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High-level forum on Digital Agriculture "2gether 4 Strong Digital Agriculture"
April 19th 2018. Sofia, Bulgaria

Increasing the viability of sown biodiverse pastures through optimization of phosphate fertilization

Operational Group

Presented by:
Nuno Rodrigues
Terraprima






Sown Biodiverse Permanent Pastures Rich in Legumes

A Biodiversity Engineering innovation by David Crespo



Permanent, because they are self-maintained during at least 10 years (in some cases, 25 years)

Sown, because improved and selected seeds are introduced (by sowing)

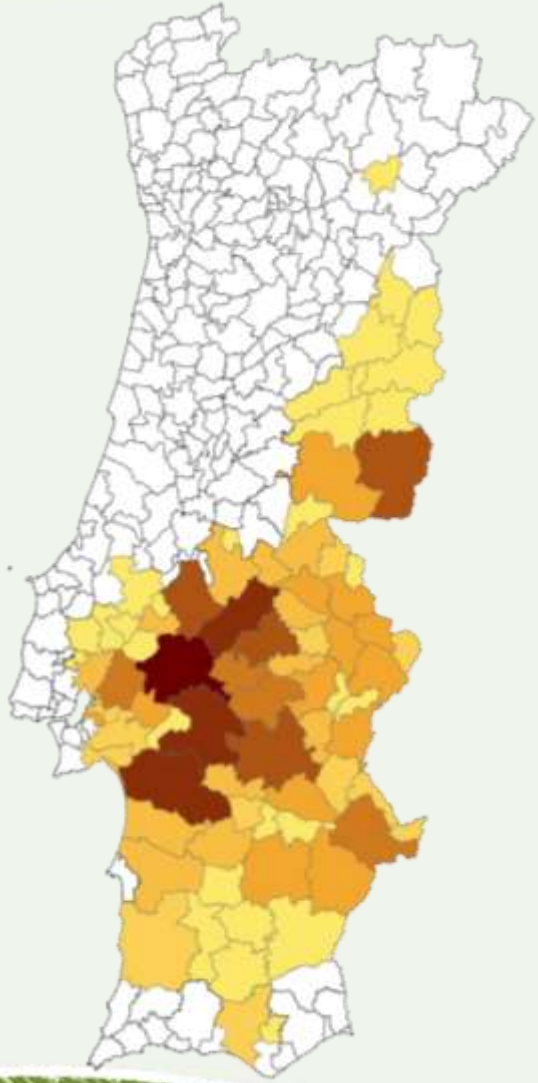
Biodiverse, because up to 20 species or varieties are sown

Rich in Legumes, because many plants are legumes, which are a “natural factory” of nitrogen, avoiding the use of synthetic fertilizers



Project Sown Biodiverse Pastures

Project Terraprima/FPC 2009-2014



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Fundo português de Carbono



Sown Biodiverse Pastures

# Farmers	1 000
Area	50 000 ha
CO_2 sold to Portuguese Carbon Fund	1 Mton
Amount paid to farmers	6.6 M€

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International acknowledge

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European Commission

CLIMATE ACTION

European Commission > Climate Action > Newsroom > Articles

Portuguese project wins World You Like Challenge

08/11/2013



The Portuguese project Sown Biodiverse Pastures has won the European Commission's World You Like Challenge competition for the best solutions to climate change. Connie Hedegaard, European Commissioner for Climate Action, announced the winner at the Sustainia Award Ceremony in Copenhagen last night.

Sown Biodiverse Pastures was crowned overall winner of the Challenge for its innovative approach to reducing CO_2 emissions, soil erosion and the risk of wild fires while increasing the productivity of pasturelands.

