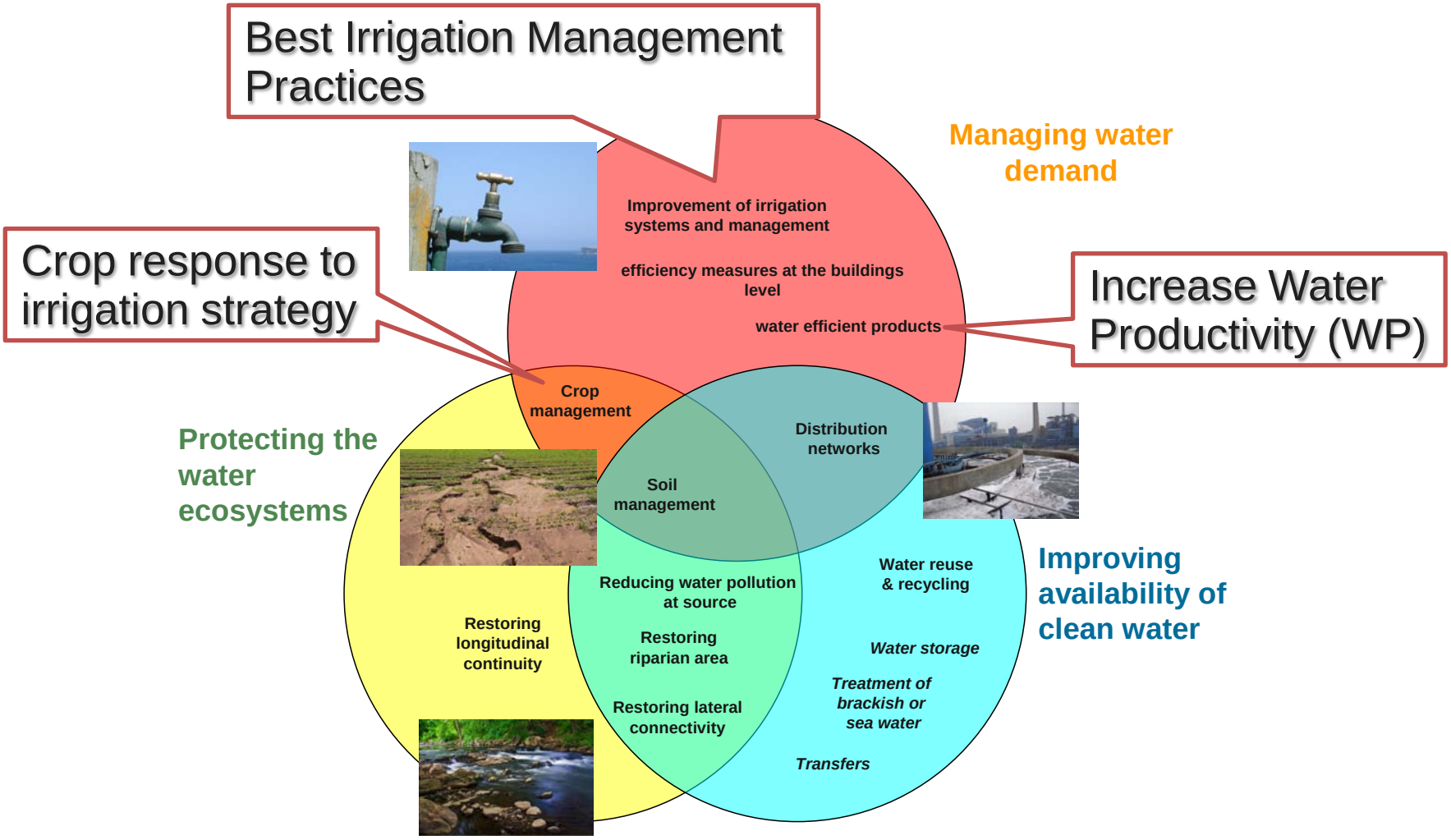
REmote sensing-based Dss for Sustainable Drought-adapted Irrigation Management

Presented by: **Johannes Hunink (FutureWater)**

Contributors (20):

