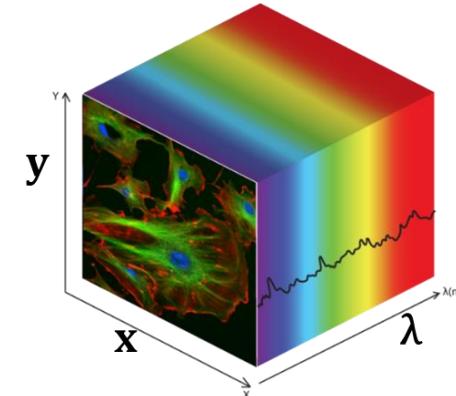
From visual assessment to data-driven viticulture



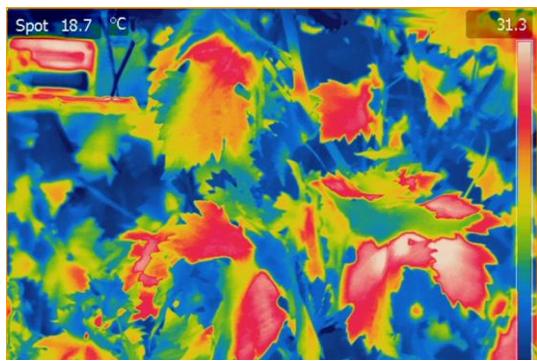
New and emerging non-invasive technologies



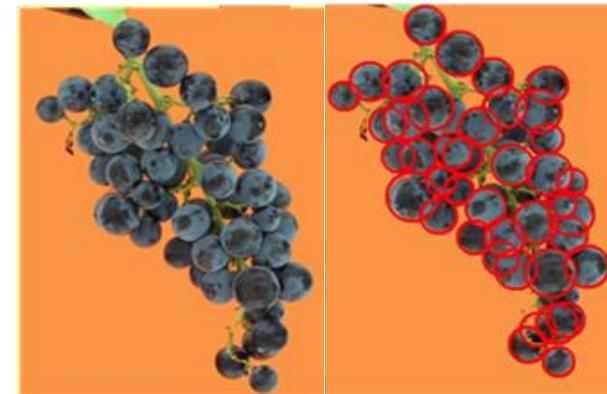
Spectroscopy



Hyperspectral imaging



Thermal imaging



Machine vision

New technologies in precision viticulture



Thermal manual camera



Terrestrial platform



Aerial platform



Vineyard robot



UR UNIVERSIDAD
DE LA RIOJA

Force A
SEE TO ACT



SIVIS

LES VIGNERONS DE
BUZET
S'engager autrement!

Hochschule
Geisenheim
University

UNIVERSITAT
POLITECNICA
DE VALÈNCIA

avanzare
nanomaterials... part of our everyday life

Televitis mobile lab



@ 5 km/h

Televitis

What viticultural parameters can
be assessed using non-invasive
technologies in the vineyards?

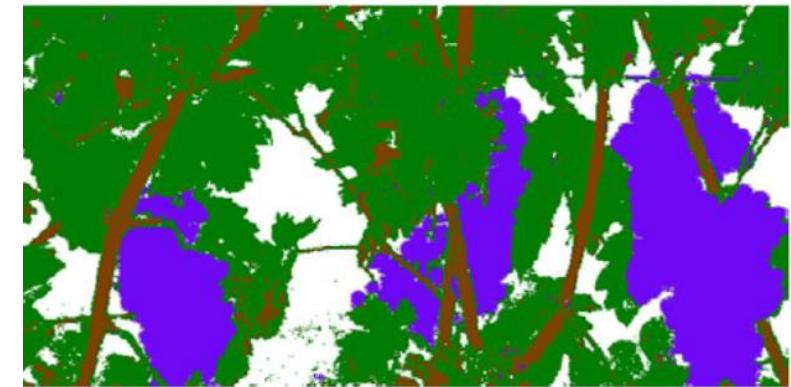
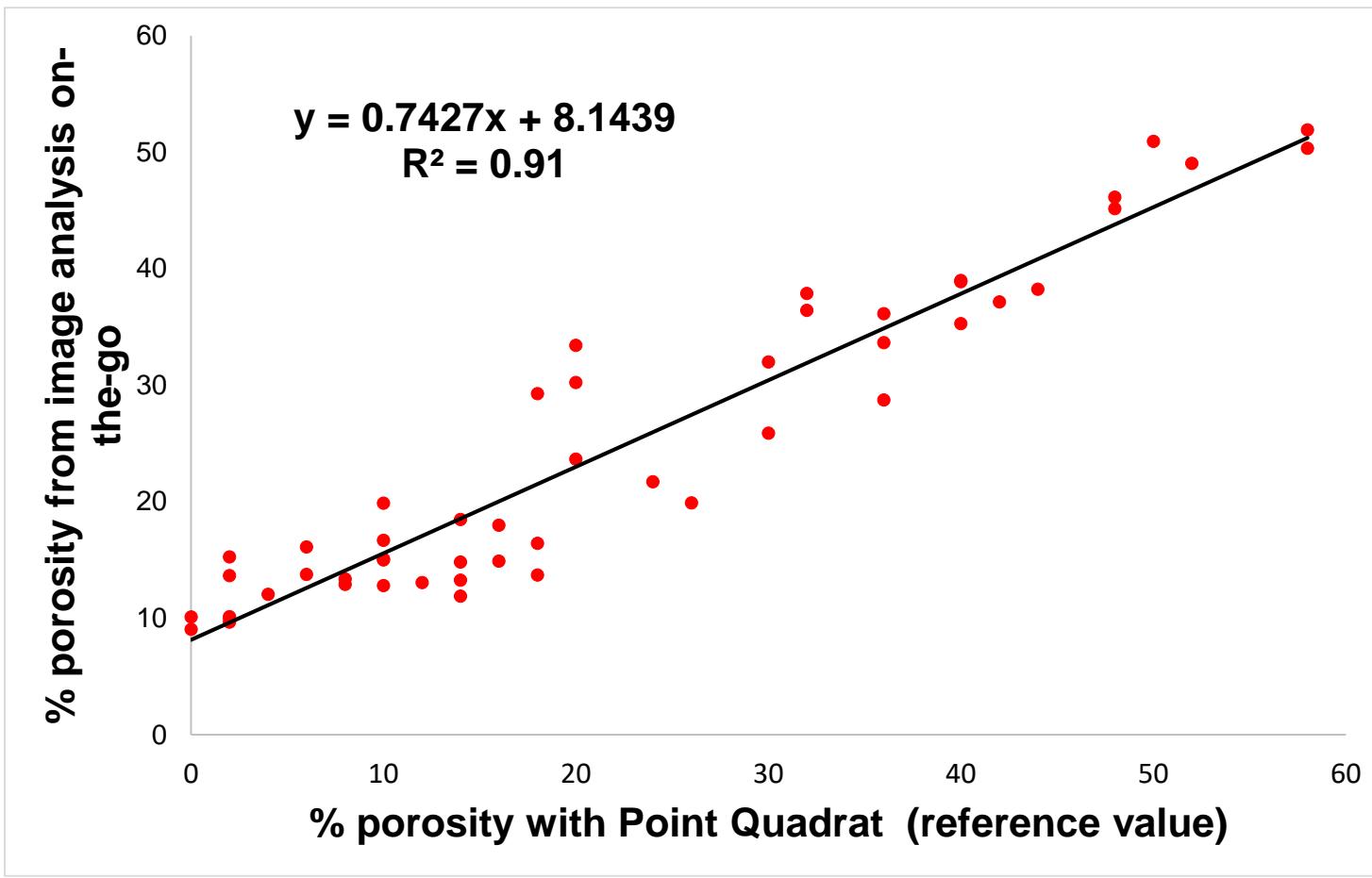
Key viticultural parameters

- Canopy status
- Water status
- Grape composition
- Cluster compactness
- Yield components
- Trunk diseases
- Pruning weight