ETS Regulatory Updates

Roadmap 2050 moving to a low-carbon economy



2014 National winner of the Energy Globe

Dryland Champions

2013 Honoured Dryland Champion by the United Nations

UNCCD

2012 Land for Life award semi-finalist

GREEN PROJECT AWARDS

2011 Green Project Awards Menção Honrosa nos

Operational Group: Increasing the viability of sown biodiverse pastures through optimization of phosphate fertilization

Objectives:

- Implement tech-based low-cost methods for **evaluating real phosphorus needs**, optimizing the use of fertilizers
- Demonstrate positive impacts on **yield** and **environmental benefits**
- Disseminate results to farmers and consultants and **provide fine-tuned recommendations for efficient phosphorus fertilization**

Expected results:

- A low-cost and expedited technologic approach for obtaining **variable rate prescription maps for phosphorus** fertilization in pastures
- **Increased pasture productivity and decreased production cost** by providing optimal fertilization recommendations

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Experimental farms and partners



- **12 partners** out of which **8** are **experimental farms**

Farm	Cattle production
Quinta da França	Beef cows and Dairy Sheep
Tapada dos Números	Beef cows
Finca Cubillos	Beef cows
Herdade dos Padres	Beef cows and Beef Sheep
Herdade da Mitra	Beef cows
Herdade das Murteiras	Beef Sheep
Herdade do Azinhal	Beef Sheep
Herdade dos Grous	Beef cows and Beef Sheep

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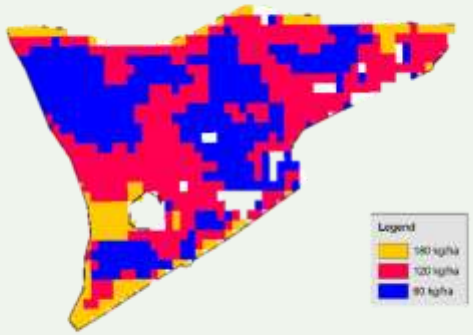
Project workflow: May 2017 to April 2021

Data collection and analysis





Prescriptive fertilization maps



Variable rate fertilization





Data collection: Spectral data and field data calibration

- Obtaining the **altimetry of 25 ha plots and producing 3D model**, using drones and RTK GPS**;**
- **Spectral measurements** with “OptRx” sensor, “Grassmaster II” probe and ASD FieldSpec3 spectrometer
- **Soil electrical conductivity measurement** with “Veris 2000 XA” sensor and “Dualem 1S” sensor
- **Soil and vegetation systematic sampling**