- **Alain BAILLE , B.MARTÍN, V, MARTÍNEZ, S. GARCIA, F. ALCÓN, R. DOMINGO, A. PEREZ (**UPCT, Cartagena, Spain**)**
- **S. TAPSUWAN** (CSIRO, Perth, Australia)
- **O. MOUNZER, P.NORTES, J.J. ALARCÓN, G. GONZÁLEZ, J. GARCÍA** (CEBAS-CSIC Murcia, Spain)
- **M.ERENA, P. GARCIA, D. SANCHEZ** (IMIDA, Murcia, Spain)
- **M. VILA, E. FERERES, M. MORALES, R. LÓPEZ, A. MONTORO** (Cordoba University, Spain)
- **R. MORCILLO, J. LOPEZ** (AFRE, Madrid, Spain)

Context

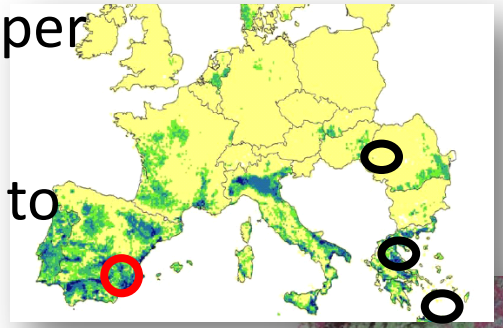

Best Irrigation Management Practices
Managing water demand
Improvement of irrigation systems and management
efficiency measures at the buildings level
water efficient products
Increase Water Productivity (WP)
Crop response to irrigation strategy
Crop management
Soil management
Distribution networks
Protecting the water ecosystems
Reducing water pollution at source
Restoring riparian area
Restoring lateral connectivity
Restoring longitudinal continuity
Water reuse & recycling
Water storage
Treatment of brackish or sea water
Transfers
Improving availability of clean water

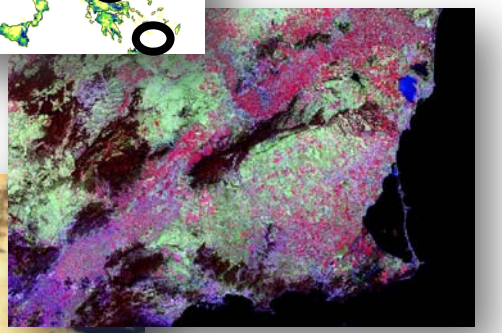
Objective

*To improve Irrigation **Water Productivity** (IWP) by developing and validating an **information system** to support **growers** in implementing and managing **deficit irrigation** techniques.*

