DESERT
Low cost water desalination ans sensor technology compact module

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Water JPI
WaterWorks2015 Cofunded Call
8 May 2018, Larnaca

Summary

1. Scientific and technological progress

2. Collaboration, coordination and mobility

3. Stakeholder/industry engagement

4. Dissemination of the results

5. Identified problems or specific risks

Water JPI

Desert

Summary

1. **Scientific and technological progress**
2. Collaboration, coordination and mobility
3. Stakeholder/industry engagement
4. Dissemination of the results
5. Identified problems or specific risks

1. Scientific and technological progress

WP1: Integration of two water compact modules: both solar powered modules HidroNIC-Desal and HidroNIC-Fert

ROLDAN (SPAIN)

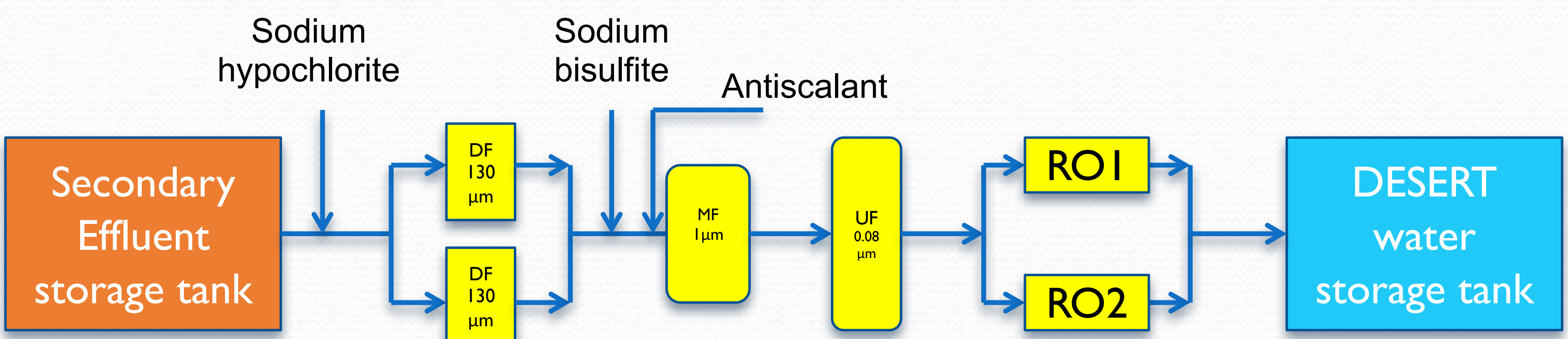
CONTAINERS WITH PHOTOVOLTAIC PANELS

BARI (ITALY)

Two experimental platforms

WASTEWATER TREATMENT

HIDRONIC DESAL



CATEGORY	PARAMETER	UNIT	AVERAGE CONCENTRATIONS		REMOVAL EFFICIENCY
			SW	DW	
Physicochemical	**EC**	dS/m	1.6	0.8	53.5%
	SAR	meq/L	5.7	4.3	23.9%
	Turbidity	NTU	1.0	0.4	60.0%
	TSS	mg/L	4.6	1.8	61.6%
Macronutrients	**NO_3^-**	mg/L	9.2	3.5	61.7%
	PO_4^{3-}	mg/	[illegible]	1.0	-140.9%
	K	mg/	[illegible]	12.8	57.5%
	Ca	mg/	[illegible]	21.9	61.2%
	Mg	mg/	[illegible]	8.1	64.3%
	SO_4^{2-}	mg/	[illegible]	31.6	75.0%
Micronutrients / phytotoxic	**Fe**	mg/L	0.07	0.05	29.8%
	Mn	mg/L	0.20	0.08	60.3%
	B	mg/L	0.71	0.56	20.7%
	Cl^-	mg/L	251.7	106.1	57.8%
	Na	mg/L	194.6	92.0	52.7%
Microbiological	**E. coli**	cfu/100 mL	163.8	<-	99.4%

1. Scientific and technological progress

- **HidroNic Fert. Xilema.** Automatic fertilizer supply equipment through electrovalves and venturis. Distribution of fertilizers.

- **Output mesh filter.** Mixing and filtering different fertilizers.
- **Blower pump** to carry out the aeration process, in the mixture of the fertilizer tanks.
- **Fertilizer tanks.** 4 fertilizer tanks and 1 acid tank.

1. Scientific and technological progress

The integrated water treatment system + Fertirrigation will work autonomously, that is, we will produce the energy that we will consume whenever we have sun.

The solar energy system consists of:

- **Solar panels.** 6-10 solar panels, composed of 72 polycrystalline cells, 327 W and 6.46 A. = 3270 W peak and 64.6 A.

- **Inverter.** Solar charge controllers, solar energy inverters and electronic regulators.

- **Batteries.** The energy produced are stored in 4 batteries of 12 vdc and 220 A / h. = 48 Vdc and 220 A / h.

I. Scientific and technological progress

- **WP2**: Development of on-line intelligent fertigation equipment

QUANTUM

- **Hardware:**

PLC

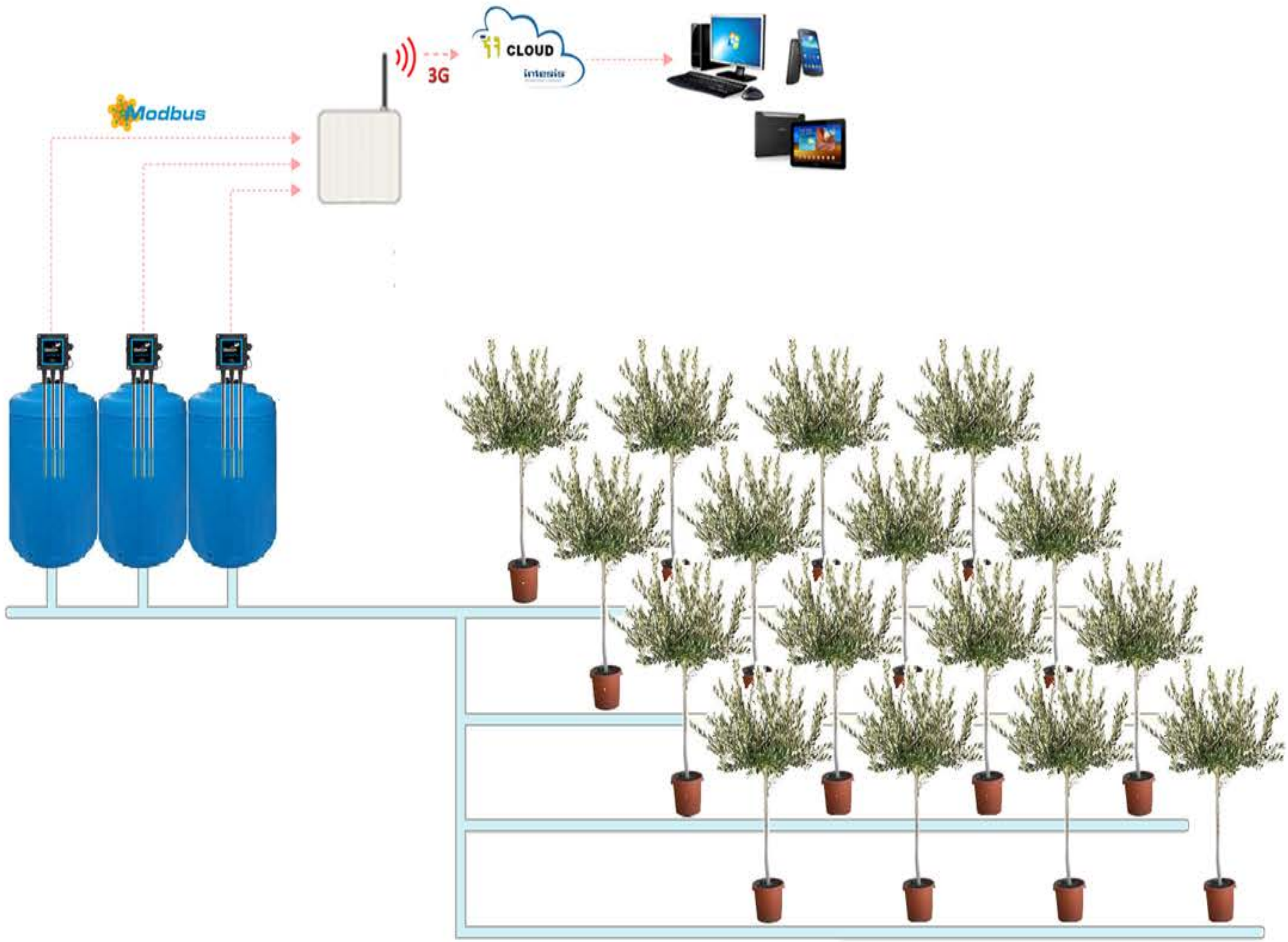
Control units

Rooter

Sensors….