Canopy status



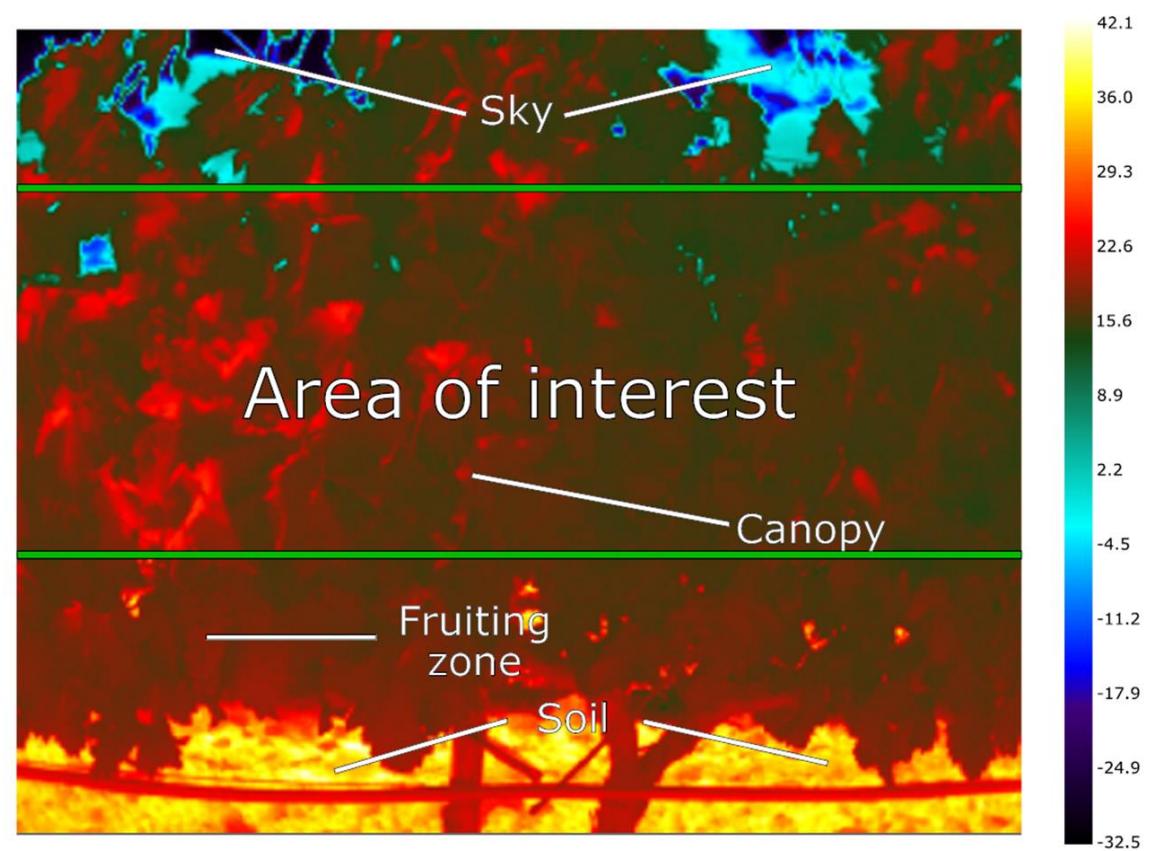
On-the-go assessment of canopy porosity by machine vision



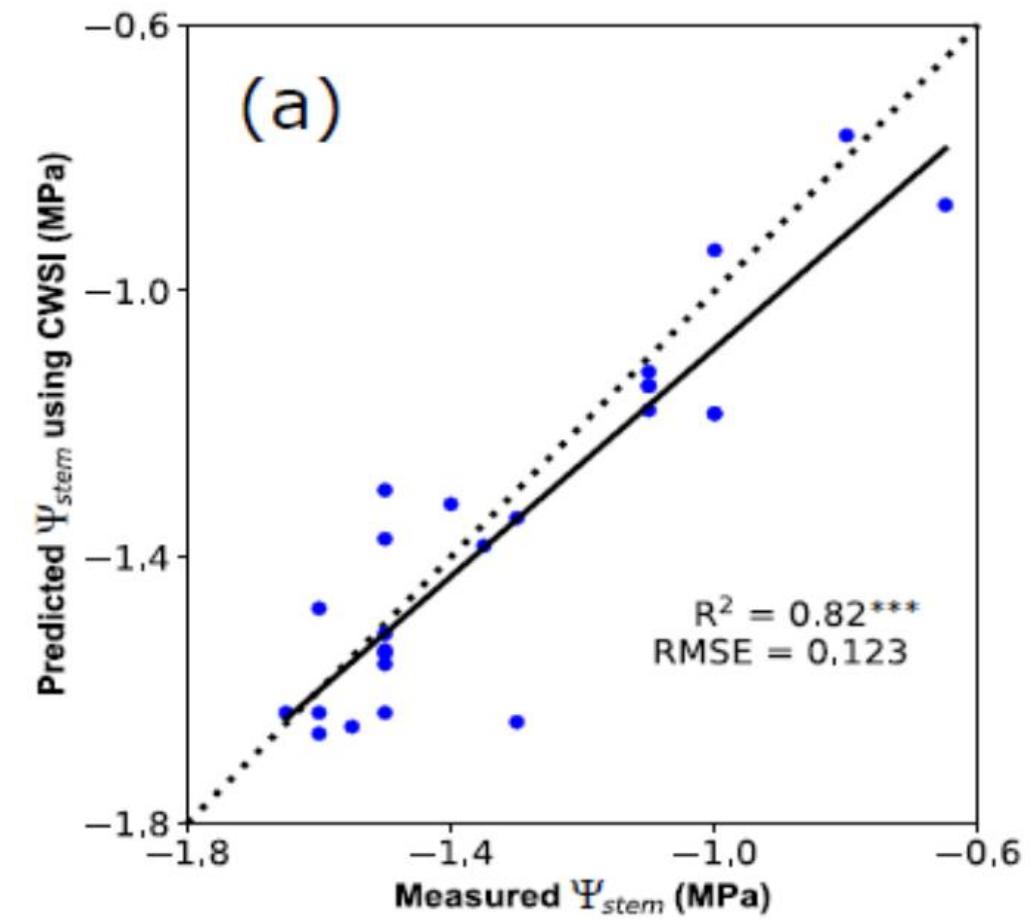
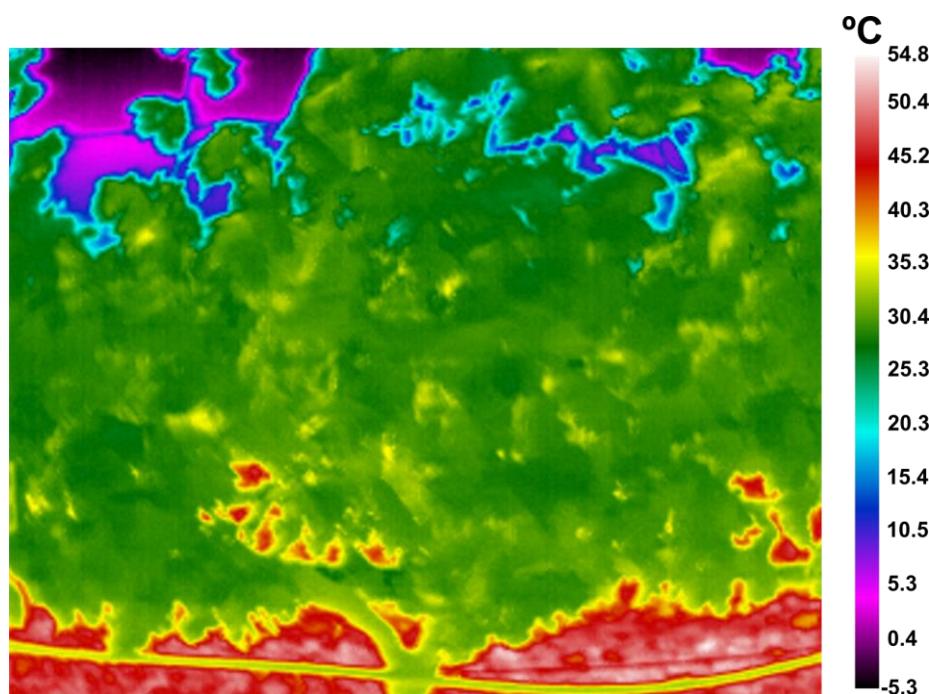
Vineyard water status