Background

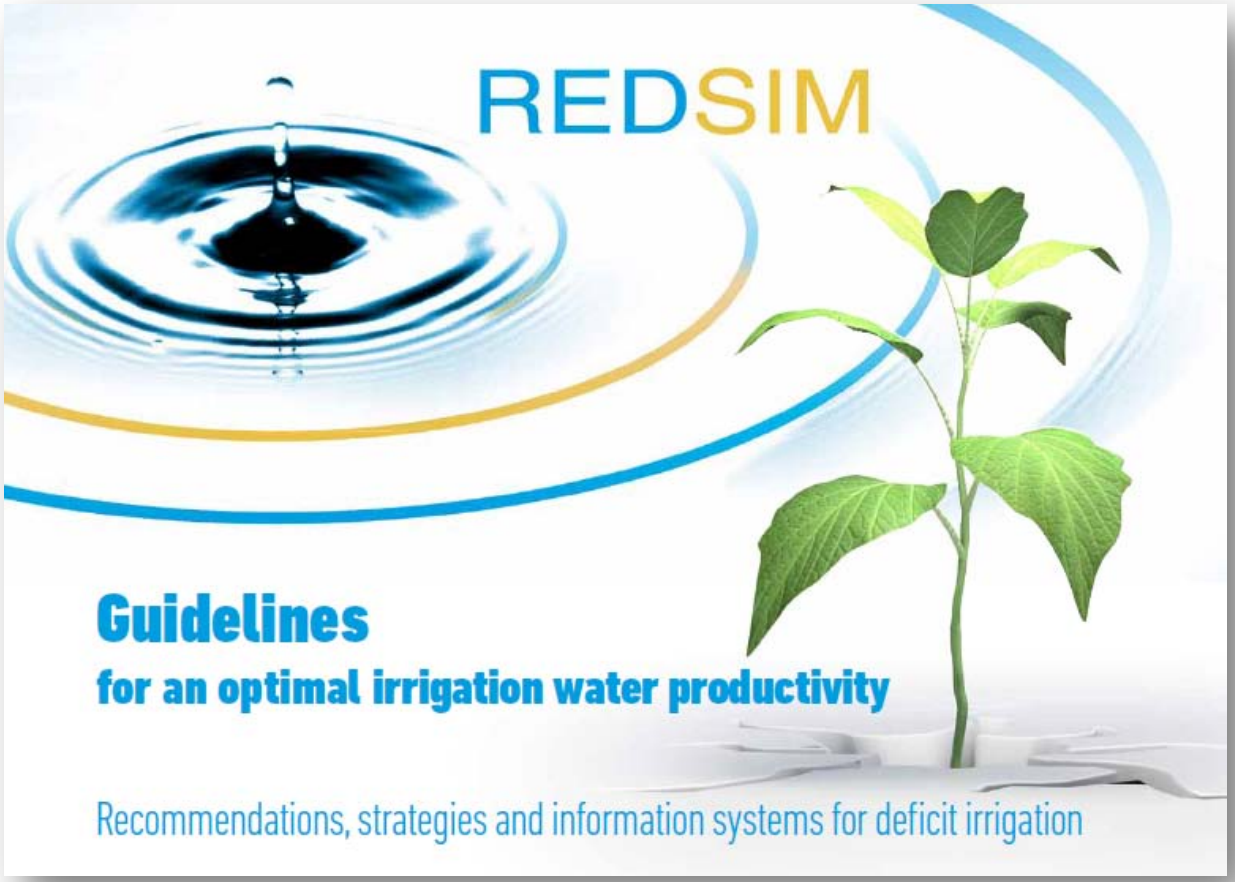
- Water stressed basins (Segura and Upper Guadiana, Spain)
- Water resources here highly sensitive to climate change
- Social and economic value of agriculture (f.e. 1.5 billion€ in Murcia region)
- Irrigated agriculture largest user of surface waters
- Diverse crop mix (fruit trees, vegetables…)
- Imbalance demand and supply and its variability requires Deficit Irrigation



