

Executive Summary:

The WaterBee Smart Irrigation Demonstration Action project aimed to demonstrate and evaluate a smart irrigation and water management system which is intelligent, flexible, easy-to-use but accurate irrigation scheduling system at an affordable cost that takes advantage of recent technological advances in wireless networking, environmental sensors and improvements in crop modeling.

WaterBee is an innovative, complete, resilient, cost-effective Smart Irrigation and Water Management system, that empowers growers to optimise their commercial and sustainable environmental operations. The web sensor networked irrigation system is centrally monitored and coordinated, and the WaterBee services are provided across Europe through collaborating Business Partners, who work closely with their local customers.

The WaterBee intelligent irrigation modelling and scheduling system goes well beyond the state-of-art, with its unique Soil-Moisture Model for optimal water use, continuously self-adapting to each user's situation and business objectives, using machine learning approaches, and its open web-enabled architecture facilitates future integration with all environmental data and farm management systems. This enables its users to optimise their use of water by irrigating only where, when and the amount needed, and also enhance plant growth and quality.

During the project, the WaterBee system was operational at 12 Demonstration Sites with various crops at very different growing situations across Europe in Estonia, Italy, Malta, Spain, Sweden and the UK. Evaluation of these reference demonstration sites over the last 15 months has indicated the following benefits for the growers involved:

- (a) Irrigation Water savings on average of 23%, and up to 44%.
- (b) Reduction of irrigation events by up to 23%
- (c) Excellent Return On Investment (ROI). Investment in a complete WaterBee system could be repaid in 5 years from a site as small as 1.5 ha, which is a relatively small area for a commercial producer. However a standard WaterBee system can operate on sites of 20 ha and greater, giving correspondingly better ROIs.

The Consortium Partners now plan to commercially deploy the WaterBee service and results of the project through one organisation that will centrally monitor and coordinate provision

of the WaterBee platform and services to users across Europe. To do this, they plan to establish a new company.

Project Context and Objectives:

The WaterBee Smart Irrigation Demonstration Action is the follow-on phase from the very successful FP7-SME-007-1 WATER-BEE “Research for SMEs” project (222440) that ended in September 2010, and developed and proved the concept of the WaterBee Prototype to provide an unique scientific soil-moisture model that automatically adapts to each installation and crop with a distributed Web-based Wireless Sensor Networked (WSN) Smart Irrigation system to optimise Water Use Efficiency (WUE) in irrigation.

The aim of the current project was to demonstrate a total irrigation management system which is intelligent, flexible, easy-to-use but accurate irrigation scheduling system at an affordable cost that takes advantage of recent technological advances in wireless networking, environmental sensors and improvements in crop modeling.

The specific project objectives were

- (a) Scale-up and productise the WaterBee laboratory prototype to a field prototype for reliable operational demonstration of the WaterBee Service
- (b) Install and operate the service over a 15 month period of growing cycles with various crops in six contrasting sites across Europe in Estonia, Italy, Malta, Spain, Sweden and UK.
- (c) Each Demonstration site to deliver water savings of 40% and other significant benefits to Growers.

The WaterBee system and soil-moisture model responds rapidly to changing conditions, continually optimizing growing conditions and water efficiency based on sensors. The innovative system fulfils the following performance objectives to ensure its widespread uptake by farmers, growers, hotels, golf clubs, and even domestic homeowners:

- The system is easy to deploy and run, and facilitates irrigation scheduling tasks.
- The system is modular and flexible.
- The system design is robust, reliable and secure.
- The system is cost effective to ensure its widespread uptake by farmers.

There is a pressing need and excellent commercial opportunity for such a system in Agriculture, which is the largest industry in the world and (according to the WWF), wastes 60% of the 2,500 trillion litres of water it uses each year – which is 70% of the world's accessible water – a huge threat to the environment. A major culprit is inefficient irrigation systems.

In Europe irrigated agriculture is the biggest water consumer (over 60%) in the Mediterranean, where drought is an increasing problem. To bridge the gap from the very successful Research project, and to enable its SMEs to address this significant market opportunity, WaterBee scaled up to a full reliable operational field prototype service, that was demonstrated and validated over a 15 month period with complete growing cycles of various crops in 12 contrasting sites across Europe, in Estonia, Italy, Malta, Sweden, Spain and UK, to quantify profitable operation of the WaterBee service for Growers, with water savings of 40% while enhancing crop quality in each site.

The project quantified the market and identified potential users of a commercial WaterBee Service. Based on these and ongoing feedback from the demonstration sites the project widely disseminated the WaterBee service to potential customers and business partners through various media and 2 specific events, and developed and validated a Business Plan for the SMEs to commercially develop and exploit the service after this Demonstration Action ended.

WaterBee Smart Irrigation and Water Management system

WaterBee is a complete, resilient, cost-effective state-of-the-art Smart Irrigation and Water Management system that includes

- A Web-driven wireless sensor networked irrigation system, including a Gateway, ZigBee wireless communications Nodes and Sensors, and a Web and Smartphone Interface
- Centrally monitored through the WaterBee Server
- Soil-moisture Model to optimise water use for each Grower.
- Services provided through Local Business Partners, who work closely with their Growers

WaterBee helps Growers to make better crop irrigation decisions, realize more profit per hectare through the efficient use of water and other farm inputs. WaterBee is a full-service solution for Irrigation Management, providing reliable, accurate and easy-to-use. It enables farmers, growers and landscape managers to gain higher quality plants, greater yields and lower operating costs.

WaterBee provides reliable, real-time information and software tools at the right place and at the right time on easy-to-use Smartphone and Web Apps that support informed decision making, by providing accurate and complete information on current field conditions. The full WaterBee service and its network of local Business Partners means no worries on software support or equipment maintenance.

The WaterBee intelligent irrigation modelling and scheduling system enables irrigation farmers not only to optimise the use of water by irrigating only where and when it is needed, but also enhancing plant growth and quality by eliminating poor irrigation practices.

A basic WaterBee Smart Irrigation system consists of:

1. An User Account on the WaterBee Server, that monitors and records the user's farm status 24x7, local rain fall, weather forecasts, and runs the WaterBee soil-moisture model tailored to the specific needs of each user's crop, zone, plant cycle and business objectives, to recommend when and how much to water, and provide the farmer with continuous real-time remote monitoring of their crop's status in the field. Users can have multiple zones.
2. Each user communicates with their WaterBee Server account using the WaterBee Smartphone App or Website to remotely monitor and control all of their crop's status in the field, from any location, any distance away.
3. The WaterBee Server communicates to a WaterBee Gateway Unit with local rain gauge on each farm, over the Internet using very low cost mobile data communications (less than €2/month). As the Gateway needs to be permanently powered, they can use either solar panels or mains power.
4. The WaterBee Gateway communicates using free Zigbee wireless to the Smart WaterBee Wireless Sensor nodes, that continuously monitor and send back the real-time soil moisture conditions across each crop zone that the farmer is managing. Typically each zone (up to 20 ha) uses 3 such nodes. Each node is buried to avoid interference with crop management equipment, and operates for at least a full growing season without any maintenance or change of battery.

5. Each WaterBee Sensor node continuously measures the actual real-time soil-moisture conditions using standard soil-moisture sensors such as WaterMark (as shown) Decagon, Vegetronix, or McBurney Scientific. The user can choose their preferred option.

The price of a complete basic system (WaterBee Server Account, Gateway, 3 Wireless Sensor Nodes with Watermark Sensors and WaterBee Web/App) to the farmer is €4,000. This includes setting up of their WaterBee Server Account, support from a local Business Partner to install and setup the system. On going monthly fees for the WaterBee Server services is just €25 per system. This system would support the monitoring and management of a reasonably square site with relatively uniform soil characteristics up to about 20 ha.