Vineyard water assessment using thermal imaging on-the-go



Machine learning and thermal imaging for vineyard water status monitoring



Gutierrez et al. 2018 PlosOne

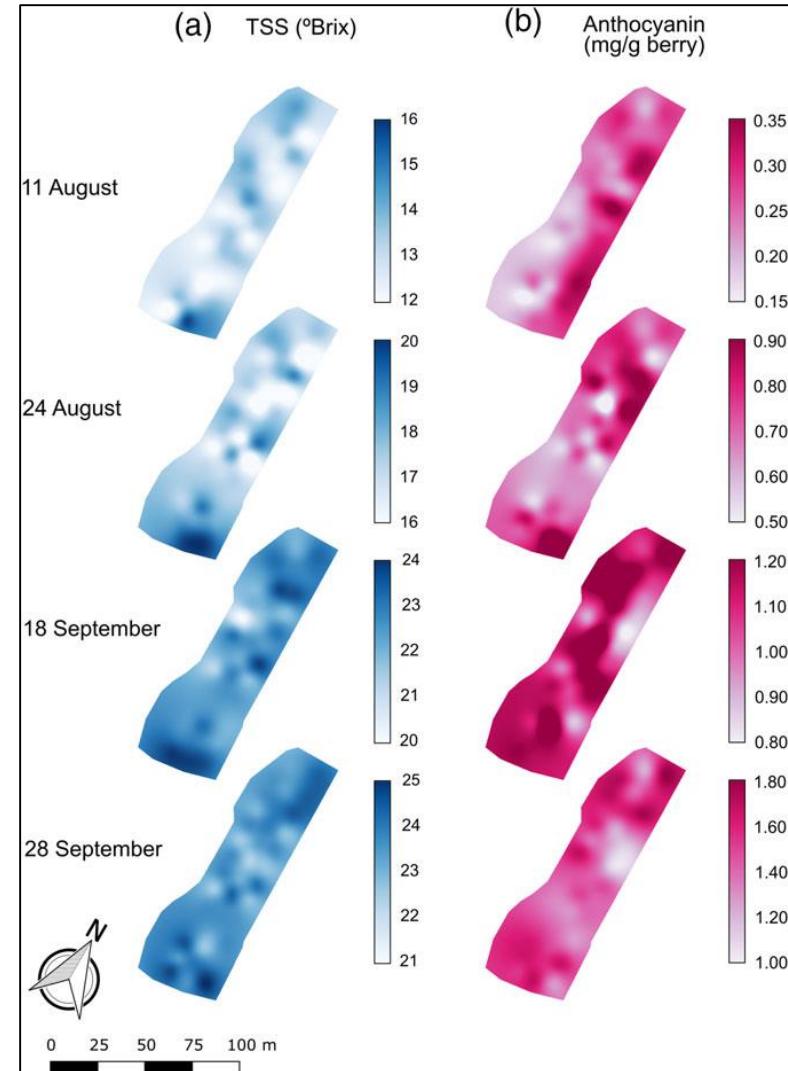
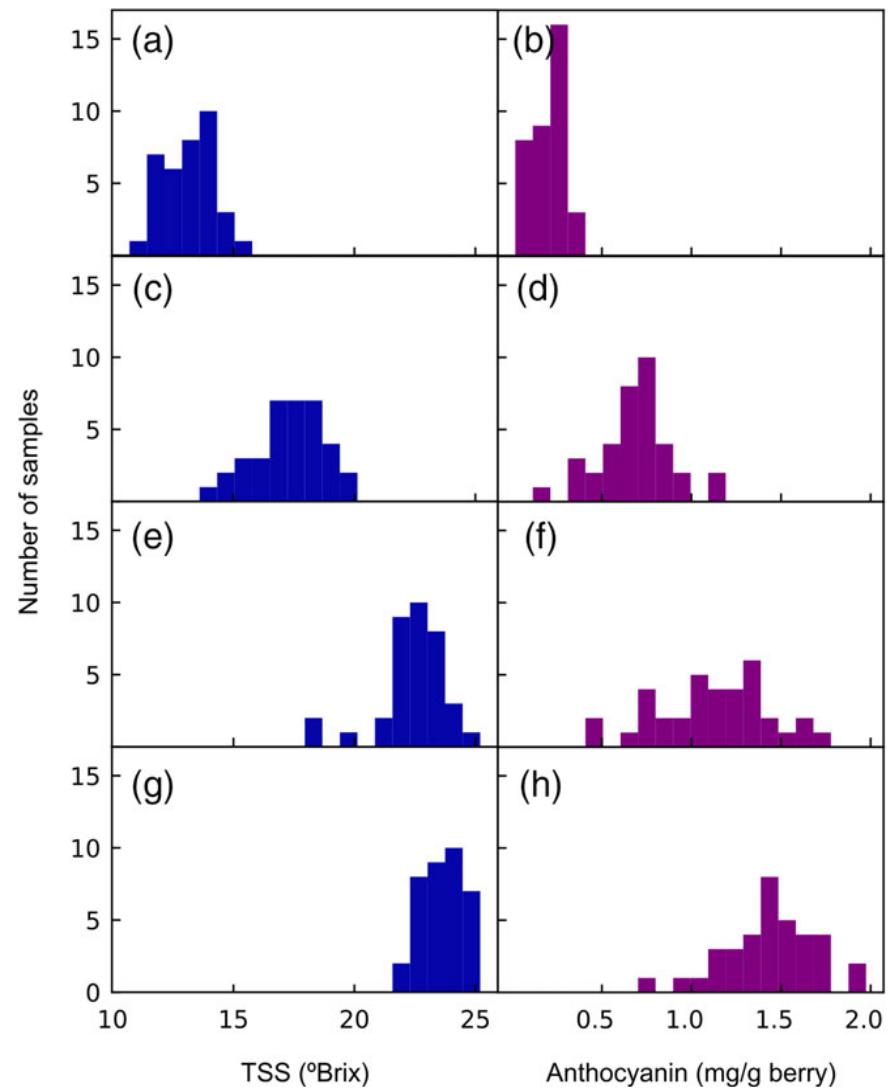
Grape composition



Hyperspectral imaging (HSI) working under field conditions



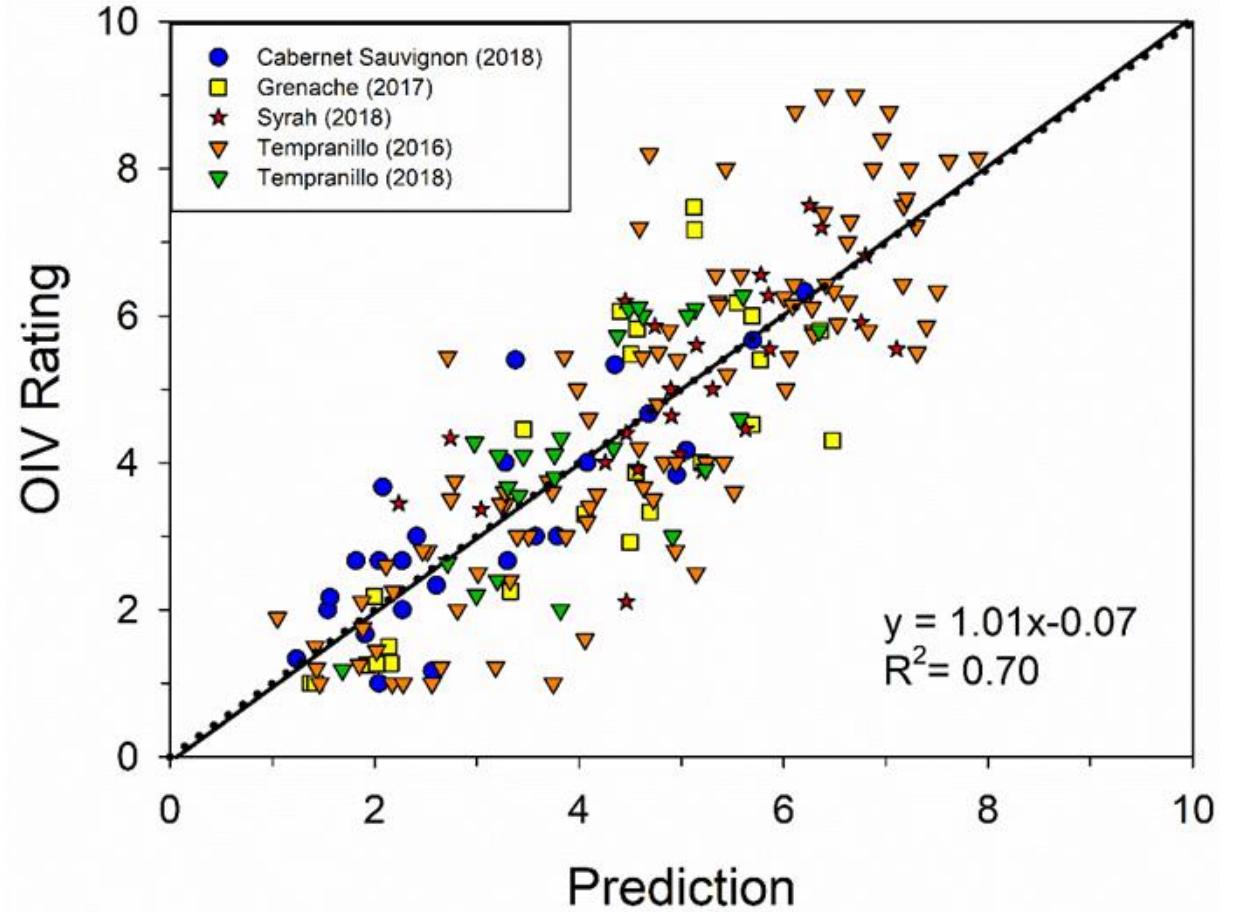
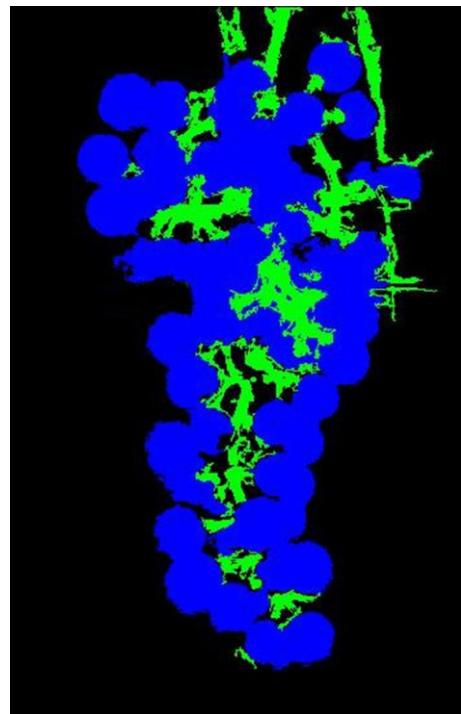
Assessment grape composition under field conditions by HSI