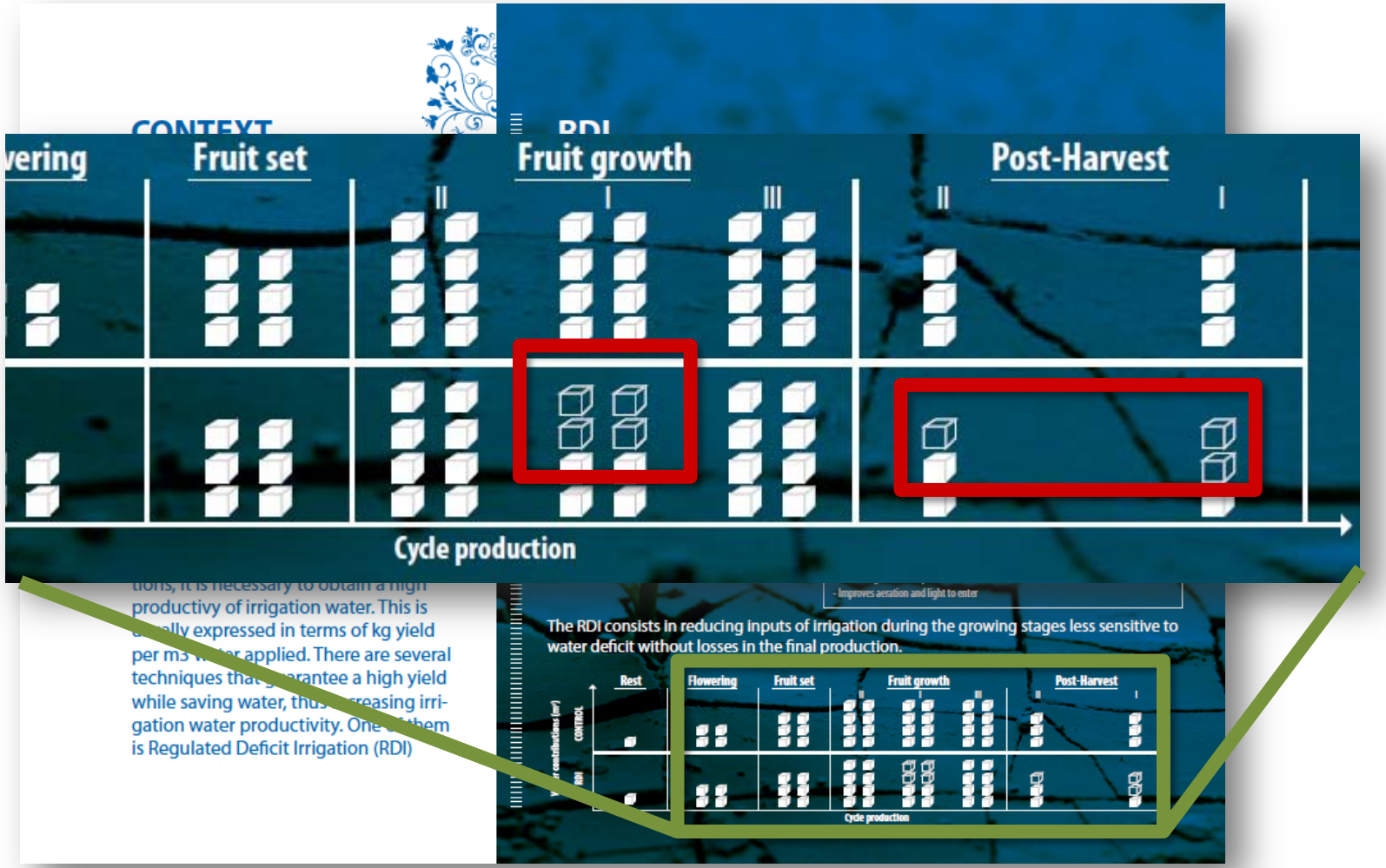


REDSIM guidelines on deficit irrigation and tools

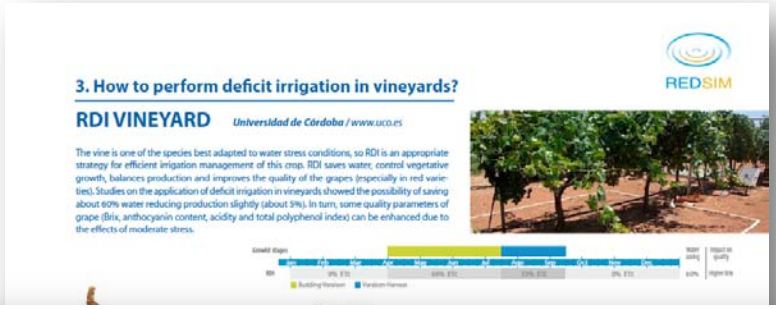
REDSIM dissemination output: guidelines ...

