Implementing Precise irrigation: Economic Impacts and Policy implication

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Objective

GENERAL OBJECTIVE
Assess to what extent the improvement of the quality of information brought with the FIGARO approach affects farmer’s strategic decisions and consequently farm’s income.

Intermediate steps
• (1) Validation of the Platform
  – Economic Impacts
  – End-user feedback

• (2) Investigation of PI implementation in EU
  – Collection of experts experiences and opinions about the practicality of PI practices
  – Collection of experts experiences and opinions to develop policy guidelines about the instruments required to drive the uptake of PI practices

• (2) Policy implication
Economic Impacts – Framework of investigation

A field experiments network encompassing the full range of climate conditions and a number of water demanding crops and soil types has been designed to test the platform, using different irrigation strategies and irrigation technologies (with a strong focus on micro irrigation).
Economic Impacts - Methodology

COMPARATIVE ASSESSMENT - FIGARO APPROACH VS COMPARING PRACTICES
(Farm practice, Latest technologies to schedule irrigation, Direct measurement)

UNIT OF INVESTIGATION
Experimental Trial

PERIOD
2013 – 2015

DATA
Information from experimental sites - Conservative parameters, Meteorological data, Water content in the soil, Plant growth, Irrigation
Additional information – Output and Input prices, Equipment costs, Subsidies and Tariffs.
Economic Impacts - Results

Relative performances of the FIGARO approach compared with other practices to schedule irrigation during the period 2013-2015 – Water use variation (%)
Economic Impacts - Results

Relative performances of the FIGARO approach compared with other practices to schedule irrigation during the period 2013-2015 – Yield variation (%)

FIGARO VS DIRECT MEASUREMENT
FIGARO VS TRADITIONAL PRACTICE (SPRINKLER IRRIGATION)
FIGARO VS TRADITIONAL PRACTICE (DRIP IRRIGATION)

Yield variation (%)
Economic Impacts - Results

Relative performances of the FIGARO approach compared with other practices to schedule irrigation during the period 2013-2015 – Gross margin variation (%)

FIGARO VS DIRECT MEASUREMENT
FIGARO VS TRADITIONAL PRACTICE (SPRINKLER IRRIGATION)
FIGARO VS TRADITIONAL PRACTICE (DRIP IRRIGATION)

Gross margin variation (%)
Economic Impacts - Results

Gross margin relative variation obtained with FIGARO and with the FARM PRACTICE to schedule irrigation interventions during the period 2013-2015
Economic Impacts - Conclusion

There is some evidence that the FIGARO approach improves irrigation compared to traditional irrigation practices, especially for drip irrigated crops:

- saving water
- reducing variability in yield
- improving economic performances.

Although results are promising:

- there is still room for investigation to improve the accuracy in estimating and in forecasting crop water requirements (addressed by the Danish case study).
- The comparison of performances with traditional irrigation practices are not statistically significant, addressing the need to collect more evidences.
End Users Feedback – Framework of investigation

**OBJECTIVE**
Assessing the utility and usability perceived by end-users (advisors / farmers) for the service offered through the FIGARO DSS system

Regions where end users operate

72 End Users
80.5% Advisors
19.5% Farmers
End Users Feedback – Results

Relevance of different sources of information to schedule irrigation

Sources of Information:
- field sensors
- local/own weather station predictions
- direct control and soil canopy status
- pluviometer
- water meters
- DSS
- TV weather predictions

Average of relevance:
- Highly relevant
- Not relevant

Relevance to advisors and farmers:
Highly relevant:
- field sensors
- local/own weather station predictions
- direct control and soil canopy status
- pluviometer
- water meters
- DSS

Not relevant:
- TV weather predictions

advisors
farmers
End Users Feedback – Conclusions

Correlation between willingness to pay for FIGARO and willingness to improve the ability to schedule irrigation

Willingness to pay for FIGARO DSS

Willingness to improve the ability to schedule irrigation

Not interested to improve

Very interested to improve
End Users Feedback – Conclusion

Both Advisors and Farmers are willing to improve their ability to schedule irrigation intervention, indicating that:

– current instruments are too expensive and too time consuming to estimate crop irrigation requirements,

– available weather prediction is not accurate enough locally

Most of the respondents agree on the usability, the robustness and the utility of the FIGARO DSS.

However, farmer are less interested in using sensors and DSS
Policy Guidelines – Regions where experts operate

Regions where the experts involved in the consultation process operate

52% consultants
48% researcher
Policy Guidelines – Results

MOTIVATION
The factors justifying the interest on PI might vary locally with the priority of intervention:

- **Environment** (as energy saving, water saving and pollutant abatements)
- **Food security** (guarantying that irrigation cover the crop demand)

CONDITIONS

- **Environmental condition**: Water availability
- **Farmer’s characteristics**: Young age, High education
- **Farm’s characteristics**: Type of production, Field morphology

PROBLEMS

- **Associated to the technology**: Distrust and expected labour efforts
- **Associated to end-users**: lack of funding and regulation.
POLICY INSTRUMENTS TO DRIVE THE UPTAKE OF PI

Key instruments

- **Indirect incentives**: (1) Subsidies to set up advisory services, (2) Inclusion of best irrigation practices in the conditionality requirements, (3) Subsidies for investments on water saving practices

Secondary instruments

- **Direct incentives**: (1) Subsidies for the equipment,
- **Indirect incentives**: (1) Imposition of volumetric charges for irrigation, (2) Discount on water charge for irrigation

Other instruments included by experts

- **Market driven incentives**: (1) Creation of quality standards associated with the correct implementation of PI,
- **Indirect incentives**: (1) Subsidies for dissemination, (2) Subsidies to develop a local meteorological network
Policy Guidelines – Results

IMPLEMENTATION STRATEGIES

1 Tailoring the selection of incentives to priorities of intervention
   • i.e. Imposing volumetric water charges and restriction on water uses in those region where water availability is limited

2 Design strategies to increase the practicality of policy instruments:
   • i.e. Tailoring subsidies with the provision of advisory services to drive the selection of instruments and their implementation
   • i.e. Implementing agglomeration payments to elicit self monitoring

4 Integrating instruments to increase awareness among end-users
   • i.e. Coupling the imposition of volumetric charges with subsidies.
General Conclusion

**PLATFORM VALIDATION**: There is some evidence that compared with current practices the FIGARO approach reduces uncertainty in the performances saving water.

**IDENTIFICATION OF TARGET USERS**: Advisors are more confident than Farmers in the FIGARO DSS, as they perceive higher ease of use and robustness.

**PROBLEMS**: Farmers might be reluctant from adopting the FIGARO DSS.

**FINAL RECOMMENDATIONS** – Advisors claim that the equipment actually used to schedule irrigation is too expensive and too time consuming

**POLICY IMPLICATION** – The FIGARO approach seems to be capable to partially satisfy this claim, but....

- Need for more research
- Need to promote the provision of advisory services
- Need to promote Demonstration Campaign
Thanks for your attention
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