



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



WaterFARMING

Project Objectives "WaterFARMING"

- Enhance the water and nutrient retention capacity and improve use efficiency in diverse arable production systems across Europe and North (N) Africa.
- Reduce soil and water pollution for sustainable management of water resources
- Quantify the potential to enhance retention and use efficiencies of water and nutrients at field, farm and catchment scale through water and soil conserving practices in a selected network of production systems;
- Develop environmental, economic and social indicators to evaluate the production systems;
- Design innovative practices and sustainable water and nutrient use production systems and
- Develop an web-based decision support tool for advisory services and policy-makers.

The network includes:

- continuous arable systems (e.g. wheat -rapeseed rotation)
- mixed farming rotations of cereals with grass (e.g. wheat-alfalfa/clover leys/rye grass) and
- agroforestry systems with annual crops/grasses.

WP1 Network of production systems and stakeholder platforms in Europe and North Africa

Objectives

- Description of a network of production systems and catchments,
- Formation of local stakeholder platforms associated with each study site,
- Development of a working protocol for stakeholder involvement.

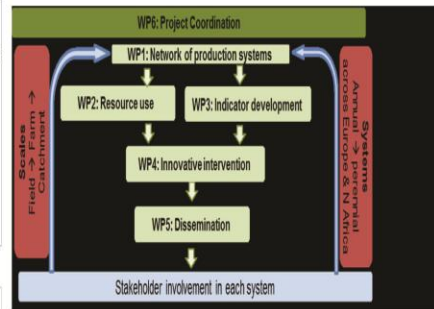
T	Name	S	E	Deliverable	Milestone
		Month			
T	Description of network of 1.1 production systems and catchments. A common template will be provided for descriptions of the identified production systems	1	12	<u>DL1</u> : Description of production systems and catchments (Month 12)	<u>ML1</u> : Template developed to describe the network of production systems and catchments (Month 6)
T	Identification of stakeholders 1.2 and formation of Stakeholder platforms. Partners will identify relevant stakeholders in order to set up local platforms for each catchment.	1	12	<u>DL2</u> : Report on stakeholder identification and formation stakeholder platforms completed (Month 6)	<u>ML2</u> : Identification of stakeholders in stakeholder platforms completed (Month 6)
T	Working protocol development 1.3 for stakeholder involvement in different WPs	6	15	<u>DL3</u> : Protocol developed for stakeholder involvement in the network of production systems (Month 15)	working protocols will be developed aiming to provide inputs to WPs 2, 3, 4 and 5.

WP2 Assessment of water and nutrient use efficiency from field to catchment scale

Objectives

- Develop and validate a crop model approach for our network of production systems,
- Determine water and nutrient use efficiencies, gaps therein and leakages of the production systems,
- Develop and validate a hybrid model approach that links field to catchment scale.

T	Name	S	E	Deliverable	Milestone
		Month			
T	Database and calibration and validation of 2.1 model-based approach. A database will be developed (based in literature, past ongoing experiments and lab analyses).	01	12	<u>DL1</u> : Report on chosen field-level model approach (Month 12)	<u>ML1</u> : Crop models validated in production system network (Month 12).
T	Assessment of water and nutrient use 2.2 efficiencies and gaps in the network of systems Using the model-based approach.	10	24	<u>DL2</u> : Report on water and fertilizer use efficiencies and nutrient leakages (Month 24)	<u>ML2</u> : Water and fertilizer use efficiencies determined (Month 24)
T	Assessment of water and nutrient budgets 2.3 and soil loss at field and farm scale. The chosen crop model (T2.1) will be linked to a hydrological model.	01	30	<u>DL3</u> : Catchment maps of land- and water- and nutrient use efficiency (Month 30).	



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

WP3 Development of indicators for productivity, environmental and economic performance

Objectives

- Development of a comprehensive list of productivity, environmental and economic indicators,
- Identification of SMART indicators for the assessment of the network of production systems performance,
- Mapping of the production systems efficiencies at catchment scale based on WaterFARMING indicators.