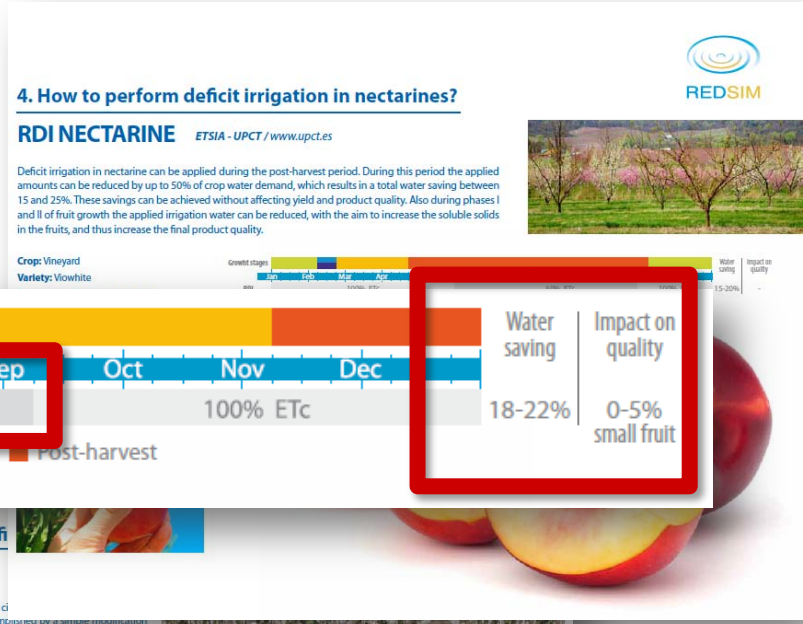


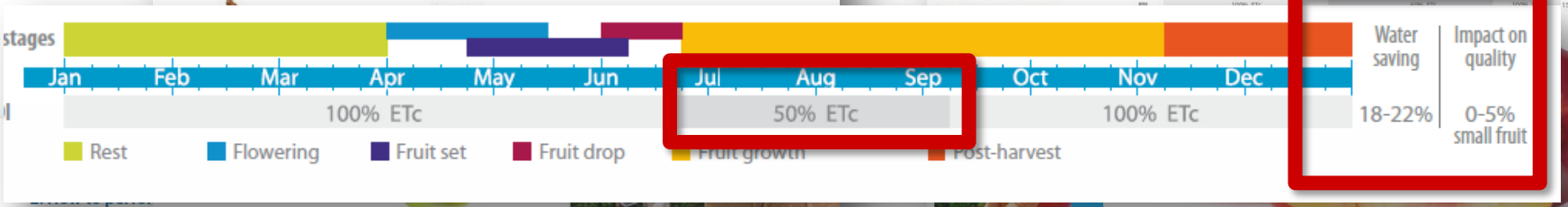
REDSIM guidelines on deficit irrigation and tools

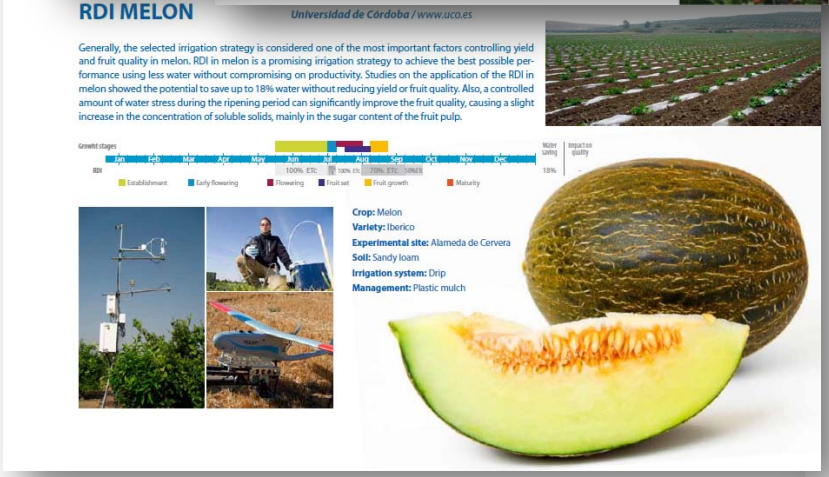


REDSIM guidelines on deficit irrigation and tools





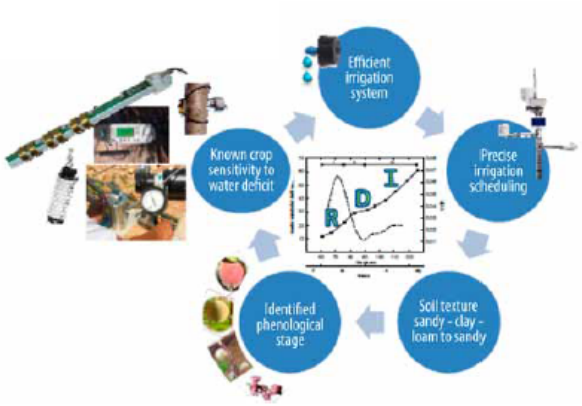




REDSIM guidelines on deficit irrigation and tools

5. Supporting tools for RDI - REDSIM

WHAT DO I NEED?



To implement RDI, the farmer needs adequate information on his field, the crops and the water requirements. REDSIM provides several information and advisory tools to support the farmer in implementing this irrigation strategy. These tools join different existing information sources and simulation tools to provide up-to-date and local data and predictions.

For more info, check **www.redsim.net**

What data is available on my plot?

REDSIM-IS is a single web portal that integrates all available spatiotemporal information (meteorological networks, weather radar, satellite remote sensing, surveying, etc.) to provide updated information on soil and crops for better irrigation management, planning and scheduling by the farmer.