In addition, WaterBee has various options to suit each farmer's requirements, such as

- Choice of sensors.
- WaterBee Actuator Nodes (for 12 or 24V DC controlled water valves) to automatically control irrigation of zones.
- WaterBee Repeater Nodes for undulating zones or flat zones that require more than about 250m range between Wireless Sensor Nodes.
- Weather Station, rather than the rain gauge, for complete local weather reporting at the Gateway.

During the project, the WaterBee system was operational at 12 Demonstration Sites in Estonia, Italy, Malta, Spain, Sweden and the UK.

During the first 9 months of the project, in analysing the market for Smart Irrigation Systems the focus was on identifying potential users, competitors and potential collaborators (or local Business Partners). From this and the results from the previous research project's prototype, the WaterBee Demonstration field prototype service and specification was developed. The WaterBee market analysis concluded that there is a very significant market with clear potential take-up for its smart irrigation system and services, especially where growers' costs are greatest, e.g. in Europe and USA.

The final 15 months of the project focused on the operation and evaluation of these reference demonstration sites, dissemination of the project's results and development of a viable exploitation plan to commercially deploy the service after the project ends.

Structured evaluation of the system at those reference trials with various crops at very different growing situations across Europe indicated the following benefits for the growers involved:

- (a) Irrigation Water savings on average of 21%, and up to 44% was achieved.
- (b) Reduction of irrigation events by up to 23%
- (c) Excellent Return On Investment (ROI). Investment in a complete WaterBee system could be repaid in 5 years from a site as small as 1.5 ha, which is a relatively small area for a commercial producer. However a standard WaterBee system can operate on sites of 20 ha and more, giving correspondingly better ROIs.

Water savings due to the use of WaterBee can reduce a growers' input costs through a reduction in water, labour and energy costs. By using the system, a grower is also able to effectively demonstrate efficient use of irrigation water which will increasingly be a requirement for the renewal of abstraction licenses.

In comparison to conventional scheduling, the WaterBee system gave savings of irrigation by volume and by number of events in all of the trials where the weather allowed differential irrigation treatments to be established; water savings varied from 4.3 to 44.0% and the reduction in the number of irrigation events ranged from 6.3 to 23.0%.

The evaluation concluded that the WaterBee system showed clear benefits in terms of saving irrigation by volume and by a reduced number of events. On average across all trials where a differential irrigation treatment was established, there was a 21% water saving and 1.3 fewer irrigation events per trial. This leads to savings in the cost of the water itself but also in the cost of pumping water, and potentially in management time. The system can also help the grower to justify the need for irrigation and to demonstrate efficient use of irrigation water; in some countries this is a requirement for renewal of abstraction licenses.

An economic assessment, taking an example where a statistical analysis was possible, and there was a large water saving (44%) and a small yield improvement (3.4%), found that investment in a WaterBee system could be repaid in 5 years if the system was implemented on only 1.5 ha, a relatively small area for a commercial producer.

It is likely that implementation of an improved WaterBee DA model, and productisation of the WaterBee system will improve its commercialization potential. Outcomes are largely also dependent on the soil and crop parameters used in the WaterBee soil-moisture model and the values can be adjusted with experience and repeated use for specific sites and scenarios which will lead to progressive enhancement of performance over multiple seasons of use.

Project Results:

Demonstration Trials

The WaterBee system was operational at 12 Demonstration Sites in Estonia, Italy, Malta, Spain, Sweden and the UK.

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Exploitation and Dissemination

Throughout the project, all partners very actively disseminated WaterBee widely in their country, so that potential clients became familiar with it. The project demonstration sites compared results with many different crops and situations and 2 major dissemination events for the WaterBee system.

Work concluded on developing and validating a sound and credible commercial business plan and market deployment strategies to attract investors and potential customers to commercially develop, exploit and WaterBee system after the project ends. To this end, the initial commercialisation business plan developed early in the project was evolved and focused, to the Final WaterBee Commercialisation Business Plan, that is now the basis of setting up a WaterBee company and commercially deploying the service post project.

The structured evaluation of the demonstration pilots also validated some of the assumptions that underlie the initial WaterBee Business Plan to result in a credible and validated Business Plan at the end of the project.

In parallel to these activities the project has been actively disseminating its activities through its website (www.waterbee.eu) and in over 65 activities and two high profile dissemination events, at the EIMA 2012 trade-show in Bologna, in November 2012, and the WaterBee World Water Day event in Barcelona, in March 2013.

While the previous Research prototype proved the attractiveness of the WaterBee functionality to growers, this project focused on gaining their trust through long-term reliable operation and functionality in the field. This is now critical to progress to a credible post-project commercial offering.

The WaterBee Smart Irrigation and Water Management Service

WaterBee is a complete, resilient, cost-effective Smart Irrigation and Water Management system, that empowers growers, public authorities and landscape managers to optimise their commercial and sustainable environmental operations. The system is centrally monitored and coordinated, and the WaterBee services are provided across Europe through collaborating Business Partners, who work closely with their local customers.

The WaterBee Smart Irrigation System goes well beyond the state-of-art, with its unique Soil-Moisture Model for optimal water use, continuously self-adapting to each user's situation and business objectives and its open web-enabled architecture facilitates future integration with all environmental data in line with the European INSPIRE Directive .

The WaterBee intelligent irrigation modelling and scheduling system enables irrigation farmers not only to optimise the use of water by irrigating only where and when it is needed, but also enhancing plant growth and quality. The system uses innovative solutions including:

- Intelligent irrigation models adapted to individual crops that enhance plant growth and quality by eliminating poor irrigation practices.
- Improving the efficiency of the irrigation system through the use of historical data and predictive modelling and thus preventing the misuse of water.
- A low cost, flexible wireless sensor networks platform that enables seamless adoption of the models developed above and that supports ‘plug and play’ deployment, has a low cost of ownership and is robust for its use in farm environments
- Soil sensor technology that requires minimal maintenance and calibration effort
- A web and smartphone interface for remote monitoring to afford growers with greater autonomy

The WaterBee service will be provided and maintained with “best of breed” web sensor networked irrigation components as required. Once this project is finished, the service will be commercially deployed. The service

- provides a complete, reliable and cost-effective smart irrigation and management service and system, with a defined Level of Service,
- by targeting high-potential growers, farmers and landscape managers
- through local Business Partners, who promote, market, install, maintain and support the service on the ground within a defined territory or sector, and
- is centrally supported and coordinated by a WaterBee service company, that also operates the web-service delivery platform.

The added-value that the WaterBee service provides to its users include:

- WaterBee helps growers (and landscape managers) make better crop irrigation decisions and realize more profit per acre through the efficient use of water and other farm inputs.

- It enables Farmers, Growers and Landscape Managers (including golf courses) to gain
 - (a) higher quality plants,
 - (b) greater yields and
 - (c) lower operating costs

- WaterBee is a reliable, accurate and easy-to-use full-service solution for Irrigation Management, that provides its users with
 - Greater control over their irrigation needs
 - Reliable, real-time information in the right place at the right time
 - Accurate and complete information on soil-moisture conditions
 - Easy-to-use software tools that support informed decision making
 - Full service, which means no worries about software support or equipment maintenance

WaterBee System Technology

The WaterBee system consists of 5 major components:

- WaterBee operational Gateway & Zigbee nodes.
- WaterBee operational Management Webservices
- WaterBee Web and Smartphone User interface.
- WaterBee Operational Sensors.
- WaterBee Soil Moisture Models.

The hardware and software design and development of the WaterBee systems was undertaken in parallel, and mainly completed during Period 1 of the project.

The WaterBee nodes use enclosures that fully meet the IP68 (Ingress Protection Rating) water-proof standard requirements. The IP68 rating indicates complete protection against the ingress of dust and can also be continuously immersed in water. This is particularly important for the Sensor Node as it is buried in the soil and subjected to irrigated water on a regular continuous basis.

