

FIG

# FIG WORKING WEEK 2017

Helsinki Finland

29 May - 2 June 2017

*Presented at the FIG Working Week 2017,  
May 29 - June 2, 2017 in Helsinki, Finland*



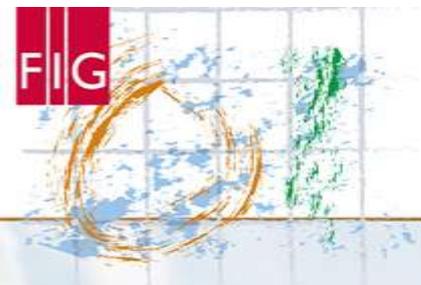
Surveying the world of tomorrow -  
From digitalisation to augmented reality

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## Drone in Agriculture: A start-up case study in Ragusa

Daniele **BRANCATO**, Cromwell **MANALOTO**,  
Alessandro **DALMASSO**, Luca **DALBUONO**.

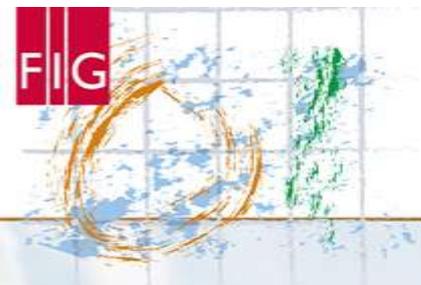


Consiglio Nazionale  
Geometri e Geometri Laureati



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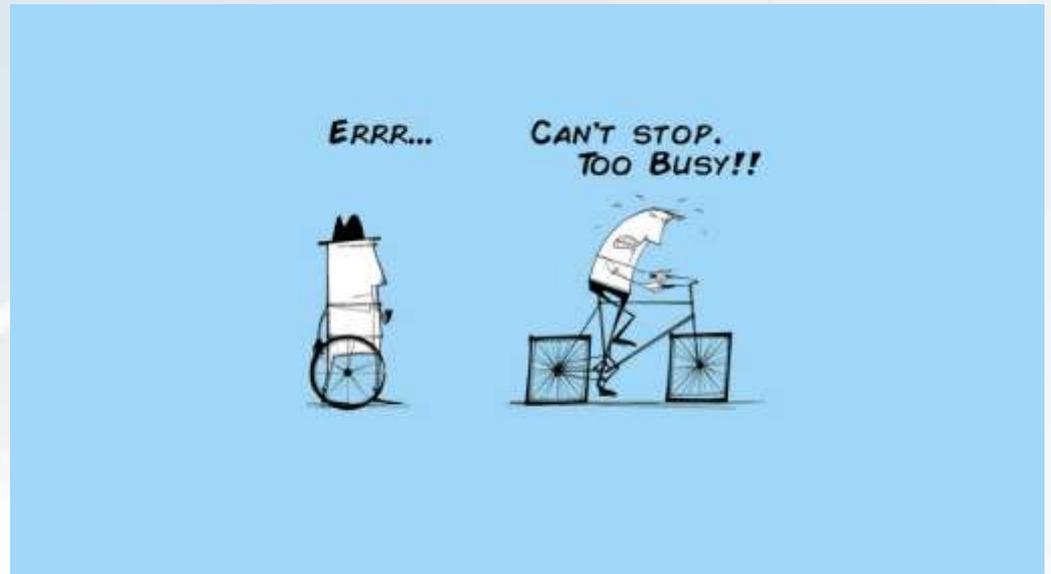
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The Figure of Surveyor is tasked to improve, Buying new equipment or start to think of new work techniques

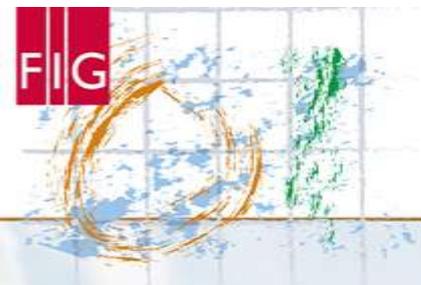


Our proposal is to Create a new opportunity, that does not require high costs, maintaining excellent professional results.