How much rain received my crop?

This same web portal also includes a new innovative product that uses state-of-the-art algorithms to combine information from weather station networks with rainfall radar in real time. This way, the farmer knows with high accuracy the amount of rain that received his plot during the last hours and days.

When and how to irrigate?

The REDSIM irrigation advisory bulletin is sent to the farmer by e-mail with synthesized and up-to-date information which supports decisions on irrigation planning. The bulletin includes: i) 7 days weather forecast with the forecasts of crop water needs, (ii) options in terms of dosage and frequency of irrigation to meet the predicted demand and soil water, and (iii) its impact on percolation and the a comparison between computed irrigation needs and applied amounts

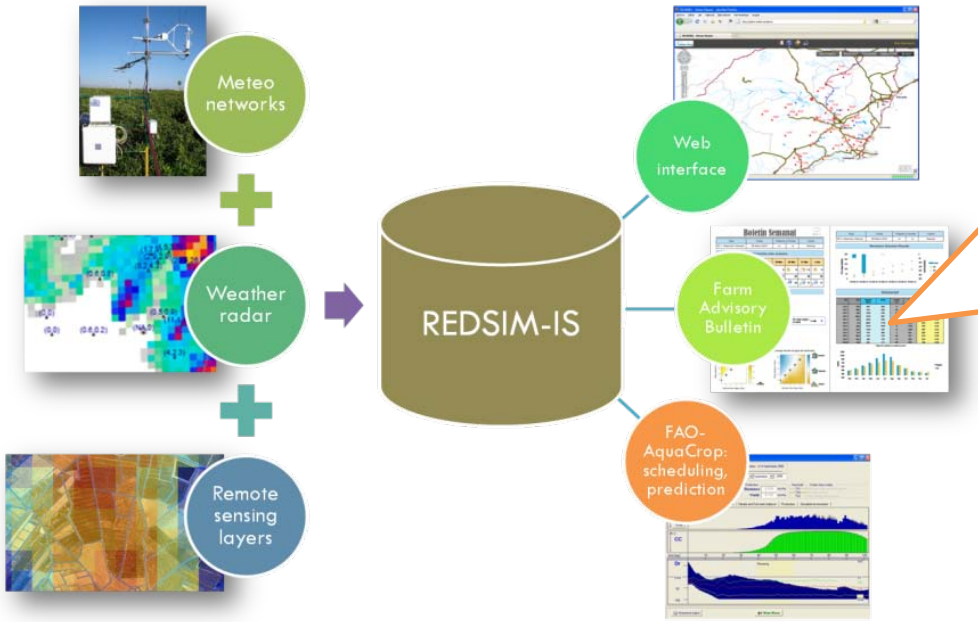
How affects irrigation my productivity?

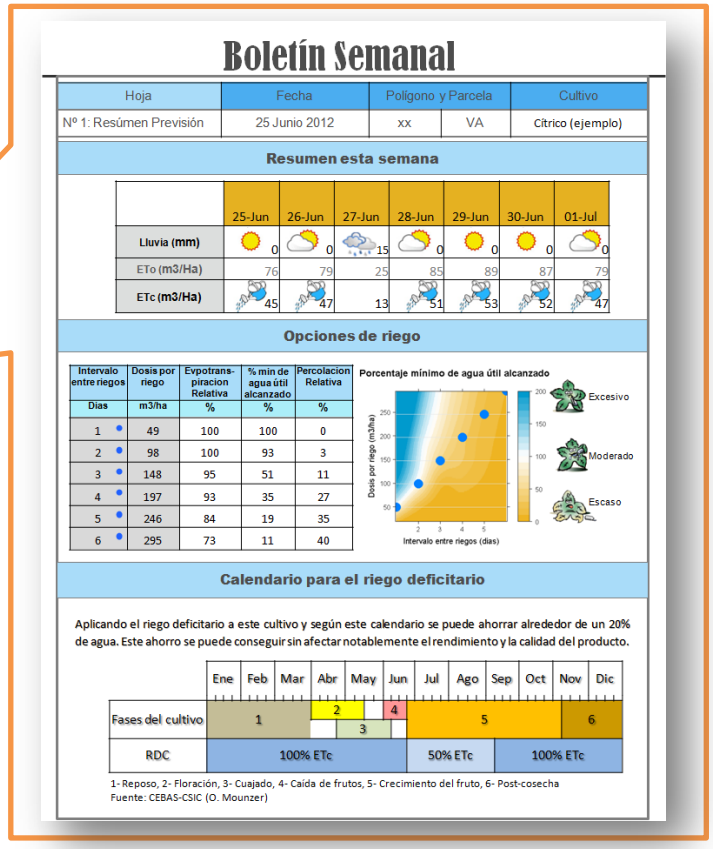
REDSIM allowed demonstrating the benefits of using the latest water productivity tool for practitioners (extension services, farmers, etc). This state-of-the-art tool "AquaCrop" is currently being developed by FAO together with researchers involved in REDSIM. It allows seasonal productivity predictions and supports the farmer in irrigation planning.