WaterBee Communications Gateway and Sensor Nodes

The WaterBee Gateway and ZigBee Sensor Nodes provide:

1. a very reliable and robust communications network from sensor to server.
2. a “plug and play” out-of-the-box deployment so as to enable easy setup, maintenance and upgrading of the system.
3. a system that minimizes any interference with the day-to-day operational duties of the growers.
4. Significantly reduced operational costs, in particular the wide-area GPRS communications costs are now less than €2 per month.

WaterBee Communications Gateway Unit

New electronics and software were developed to achieve the WaterBee requirements for the Demonstration Trials’ prototype Gateway Unit:

The WaterBee Gateway Unit summary Technical Specification is as follows:

Power:	Mains Voltage 110/220Vac.
	Solar Powered
Communications:	GPRS: Remote WaterBee Server
	Zigbee: Sensor Nodes to Gateway
	Operating Distance: up to 250meters

Data Communications Cost:	< €2 per month
User Interface:	USB to PC for unit setup
Sensor Interface Options:	3 Soil Moisture Sensors RS232 & SDI-12 Sensor Interface Rain Gauge Water Meters x 2
Size	100mm diameter x 90mm high

WaterBee Zigbee Sensor Node Unit

New electronics and software also had to be developed for the WaterBee Zigbee Sensor Nodes. The resulting WaterBee Zigbee Sensor and Repeater Nodes were installed in the Demonstration Trials pilot sites.

The WaterBee Sensor and Repeater Node Unit summary Technical Specification is as follows:

Power:	Replacement Battery: 9V Solar Powered: (Repeater Node Option)
Communications:	Zigbee: Sensor to Gateway Operating Distance: up to 250meters
Sensor Interface Options:	3 Soil Moisture Sensors Interface Options : - 0-20mA - 0 – 1V, 0 – 10V - SDI-12 - RS232 Reed Switch (Rain Gauge & Water Meters)
Size	110mm diameter x 90mm high

WaterBee Backend Server and Database

The WaterBee Server uses an open Service Orientated Architecture (SOA) that is totally in line with the INSPIRE Networks Service Architecture , to facilitate future integration with all environmental data in line with the European INSPIRE Directive . However it is also designed to have as few data performance bottlenecks as possible, when the remote devices and clients communicate with the database. This will be critical to ensure optimum performance as the WaterBee service and system scales-up to thousands and tens of thousands of users.

WaterBee user interfaces - Web and Smartphone Apps

The user interface to the WaterBee Service is through the WaterBee Website on PC/laptops, tablet computers and smartphones. The latter is particularly important for growers and farmers to view the status of their irrigation while out in the field.

The WaterBee Website uses state-of-the-art technology to provide its users with a desktop and mobile interface to quickly monitor the status of their farms and promptly respond to irrigation alerts. The user interface has been designed to provide a pleasant user experience with the complexity hidden by a simplistic design.

The WaterBee Administrator, who customises the service for each user has a similar web interface.

WaterBee Operational Sensors

Measurements from soil moisture sensors provide the main inputs to the Waterbee system's computer models which are intended for assisting farm irrigation decisions. The system requires sensors that are both accurate and competitively priced in relation to alternative irrigation scheduling approaches.

Most of the WaterBee Demonstration Sites used standard off-the-shelf low-cost sensors, such as the Watermark sensors.

However these current soil moisture sensors have limitations for use in the WaterBee system. Amongst other limitations, measurement of soil electrical properties can be confounded by the effects of fluctuations in soil temperature or solute content. So MBS developed their novel T: wave Z-Bee RF module with a sensor that uniquely uses a thermal method to overcome these limitations, and is suitable for volume production of low-cost, high reliability sensors which can be configured for water content or water potential with temperature measurement also included as standard.

WaterBee Soil Moisture Model

The underlying principle of the implemented WaterBee model is to make irrigation decisions based on the soil water potential/content in the entire root zone gathered from sensor readings. The role of the model is to decide whether irrigation is required, and to calculate the amount required, based on soil sensor readings, crop species, crop growth stage, soil hydraulic properties and the average reference evapotranspiration over the growing period.

Based on these principles the core WaterBee model was constructed. The model performs the following procedures to enable the irrigation scheduling and amount to be calculated:

1. interpolate the measured soil water potential/content
2. convert between water potential and content via soil water retention curve
3. estimate the rooting depth
4. calculate the maximum allowable soil moisture deficit (MAD) in the rooting depth
5. compare between the measured soil water deficit and MAD
6. calculate the irrigation water depth to bring the soil water in the rooting zone up to 90% of field capacity

However the implemented WaterBee model presents some limitations:

- The rooting depth is estimated based on the crop above-ground final dry weight yield and a pre-defined growth curve. However the estimation of the final dry weight yield is often difficult

- The model asks for the average value of ET over the entire growth period to determine soil water content threshold (i.e MAD value) for irrigation. It may not be satisfactory for crops grown under the conditions where ET varies drastically
- There is no flexibility of changing model variable values once it is in operation
- It is not suited for irrigating extremely light soils
- When no sensor data is available, the model is unable to give any recommendation

Due to the limitations mentioned above, a more practical and dynamic model, named the WaterBee-DA model, was created to improve the accuracy of irrigation and to make recommendations when data is missing. The new WaterBee-DA model contains the following features:

1. creates a comprehensive crop table containing growth stage-specific threshold of soil water content for various crops
2. constructs a soil water retention curve
3. calculates reference evapotranspiration based on weather information
4. estimates rooting depth based on total growth period for non-flowering crops
5. estimates rooting depth for flowering crops
6. determines growth stage-specific threshold of soil water content
7. calculates average SMD over the root zone based on sensor readings
8. uses water balance method when sensors are faulty
9. provides the option to make decisions based on water potential threshold for situations where frequent light irrigation is required
10. gives a decision on irrigation.

Project Progress and Main Dissemination Activities

The project's progress and main dissemination activities as recorded in the News section of www.waterbee.eu through the 24 months of the project, were as follows:

July 2011 - Project Kickoff Meeting

The initial Project Executive Committee meeting and Kickoff Meeting, took place in Limerick, Ireland on 14-15 July 2011. The end-user cultivators and industry manufacturers' representatives from the agricultural sector from Europe came together with European research providers for this two day Meeting, which marked the start of this Demonstration Action Project.

Oct 2011 - WaterBee at the Malta Fair

The WaterBee system was shown at the Malta Trade Fair by Chadwick Mushrooms Farm Ltd, based on their successful trials with the system.

Oct 2011 - Water-Bee Communications Gateway & ZigBee Nodes

Based on its extensive electronics and productisation expertise and experience, MAC optimized the system architecture to cost-reduce, harden, and productise the WaterBee Gateways, Soil Moisture Monitoring and Watering Actuator Zigbee Nodes, particularly to have lower operational costs (mainly phone), with easier installation and maintenance, and fully IP67 water proof enclosures.

Oct 2011 - New WaterBee management website

IRIS developed a new Web Portal running from the WaterBee Research project. This Initial WaterBee User Interface Prototype served as a platform upon which consultations with growers could commence in order to get their opinions, suggestions and recommendations to feed into a more user-centred design of the WaterBee User Interface.

The WaterBee Demonstration web portal version included architectural and database system hardening, and features such as a more open Web Service API and an improved user-interface and user definable reporting and applications, to ensure a reliable operational platform for the Demonstration Pilots.

Oct 2011 - Second Project Meeting in Barcelona.

The second WaterBee DA Project Board and Executive Committee meetings took place in Barcelona, on 20-21 October 2011, hosted by IRIS. These meetings considered the market potential for the WaterBee service, and agreed the functionality of the WaterBee system to be installed and demonstrated at the 6 sites in Estonia, Italy, Malta, Spain, Sweden and the UK.