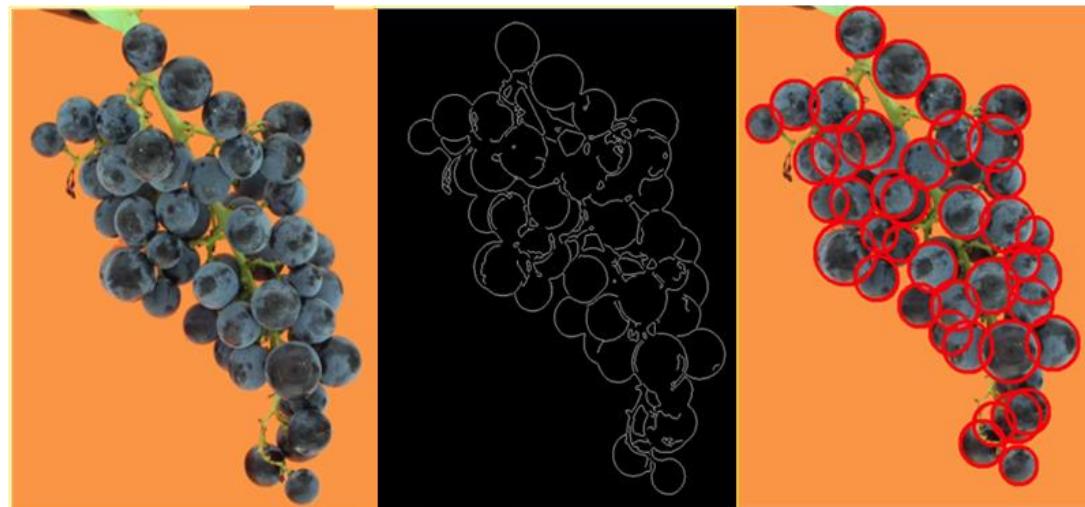
Cluster compactness



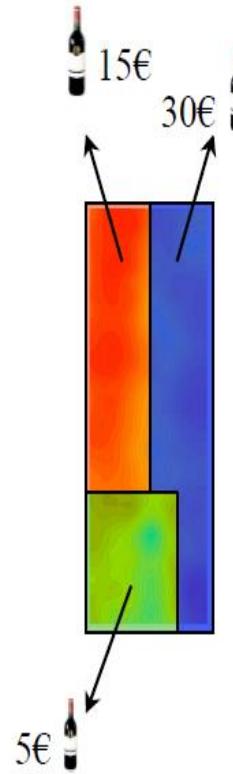
Cluster compactness assessment in commercial vineyards



Yield components



Yield, a key factor for grape and wine sector



**One of the
first worldwide
available Apps
for viticulture**

Download it free!

vitisFlower

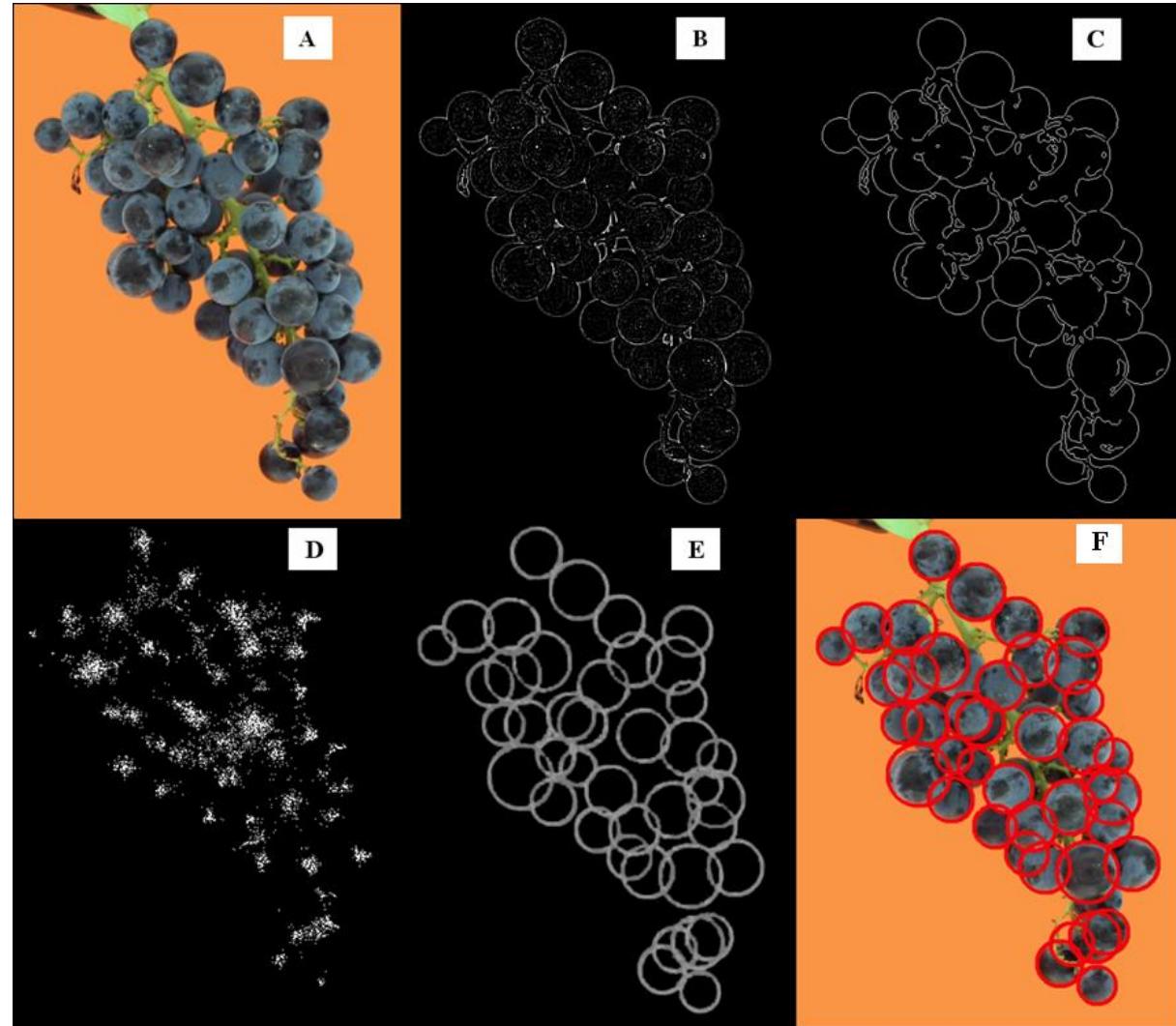
Estimación del número de flores
por inflorescencia de la vid mediante
análisis de imagen