T	Name	S	E	Deliverable	Milestone
		Month			
T	Literature review on 3.1 environmental, economic and social indicators.	01	12	<u>DL1</u> : A comprehensive environmental, economic and social indicator database developed (Month 12).	<u>ML1</u> : Synthesis of the indicators and corresponding reports completed (Month 12)
T	Identification of SMART 3.2 indicators for agronomic and environmental performance evaluation of the network of production systems.	18	30	<u>DL2</u> : Report on identified SMART indicators for agronomic and environmental performance evaluation of network of production systems (Month 30)	<u>ML2</u> : Indicators and metadata files and catalogue completed (Month 24).
T	Implementation of the 3.3 indicators for mapping ecosystem services in the network of the production.	24	30	<u>DL3</u> : Report on implementation of the SMART indicators for mapping of ecosystem services (Month 30).	
T	Synthesis of a database on 3.4 best practices for water and soil conservation.	24	34	<u>DL4</u> : Synthesis of a database on best practices for water and soil conservation (Month 24)	

WP4 Design of innovative water and nutrient efficient production systems

Objectives

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

T	Name	S	E	Deliverable	Milestone
		Month			
T	Simulation of management measures for the network 4.1 of production systems by application of the field-catchment scale SMART indicators.	01	12	<u>DL1</u> : Report on simulation of management scenarios for the network of production systems (Month 12)	<u>ML1</u> : Management scenarios for the network of production systems drafted (Month 6).
T	Analysis and short listing of different measures in 4.2 consultation with the stakeholder platforms, for improvement of the network of production systems	01	18	<u>DL2</u> : Report on analysis and short listing of different scenarios with the stakeholder platforms (Month 18)	<u>ML2</u> : Analysis and short listing of different scenarios reported (Month 12)
T	Implementation of on-farm trials for improvement of 4.3 water, nutrient and soil conserving practices.	24	32	<u>DL3</u> : Report on on-farm trials on water, nutrient and soil conserving practices (Month 32)	<u>ML3</u> : On-farm trials protocol prepared (Month 24).
T	Socio-economic assessment of the suggested 4.4 management measures under current and future climate and land use conditions.	24	36	<u>DL4</u> : Socio-economic assessment of on-farm trials with the stakeholder platforms (Month 36)	

WP5 Dissemination and communication work

Objectives

- Coordinate communication of the project outputs from the work packages 1-4.
- Invent dissemination tools to facilitate knowledge exchange, based on the scientific and practical agronomic knowledge. Ensure the efficient delivery of disseminated information to the land-users, policy-makers, administration, extension services, and higher education institutions.
- Assists the adoption of soil, water and nutrient conserving practices in Europe and N. Africa.

Tas	Name	S	E	Deliverable	Milestone
k		Month			
T	Development of Knowledge Exchange Plans and 5.1 a common visual identity for the project	03	6	<u>DS1</u> : Roadmap for Knowledge exchange, Communication and Impact Maximization Plan.	<u>MS1</u> : Knowledge exchange, Communication and Impact Maximization plan drafted (Month 3)
T	Project website and exposure to social media 5.2 and related research projects.	05	30	<u>DS2</u> : Launching of the project website with links to social media like Facebook, Twitter, YouTube (M 6)	<u>MS2</u> : Draft prepared for the Project web site (Month 4)
T	Communications with the scientific community 5.3 stakeholder and preparation of dissemination materials.	06	36	<u>DS3</u> : Technical guidelines for farmers, stakeholders and preparation of policy briefs (M 36)	
T	Development of decision Support Tools (DST) for 5.4 informed decision-making by stakeholders.	08	36	<u>DS4</u> : Report on the DST and e-learning module made available on-line (M 36)	<u>MS3</u> : Stakeholder events (field demonstrations and workshops) planned with stakeholders (Months 24)

WP6 Project Co-ordination

Objectives

- Facilitate communication among all parties and actors involved in the project,
- Ensure high scientific quality of the deliverables,
- Effective kick-off and project coordination meetings,
- Formation of advisory board to provide feedback and future direction on project activities.

Task	Name	Lead	participants	S	E	Deliverable	Milestone
				Month			
T	Overall project management 6.1	UCPH	WU, UCPH, UFZ, NARS, CERTE, FFUL, CNR	01	36	<u>DS1</u> : Consortium Agreement (Month 1)	<u>ML1</u> : Knowledge exchange, Communication and Impact Maximization plan drafted (Month 3)
T	Scientific management and monitoring quality control 6.2	UCPH	WU, UCPH, UFZ, NARS, EFTE, FFUL, CNR	01	36	<u>DS2</u> : 1st, 2nd and 3rd periodic report to the national funding agency and Water JPI (Month 12, 24 and 36).	<u>ML2</u> : Draft prepared for the Project web site (Month 1st, 2nd and 3rd periodic draft reports completed) (Month 10, 22 and 34).
T	Participation in Water JPI common kick-off, mid-term and annual project and final meetings. 6.3	UCPH	WU, UCPH, UFZ, CERTE, FFUL, CNR	01	36	<u>DS3</u> : Technical guidelines for farmers, stakeholders and preparation of policy briefs (M 36)	<u>DS3</u> : Documentation of kick-off and WP leader meetings



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