Jan 2012 - Significant WaterBee Market Potential

WaterBee market research and analysis concluded that there is a very significant market with clear potential take-up for its smart irrigation system and services, especially where growers' costs are greatest, e.g. in Europe and USA. So all partners would disseminate WaterBee widely in their country, so that potential clients become familiar with it. The 6 project demonstration sites will compare results with many different crops and situations (vineyards, golf courses, watermelon...) and disseminate the WaterBee events.

Feb 2012 - WaterBee Demonstration Site in Murcia Spain

WaterBee was installed and made operational at the Intercrop Demonstration Site in Murcia, Spain.

Feb 2012 - First WaterBee Demonstration Site filmed by EuroNews

The first WaterBee Demonstration Site at Intercrop in Murcia, Spain, was filmed by EuroNews on 2 February 2012, for a 3 minute video on successful innovative products and services from EU programmes, to be broadcast in March 2012.

Feb 2012 - Third Project Meeting in Cartagena

The third WaterBee DA Project Board and Executive Committee meetings took place in Cartagena, on 2-3 February 2012, hosted by Intercrop. These meetings reviewed the first Demonstration Site installation at Intercrop, and agreed the installation arrangement for the remaining sites in Estonia, Italy, Malta, Sweden and the UK.

Mar 2012 - See WaterBee on EuroNews

WaterBee featured on Euronews SCI-TECH INNOVATION in the video “Smart Irrigation bears fruit”. See the video at http://www.euronews.com/2012/03/14/smart-irrigation-bears-fruit/#.T2MB_TGfwlk.email

Mar 2012 - WaterBee Demonstration Site in Malta

WaterBee was installed and made operational at the Chadwick Mushroom Farm Demonstration Site in Malta

Mar 2012 - WaterBee presentation to the President of Malta

WaterBee was presented to the His Excellency Dr. George Abela, President of the Republic of Malta, on 8th March 2012, at an exhibition organized by the Malta Council for Science and Technology, showing Malta’s most successful FP7 projects. The WaterBee presentation was by Saviour Gauci of Chadwick Mushroom Farm Ltd.

Apr 2012 - WaterBee at Brazil Workshop

WaterBee was presented by Dr Andrew J. Thompson of Cranfield University, at the British Council Research skills workshop – Agriculture. Sao Paulo, Brazil, 31st March – 4 April 2012.

May 2012 - WaterBee Demonstration Sites in Italy

WaterBee was installed and made operational at the OSV Demonstration Site in Italy with melon and tomato crops, in open field and under mini-tunnel.

May 2012 - WaterBee at IWA Water Congress

WaterBee presentation on “Water Management using Web Sensor Networks” at the KARIM workshop on “Environmental Solutions for Water and Agriculture” at the IWA World Congress on Water, Climate and Energy, Dublin , 16 May 2012 was presented by Dr. John O’Flaherty of MAC.

Jun 2012 - All WaterBee Demo Sites Operational

The WaterBee DA project achieved a major Milestone in June 2012, with all of its Demonstration Site operational. In addition to the initially planned demonstration trial in each of the 6 countries (Estonia, Italy, Malta, Spain, Sweden and the UK), there are currently 8 individual trials in operation, and more planned to begin shortly. The project is also in active discussions with a number of further demonstration sites that will be operational in the coming months.

Jun 2012 - 4th Project Meeting Cranfield, UK

The fourth WaterBee DA Project Board and Executive Committee meetings took place in Cranfield on 13-14 June 2012, hosted by Cranfield University. These meetings reviewed all of the Demonstration Site installations in Estonia, Italy, Malta, Spain, Sweden and the UK. It also finalized preparations for the WaterBee Dissemination Event at the prestigious EIMA 2012 (International Agriculture Machinery Exhibition) in Bologna, Italy, on 9 November 2012. Led by OSV, this will be targeted at Technical Press, Dealers, Big Farmers and Consulting Associations.

Jul 2012 - WaterBee at “Research in Action” & visited by Commissioner Máire Geoghegan-Quinn

The WaterBee system was demonstrated at the ‘Research in Action’ exhibition of seven FP7 projects held at the European Commission Representation in Ireland as part of ESOF2012, (the Euroscience Open Forum) held in Dublin, 10-20 July 2012. The exhibition was opened by Commissioner Máire Geoghegan-Quinn, on 11 July 2012.

Commissioner Máire Geoghegan-Quinn (Research, Innovation and Science), viewed the WaterBee System as demonstrated by Dr. John O’Flaherty, the Project Manager, at the ‘Research in Action’ exhibition of FP7 projects at the European Commission Representation in Ireland on 11 July 2012.

Aug 2012 - WaterBee Factsheet on STREAM

A WaterBee DA Factsheet was made available on the STREAM (Sustainable Technologies and Research for European Aquatic Management) site at www.stream-project.eu/sites/default/files/WaterBee%20DA_0.pdf

Aug 2012 - WaterBee in the Times of Malta

An article on WaterBee entitled “Technology that saves water and supports agriculture” was published in the Times of Malta, on 23rd August 2012, see <http://www.timesofmalta.com/articles/view/20120823/technology/Technology-that-saves-water-and-supports-agriculture.434074>

Sep 2012 - WaterBee at STREAM Summer School

OSV Srl presented the WaterBee DA project and its approach at the Second STREAM Summer School on “Water Research meets Policy and Industry”, which took place in Rome, on 24-28th September 2012. See www.stream-project.eu/summer-schools/second-summer-school-0

Sep 2012 - WaterBee EIMA2012 Press Release

WaterBee Smart Irrigation System to exhibit at EIMA, Bologna

The International Agricultural and Gardening machinery exhibition is the stage for showcasing a cutting-edge solution for obtaining water efficiency in irrigation

- 40% of the world’s food is produced by irrigated agriculture
- Irrigation uses about 70% of all of the world’s fresh water and 60% of this is wasted
- WaterBee system will achieve water savings of 40% while enhancing crop quality

- In Europe, irrigated agriculture is the biggest freshwater consumer –over 60%
- Smart Irrigation is estimated to be a €1.7 billion market by 2020

28th September 2012

EIMA International, the world's largest exhibition of agricultural machinery, which will be held on November 7 to 11 in Bologna (Italy), will host the WaterBee Smart Irrigation System, which is the result of an EU research and demonstration projects undertaken by a team of 10 partners from 8 European countries targeting a sustainable solution to contribute to reducing the some 2,500 trillion litres of fresh water used today by the agriculture sector, according to the WWF. Inefficient irrigation systems are major culprits in excessive water use in agriculture. Indeed, irrigated agriculture is the biggest freshwater consumer (over 60%) in the Mediterranean, where drought is an increasing problem. Globally, 40% of food is produced by irrigated agriculture.

The WaterBee Smart Irrigation Demonstration Action is the follow-on phase from the very successful European Framework Programme WaterBee "Research for SMEs" project that ended in September 2010, and very convincingly researched, developed and proved the concept of WaterBee's ability to provide a Smart Irrigation system to optimise Water Use Efficiency (WUE) in irrigation, based on a distributed Web-based Wireless Sensor Networked (WSN) in the field that sends readings to an unique scientific soil-moisture model that automatically adapts irrigation requirements to each installation and crop. The WaterBee system will achieve water savings of 40% while enhancing crop quality.

Benefitting from follow-on funding, the WaterBee prototype solution has been optimised and scaled up to a full reliable operational field prototype service, that is being demonstrated and validated over a 15 month period with complete growing cycles of various crops in 12 contrasting sites across Europe, in Estonia, Italy, Malta, Sweden, Spain and UK, to quantify profitable operation of the WaterBee service for growers.

On the 9th November 2012, the WaterBee system and the ongoing results from its demonstration trials will be presented and discussed with growers and potential business partners at a public workshop organised within EIMA 2012, at Sala Allemanda Pad.33/34 ammezzato. The Smart Irrigation System will be presented at the WaterBee Stand, in Hall 22 – B53, Bologna Trade Fair Centre.