Televitis
VITICULTURA DE PRECISIÓN
televitis.unirioja.es

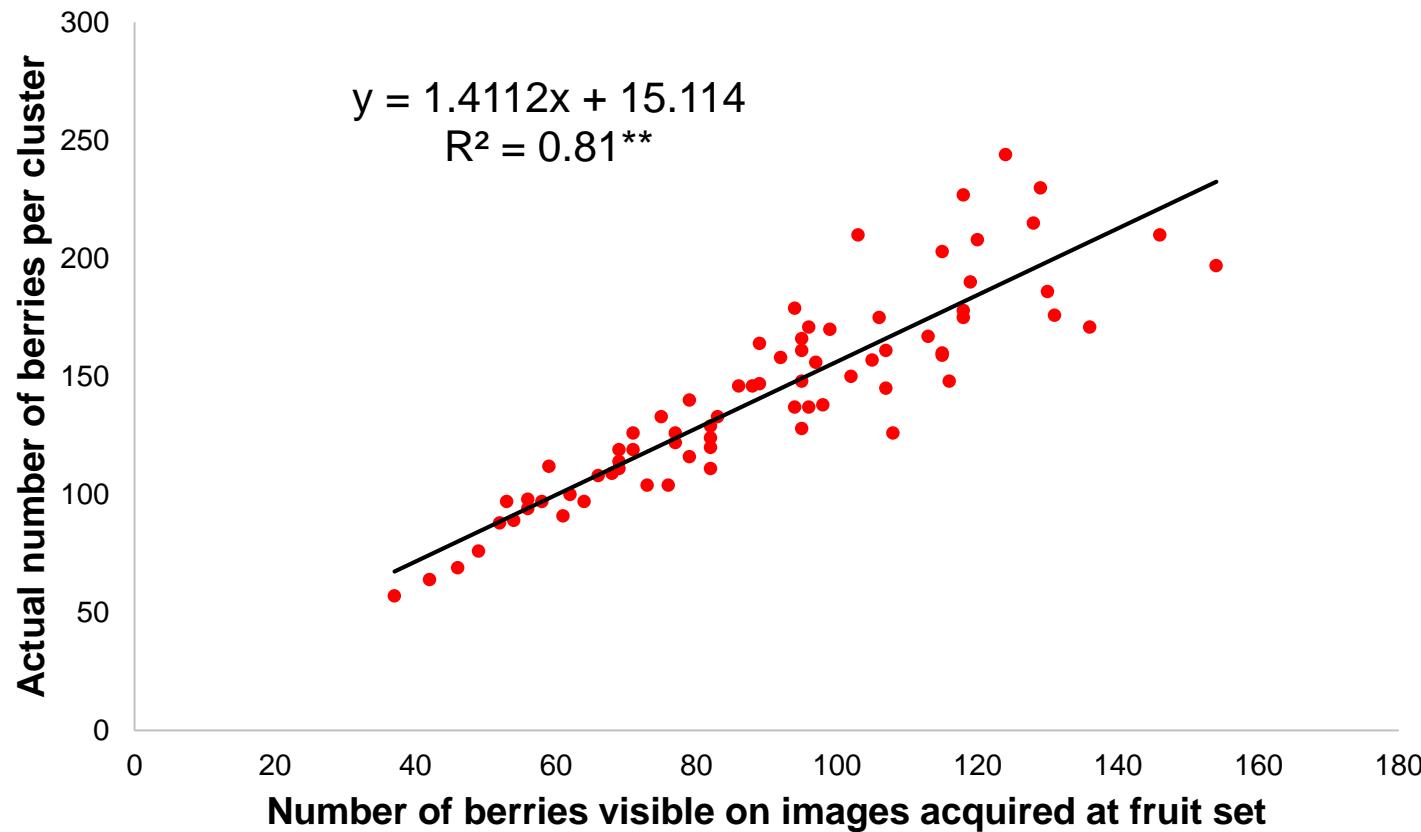
UNIVERSIDAD
DE LA RIOJA

ANDROID APP ON
 Google play

Berry number per cluster by image analysis under lab conditions



Estimation of berry number per cluster by machine vision



Yield assessment from on-the-go image acquisition



Wood pruning weight



Vineyard pruning weight assessment by machine vision: towards an on-the-go measurement system

This article is published in cooperation with the 21th GIESCO International Meeting, June 23-28 2019, Thessaloniki, Greece. Guests editors : Stefanos Koundouras and Laurent Torregrosa

Borja Millan, Maria Paz Diago, Arturo Aquino, Fernando Palacios, Javier Tardaguila 

Vol 53 No 2 (2019): OENO One, 53, 2

Received : 7 March 2019; Accepted : 24 April 2019; Published : 28 May 2019

DOI: <https://doi.org/10.20870/oeno-one.2019.53.2.2416>

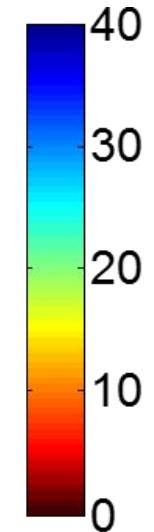
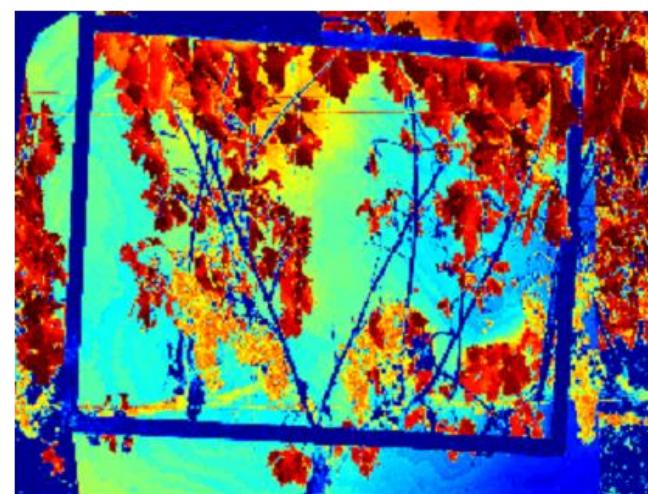
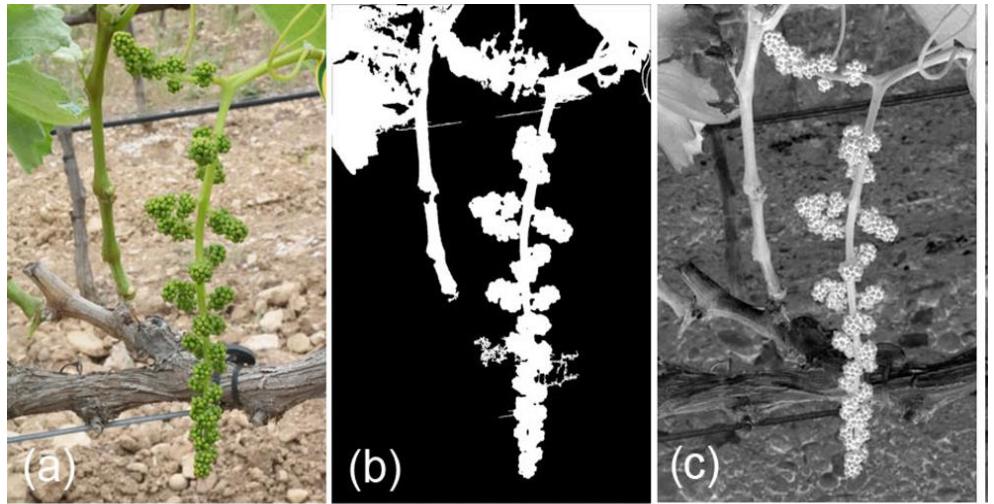