- **Software:**

DSS



HARDWARE components

Sensors

Parameters

- **Ca**
- **Cl**
- **Cu**
- **Br**
- **F**
- **NH_4^+**
- **Mg**
- **NO_3^-**
- **NO_2^-**
- **K**
- **Na**
- **TSS**
- **Ec**
- **pH**

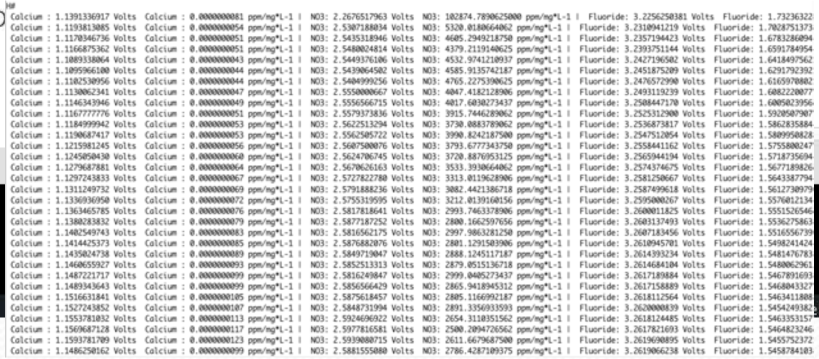
SWI-001 | Waspmote Waspmote PRO IDE

SWI-001

```
pt1000Class tempSensor;

// INIZIO DEFINIZIONE DEI PARAMETRI DI CALIBRAZIONE

//==============================================================
// Calibration concentrations solutions used in the process
//==============================================================
#define point1 10.0
#define point2 100.0
#define point3 1000.0
//==============================================================
// Calibration voltage values for Calcium sensor
//==============================================================
#define point1_volt_Ca 2.144
#define point2_volt_Ca 2.268
#define point3_volt_Ca 2.366
//==============================================================
// Calibration voltage values for NO3 sensor
//==============================================================
#define point1_volt_NO3 3.080
#define point2_volt_NO3 2.900
#define point3_volt_NO3 2.671
//==============================================================
// Calibration voltage values for Fluor sensor
//==============================================================
#define point1_volt_F 2.847
#define point2_volt_F 1.574
#define point3_volt_F 1.380
//==============================================================
// Calibration values for chloride sensor
//==============================================================
#define point1_volt_Cl 2.852
#define point2_volt_Cl 2.588
#define point3_volt_Cl 2.330
//==============================================================
// Define the number of calibration points
//==============================================================
#define NUM_POINTS 3

// FINE PARAMETRI DI CALIBRAZIONE
```

```
  //==============================
  // Read the chloride sensor
  //==============================
  float chlorideVolts = chlorideSensor
  float chlorideValue = chlorideSensor
//  delay(500);

  USB.print(F(" Chloride: "));
  USB.print(chlorideVolts);
  USB.print(F(" ppm/mg*L-1 | "));


  USB.print(F("\n"));
//  SWIonsBoard.OFF();


  // Read and store the values in the Modbus registers
  regs[MB_0] = (int) flourideValue;
  regs[MB_1] = (int) calciumValue;
  regs[MB_2] = (int) NO3Value;
  regs[MB_3] = (int) chlorideValue;
  regs[MB_4] = (int) (tempValue*10);
  regs[MB_5] = PWR.getBatteryLevel();
  regs[MB_10] = (int) (flourVolts*1000);
  regs[MB_11] = (int) (CaVolts*1000);
  regs[MB_12] = (int) (NO3Volts*1000);
  regs[MB_13] = (int) (chlorideVolts*1000);

  counter = 0;

  }
counter = counter +1;

  delay(10);
}
```

Serial monitor



Sensors calibration

QUANTUM

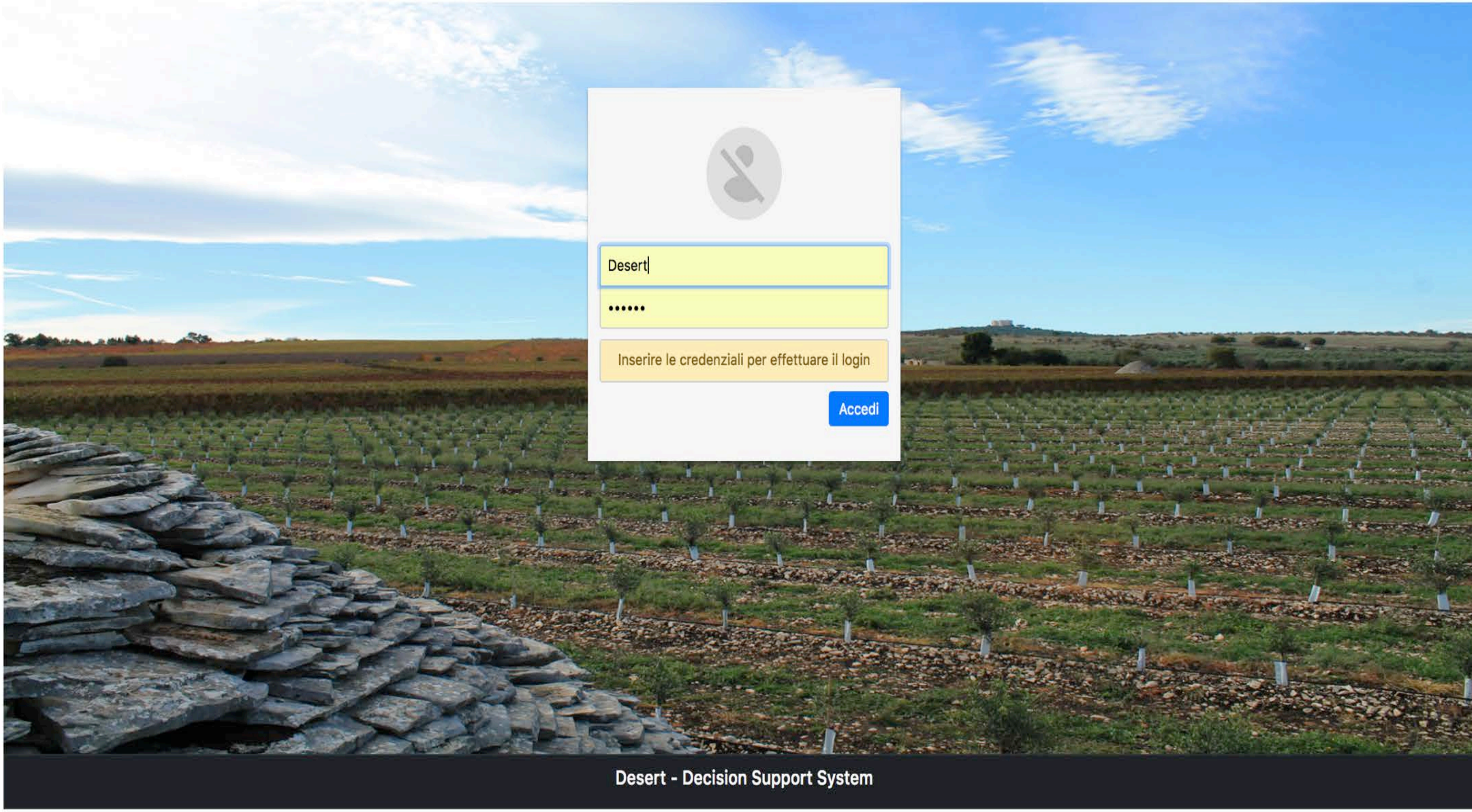
Integration with HidroNic Desal and HidroNic Fert

Water JPI

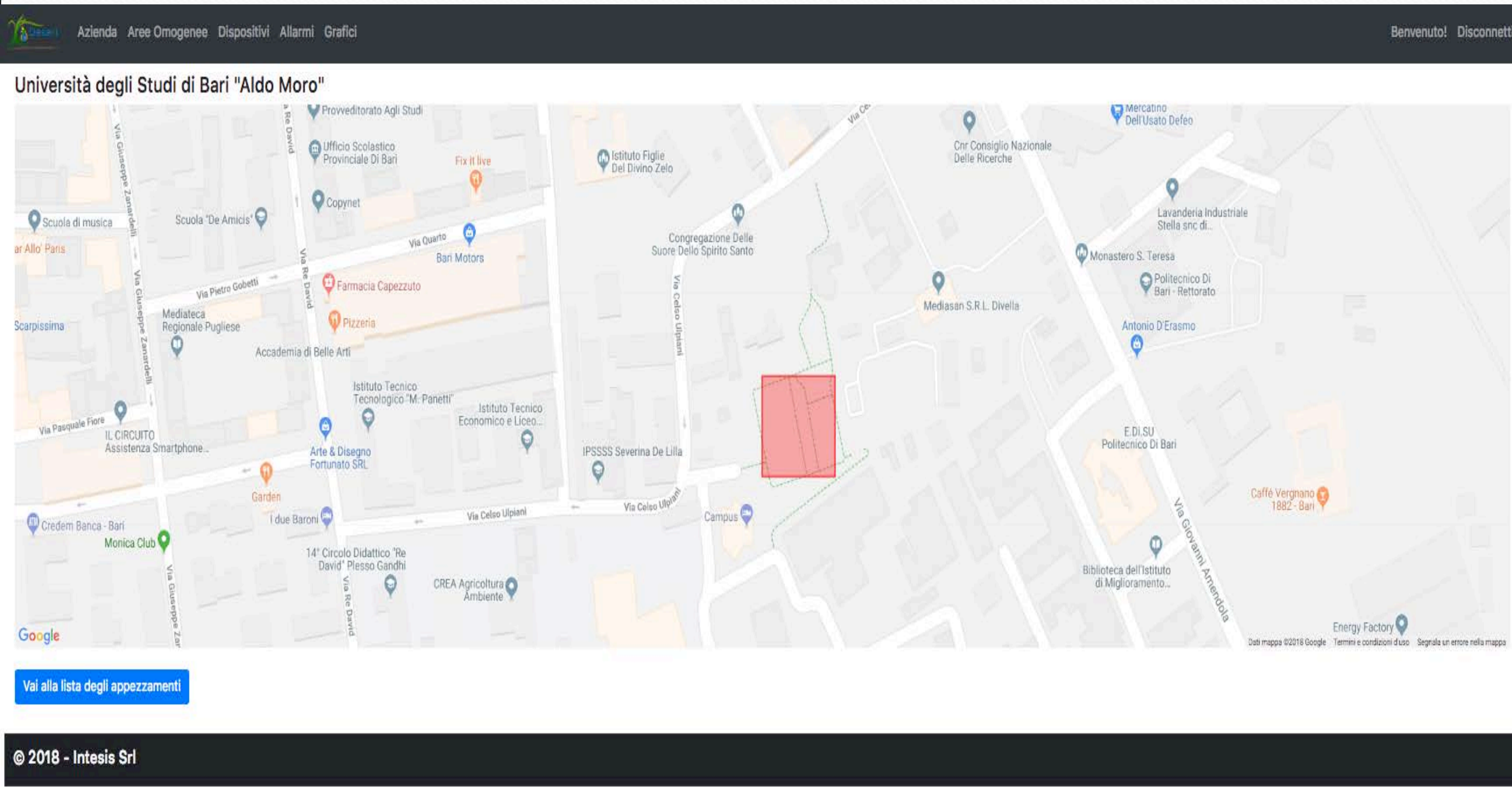
1. Scientific and technological progress