The project coordinator, Dr John O’Flaherty, from the National Microelectronics Applications Centre Ltd (MAC) in Ireland, highlights the potential of the WaterBee system: “Current agriculture and environmental sectors demand an efficient water management. In Europe, farmers are increasingly suffering the impacts of increasing and prolonged incidences of drought, and the Mediterranean region, with its limited, fragile and unevenly distributed water resources is especially vulnerable”. Dr O’Flaherty stresses that “the majority of farmers use their own judgment to decide when to irrigate and how much, and more often than not they tend to overcompensate by irrigating more than required, leading to significant water wastage and leeching of nutrients into the ground water”.

Besides MAC, nine other companies and entities are involved in this 2-year WaterBee DA European project: OSV Srl, Italy; Mc Burney Scientific Ltd, United Kingdom; LAQUA Treatment AB, Sweden; Chadwick Mushroom Farm Ltd, Malta; Intercrop Iberica SL, Spain; Seedri Puukool OÜ, Estonia; Innovació i Recerca Industrial i Sostenible SL (IRIS), Spain; University of Cyprus, Cyprus; Cranfield University, United Kingdom.

The research leading to these results is funded by the European Community’s Seventh Framework Programme (FP7/2007-2013) in the project “WaterBee DA” with grant agreement number 283638.

The great biennial of mechanization for agriculture, gardening, greenskeeping and components will take over 117,000 m² under cover in pavilions and another 20,000 m² outdoors for trials of machinery and equipment for the bioenergy production line. Overall, the exhibition set up on 137,000 m² will be the world’s largest in the sector to mark the highest achievement in the history of the event, according to the EIMA news release as of July 2012. The upcoming exhibition is drawing “1,700 exhibiting industries from 40 nations, organized in its 14 sectors” and on the side of attendance, expectations are for numbers well over the 166,400 visitors who arrived for the 2010 exhibition.

Oct 2012 - WaterBee a “Success Story”

WaterBee was chosen as a “Success Story” of smart irrigation technology set to reduce costs and save water, and a good example of a “Demonstration Action” in the European Commission’s SME Update Magazine, Issue 14, October 2012.

See http://ec.europa.eu/research/sme-techweb/newsletter/issue14/success-story_en.html and http://ec.europa.eu/research/sme-techweb/newsletter/issue14/news_en.html

Oct 2012 - WaterBee chosen as EC exemplar

The European Commission choose WaterBee as an example of how research supported by the European Commission in the past year has the potential to make a real difference to our lives and to the future of the EU.

See http://ec.europa.eu/research/sse/2011/index_en.cfm?pg=sme-projects

Investing in Research and Innovation will lead to a more competitive and more resilient European economy. For this reason, the EU2020 Strategy for growth and jobs gives Research and Innovation a prominent role. Since 2007, the main funding instrument to implement this policy has been the Seventh Framework Programme for Research and Technological Development (FP7).

Through this instrument, the European Commission seeks to convert scientific breakthroughs into technologies and products that can transform sectors like energy or transport (often in partnership with major private actors from each field), but also to address the main challenges that affect our daily life, from our health to our environment.

Nov 2013 - WaterBee Successful Stand and Workshop at EIMA 2012

The WaterBee system and the ongoing results from its demonstration trials were presented and discussed with growers and potential business partners at a public workshop on 9th November 2012, as part of the major and highly influential EIMA 2012 (International Agricultural and Gardening Machinery Exhibition), that takes place 7-11 November 2012, in Bologna, Italy. The WaterBee Stand was in Hall 22 Stand B53 for farmers to come meet the WaterBee Team and discuss their irrigation needs. See <http://www.eima.it/en/index.php>

The WaterBee Stand and Workshop at the EIMA 2012 (International Agriculture Machinery Exhibition) in Bologna, Italy, on 7-11th November 2012, proved to be a great success with many follow-up enquires, as documented in the WaterBee Interim Dissemination Event Report (a public deliverable of the WaterBee Demonstration Action project, and available in the Project/Reports tabs above).

EIMA 2012, as the the world's largest agri-business exhibition, was the ideal context to exhibit and demonstrate the WaterBee Smart Irrigation system, meet potential customers and Business Partners in the key Italian market, and host the WaterBee workshop.

The WaterBee workshop indicated the clear need for a smart irrigation system such as WaterBee, and from the many EIMA exhibitors, it appears that there is no other smart irrigation system based on a solid scientific model to optimise the WUE and extensive web service infrastructure to support real-time smartphone Apps to provide Growers with constant real-time monitoring of their in-field soil moisture conditions and direct control of their irrigation.

WaterBee was filmed and featured on the EIMA Web TV that ran during the exhibition.

See the video at

<http://www.youtube.com/watch?v=0U9Lv9HaZWk&feature=BFa&list=UUqZtJHARUmxz-vEV5OGwC4A> (in Italian) or <http://www.youtube.com/watch?v=Dv85aY16shw> (in English)

Nov 2012 - WaterBee Italian Demo site wins WWF award

WWF Italy gave a special award to the farm "Soc. Agr. Olianina" (WaterBee field test) as a vehicle of innovation for saving water during irrigation and resulting excellent harvest of tomatoes. This result was achieved thanks to the system WaterBee supervised by OSV.

150 farmers, many Presidents of Tomato Associations and the President of Italian North Italy Associations of Tomato attended the event organized by Mutti SpA on 13 November 2012 where the results of the field test were presented.

See

http://www.mutti-parma.com/uploads/pdf/CS_Pomodorino%20d'Oro_13_novembre_2012.pdf
<http://www.wwf.it/client/ricerca.aspx?root=32083&content=1>

and

Nov 2012 - WaterBee: così si risparmia acqua

In occasione dell'Eima International 2012 è stato presentato il progetto WaterBee, il sistema di irrigazione intelligente, che riesce a ridurre i circa 2500 trilioni di litri d'acqua utilizzati ogni giorno dal settore agricolo.

Si tratta del risultato di un progetto di ricerca, terminato nel Settembre 2010, finanziato dalla Comunità Europea e portato avanti da una squadra di dieci partner provenienti da 8 diversi paesi europei, tra i quali anche università e centri di ricerca.

Altro <http://www.agricolturanews.it/waterbee-cosi-si-risparmia-acqua/>

Nov 2012 - 5th Project Meeting Bologna, Italy

The fifth WaterBee DA Project Board and Executive Committee meetings took place at the Bologna EIMA 2012 Exhibition, on 9th November 2012, hosted by OSV srl. These meetings reviewed all 14 of the Waterbee demonstration site installations in Estonia, Italy, Malta, Spain, Sweden and the UK. It also reviewed the WaterBee Stand and presentations for the WaterBee Dissemination Workshop at the prestigious EIMA 2012 (International Agriculture Machinery Exhibition) in Bologna, Italy, on 9th November 2012.

Nov 2012 - WaterBee at CASAT Conference in Spain

The Fourth Workshop on processing Tomatoes organized for CASAT (<http://www.casat.es/>), an Agrarian Transformation Society located in the Don Benito locality (Spain), took place on 16 November 2012. This conference was attended by about 60 sector professionals, where research results on irrigation and fertilization were presented. Rafael Fortes (Researcher of the Finca La Orden-Valdesequera irrigation and nutrition group) spoke about new technologies applied to processing tomato crop, and he described use of the WaterBee system in the control and efficient use of irrigation water.

Nov 2012 - WaterBee in Extramadura Tomato Crop Research

A meeting on the transfer of tomato research results met over 120 people between industrialists, researchers, technicians and farmers related to the tomato crop in Extremadura on 6 November 2012, at Talavera la real, Extremadura (SPAIN) organized by Fundecyt. The meeting presented the results of field trials conducted by researchers at the Irrigation Group Nutrition. Dr. Carlos Campillo (Researcher of the Finca La Orden-Valdesequera irrigation and nutrition group) spoke about irrigation management in tomatoes and new technologies that facilitate the management of irrigation in this crop. He described use of the WaterBee system in the control and efficient use of irrigation water.