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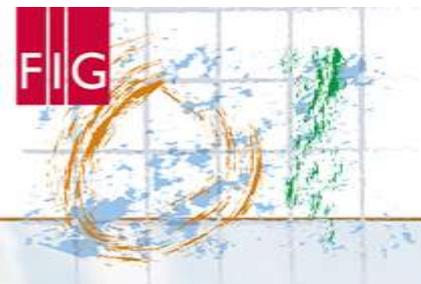
Our idea is the use of drones as a primary tool to service small and medium enterprises.

Monitoring Crop management, analysis vegetation and plants' health.



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A drone is an aircraft or a helicopter-shaped flying object which flies by radio waves as unmanned aerial vehicle or remotely piloted aircraft.

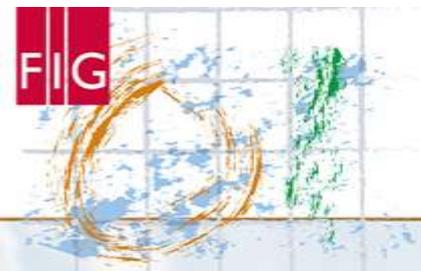
Initially developed for military purpose such as combat or reconnaissance.

Now used in diverse parts including leisure, observation, agriculture



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Drone can be classified in two types "Fixed wing drones" and "Rotary wing drones". The choice was based largely on its ease of use and because of its basic standard package also resulted to be cost-efficient (€. 460.00 for the standard package, €. 850.00 for the professional package).

		
Projects	Mapping	Small area mapping & inspection
Applications	Land surveying (rural), agriculture, GIS, mining, environmental mgt, construction, humanitarian	Inspection, cinematography/ videography, real estate, surveying (urban), construction, emergency response, law enforcement
Cruising speed	High	Low
Coverage	Large	Small
Object resolution	cm/inch per pixel	mm per pixel
Take-off/landing area	Large	Very small
Flight times & wind resistance	High	Low

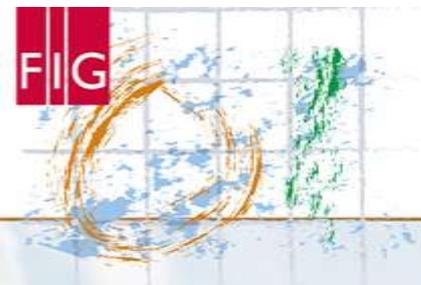
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Operating a drone require a skilled and certified professional. The professional or drone operator in Italy should also be complaint to the new (unfortunately, changing) norms on aviation as prescribed by ENAC



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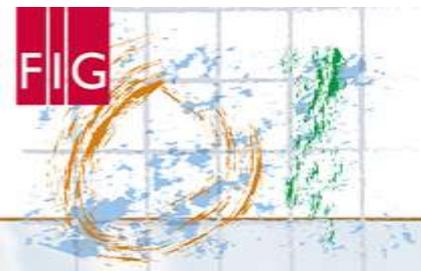
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As for data acquisition, we are in touch with an Italian Company that could provide both hardware (NDVI camera) and software (post processing)



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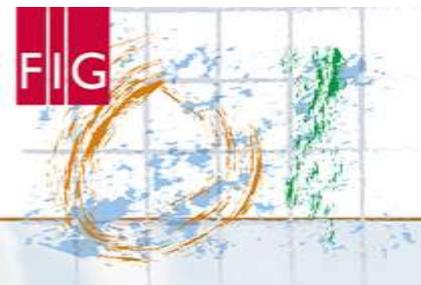
Our start-up focuses on small-medium scale plantations and agricultural fields, which are easily covered in shorter period of time of flight.

The choice of collaborating with small and medium enterprises was easily undertaken since most agricultural fields in Italy are managed by family-run businesses.



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## Our Project

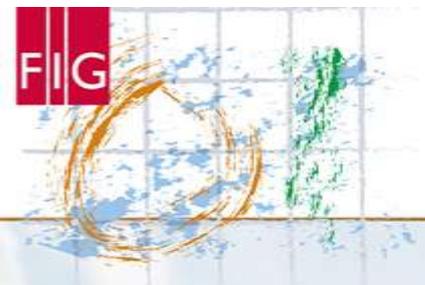
The main purpose is to work in cooperation and collaboration with small and medium agricultural enterprises, optimizing the use of drones and cameras as main tools.

Analyzing the life of trees using NDVI multispectral cameras, and optimize the distribution of resources.



