WaterFARMING

Improvement of water and nutrient retention and use efficiency in arable farming systems from field to catchment scale in Europe and North Africa

Common Kick-off meet in Stockholm

Consortium
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Water JPI
WaterWorks2015 Cofunded Call
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MOTIVATION
State-of-the-art and the relevance of project

- In the EU, ~50% of the water resources do not meet WFD targets due to pollution from agriculture and industry.
- Agriculture accounts for 25-80% of total water use in the EU and North Africa.
- Excessive and inappropriate timing of fertilizers/manure use cause nutrient loss into the ground water/water bodies.
- Climate change is predicted to result in 30% reductions and increased uncertainty in rainfall.
- Overexploitation of ground water for irrigation has caused salinization leading to soil degradation and loss of fertility.
OBJECTIVES

- Enhance retention and use efficiencies of water and nutrients at field, farm and catchment scale in a network of production systems in Europe and North Africa
- Identification of environmental, economic and social SMART indicators to evaluate the production systems
- Design innovative practices and sustainable water and nutrient use production systems
- Develop a web-based decision support tool for informed-decision making by farmers, advisory services and policymakers
Work package description

WP6: Project Coordination

WP1: Network of production systems
  WP2: Resource use
  WP3: Indicator development
  WP4: Innovative intervention
  WP5: Dissemination

Stakeholder involvement in each system

Figure 1:
Relationship between WPs in WaterFARMING
Green: WPs flow
Blue: Stakeholders
Red: Systems and scale

Scales → Field → Farm → Catchment
Annual perennial across Europe & N Africa
# Network of production systems

<table>
<thead>
<tr>
<th>Country</th>
<th>Production systems</th>
<th>Research issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>combined food and energy production</td>
<td>Water use, nutrient inputs and soil fertility</td>
</tr>
<tr>
<td>Germany</td>
<td>Barley-rye-rapeseed-Maize</td>
<td>nitrogen and phosphorus fertilizer management</td>
</tr>
<tr>
<td>Netherlands</td>
<td>potato-winter wheat-onion rotation</td>
<td>optimal water management, spring and summer droughts</td>
</tr>
<tr>
<td>Portugal</td>
<td>maize-potato/peas/ryegrass (irrigated)</td>
<td>Water and nutrient use efficiency and drought</td>
</tr>
<tr>
<td>Italy</td>
<td>olive trees intercropped with wheat</td>
<td>drought, soil erosion, landslides, flooding events</td>
</tr>
<tr>
<td>Egypt</td>
<td>cotton/maize wheat/vegetables/beans</td>
<td>drought, water logging, salinity, evapotranspiration</td>
</tr>
<tr>
<td>Tunisia</td>
<td>wheat-fodder(cereal/legume mixture)</td>
<td>drought, salinity, soil fertility, groundwater depletion</td>
</tr>
</tbody>
</table>
# Work package description

## WP 1

<table>
<thead>
<tr>
<th>Lead/Partners</th>
<th>UCPH</th>
<th>UFZ</th>
<th>NARS S</th>
<th>CNR</th>
<th>WU</th>
<th>FFCUL</th>
<th>CERTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person-Months</td>
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<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
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</tbody>
</table>

## Objectives

1. Description of a network of production systems and catchments
2. Formation of local stakeholder platforms associated with each study site
3. Development of a working protocol for stakeholder involvement
# Work package description

<table>
<thead>
<tr>
<th>WP 2</th>
<th>Assessment of water and nutrient use efficiency from field to catchment scale</th>
<th>Start Month: 1</th>
<th>End Month: 36</th>
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</thead>
<tbody>
<tr>
<td><strong>Lead/Partner</strong></td>
<td>WU</td>
<td>UFZ</td>
<td>NARSS</td>
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<td><strong>Person-Months</strong></td>
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<td>4</td>
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</table>

**Objectives**
1. Develop and validate a crop model approach for our network of production systems
2. Determine water and nutrient use efficiencies, gaps therein and leakages of the production systems
3. Develop and validate a hybrid model approach that links field to catchment scale
## Work package description

**WP 3**

**Development of indicators for productivity, environmental and economic performance**

<table>
<thead>
<tr>
<th>Lead/Partner</th>
<th>UCPH</th>
<th>UFZ</th>
<th>NARSS</th>
<th>CNR</th>
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<td>2</td>
<td>2</td>
<td>1</td>
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</table>

**Objectives**

1. Development of a comprehensive list of productivity, environmental and economic indicators
2. Identification of SMART indicators for the assessment of the network of production systems
3. Mapping of the production system efficiencies at catchment scale based on WaterFARMING indicators
## Work package description

<table>
<thead>
<tr>
<th>WP 4</th>
<th>Design of innovative water and nutrient efficient production systems</th>
<th>Start Month: 1</th>
<th>End Month: 36</th>
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</thead>
<tbody>
<tr>
<td>Lead/Partner</td>
<td>UCPH</td>
<td>UFZ</td>
<td>NARSS</td>
</tr>
<tr>
<td>Person-Months</td>
<td>3</td>
<td>6</td>
<td>2</td>
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</tbody>
</table>

### Objectives:

1. Simulation of management measures by application of field-to-catchment scale indicators developed in WP3 and use of the map developed in WP2
2. Analysis and short listing of different measures in consultation with the stakeholder platforms
3. Carry out on-farm trials for improvement water, nutrient and soil conserving practices in the network of production systems
4. Assessment of on-farm trials with the stakeholder platforms for gaps and improvements
**Work package description**

<table>
<thead>
<tr>
<th>WP 5</th>
<th>Dissemination of outputs and communication to stakeholders</th>
<th>Start Month: 1</th>
<th>End Month: 36</th>
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<td>UFZ</td>
<td>NARSS</td>
</tr>
<tr>
<td>Person-Months</td>
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**Objectives:**
WP5 will devise communication pathways and dissemination materials to share the results of the project with the stakeholder platforms and the wider farming and end-user community, via awareness creation, publications, workshops and online tools for informed decision making by hierarchy of stakeholders (farmers, extension services and policy makers). A decision support tool will be developed to synthesize the innovative tools.
## Work package description

<table>
<thead>
<tr>
<th>WP 6</th>
<th>Project Co-ordination</th>
<th>Start Month: 1</th>
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<td>NARSS</td>
</tr>
<tr>
<td>Person-Months</td>
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<td>1</td>
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**Objectives:**
1. To facilitate communication among all parties and actors involved in the project
2. To ensure high scientific quality of the deliverables
3. Effective kick-off meeting and project coordination meetings
4. Formation of advisory board to provide feedback and future direction on project activities
WaterFARMING Innovative elements

- WaterFARMING will adopt an innovative case-study approach by bringing together a network of locally relevant production systems in Europe and N. Africa.
- The consortium represents a wide range of geographical regions and land-use systems with complementary roles and multi-disciplinary expertise.
- Exchange of researcher visits, students, online and campus courses, will enhance the visibility of the project outputs far beyond the project countries.
- The partnership will be hub for connecting with other researchers in the region and establishing long term research collaboration in soil and water pollution issues.
- The consortium will identify gaps in their own prioritized issues of water and soil pollution relevant to the local production systems by use of innovative methods and tools from field to catchment scale.
- WaterFARMING will develop a common set of tools to quantify water and nutrient use efficiency from field to catchment scales across a wide variety of production systems taking environmental, social and economic indicators of sustainability into account.