For further information, see the following links:

<http://www.fundecyt.es/index.php?pagina=agenda&evento=57#>

<http://www.gobex.es/salaprensa/view/press/press/detalle.php?id=6853>

Finca La orden-valdesequera agricultural research institute

(<http://centrodeinvestigacionlaorden.gobex.es/>)

Irrigation and nutrition group

(<http://centrodeinvestigacionlaorden.gobex.es/imasdemasi/equipos-de-investigacion/136>).

Nov 2012 WaterBee smart irrigation technology to reduce costs and save water

WaterBee technology featured in the Scottish version of the Enterprise Europe Network, an European platform aimed at promoting businesses and fostering collaborative partners in Europe.

Due in large part to inefficient water irrigation systems, the agriculture industry wastes 60% of the water it uses each year, or 70% of the world's freshwater. WaterBee has developed a smart irrigation system to reduce this wastage, thereby saving money and increasing both crop quality and yield (...)

The full article as published in the News section of the Enterprise Europe Network in Scotland is available at

<http://www.enterprise-europe-scotland.com/sct/news/index.asp?newsid=3974>

Nov 2012 - Risparmiare acqua con Waterbee/Save Water with Waterbee

The Italian weekly magazine 'Terra e Vita' published an article about WaterBee, as a result of its presence at the EIMA show celebrated in Bologna, November 2012.

The full article (in Italian) in the agriculture-focused magazine, is at

<http://mailing.businessmedia24.com/bump/newsletter/n,6HMOEYE6KLDO7ZC9QVZ9,72IPBHZBC8J4BPMX61Q7.html>

Nov 2012 - WaterBee at Cyprus Researchers' Night

Antonis Karayiannis, of the University of Cyprus, demonstrated the WaterBee system at the nationally organized, Researchers' Night, which took place on 28th September 2012, as part of the EU wide campaign to promote research to the wider public. This was part of an EU wide initiative and similar events took place on the same evening in 350 European cities.

The philosophy behind the event is important and as stated by the EU in its official press release "by bringing researchers directly into contact with the public, the event aimed to show the important role research plays in society. Encouraging more people to choose a career in research is crucial for Europe's future growth, which is increasingly dependent on innovation in products, services and business models."

See

http://europa.eu/rapid/pressReleasesAction.do?reference=IP/12/1013&format=HTML&age_d=0&language=en&guiLanguage=en

According to the organizers (the Cyprus Research Promotion Foundation) the event in Cyprus attracted 2000-2500 visitors.

Nov 2012 – WaterBee featured in Cyprus Newspapers

The WaterBee attendance at EIMA 2012 led to it being featured in National newspapers in Cyprus. An article was included in Phileleftheros (Greek: 'Ο Φιλελεύθερος, meaning "The

Liberal”) the largest newspaper (by circulation) in Cyprus, with about 26,000 copies daily. While the top-selling English-language publications, Cyprus Mail and Cyprus Weekly, with circulation exceeding 14,000 also featured articles on WaterBee.

In addition, WaterBee was included in the banner of the University of Cyprus (WaterBee project Partner) to publicize the participation of WaterBee at EIMA and the actual technology. See <http://www.ucy.ac.cy/>.

Nov 2012 - L’ agricoltura è “smart” con WaterBee

Impresa&Territori journal published a news article on the 30th of November featuring WaterBee.

The article highlights the wireless sensors which allows to monitor specific parameters for better use of irrigation water. The Italian partner OSV is introduced in the article as a company with large expertise in the sector.

The article is available at <http://www.waterbee.eu/files/2012/12/ARTICOLO-WB.pdf>

Dec 2012 - WaterBee on Cyprus National Radio

WaterBee Project Manager, John O’Flaherty, was interviewed live by journalist Rosie Charalambous on the “Round and About “ radio show on 5th December 2012. This is Cyprus Broadcasting Corporation’s Radio 2’s most popular national English language daily show in Cyprus.

See <http://www.cybc.com.cy/en/index.php/radio>

The 15 minute interview highlighted the importance of water conservation in Cyprus and the need for more efficient irrigation, the importance of pan-European partnerships like WaterBee, the role of the University of Cyprus’ KIOS Centre in the project, and the potential for a future WaterBee demonstration site in Cyprus.

Mar 2013 - WaterBee World Water Day Event in Barcelona

Smart Irrigation got the limelight at the WaterBee Open Demonstration Session hosted by IRIS R&D in its headquarters facilities at Castelldefels, Barcelona (Spain).

The WaterBee World Water Day 2013 Workshop and Demonstration, took place on 22nd March 2013 at Parc Mediterrani de la Tecnologia of the Universitat Politècnica de Catalunya in Castelldefels, Barcelona.

The Catalan Government supported this event, with an opening conference on the “Current situation of the irrigation in Catalonia” by Mr. Antonio Enjuanes, Subdirector of Rural Infrastructures in the Department of Agriculture, Farming, Fish and Environment (DAAM) of the Generalitat de Catalunya.

Following an introduction to the cost-effective smart irrigation and water management system by the WaterBee project consortium, the team demonstrated the WaterBee system collecting and showing real time data for supporting growers irrigation decision-making. The event was attended by growers and students, as the “Agropolis” area in Viladecans belongs to the Politechnics University of Catalonia (UPC).

WaterBee empowers growers, vineyards, golf clubs, public authorities and landscape managers to optimise their commercial and sustainable environmental operations. The web sensor networked irrigation system is centrally monitored and coordinated, and the WaterBee services are provided across Europe through collaborating Business Partners, who work closely with their local customers.

This WaterBee one-day event aimed to raise awareness about water use in the agriculture sector, which wastes 60% of the 2,500 trillion litres of water it uses each year – which is 70% of the world’s accessible freshwater – a huge threat to the environment. The event was registered on the UN-Water official events list (www.unwater.org/water-cooperation-2013/events/worldwide-events/world-map-view/en/)

The UN World Water Day is held annually on 22 March as a means of focusing attention on the importance of freshwater and advocating for the sustainable management of freshwater resources. (see <http://www.worldwaterday.org> for details). In December 2010, the United Nation General Assembly declared 2013 as the United Nations International Year of Water

Cooperation. The objective of the year is to raise awareness of the potential for, and value of increased cooperation in relation to water.

As documented in the WaterBee Final Dissemination Workshop Report (a public deliverable of the WaterBee Demonstration Action project, and available in the www.waterbee.eu Project/Reports tabs), the event clearly indicated and raised awareness of the critical importance of more efficient irrigation in the overall use of water and its management, as globally irrigation accounts for 70% of fresh water usage, and an estimated 60% of that is wasted.

The workshop particularly highlighted and quantified the importance of irrigation within Catalonia, and its importance was emphasized by the participation of Federació de Cooperatives Agràries de Catalunya (FCAC), the Catalan regional government and Castelldefels City Council in the event.

The in-field demonstration at the Agrofood School (ESAB) UPC crops site, allowed much interaction and hands-on use of the WaterBee user interface by interested and knowledgeable growers and farmers.

The results from the 14 WaterBee trials across 6 EU countries, indicate that WaterBee recommends fewer irrigation events and significantly smaller amounts of water than farmers normally do in practice, while retaining the same yield and quality of the plants, resulting in large WUE improvements. The system reliably produces a vast amount of data to make its irrigation recommendations, and for further scientific analysis and use in other systems, such as precision farming systems, if the farmer wishes. While the system's processing of data from multiple sensors gives accurate zone estimates of irrigation needs.