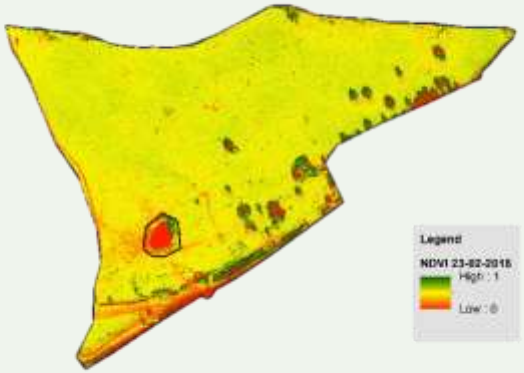






Data analysis, prescriptive maps and fertilization

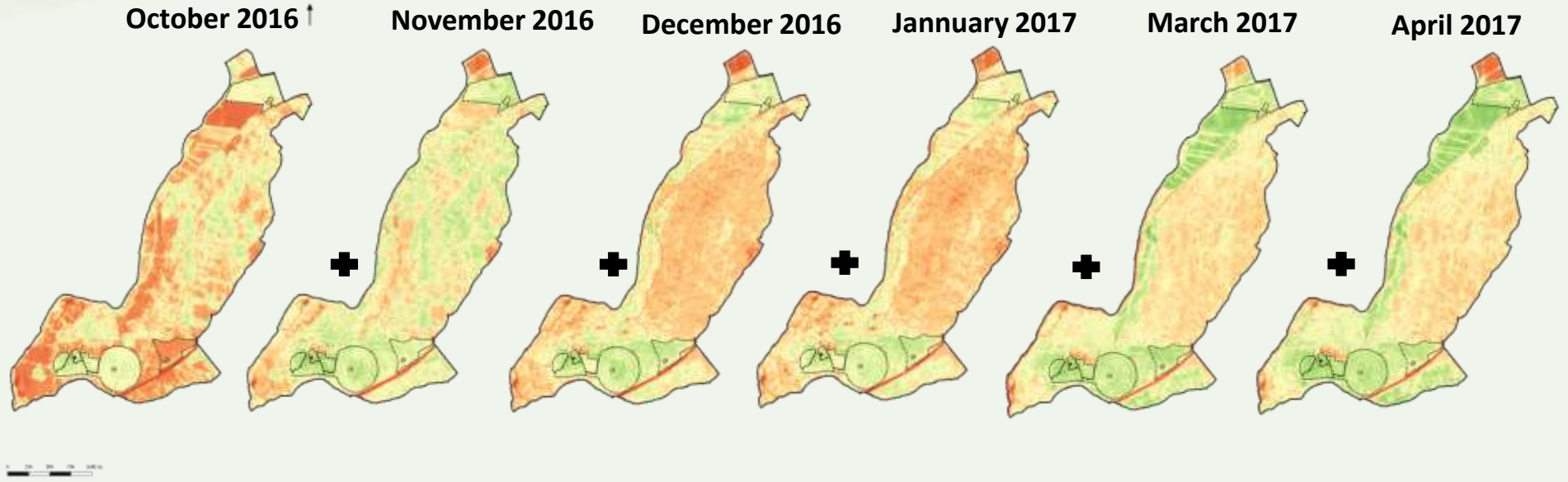
- **Producing vegetation indices maps, using satellite** (Sentinel 2) and **drone images**
- **Correlation model: field – drone – satellite**,
- **Soil capacity maps for phosphorus**
- **Prescription maps**
- **Conventional fertilization** vs. **Differential fertilization** using **Variable Rate Techonology**
- **Pasture assessment and spectral measurements**

