



SPANISH PILOT AREA

La Mancha Oriental



FATIMA

PRODUCE MORE WITH LESS

- Flat plateau (650 a.s.l.) under continental-mediterranean climate
- Agriculture under severe climate constrains: low yields and low incomes in rainfeed agriculture.
- Great economic weight of irrigation agriculture, but based in by an endanger acuífer.



General Description

- **Overall size:** 10.000 km², 500.000 ha devoted to agriculture, of which 130.000 ha receive some type of irrigation).
- **Total population:** 400.000.
- **Semi-arid climate:** rainfall < 350 mm/year mainly in cold season, evapotranspiration about 1200 mm.
- **Size of farms:** 70% larger than 100 ha.
- Type of agriculture: 82% conventional, 10% organic, 7,5% conservation tillage.
- **Irrigation systems:**
 - Annual crops: 75% central pivot, other sprinkler systems 24%, 1% others.
 - Woody crops: 100% drip irrigation.
- **Mayor crops:**
 - Rainfeed:
 - Annual: winter cereals and legumes.
 - Perennial: vines and almonds.
 - Irrigation:
 - Annual: winter cereals, maize, poppy, garlic, onion, oil seed rape, and progressively short-cycle vegetables (broccoli, lettuce, carrot, potato...)
 - Perennial: vines, almonds and pistachio.

Pilot Area features

- Soil: shallow and very variable, limestone bedrock limiting root growth, texture ranging from sandy loam, loam to clay loam, often very stony.
- Rainfall: low and unpredictable rainfall pattern, high variation between seasons and between years.
- Irrigation water source: over exploited aquifer, deficit 82 hm³/year (inputs 323 hm³/year-outputs 405 hm³/year). Water depth 60-200m, very demanding in energy cost.
- Environmental threats:
 - Nitrates groundwater pollution.
 - Soil erosion.
 - Landscape degradation.
- Farm technology:
 - Fairly updated irrigation systems.
 - High level of mechanization.
 - Some innovative farmers with economic resources to invest in management improvements new technologies.

Experiments in Spanish Pilots

3 years/ 5crops: maize, wheat, poppies, onion and garlic:
Campaigns 2015-2016-2017

Validating the remote sensing satellite approach by monitoring crops and characterizing the variability in the field:

- 31 commercial fields monitored.
- 3463 biomass samples taken.
- 3600 soil samples taken.
- 500 radiometric and chlorophyll measures.
- 3151 detailed observation of phenology in georeferenced points.
- 20 fields harvested with yield monitors in combines.



Validation of the EO-based methodology for biomass productivity maps to characterize the field variability (management zones).

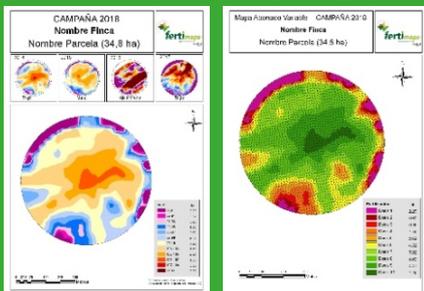
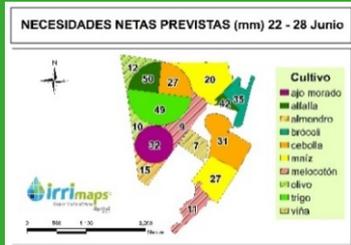
Implementation of EO-based variable rate fertilization at commercial scale:

- Purchase of a specific last generation fertilizer spreader and becoming experts in its management.
- Basic adaptation of an existing fertilizer.
- Elaboration of fertilizer application maps.
- Validation of EO-based methodology for the prediction of water requirements a week in advance.



Area Pilot Area Facts & Figures

Three years pilot results



- Farmers are willing to pay and rely on our weekly water requirements prediction for planning their irrigation activities.
- The brand “irrimaps®” has been created to commercialize these prediction maps, which are based on time series of satellite imagery and weather forecast modeling.
- The correlation between maps obtained with harvester yield monitors and those elaborated with satellite imagery time series has been validated.
- Management Zone Maps (MZM) based on historical series of satellite imagery have opened the possibility of capturing immediately the variability of any field. This achievement has been translated into the creation of the brand “fertimaps®” to commercialize them. The MZM allows the farmer to:
 - Perform diagnostic (soil sampling...) and crop monitoring work more accurately.
 - Use crop nutrients uptake maps for the preparation of plans and decision making on fertilization.
 - Apply Variable Rate fertilization based on application maps introduced in the spreader intelligence.

Future Perspective / Regional Impact of FATIMA

- Creating new job profiles for field work by supporting and transferring these technologies.
- Raising awareness among farmers of the economic-environmental benefits of VRT use.
- Optimizing water and fertilizer.
- Improving relationships and communication between farmers and researchers.



Pilots regional team



<http://www.teledeteccionysig.es/>

<http://www.itap.es/>



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