Mar 2013 - WaterBee in Greek Kathimerini newspaper

The WaterBee Smart Irrigation system was presented in the International Economy section (Science and Technology) of the Greek newspaper Kathimerini on 3rd March 2013. Quoting Dr. Christos Panayiotou of the KIOSResearch Center at the University of Cyprus, the article stressed how the WaterBee Smart Irrigation system is helping to address the huge losses of fresh water in agricultural every year, a figure equivalent to 70% of the drinking water available worldwide. The article highlights the innovative aspects of the system, stressing the system's potential for significant water savings in agriculture and the huge market potential for such a product. This, the article concludes, is also a major opportunity, with

independent estimates showing that by 2020, investment in systems of “smart” irrigation is expected to reach 500 million euros in Europe, and 1.7 billion worldwide.

See http://news.kathimerini.gr/4dcgi/_w_articles_economyagor_1_02/03/2013_512912

Mar 2013 - 6th Project Meeting in Castelldefels, Spain

The sixth WaterBee DA Project Board and Executive Committee meetings were hosted by IRIS in their offices at Castelldefels, Spain on 21st March 2013. These meetings reviewed all 14 of the Waterbee demonstration site installations in Estonia, Italy, Malta, Spain, Sweden and the UK. It agreed the basis for the commercial deployment of the WaterBee system, after the project ends in June 2013. It also finalized preparations for the WaterBee World Water Day 2013 workshop and event.

Apr 2013 - WaterBee is an Eco-Innovation

The WaterBee DA project was entered on the European Commission’s ECOWEB platform at http://www.ecoweb.info/128_waterbee-smart-irrigation-systems-demonstration-action

ECOWEB is an initiative by the European Commission to increase the uptake of eco-innovative research results from FP, CIP and LIFE+ projects. The ECOWEB platform features several functionalities that ensure an optimal exploitation, dissemination and visibility of research results to a large community of eco-innovative SME’s, networks and researchers.

“Eco-innovation is any innovation that reduces the use of natural resources and decreases the release of harmful substances across the whole life-cycle. The Eco-innovation Observatory, 2010

May 2013 - WaterBee at Irish EU Day

Dr. John O’Flaherty of MAC presented the WaterBee DA project as a best practice example of the Commission’s support for Innovation in SMEs at “Export Europe Day – Celebrating 40

years of Ireland's economic growth through the Single European Market", which was one of Ireland's Europe Week events celebrating its 40 years in the EU, on 9th May 2013.

See <http://eu2013.ie/media/eupresidency/content/documents/Europe-week.pdf>

Jun 2013 – WaterBee an example for Horizon 2020

WaterBee was one of the 12 examples presented in the European Commission's publication "Investing in European success – Empowering European SMEs to innovate and grow", that show how research and innovation by SMEs makes a real difference to EU citizens' everyday lives, and is changing tomorrow today.

Research and innovation contributes to making Europe a better place to live and work, improving Europe's competitiveness, future growth and ultimately job creation while tackling the main current and future societal challenges. Horizon 2020 is the financial instrument implementing the innovation union and directly contributing to the aims of the Europe 2020 strategy for growth and jobs. Horizon 2020 will help to bridge the gap between research and the market by helping innovative enterprises develop their scientific and technological breakthroughs into viable products and services with real commercial potential.

Available at <http://bookshop.europa.eu/en/investing-in-european-success-pbKI0113112/?pgid=y8dIS7GUWMdSR0EAlMEUUsWb0000F-Sh9ZsS;sid=GILVDDvpLyXVC2pQyHpLq1nMVzHLfnaKBCA=?CatalogCategoryID=Gj0KABst5F4AAAEjsZAY4e5L>

Jun 2013 – WaterBee Demonstrated in Malta

MCAST Agribusiness Institute students, who are managing one of the WaterBee greenhouse trials in Malta, demonstrated the system and their results at the College's annual Open Weekend for the general public.

See <http://www.mcast.edu.mt/TopMenu/Institutes/InstituteOfAgribusiness/Welcome.aspx>

Jun 2013 - “Ground Sensors for Irrigation Control” Field Demonstration Day

The Agricultural Research Center-Valdesequera held a Field Demonstration Day, on “Soil sensors for irrigation control”, on June 19, 2013.

The aim of the conference was to present different sensors for measuring soil moisture content to technical personnel involved in irrigated agricultural enterprises.

This involved a practical demonstration of the WaterBee smart irrigation and water management system in processing tomato plots with different drip irrigation systems. Its Programme was follows:

See <http://centrodeinvestigacionlaorden.gobex.es/>

July 2013 - WaterBee in REA internal newsletter

The WaterBee project is spotlighted in the Summer 2013 edition of “The REAder”, the REA internal newsletter as one of two successful SME smart water management projects from its pool of 128 on-going research projects on water currently being run by the REA agency.

Potential Impact:

The final results of this project is a complete, resilient, cost-effective WaterBee Smart Irrigation and Water Management system, that empowers growers, vineyards, golf clubs, public authorities and landscape managers to optimise their commercial and sustainable environmental operations. The web sensor networked irrigation system is centrally monitored and coordinated, and the WaterBee services are provided across Europe through collaborating Business Partners, who work closely with their local customers.

The Demonstration Sites validated and characterised WaterBee as a reliable, accurate and easy-to-use Full Irrigation Management Service, that empowers its users with:

- Greater control over their irrigation needs and earn more profit per acre through the efficient use of water and other inputs
- Accurate and complete information on soil moisture conditions
- Easy-to-use Smartphone and Web Apps to support better crop irrigation decisions with reliable real-time information.
- Full service, with no worries about software support or equipment maintenance
- Lower operating costs, reduced water inputs and improved water use efficiency without affecting crops quality.

The WaterBee intelligent irrigation modelling and scheduling system goes well beyond the state-of-art, with its unique Soil-Moisture Model for optimal water use, continuously self-adapting to each user's situation and business objectives and its open web-enabled architecture facilitates future integration with all environmental data in line with the European INSPIRE Directive. This enables users not only to optimise the use of water by irrigating only where and when it is needed, but also enhancing plant growth and quality by eliminating poor irrigation practices..

Water is a precious resource and fundamental for the sustainability of life. Due to the growing world population and industrial development, our need and use of fresh water continues to increase, and regional water shortages are expected to become prevalent in the coming years.

In the face of mounting uncertainty and threats posed by droughts, climate change, pollution and toxic residues, water overuse and wastage, there is a huge need to foment sustainable practices across the board when it comes to water usage and to prevent water wastage.

Agriculture is the largest industry in the world; however it also poses one of the biggest threats to the environment. According to the World Wildlife Foundation (WWF), agriculture wastes 60% or 1,500 trillion litres, of the 2,500 trillion litres of water it uses each year- which is 70% of the world's accessible water. One of the main culprits is inefficient water irrigation systems.

There is a real and urgent need to improve the efficiency, performance and ease of operation of irrigation scheduling to which WaterBee is contributing; this would have a major impact in terms of cost savings (labour and water costs), improved product quality and yield, and in the protection of biodiversity by maintaining water quality and flows rates in surface and ground waters.

A dramatic increase in the uptake of scientific scheduling is needed and this will be greatly facilitated by the self-contained, automated scheduling WaterBee system as an improved technology that greatly simplifies the process of irrigation scheduling and improves confidence in technology for collecting in-field data.

Anticipated impact of the WaterBee service

It is expected that the WaterBee consortium SME end-users of the system will derive significant strategic benefits and advantages from the direct use of the results of this project in their own business activities and will also share in sales and licensing royalties via the European-wide commercialisation of the system. They will improve productivity by being able to maximise their water use and yield ratios. The uptake of the intelligent ZigBee-enabled irrigation smart scheduling system by European SME growers will afford them with multiple advantages:

- To reduce the cost of water and labour through fewer irrigations thereby making maximum use of soil moisture storage;
- Enable the scheduling of water rotation among the various fields to minimise crop water stress and maximise yields;

- Lower fertilizer costs by holding surface runoff and deep percolation (leaching) to a minimum;
- Increase net returns by increasing crop yields and crop quality;
- Minimise water-logging problems by reducing the drainage requirements;
- Assists in controlling root zone salinity problems through controlled leaching;
- Enable additional returns by using the "saved" water to irrigate non-cash crops that otherwise would not be irrigated during water-short periods;
- Reduce the time spent analysing irrigation management issues; etc.