Traditional evaluation of wood pruning weight in the vineyard



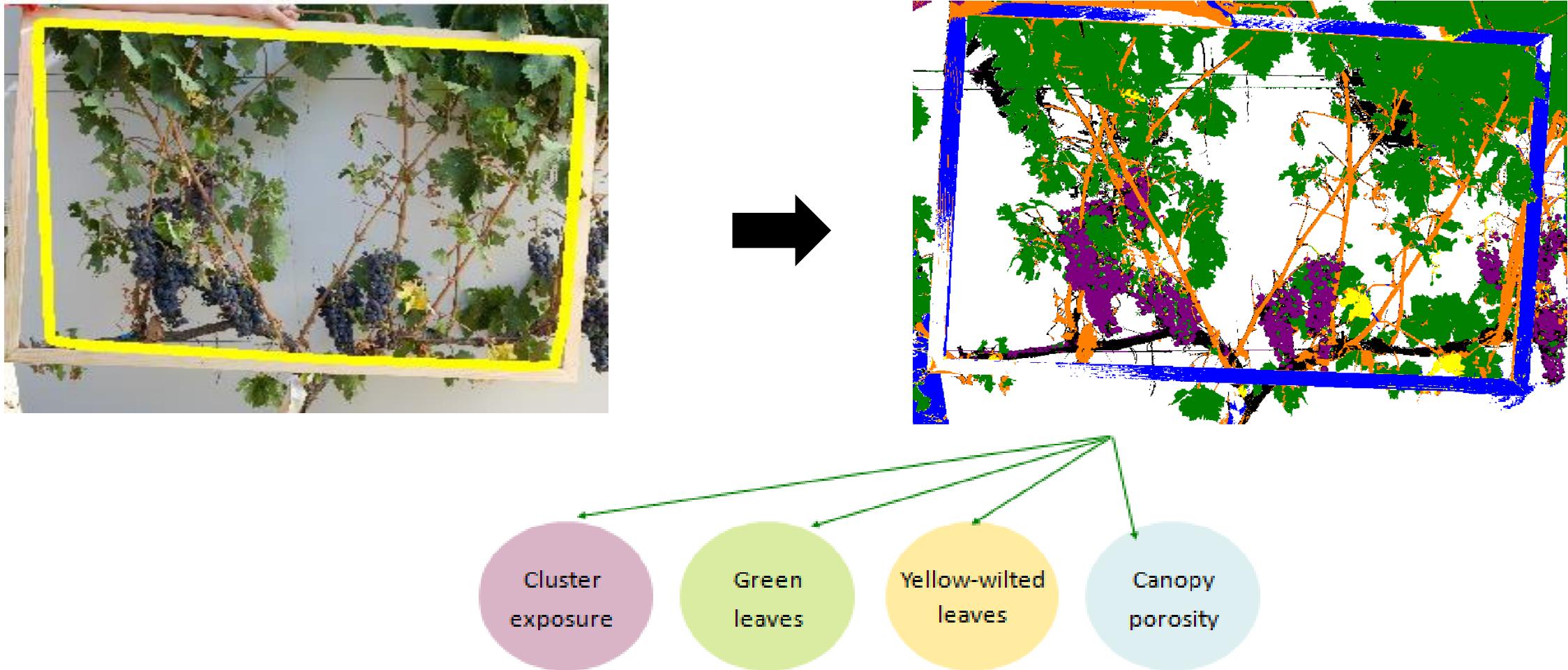
- Manual pruning + Wood weighing
- High labour demanding
- Time consuming
- No commercial assessment

Machine vision in viticulture

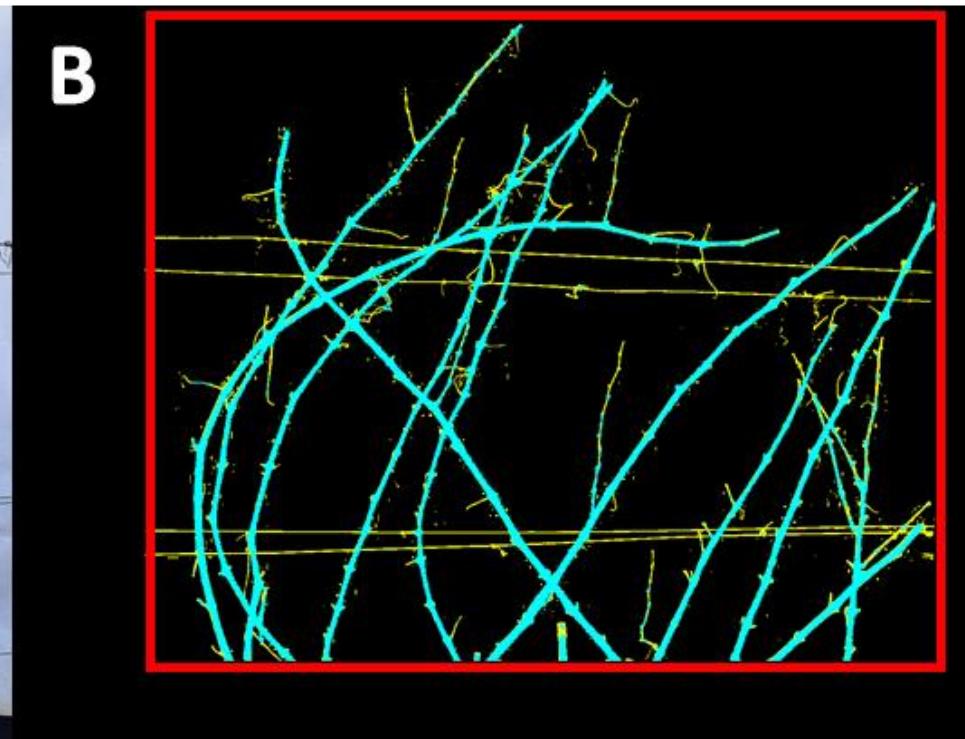


Computer vision is a new technology for assessing key viticultural parameters

Machine vision in viticulture



Manually acquired image with background and segmented image



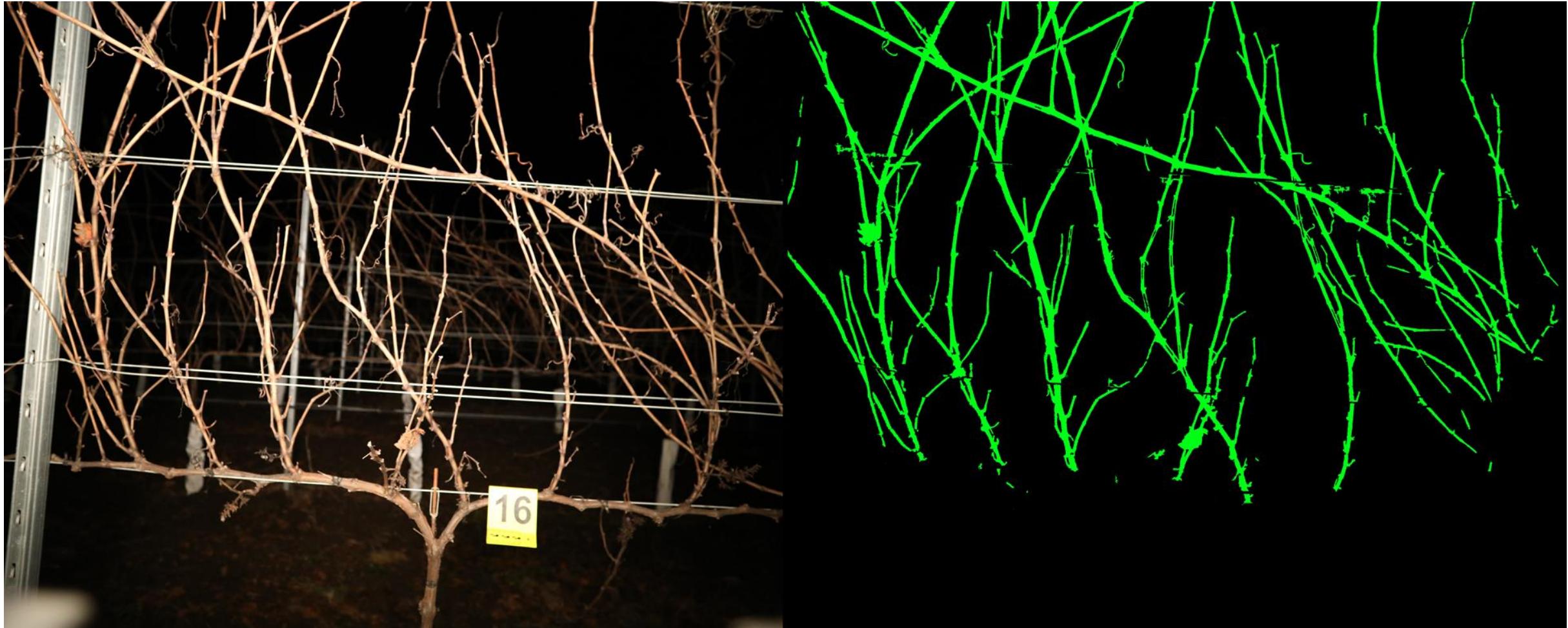
On-the-go assessment of vine pruning weight using machine vision