1. Scientific and technological progress

Decision support system



1. Scientific and technological progress



Desert Azienda Aree Omogenee Dispositivi Allarmi Grafici Benvenuto! Disconnetti

Farm data

Azienda	Nome	Superficie (ha)
Università degli Studi di Bari "Aldc	Olivo	10

Crop characteristics

Gruppo	Specie	Fase Ciclo	Produzione Attesa (t/ha)
Arboree	Olivo olive, legno e foglie	Piena Produzione	10

>

Soil characteristics

Fosforo (ppm)	Sabbia (%)		Calcare Totale(%)	Azoto Totale (g/kg)
30	40		21	1,1
Potassio (ppm)	**Argilla (%)**	**Classe Tessitura**		**Sostanza Organica (%)**
300	40	TendenzialmenteArgilloso		2
Profondità (cm)	**Limo (%)**	**Ubicazione**	**Drenaggio**	**C/N**
50	20	Pianura Limitrofa a Zone Urbanizz	Normale	10,5636361346757

Climatic parameters

Precipitazioni in mm dal 1/10 al 31/01	Apporto Ammendanti	N Anno Precedente (kg/ha)	Frequenza
170	Ammendante	30	Ogni 3 anni

Ritorna indietro

1. Scientific and technological progress

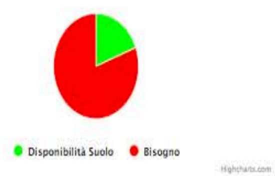
Azienda Aree Omogenee Dispositivi Allarmi Grafici Benvenuto! Disconnetti

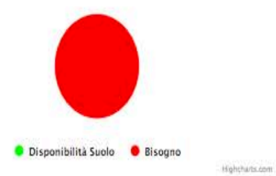
Azienda	Aree Omogenea	Fase/Ciclo	Superficie (ha)	Produzione Attesa (t/ha)
Università degli Studi di Bari "Aldo Moro"	Olivo	Piena Produzione	10	10

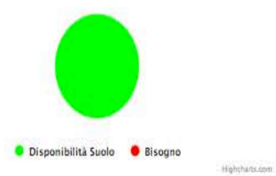
+	NECESSITA'	N (kg/ha)	P2O5 (kg/ha)	K2O (kg/ha)
A)	Fabbisogno della Coltura	248	48	200
C)	Perdite per Lisciviazione	6	0	10
D)	Immobilizzazioni e dispersioni	6	/	/
B1)	Arricchimenti	0	0	0
A2)	Anticipazioni anni futuri	0	0	0
Totale Necessità		260	50	212

-	DISPONIBILITA'	N (kg/ha)	P2O5 (kg/ha)	K2O (kg/ha)
B)	Fertilità del Suolo	24	0	508
E)	Precessione	0	/	/
F)	Fertilità Organica Residua	6	/	/
G)	Apporti Naturali	20	/	/
Totale Disponibilità		50	0	508

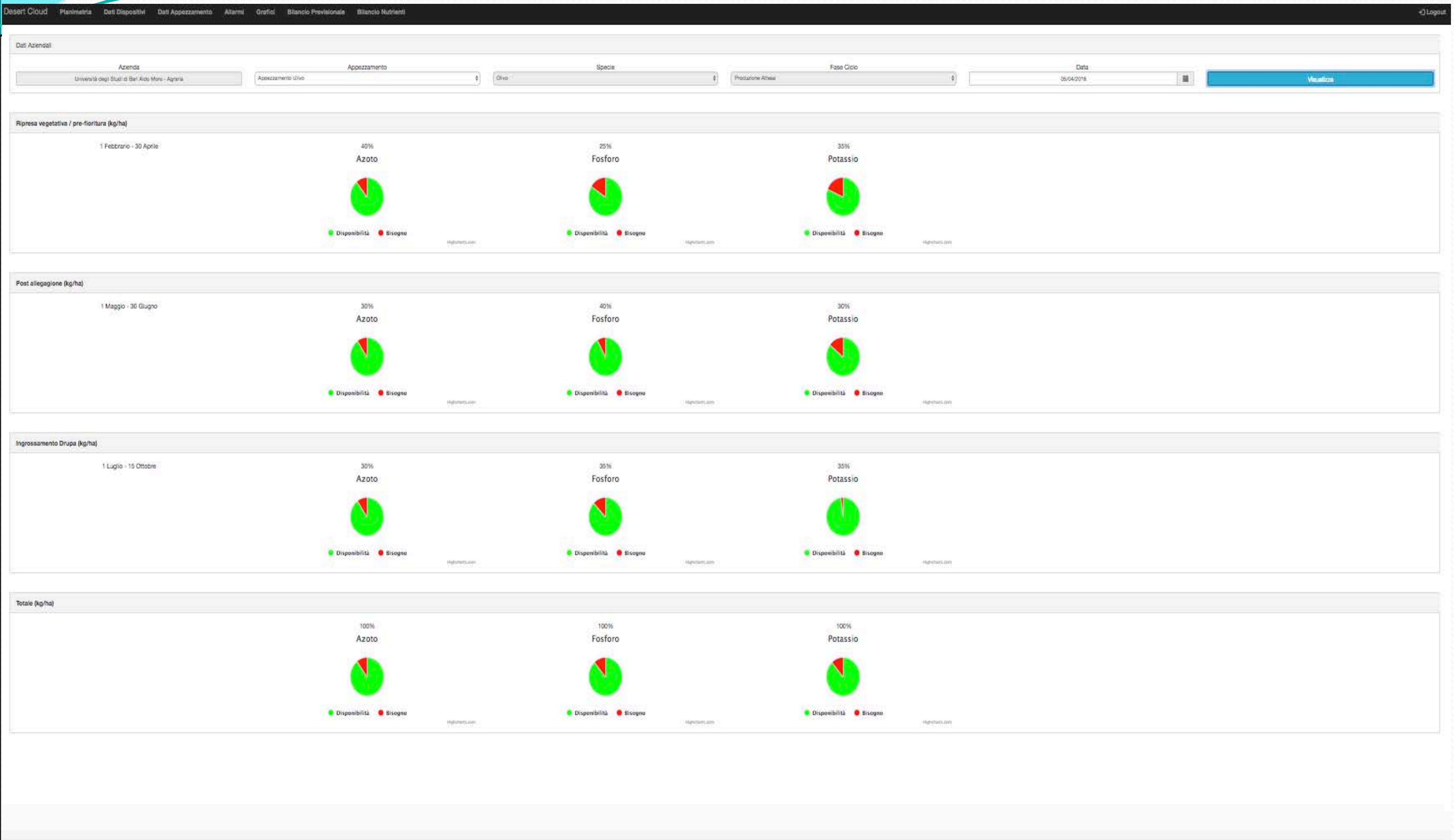
=	BISOGNO CALCOLATO	N (kg/ha)	P2O5 (kg/ha)	K2O (kg/ha)
	Totale	210	50	-296



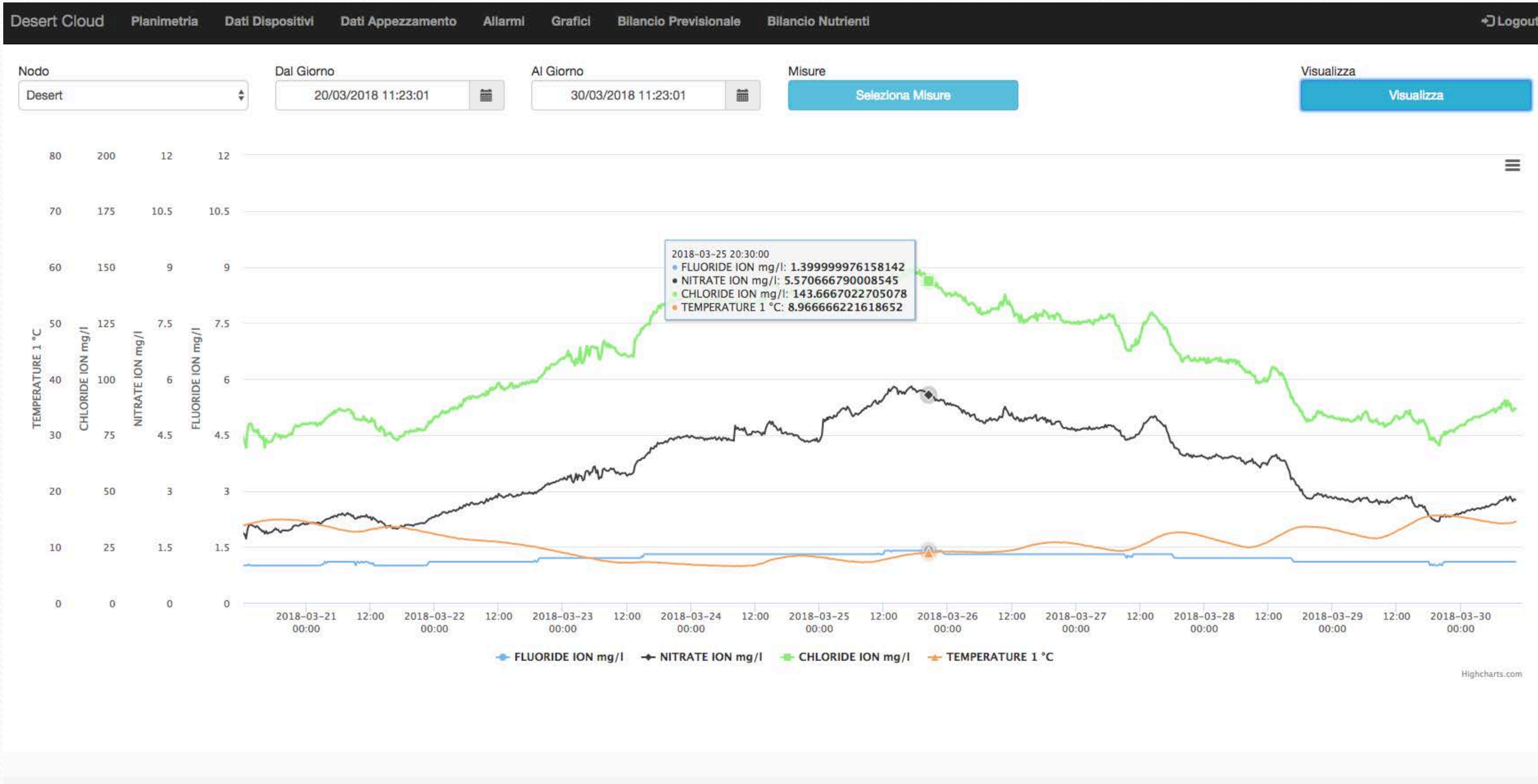




1. Scientific and technological progress



1. Scientific and technological progress



1. Scientific and technological progress

Azienda Aree Omogenee Dispositivi Allarmi Grafici Benvenuto! Disconnetti

Lista delle concimazioni effettuate:

Data / Ora	Concime	Modalità Somministrazione	Titoli (kg/q)			kg/ha	Efficienza (%)			Somministrati			Operazioni
			N	P2O5	K2O		N	P2O5	K2O	N	P2O5	K2O	
04/05/2018	Fertil MBS 9/14/13 +2+16+7,6	Granulare - Tre Somministrazioni	9	14	13	10	90	100	100	0,81	1,4	1,3	Elimina
07/09/2018	AZO TOP 18,5/0/0	Granulare - Unica Somministrazione	18,5	0	0	10	60	100	100	1,11	0	0	Elimina
01/03/2018	BELFRUTTO MB 5/10/15 +5+16	Per via Fogliare	5	10	15	10	100	100	100	0,5	1	1,5	Elimina
05/05/2018	Acido fosforico 85%	Fertirrigazione	0	61	0	10	100	100	100	0	6,1	0	Elimina

Aggiungi Modalità Somministrazione e Concime

Giorno	Concime	Modalità Somministrazione	Quantità	
05/05/2018	✓ Acido fosforico 85%	…azione	10	Aggiungi

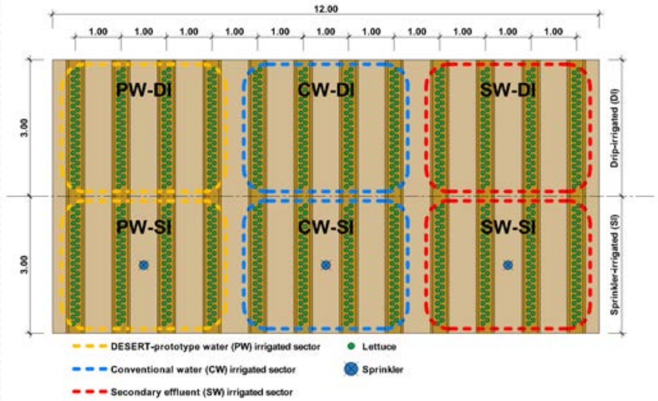
- ✓ Acido fosforico 85%
- AGRESTE ORG.MIN. 7,5/12/21
- AGROFERT MB ORG.MIN. 10/5/15 +2+16
- AGROFERT MBS O MIN. 9,5/5/14,5 +2+24
- AZO TOP 18,5/0/0
- AZO TOP 18,5/0/0 +32
- Azogold 40 N + 12 SO3
- Azoplus 35 N + 22 SO3
- BELFRUTTO MB 5/10/15 +5+16
- BELFRUTTO MBS KG 25 ORG.MIN. 6/10/15
- Calciocianamide oleata
- Calciocianamide granulare
- Calciocianamide in polvere
- Cloruro di potassio
- Ferroumato
- Fertil agreste start kg 50 10/12/7
- Fertil MBS 9/14/13 +2+16+7,6
- Fosfato biammonico 18-46
- Fosfato biammonico 21-52
- Fosfato monoammonico 12-61
- Fosfato monopotassico 0-52-34
- Fosfato naturale tenero 0-27-0
- Fosfato monoamm multi map
- Fosfato monopot multi mkp
- Geomag mcr 0,2+5+0,5+0,5
- Humofos 3/15/0 +16+8

Ritorna indietro

Water JPI

1. Scientific and technological progress

- **WP3**: DESERT irrigation water validation and agronomic assessment for fruit tree crops and soil quality monitoring



Physiological parameters	SPRINKLER IRRIGATION (SI)			DRIP IRRIGATION (DI)		
	Secondary RW (SW)	Irrigators Comnunity	DESERT	Secondary RW (SW)	Irrigators Comnunity	DESERT
A ($\mu mol\ m^{-2}\ s^{-1}$)	19,94	17,58	16,65	20,64	21,67	20,94
g_s ($mmol\ m^{-2}\ s^{-1}$)	385,1	267,0	171,9	397,0	327,3	276,3
WUE intrinsec (A/g_s)	**51,8**	**65,8**	**96,9**	**52,0**	**66,2**	**75,8**

LETTUCE (var. Romana)

TOMATO

Yield and fruit quality

DESERT water reached the highest WP values with 17,4 Kg/m^3.

BROCCOLI

Yield

Water productivity and yield

WATER QUALITY SOURCE	PLANT WEIGHT (g)	Yield (Kg/ha)	Water applied (m^3 / ha)	Water productivity (kg /m^3)
Brine + Secondary RW	438,1 ± 71,1 a	21905 ± 3555	1254	17,5
DESERT	393,9 ± 63,6 a	19695 ± 3180	1254	**15,7 (-10%)**

ORANGE ORCHARD

Yield

Water productivity and yield

WATER QUALITY SOURCE	Yield (Kg / tree)	Yield (Kg/ha)	Water applied (m^3/ ha)	Water productivity (kg /m^3)
Irrigators Community water	59,4	24750	4987,4	5,0
DESERT water	61,8	25750	4987,4	**5,2 (+4%)**

Water JPI

ORANGE ORCHARD

Fruit Quality

WATER QUALITY SOURCE	FRUIT WEIGHT (g)	FRUIT DIAMETER (mm)	PEEL THICKNESS (mm)	JUICE (mL)	SSC (ºBRIX)
CONTROL	235,9 ± 7,4 a	76,9 ± 0,8 a	4,25 ± 0,09 a	126,9 ± 4,1 a	14,6 ± 0,19 a
DESERT	264,5± 9,8 b	79,4 ± 0,9 b	4,44 ± 0,10 a	141,9 ± 5,15 b	12,9 ± 0,39 b
% increase by DESERT	12,1	3,2	4,6	11,9	-11,4

Colour index: HUE and L slightly higher (1,9 and 0,9%) and less Chroma (-0.8%).

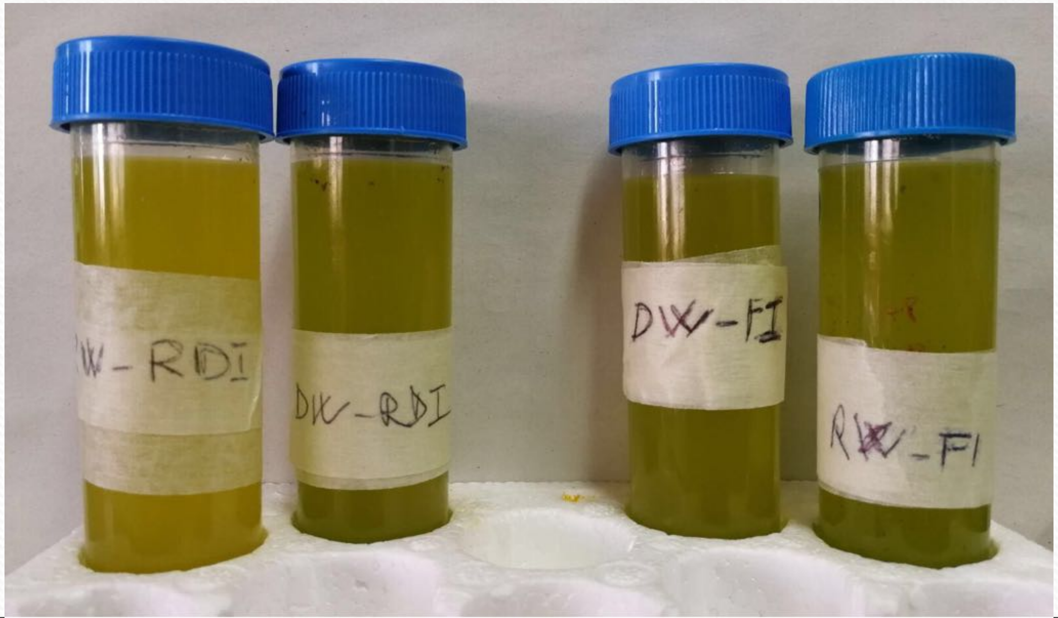
Water JPI

Olive trees - Oil quality

WATER QUALITY SOURCE	Fenols	Acidity	Peroxide	Chl
DW-FI	391c	0.23 ab	7.80 b	0.17 b
DW-RDI	441 b	0.20 b	7.64 a	0.18 b
RW-FI	406 c	0.23 ab	8.52 c	0.18 b
RW-RDI	459 a	0.25 a	8.81 d	0.09 a

DW Desert Water
RW Not treated water

DW
Ecw= 1.5 dS/m
RW
Ecw= 3.0 dS/m



Almond trees – leaves

WATER QUALITY SOURCE	Na	K	NTot
Ecw 1.5 DW-FI	0.06 b	1.69 ab	2.03 a
Ecw1.5 DW-RDI	0.05 b	1.71 b	2.10 ab
Ecw 3.0 RW-FI	0.14 a	1.54 ab	2.34 bc
Ecw 3.0 RW-RDI	0.19 a	1.49 a	2.41 c