The REDSIM-IS tools

- Irrigation recommendations
- Rainfall radar
- But recently also: flooding events - damages

REDSIM Irrigation advisory bulletin





Boletín Semanal

Hoja	Fecha	Polígono y Parcela		Cultivo
Nº 1: Resúmen Previsión	25 Junio 2012	xx	VA	Cítrico (ejemplo)

Resumen esta semana

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	01-Jul
Lluvia (mm)	0	0	15	0	0	0	0
ETo (m3/Ha)	76	79	25	85	89	87	79
ETc (m3/Ha)	45	47	13	51	53	52	47

Opciones de riego

Intervalo entre riegos	Dosis por riego	Evpotrans-piracion Relativa	% min de agua útil alcanzado	Percolacion Relativa
Dias	m3/ha	%	%	%
1	49	100	100	0
2	98	100	93	3
3	148	95	51	11
4	197	93	35	27
5	246	84	19	35
6	295	73	11	40

Porcentaje mínimo de agua útil alcanzado

Excesivo
Moderado
Escaso

Dosis por riego (m3/ha)
Intervalo entre riegos (dias)

Calendario para el riego deficitario

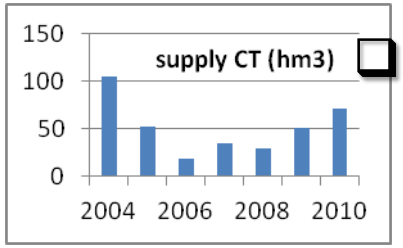
Aplicando el riego deficitario a este cultivo y según este calendario se puede ahorrar alrededor de un 20% de agua. Este ahorro se puede conseguir sin afectar notablemente el rendimiento y la calidad del producto.

	Ene	Feb	Mar	Abr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dic
Fases del cultivo	1			2	3	4	5				6	
RDC	100% ETc						50% ETc				100% ETc	

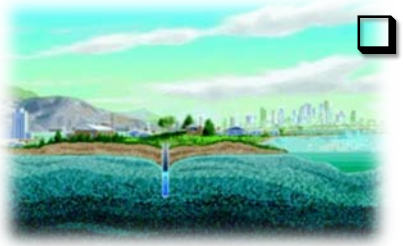
1- Reposo, 2- Floración, 3- Cuajado, 4- Caída de frutos, 5- Crecimiento del fruto, 6- Post-cosecha
Fuente: CEBAS-CSIC (O. Mounzer)

- Personalized recommendations
- Impacts on losses, and stress
- Other guidelines – “formative evaluation”

Policy relevant findings and recommendations



- For farmers: VARIABILITY (in supply) = RISK. *Deficit Irrigation* techniques can reduce this risk , and reduce groundwater abstractions