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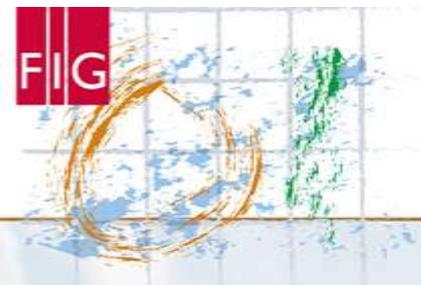
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A recent case study noticed a serious risk of rapid drying of olive trees in all mediterranean's country due to the presence of **Xylella Fastidiosa (Xf)**.



The olive that has been infected is expected to die immediately as soon as the bacteria reaches inside its vascular system. This infection could be identified by chromatic changes on the leaf and branches, so an analisis done by this method should give us a rapid survey in which infected trees are shown.



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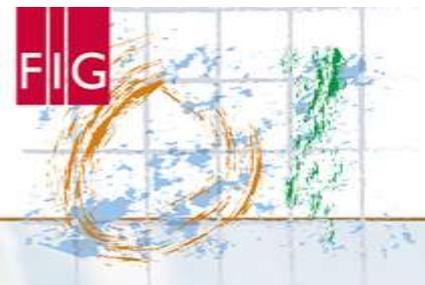
Such findings are definitely alarming. Considering that 95 % of the olive oil production in Italy is found on its Mediterranean regions, and Italy is the 2° olive oil producing country in the global market, Xf is a serious threat for the production and gravely limits cultivation of Olive trees. Without an effective control measure is essential to identify and prevent plant contamination.

Identify the first stages of the problem, with prevention and control is a good step also signifies investing time and money.



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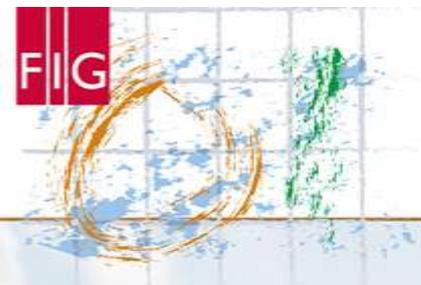
## The Project

We took information about the production process of an enterprise in Sicily, Southern Italy, specialized in the production of Organic olive oil. The study subject is a Company Known as «Furgentini», producing Quality olive oil since 1980, in continuous improvement, gaining awards and recognition on the National level.



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The Company's clientele consists not just of local restaurants and private entities, but also on a national scale. During Our initial inspection in the company we learned:

- ✓ Annual production between 3/5 metric tons of organic olive oil,
- ✓ Olive harvesting and the production has been kept on Traditional methods by manual techniques,
- ✓ There are around 2000 olive trees in their lot.

Analyzing these data we knew that

30/40 days to control every plants for eventual presence of VIRUS or problems

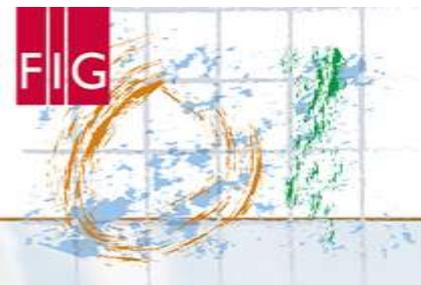
Harvesting takes about 2 months (from Sept. to Nov.)

*With our method we shift from 30 days to 1 week «overfly + post process»*



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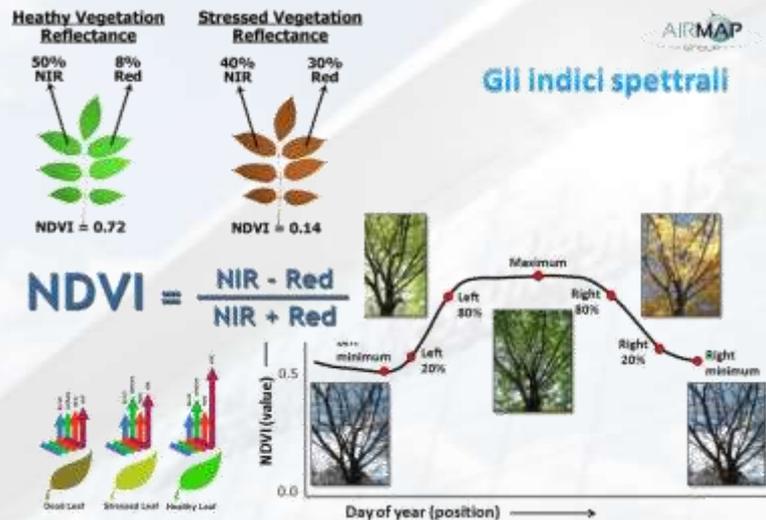
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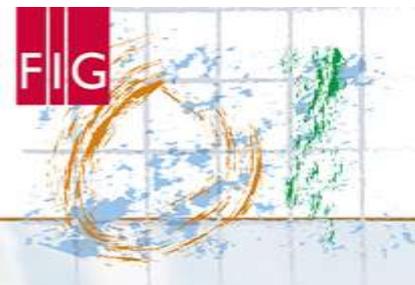
Our study focused on the use of multispectral cameras with NDVI “Normalized Difference Vegetation Index”