Ecw=1.5 dS/m

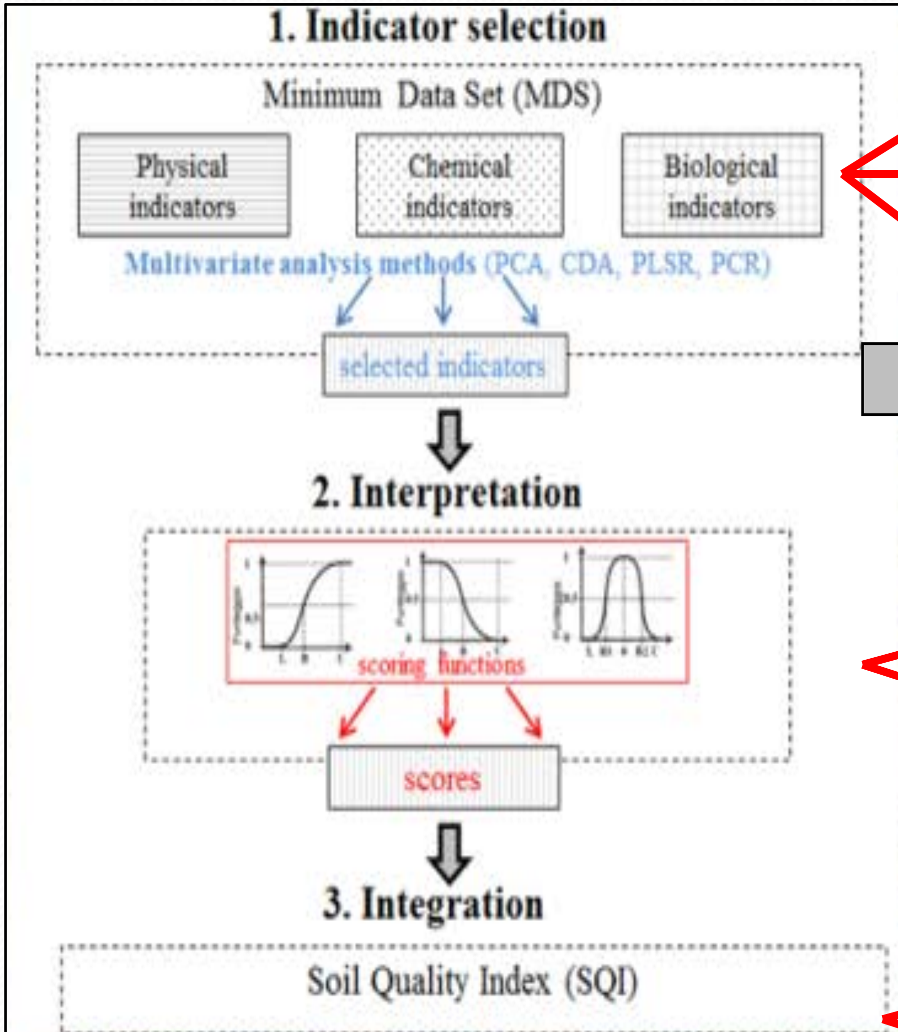
DW Desert Water
RW Not treated water

Ecw= 3.0 dS/m

Task 2.1: Comparison of different methodological approaches to compute soil quality indices (SQIs)

SQIs allow to synthetize in a standardized value information brought by numerous soil indicators

A critical aspect is the choice of representative indicators for building the Minimum Data Set (MDS)



- Expert opinion
- Literature review
- Multivariate analysis

PCA, CDA, SDA, PCR, PLSR

- Linear parametrization functions
- Non-linear parametrization functions

- Additive indices
- Weighed -additive indices

Task 2.1: Comparison of different methodological approaches to compute soil quality indices - Results

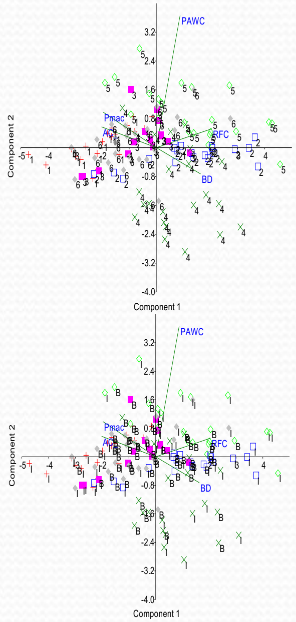
water

MDPI

Article

Application of multivariate analysis techniques for selecting soil physical quality indicators: a case study in long-term field experiments in Apulia (southern Italy)

Mirko Castellini [1,*], Massimo Iovino [2] and Anna Maria Stellacci [3]



AIMS:

-Investigating **soil variables selection** with the use of different statistical approaches: **correlation analysis, PCA** and **SDA,** using datasets deriving from **long-term field experiments**.

RESULTS:

Results highlighted the **complementary and supplementary role of the three data analyses procedures** applied (corr, PCA, SDA) and the **importance to use simultaneously different approaches** to have a **complete understanding of the processes investigated**.

RFC showed to have a crucial role among soil physical quality (SPQ) indicators, being **able to synthetize part of the information** given by **AC** and **PMAC**.

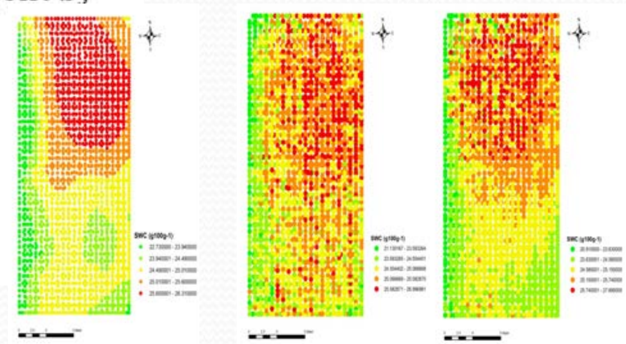
Water JPI

Task 2.2: Characterization of the soil spatial variability of the experimental site - Results

Submitted to GEODERMA

Contribution of EMI and GPR proximal sensing data in soil water content assessment by using linear mixed effects models and geostatistical approaches

Emanuele Barca [1], Daniela De Benedetto[2*], Anna Maria Stellacci [2,3]



AIMS

-investigating the single or combined contribution of EMI and GPR sensor data in soil water content (SWC) assessment;

-comparing linear mixed effects models (LMM) and geostatistical approaches to estimate SWC.

MAIN FINDINGS

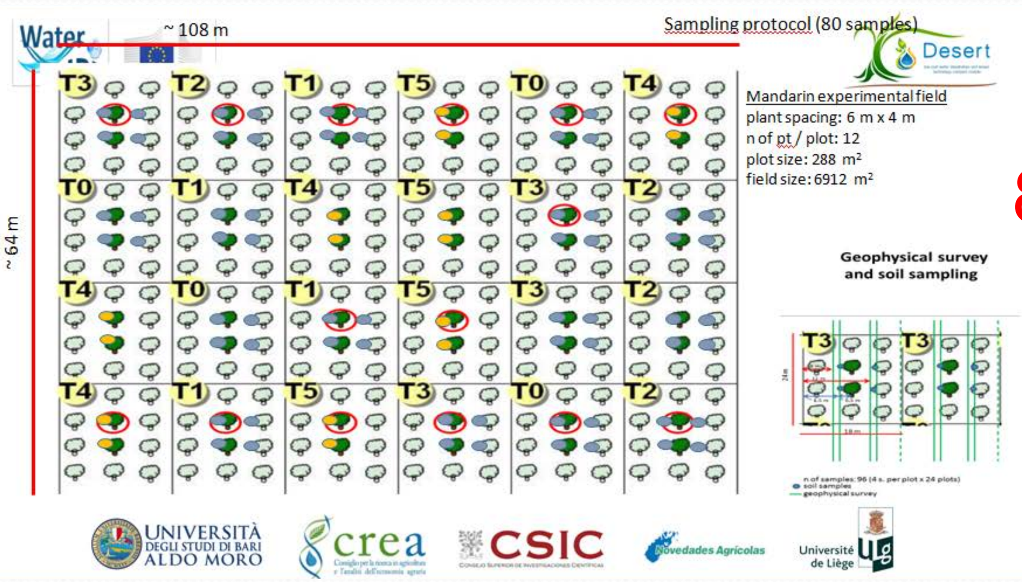
GPR was more effective than EMI in estimating soil water content (SWC).

The combined use of both data sources showed an even larger explaining capability with more accurate predictions of SWC.

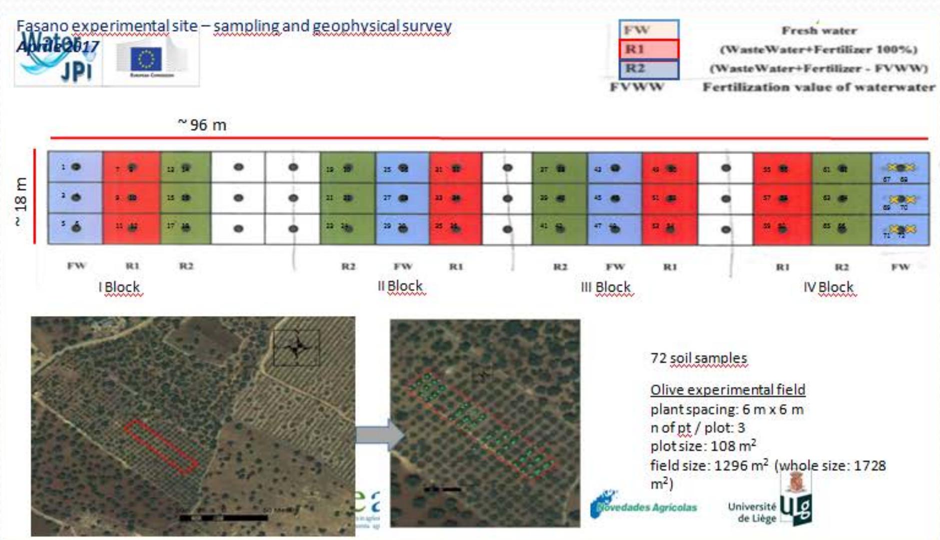
LMM and geostatistical approaches proved to behave very similarly.

Proximal sensing information was able to explain the larger part of the spatial structure of SWC.