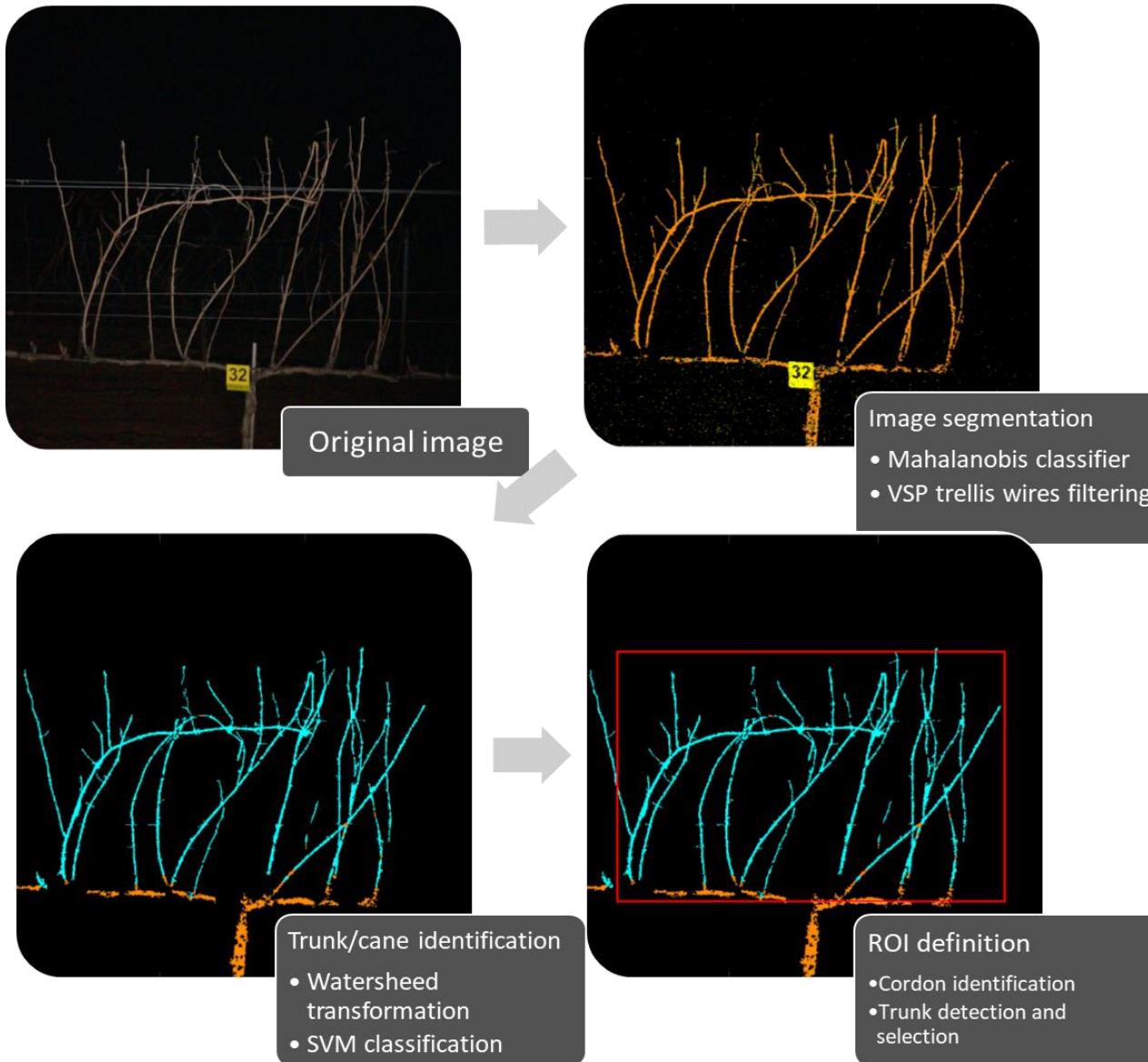
Original image taken on-the-go by Televitis mobile lab



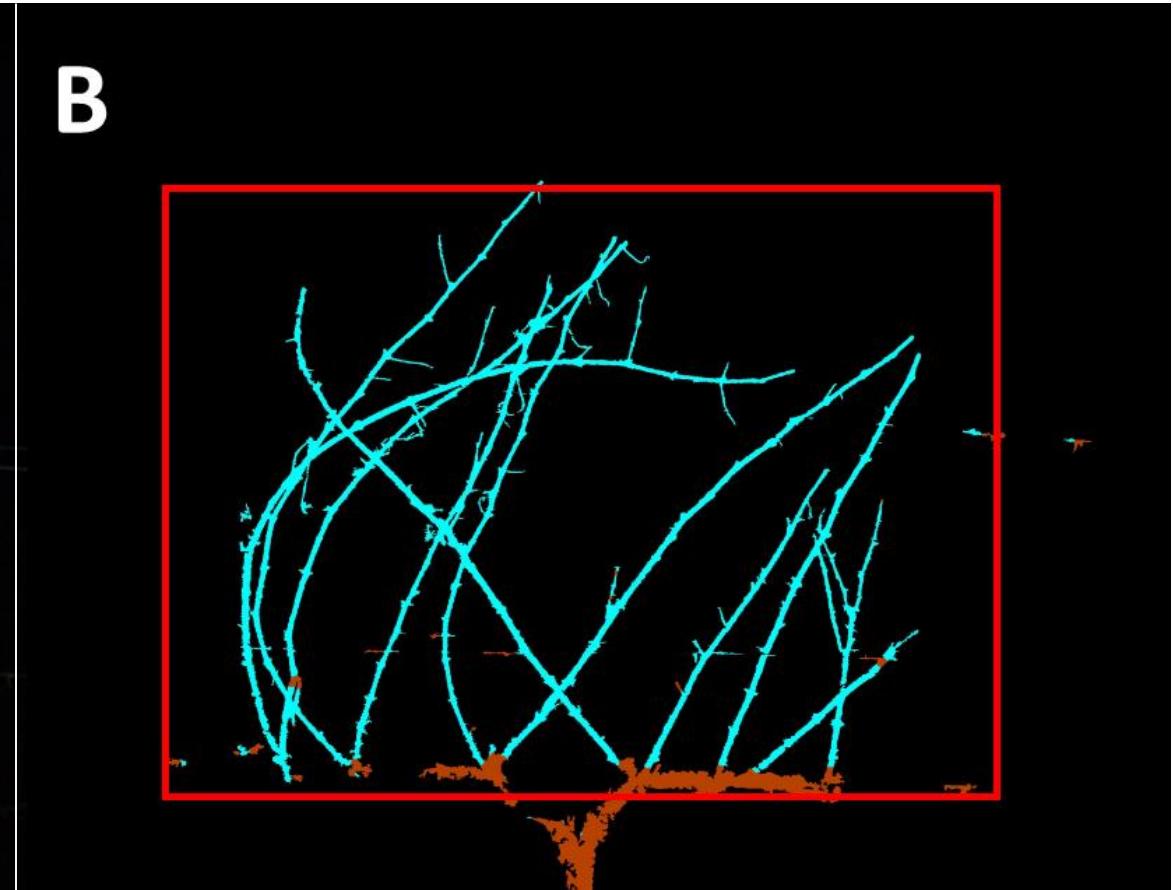
Segmented image for pruning weight assessment