The most common technique to study and analyze vegetation and it relates to the presence of chlorophyll in plants.



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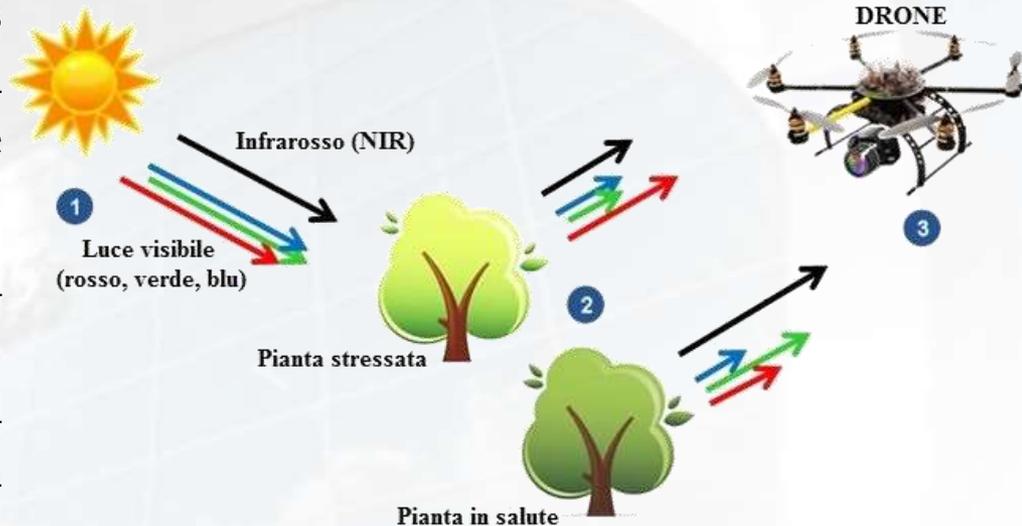
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Biological elements as Virus, bacteria, fungus, insects, etc..., abiotic elements like drought pollution, frost, hailstorm, or mechanical injury are stress factors for the trees.

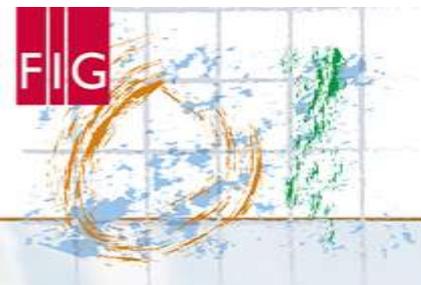
These elements can determine an alteration on the plant's health and his production, with negative effects for the Company

By providing aerial imagery and relative analysis for each flight, the company can identify which problems are present and which actions should be done to address them.



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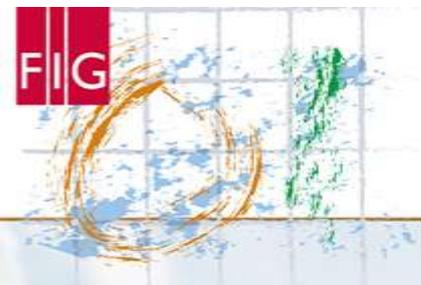
## *Advantages:*

- ❖ Fast and economic *“the enterprise reduce the survey time”*,
- ❖ Frequent multiple monitoring *“the process can be repeated over a certain period of time”*,
- ❖ Historical data, also for probable damage estimate,
- ❖ Could be integrated with difference analysis techniques *“ex. Point cloud”*
- ❖ Initial low cost investment,
- ❖ Guarantees the health condition of the plants during the trade process.



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## Thank You for your Attention



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