Characterization of the soil spatial variability of the experimental site – ongoing activities



80 sampled locations



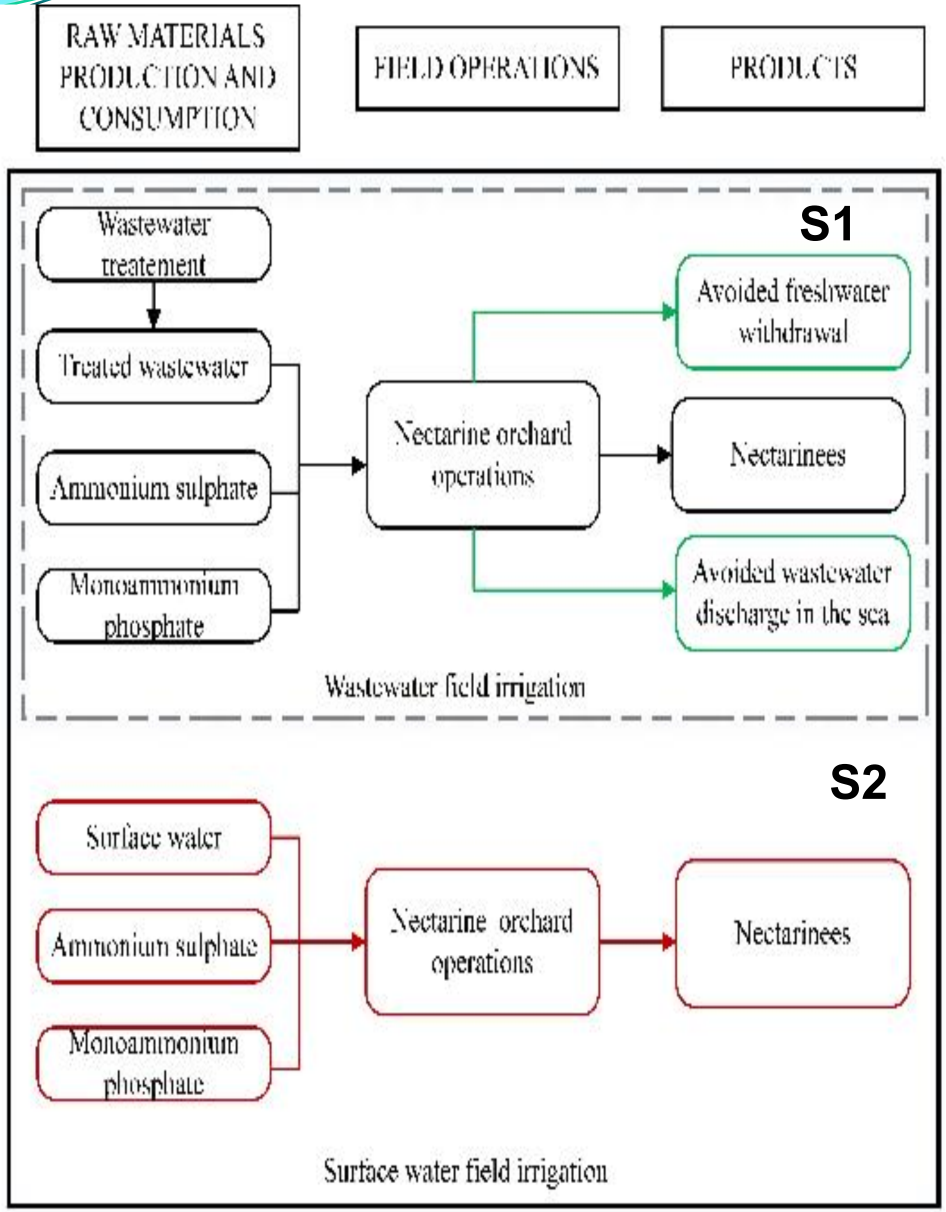
72 sampled locations

Two experimental sites:

- Long-term (8 years): Campotejar (Murcia, Spain)
- Short-medium term (3 years): Fasano (Puglia, Italy)

1. Scientific and technological progress

- **WP4**: Sustainability assessment, energy and cost efficiency of the DESERT system



The environmental impact assessment model is based on the Environmental Life cycle analysis framework

- Three-year study (2012–2014)
- *Prunus persica L. Batsch*
- Drip irrigation with SW and TMW

Functional unit:
1 kg of Nectarines

Scenario 1 → Treated municipal wastewater

Scenario 2 → Conventional water

VALUATION OF TREATED URBAN WASTE-WATER FOR IRRIGATION:

a cross-country study

Scope

1

- *Farmers' willingness to use treated urban wastewater for irrigation to complement conventional water resources*

2

- *Use value of treated urban wastewater used for irrigation in agriculture in water-scarce regions*

3

- *Farmers' response to future credible policies options*

Summary

1. Scientific and technological progress

2. **Collaboration, coordination and mobility**

3. Stakeholder/industry engagement

4. Dissemination of the results

5. Identified problems or specific risks

2. Collaboration, coordination and mobility

Collaboration

Collaboration:

- Deep collaboration among partners

New projects

H2020 - A digital platform for wATer quaLity AwareNess, TechnologIes and Solutions

Agronym: ATLANTIS

PRIMA call - Efficient production and sustainable management of REclaimed wasteWATer and desalinated seawater in the MEDiterranean area

Acronym: REWATMED

Erasmus Plus – NUCIF

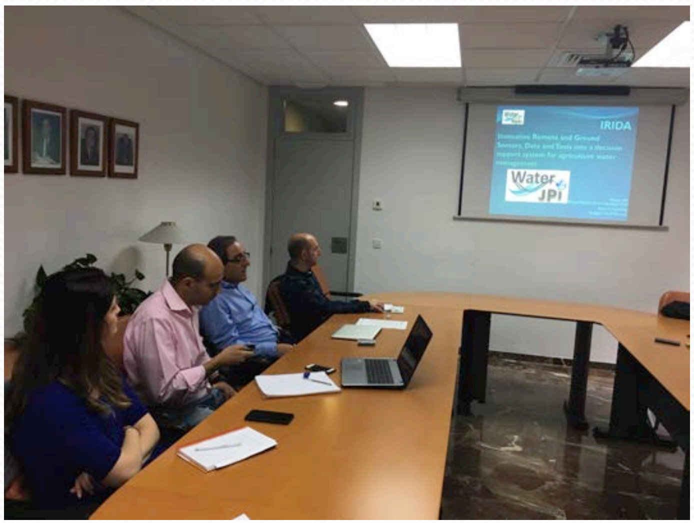
Knoledge hub Agroalimentare y Agroindustria (water reuse in agriculture)

With different Universities of South America

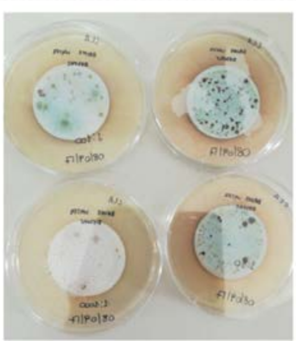
Cofinanciado por el programa Erasmus+ de la Unión Europea

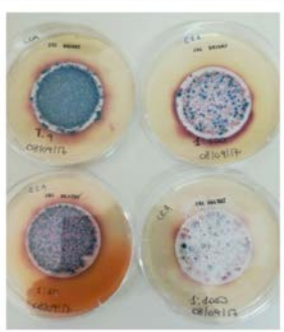
Collaboration

During the Mid Term Meeting of DESERT we invited the project coordinator of **IRIDA project**



IWA Conference in California Poster
With **MEPROWARE**
Alfieri Pollice Project Coordinator





Collaboration wiith Dipartimento di Scienze Biomediche e Oncologia Umana (DIMO)
Food Science, Clinical Chemistry, Epidemiology for microbilological analysis

2. Collaboration, coordination and mobility

Coordination

Kick off meeting DESERT project

21st September 2016 - Bari - Italy

MID Term Meeting

April 2018 – Murcia - Spain

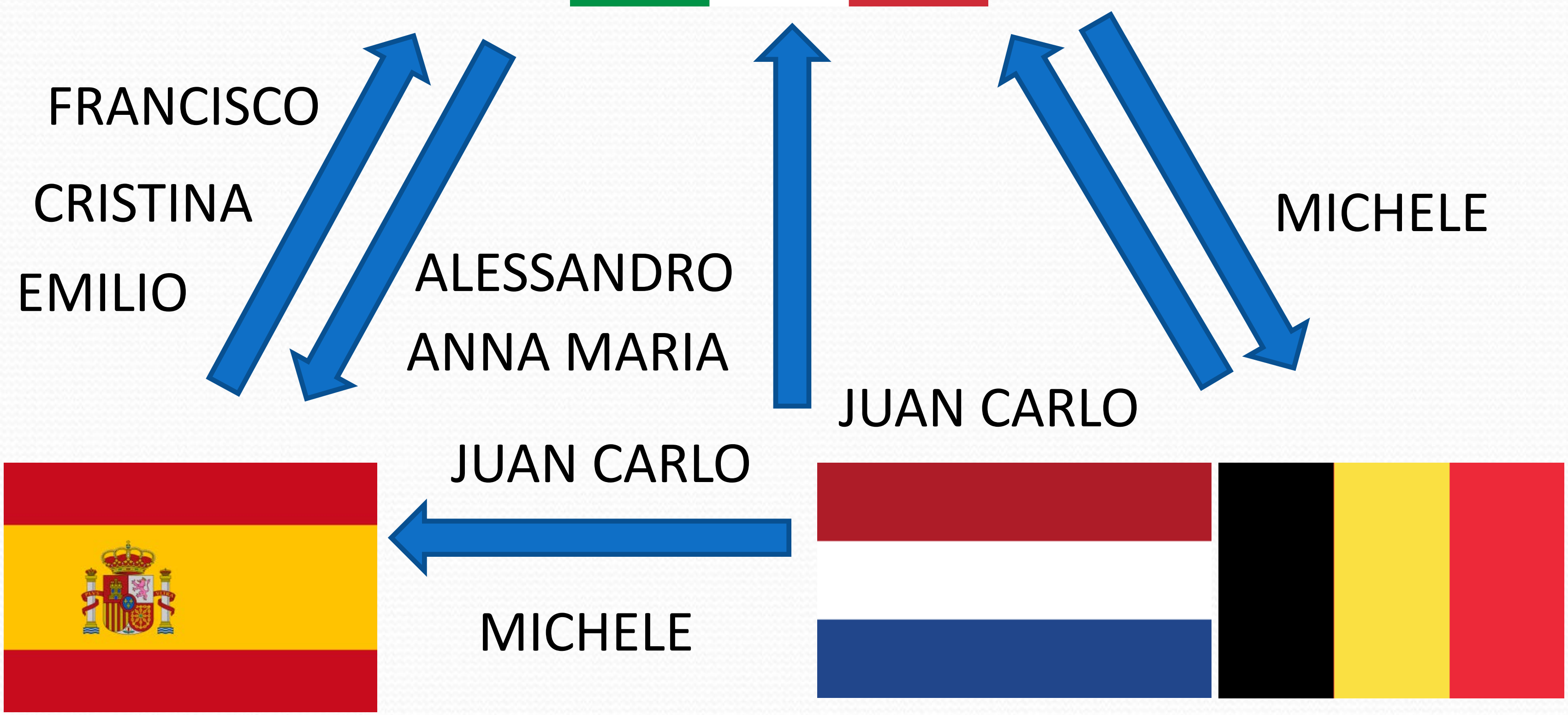
MID TERM REPORT


WaterWorks2014 Cofunded Call
Mid-Term Progress Report
Research and Innovation for Developing Technological Solutions and Services for Water Systems