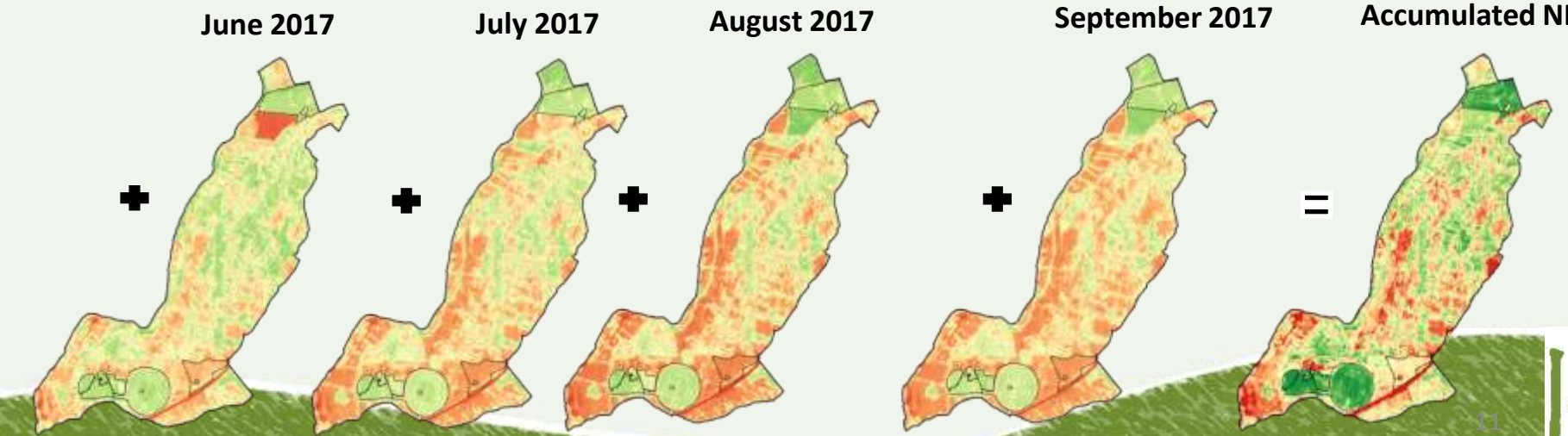






First results: Automatic prescriptions using satellite images

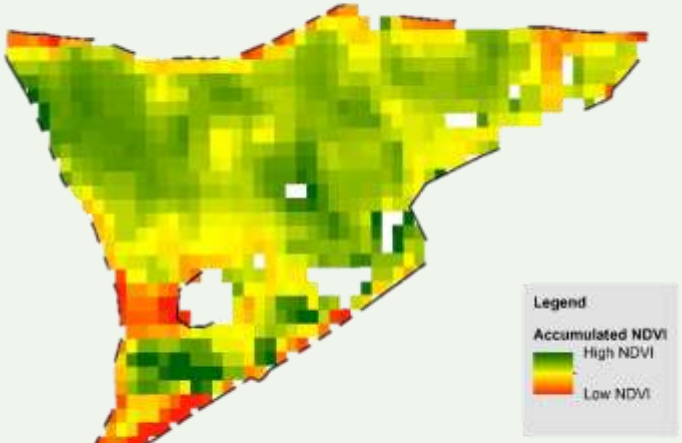




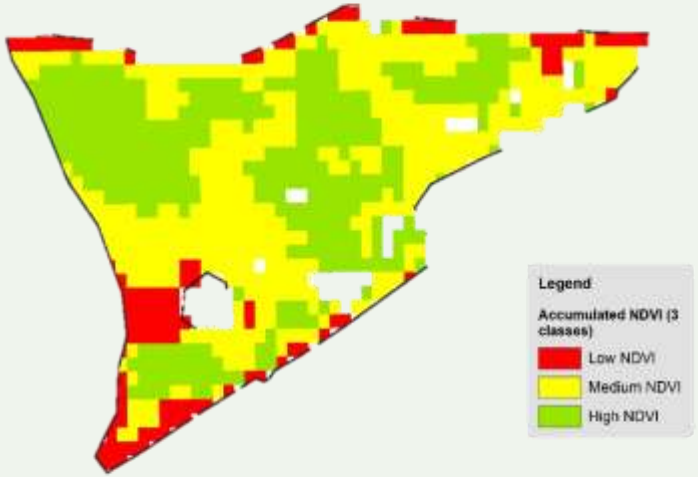
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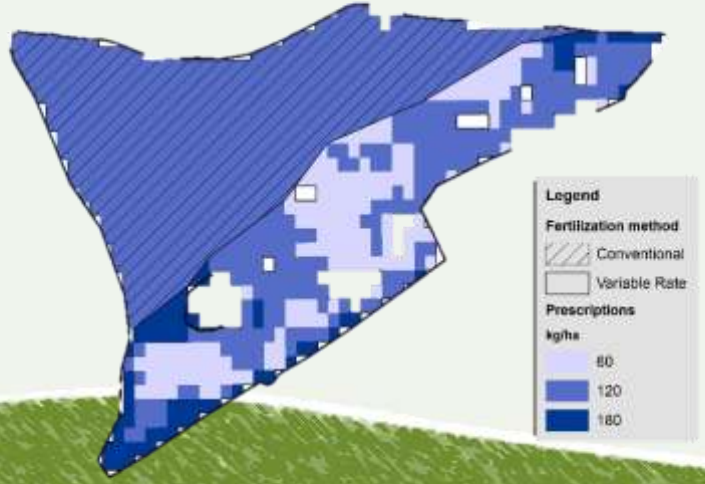
Accumulated NDVI



Accumulated NDVI in 3 classes



Fertilizer prescription



Fertilizer applied



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