Wider Community Impact

Water is not merely an input of irrigated agricultural systems but also a scarce natural resource with alternative destinations. Everyone wants more water: industry, farming, householders. Its use is of huge societal significance in terms of economic efficiency, territorial equilibrium and social equity (World Wildlife Foundation (WWF): Agriculture, major impacts on species and places. See http://www.panda.org/about_our_earth/agriculture_impacts/ for details). Therefore, beyond the impact of the results of this project for its Partners, WaterBee will also make a far-reaching contribution to key societal objectives, from economic impacts (farm and rural incomes), social impacts (direct labour and rural development) and environmental impacts (e.g. water consumption, etc.).

The European uptake of a Smart Irrigation and Water Management technology such as the WaterBee service will make a significant contribution to improving the quality of life, health and safety of European citizens across many levels. Ready access to clean, fresh water is fundamental to maintaining and safeguarding our high European standard of living. Almost every aspect of our daily lives, from having a shower and a cup of coffee in the morning, to having food on our tables, operating our dish washers, cleaning our clothes, washing our cars, watering our plants and gardens, depends on ready access to water. In order to ensure a sustainable supply for all European citizens, services such as WaterBee which enable more efficient and effective water use are an absolute must. In terms of contributing to health and safety, access to clean and abundant water is a basic criterion for human survival, and essential for a healthy lifestyle.

The European Environment Agency (EEA) says that water shortages and soaring temperatures in southern Europe are becoming the norm, and its climate models suggest

much of the continent may start to become drier as deserts advance (Climate fears, water shortages haunt Europe. Source: 2006, Reuters). By 2070, between 16 and 44 million Europeans are projected to be suffering water shortages (Jose Manuel Moreno. Coordinator of the group of scientists who wrote the chapter on Europe in the report issued by the Intergovernmental Panel on Climate Change. April 2007). Sustainable water management is vital to protect biodiversity, the well-being of citizens and the competitiveness of European industries. Concerted action at EU level is a must. The WaterBee service represents a positive step in the right direction and the European added value of a transnational approach to this effort is clear.

Water is a precious resource that does not respect national boundaries. How water is used in one Member State can affect neighbouring Member States. Water shortages are no longer singular to countries such as Spain and Italy, and it is commonly recognised that Europe can no longer go on using and wasting water the way it has done for so long.

There is a need to reduce and optimise water consumption within the agriculture sector at European level, and not just in any given Member State.

Access to a range of countries and their irrigated agriculture systems, type of crops, climates, existing technological levels, etc. will allow for a more integrated understanding of needs in terms of improved irrigation systems throughout Europe.

There are major differences between the water pricing systems in the Member States. In the Southern European countries for example agriculture, which is a major water consumer, pays for its water at preferential rates (because of various subsidies). Pricing is playing an increasing part in the water policy in many Member States (Communication from the Commission to the Council, European Parliament and Economic and Social Committee: Pricing and sustainable management of water resources [COM(2000) 744 - Not published in the Official Journal].), and the value-add of the WaterBee system.

There is a need to improve the efficiency of irrigation systems at European level in order to assist the EU in meeting its objectives under its various water-related and agriculture based Directive and Policies (as mentioned below).

Pan-European Cooperation and Employment

Efficient water use is critical to sustaining competitiveness and jobs in the agriculture sector, given that the availability of water for irrigation allows farmers to obtain higher yields and the possibility of growing a larger amount of crops. This translates into workers having to be laid off, higher food prices and a general dip in competitiveness. Equipping EU farmers with a technology which will optimise water usage, will serve to strengthen their market position due to increased productivity and output, and reduced environmental impact. As a result, it is envisaged that the widespread uptake of WaterBee across the EU will safeguard at least 10,000 jobs in the irrigated agriculture sectors, and will contribute to the creation of at least 1,500, due to heightened productivity and crop outputs, as well as new jobs in the manufacture, commercialisation, installation and maintenance of the WaterBee system. The contribution to improving employment will also arise from creating jobs for younger, inexperienced people, who will have to be trained to fulfil the optimal use of the proposed technology, especially in rural areas.

Environment

The environmental benefits which will be derived by the use of the WaterBee service by European cultivators will be significant. On the one hand, there is a sustainable limit to how much water can be taken from underground aquifers and in some farming areas across Europe where irrigated agriculture is heavily practiced, the water tables have dropped significantly over the years, leading to desertification. This is a major environmental problem for many parts of Southern Europe. Water saving technologies will go a long way towards contributing to a sustainable solution. The WaterBee service will spur the project partners and a wider group of European companies towards best practice and improved standards in the area of agricultural irrigation systems and will enable organisations to optimise and reduce the amount of water they need for irrigating their crops.

EU Policies

A widely used WaterBee service will significantly contribute to EC policies. Water management is increasingly important as we adapt to the inevitable consequences of climate change and the protection of water resources, of fresh and salt water ecosystems and of the water we drink and bathe in is therefore one of the cornerstones of environmental protection in Europe. The WaterBee Smart Irrigation system will contribute to the sustainability of irrigated agriculture in Europe within the context of the post Agenda 2000 CAP Reforms and the Water Framework Directive (WFD), in particular the Rural Development Policy, the Nitrates Directive (as excessive irrigation washes away fertilizers which then need to be reapplied) and the Common Policy on Water as well as national irrigation strategies, standards and protocols, which combine together to make up an ambitious policy to protect and manage this vital natural resource.

Exploitation of results

As the debate over water resources heats up and as cultivators become increasingly burdened by legislative and market pressures to become more efficient in their water usage, the market potential of a system such as WaterBee will grow.

The WaterBee consortium plan to exploit the WaterBee Smart Irrigation System and results of the project through one organisation that will centrally monitor and coordinate provision of the WaterBee platform and services to users across Europe (initially focusing on Spain and Italy).

The Demonstration Action has proven the existence of a viable and validated market for the WaterBee service, so a network of regionally based Business Partner organisations will be identified and introduced to market, install, support and manage the rollout of the WaterBee service. With the exception of certain localisation and productisation, the WaterBee hardware and software platform that emerged from the project requires little additional research and development. Another 6 months will now be dedicated to post-project commercial productisation of the precompetitive demonstration prototype, so that it can be commercially rolled out and fully operationally exploited from 2014 onwards.

The WaterBee exploitation plan is as follows:

Vision

Smart Irrigation Web Sensor Networks optimising the commercial and sustainable environmental operation of all cultivation and landscape management operations.

Mission

To provide a complete, reliable and cost-effective WaterBee Smart Irrigation service and system, that will empower growers, farmers and landscape managers to optimise their commercial and sustainable environmental operations

Organisation

One organisation will centrally monitor and coordinate provision of the WaterBee platform and services to users across Europe working with local Business Partners, who will market, install, support and train their local customers.

Strategy

Provide and maintain the WaterBee service with “best of breed” web sensor networked irrigation components as required and commercially deploy the service to provide a complete, reliable and cost-effective smart irrigation and water management service and system, with a defined Level of Service, by targeting high-potential growers, farmers and landscape managers through local Business Partners, who will promote, market, install, maintain and support the service on the ground within a defined territory or sector, and will be centrally supported and coordinated by one organisation, that also operates the web-service delivery platform.

The Partners plan to establish a new company, WaterBee Ltd, in Ireland or the UK, after each Partner has had time to properly assess the Commission response to the outcome of the project and what the costs and potential benefits might be for them to make the commercial decision to invest and participate in WaterBee Ltd, and what its location and legal form might be.

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