Low cost water desalination and sensor technology compact module DESERT

Mobility

2 post-doc
1 Intership
1 Visiting researcher



Summary

1. Scientific and technological progress

2. Collaboration, coordination and mobility

3. **Stakeholder/industry engagement**

4. Dissemination of the results

5. Identified problems or specific risks

Water JPI

3. Stakeholder/industry engagement

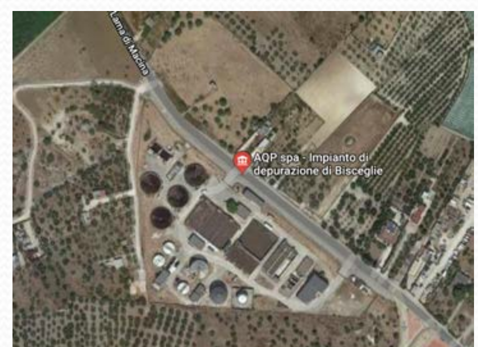
DESERT technologies

irritec
don't wait for rain®

To test the plant performance under different salt and nutrients loads

AGROMILLORA

Tertiary wastewater treatment plant of Bisceglie municipalty interested on QUANTUM system



Water JPI

Summary

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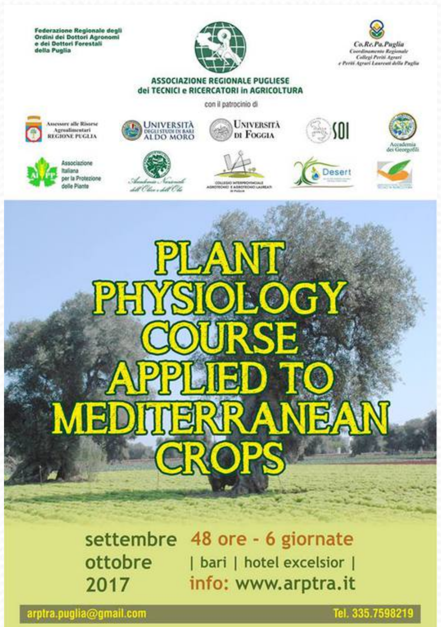
4. Dissemination of the results

- **WP5**: Dissemination on strategy and exploitation plan for transfer of knowledge and market uptake



Il Fatto Quotidiano 10 August 2017
National new paper


SEZIONI il Fatto Quotidiano.it
Annuncio chiuso da Google
Int. visual. ann.
Perché questo annuncio?
Siccità, per combatterla un'idea made in Italy. Ecco Desert: "Riuso dell'acqua reflua grazie ai depuratori per evitare lo spreco"

TGR 3 – Regional TV news report

Students: ≈ 150

Students of University of Wageningen visited experimental platform of CEBAS -CSIC

22nd October 2016 - Murcia - Spain

Seminar: Irrigation Water Management on Semi-Arid Climates: Strategies and Reuse"
22th September 2016 - Bari - Italy

CEBAS-CSIC, received the visit from staff of the Agriculture Department, State Govt. of Himachal Pradesh (India)

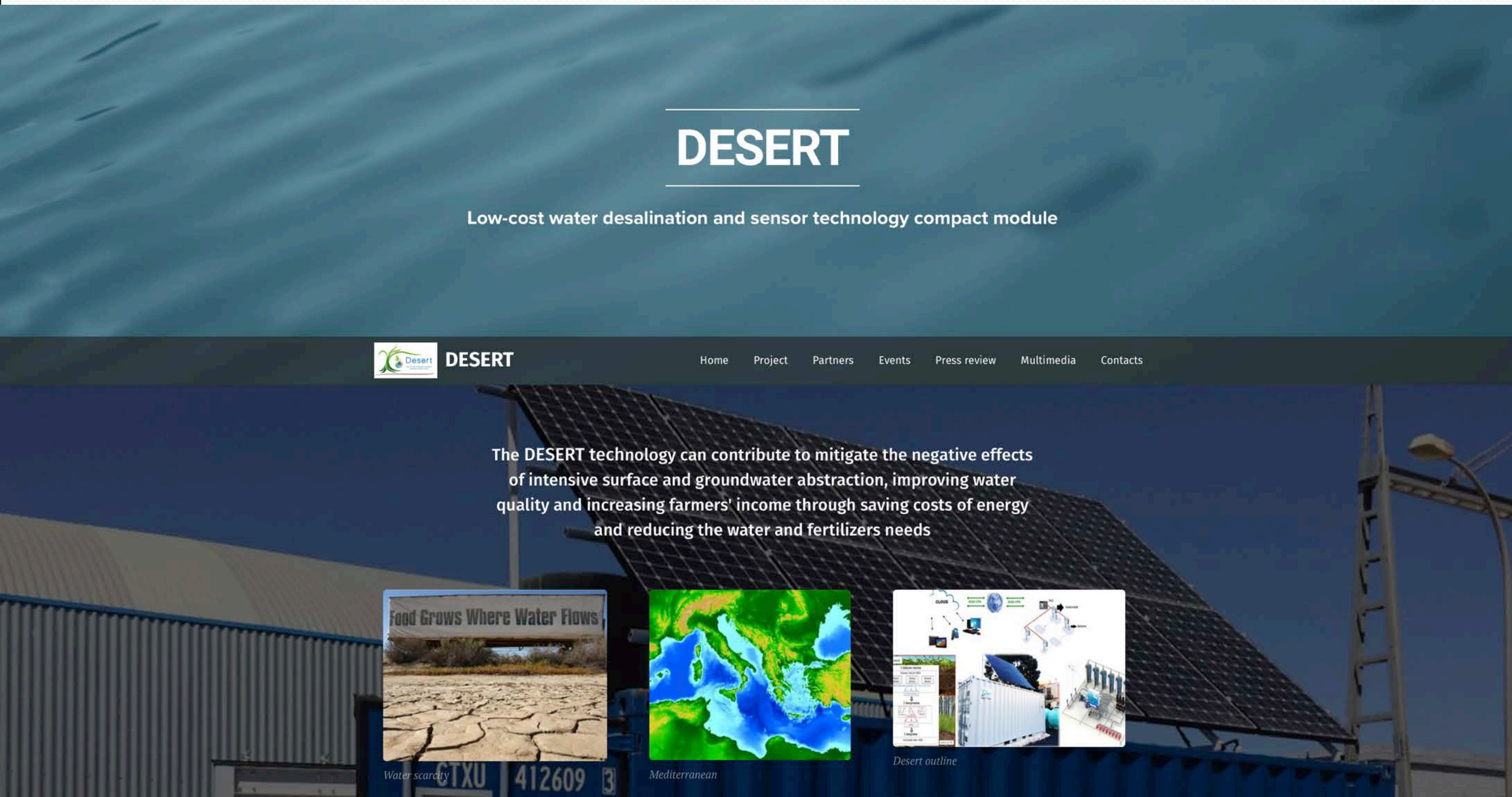
19th October 2016 - Murcia - Spain

Workshop "Yout Innovating with Wastewater for a Sustainable Mediterranean"

21st-22nd March 2017 - Marseille - France

Workshop of the European Group of LIFE ReQpro project

27th and 28th October 2016 - Murcia - Spain



www.desertproject.eu

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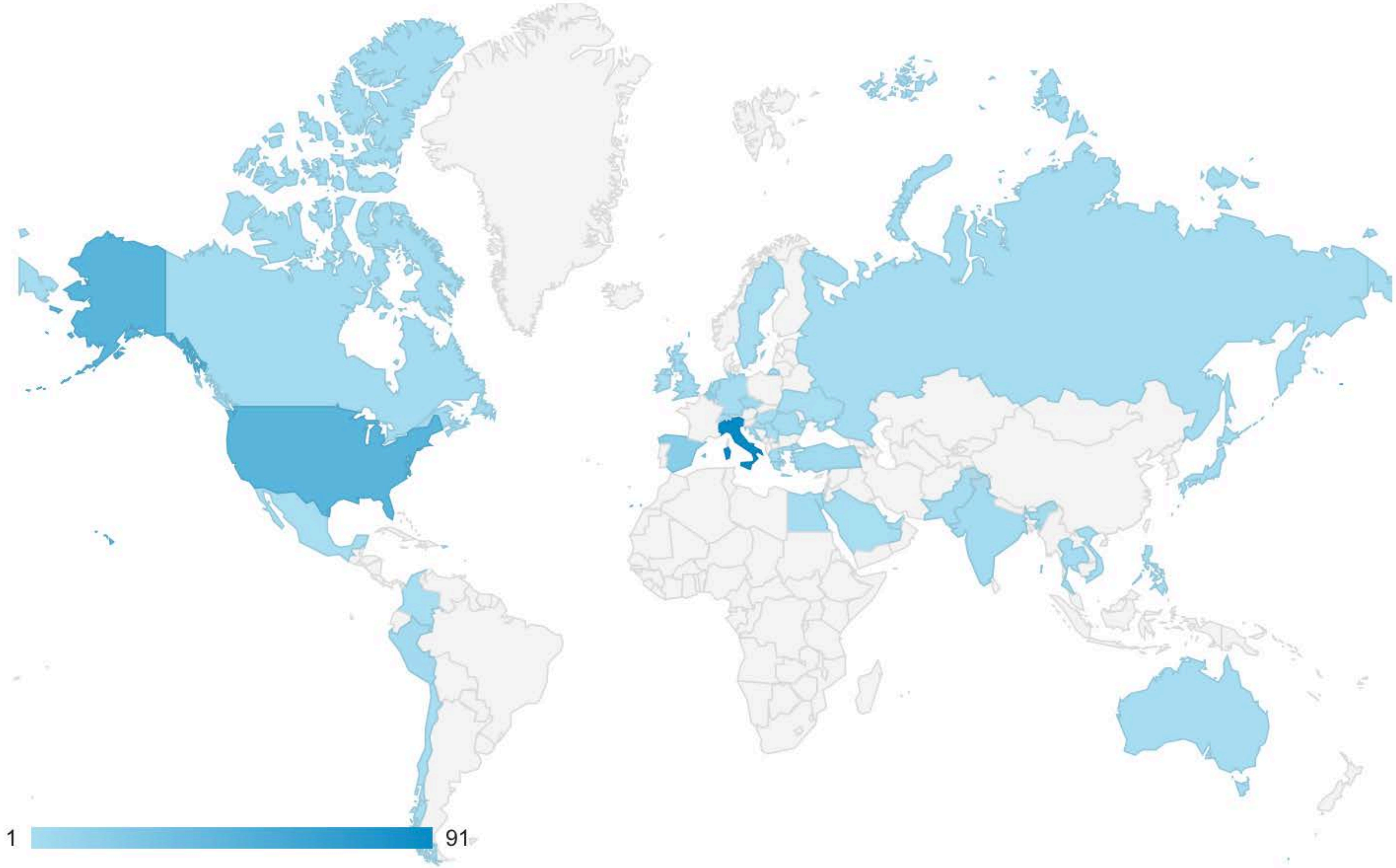