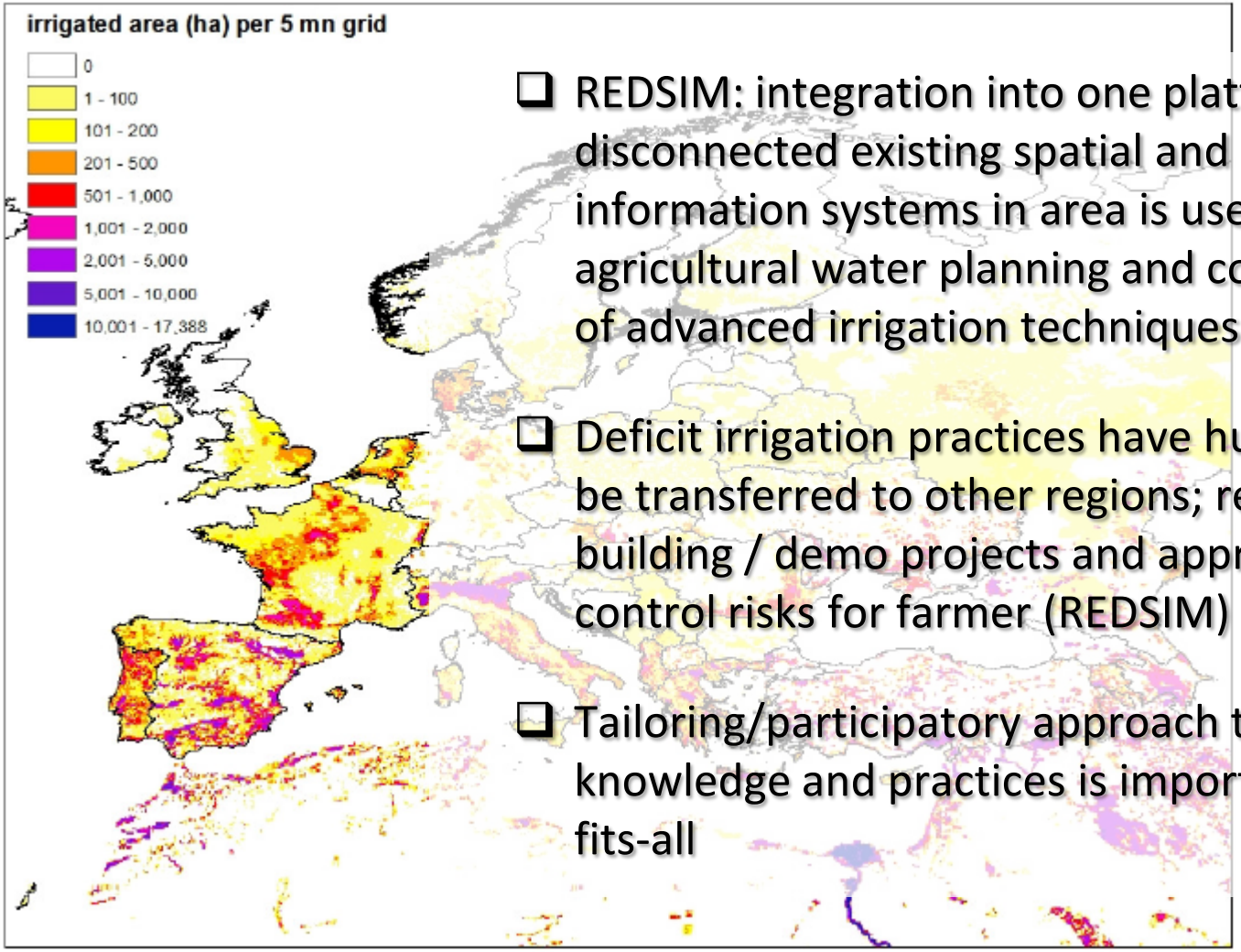
- Also for wet periods: *Deficit Irrigation* can save significant amounts of water. Saved or stored in aquifer? → Conjunctive groundwater and surface water management

- Precise and deficit irrigation requires use of more advanced irrigation management tools, and economical triggers.

- Farmers' perspective on water saving is of paramount importance: decisions on agricultural water use take place on-farm.

-

Policy relevant findings: extrapolation to other regions



- REDSIM: integration into one platform of disconnected existing spatial and temporal information systems in area is useful for agricultural water planning and could boost uptake of advanced irrigation techniques.
- Deficit irrigation practices have huge potential to be transferred to other regions; requires capacity building / demo projects and appropriate tools to control risks for farmer (REDSIM)
- Tailoring/participatory approach to adapt to local knowledge and practices is important, no one-size-fits-all

Perspectives

- Extension of REDSIM approach and tools to other crop species
- Further dissemination through irrigation authority and support water authorities
- Other services related with extremes and disaster risk management
- Personalized services for farmers
- More info:
  - email me. **Johannes Hunink** - **j.hunink@futurewater.es**
  - www.futurewater.nl / www.futurewater.es
  - **www.redsim.net**