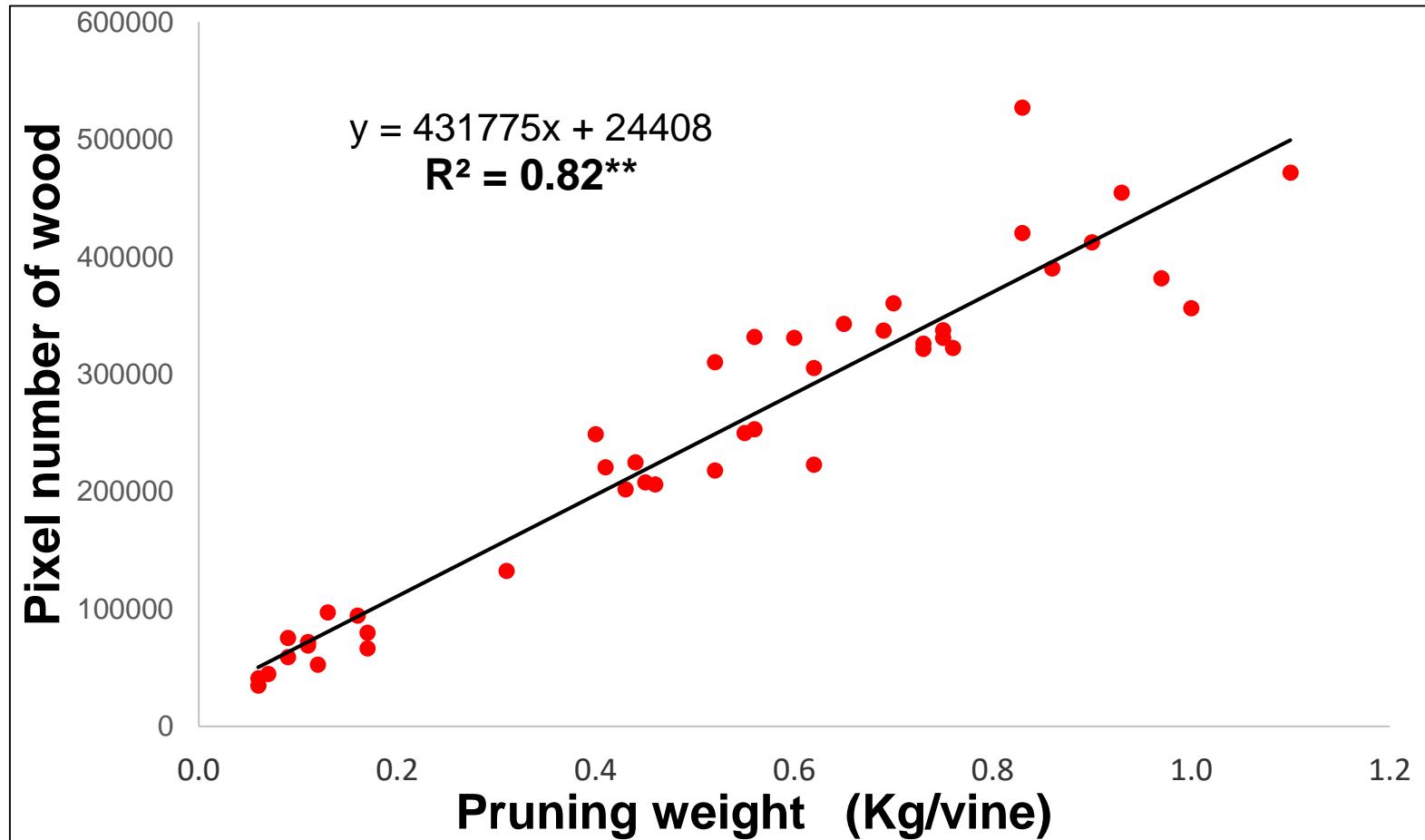
Multi-step automated image processing algorithm



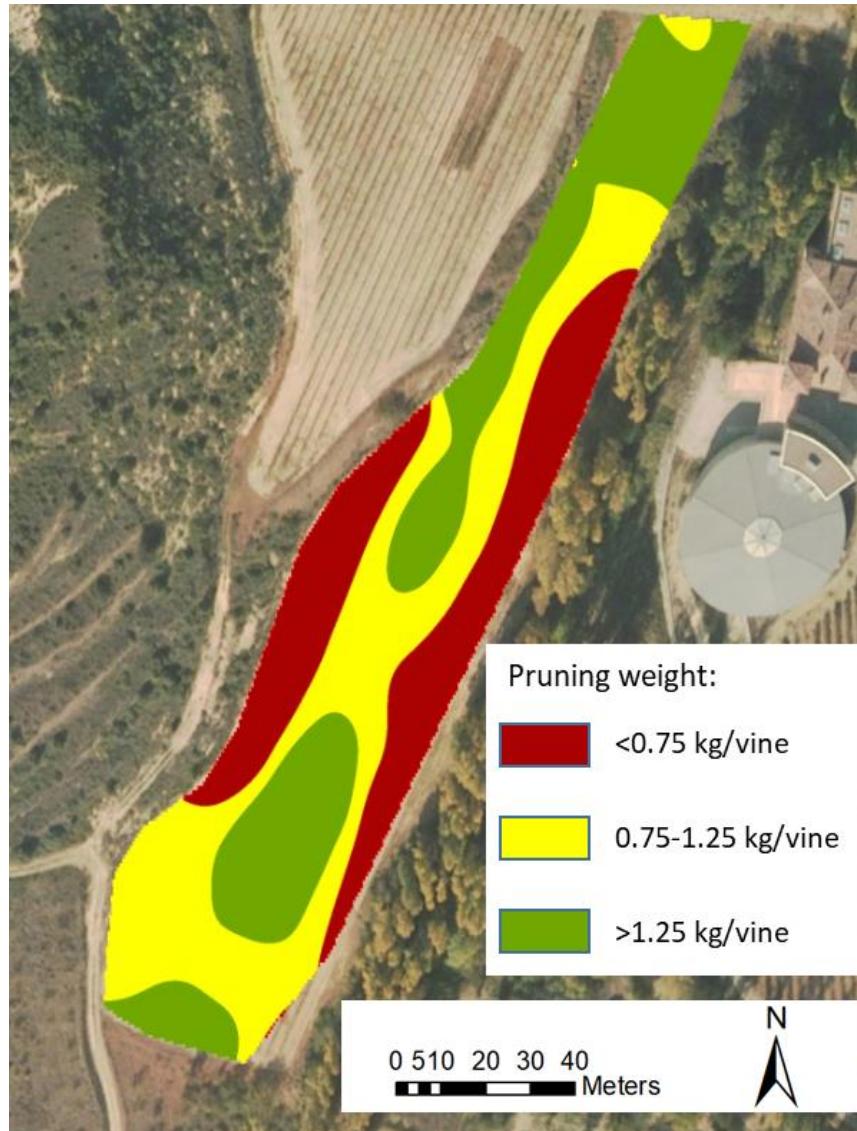
Vineyard in Rioja cv. Tempranillo



On-the-go assessment of pruning weight: cv Tempranillo. Rioja

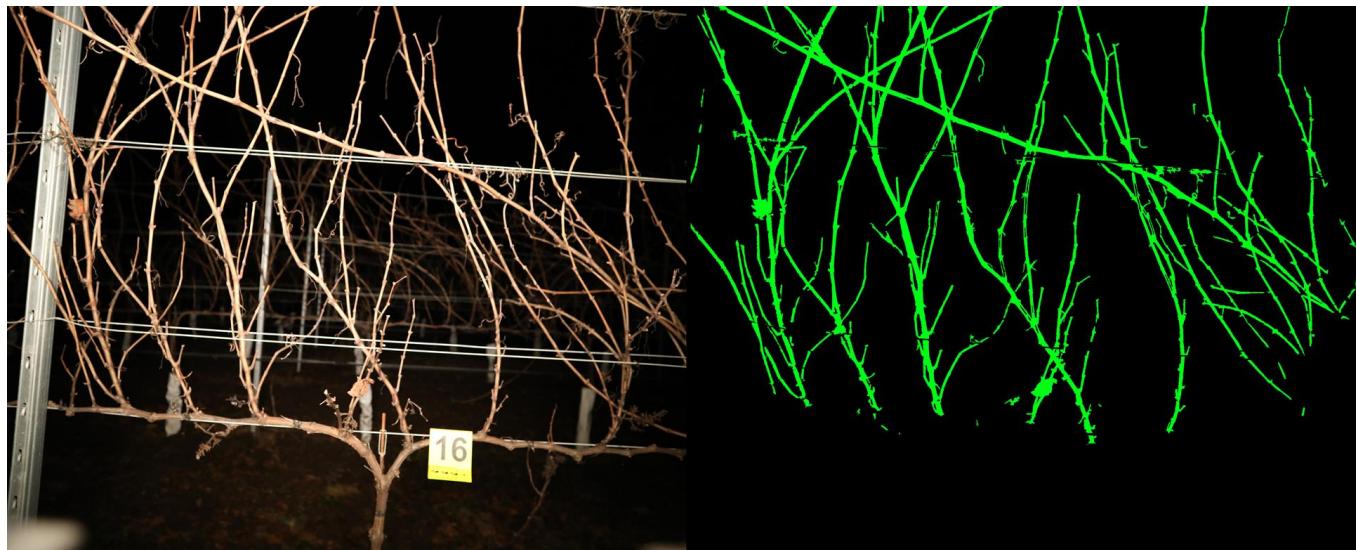


Mapping of pruning weight in commercial vineyards



Conclusions

- ❑ Machine vision can be applied for assessing wood pruning weight
- ❑ Vine vigour can be determined and map using a mobile sensing platform and image analysis





UNIVERSIDAD
DE LA RIOJA

Televitis
DATA-DRIVEN VITICULTURE

Merci beaucoup pour votre attention !



televitis.unirioja.es

javier.tardaguila@unirioja.es