38 Countries

Source: google analytic

1.	Italy	90 (39,82%)	81 (37,85%)	184 (55,59%)	42,39%
2.	United States	44 (19,47%)	44 (20,56%)	48 (14,50%)	93,75%
3.	Spain	18 (7,96%)	17 (7,94%)	23 (6,95%)	26,09%
4.	Belgium	11 (4,87%)	11 (5,14%)	11 (3,32%)	72,73%
5.	Czechia	5 (2,21%)	5 (2,34%)	5 (1,51%)	100,00%
6.	Turkey	5 (2,21%)	5 (2,34%)	5 (1,51%)	60,00%
7.	United Kingdom	4 (1,77%)	3 (1,40%)	5 (1,51%)	40,00%
8.	Netherlands	4 (1,77%)	4 (1,87%)	5 (1,51%)	0,00%
9.	Peru	4 (1,77%)	4 (1,87%)	4 (1,21%)	100,00%
10.	Canada	3 (1,33%)	3 (1,40%)	3 (0,91%)	100,00%
11.	United Arab Emirates	2 (0,88%)	1 (0,47%)	2 (0,60%)	100,00%
12.	Australia	2 (0,88%)	2 (0,93%)	2 (0,60%)	50,00%
13.	Germany	2 (0,88%)	2 (0,93%)	2 (0,60%)	100,00%
14.	Egypt	2 (0,88%)	2 (0,93%)	2 (0,60%)	0,00%
15.	India	2 (0,88%)	2 (0,93%)	2 (0,60%)	50,00%
16.	Japan	2 (0,88%)	2 (0,93%)	2 (0,60%)	100,00%
17.	Pakistan	2 (0,88%)	2 (0,93%)	2 (0,60%)	0,00%
18.	Romania	2 (0,88%)	2 (0,93%)	2 (0,60%)	100,00%
19.	Russia	2 (0,88%)	2 (0,93%)	2 (0,60%)	0,00%

Source: google analytic

Prof. Steve Robert Grattan – UC California

Prof. Ing. LUIS ALBERTO LIMA MORRA
MINISTRO PRESIDENTE DEL CONSEJO NACIONAL DE CIENCIA Y TECNOLOGÍA (CONACYT) Paraguay

4. Dissemination of the results

Conference

IWA Regional Conference on Water Reuse and Salinity Management

11-15 June 2018. Murcia- Spain

iwaresa.com

ResearchGate

Project

LOW-COST WATER DESALINATION AND SENSOR TECHNOLOGY COMPACT MODULE - DESERT

Francisco pedrero salcedo · E. Nicolás · Gaetano Alessar · Show all 6 collaborators

Goal: The next decades a large percentage of the world population will live in areas with water scarcity and poor water quality due to climate change and increasing population pressure, thus agriculture will face the challenge of supplying the increasing demand for food resultin…

Show details

Updates	5 (0 new)
Recommendations	3 (0 new)
Followers	16 (0 new)
Reads	122 (4 new)

Project log · References (39) · Questions · Add research · Add update

Twitter

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Water JPI

Pubblished

1. Pedrero F et al., 2018. Use of reclaimed wastewater on fruit quality of nectarine in Southern Italy. **Agriculture water management**
2. **Pedrero et al., 2017.** Nutrient uptake and fruit quality in a nectarine orchard irrigated with treated municipal wastewaters.. **Desalination and water treatment**
3. Intriago et al., 2018. Agricultural Reuse of Municipal Wastewater through an Integral Water Reclamation Management. **Journal of Environmental Management**
4. Castellini M., Di Prima S., Iovino M., 2018. An assessment of the BEST procedure to estimate the soil water retention curve: A comparison with the evaporation method. **Geoderma**, 320, 82–94.
5. Vivaldi et al., 2017. Progetto DESERT, irrigazione sostenibile da fonti alternative. **Fruit journal**
6. Pedrero et al., 2017. Multidisciplinary approach on reclaimed water use projects in agriculture. **Web**

Submitted

1. Barca E., De Benedetto D., Stellacci A.M., 2018. Contribution of EMI and GPR proximal sensing data in soil water content assessment by using linear mixed effects models and geostatistical approaches. Submitted to Geoderma
2. Castellini M., Stellacci A.M., Iovino M., 2018. Application of multivariate analysis techniques for selecting soil physical quality indicators: a case study in long-term field experiments in Apulia (southern Italy). Submitted to **Water**.

Preparing

1. Moretti et al., 2018. Modelling environmental impacts of treated municipal wastewater reuse for tree crops irrigation in the mediterranean coast. **The International Journal of Life Cycle Assessment**
2. Pedrero et al., 2018. Opportunities for expanding the use of waste waters for irrigation of olives. Irrigation Science.
3. Intrigliolo et al., 2018. Effects of full and deficit irrigation on yield and grape composition of cv. Bobal grapevines in semi-arid terroirs of eastern Spain. Agricultural water management.

Conference

1.Nicolás E. Usos del agua depurada en Agricultura. **III Jornadas Campesinas**. Bullas (Murcia). June 2016.

2.Nicolás E. Respuesta de cultivos leñosos al riego con agua depurada. **Training courses** about "Especialización en Riego Deficitario. Implementación de una gestión eficiente del riego para una agricultura sostenible". Centro Integrado de Formación y Experiencias Agrarias (CIFEA). Molina de Segura (December 2016), Torre Pacheco (February 2017) and Jumilla (March 2017).

3.Nicolás E. Caracterización físico-química y microbiológica de las aguas regeneradas de la EDAR de Jumilla. Aspectos generales y recomendaciones de uso. **Irrigators Community of Miraflores** in Jumilla (Murcia) (CIFEA). March 2017.

4. Nicolás E. Sensores, robótica y big data en la gestión del fertirriego. **Jornadas FAME-INNOWA**. Foro de conocimiento e innovación agrícola. IFEPA. Torre Pacheco (Murcia). March 2017.

5. Nicolás E. Reutilización en el ámbito agrícola, experiencia CR Miraflores. **Jornadas LIFE SIAMEC**. Murcia. June 2017.

6. Nicolás E. Caracterización físico-química y microbiológica de las aguas regeneradas de la EDAR de Jumilla. Aspectos generales y recomendaciones de uso. **Jornadas LIFE IRRIMAN**. Jumilla (Murcia). December 2017.

7. Nicolás E. Procesos y consideraciones para la reutilización de aguas regeneradas en riego agrícola. Caso práctico. **Jornada «La regeneración de agua para riego en Andalucía: Una alternativa sostenible»**. FERAGUA. Sevilla. March 2018.

National Congress

1.Lorente B., Zugasti I., Luna A., Ortuño MF., Sánchez-Blanco MJ., Nicolás E, Nortes P., Alarcón JJ. Efecto del medio de cultivo en el comportamiento hídrico, nutricional y productivo de plantas de tomate regadas con aguas regeneradas con altos niveles de salinidad. XXXVI Congreso Nacional de Riegos (Valladolid). June 2018.

2.G.A. Vivaldi, F.P. Salcedo, M.A. Mastro, S. Camposeo Vivaldi. Innovativo sistema di supporto alle decisioni per il riuso sostenibile di acque reflue urbane in olivicoltura. IV Convegno Nazionale dell'Olivo e dell'Olio. 18 Ottobre 2017

Water JPI

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In the desalination part, the process of setting up the prototype of Roldan and its first phase of experimentation, has given us as results, **rapid fouling of the ultrafiltration membrane** due to the high rate in incoming water of:

- Dissolved solid
- Organic componets

This in a very short time, has resulted in an excessive clogging of the ultrafiltrate membrane, causing its saturation, and a great loss of pressure, which has required several chemical cleaning processes.

To solve these problems the following actions have been taken:

1. Installation of a 1 micron microfiltration cartridge, as a measure of retention before microfiltration, to retain particles or biofilms of organic origin.

2. **Modify the flow that is drained in the filtration process** to twice the expected, passing to 250 l / h of cross-flow, thus achieving a considerable **increase in the time between chemical cleanings**, not having to be done before 40 hours of operation, giving us in our test a frequency of 1 cleaning per month.

3. To be able to carry out the chemical **cleaning of the ultrafiltration membrane in situ**. Design and installation of a new chemical cleaning system, consisting of a tank for the chemical preparation of the cleaning solution, hydraulic lines and a pumping system, as well as an additional programming in the control automation to carry out the process.

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1st Problem

Different sizes
Did not fit with probe holders

2nd Problem

Malfunctioning of 8 probes holders

Thank you for your attention

Desert

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