A new approach to innovation in agriculture production in Europe

CSIC
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IAS

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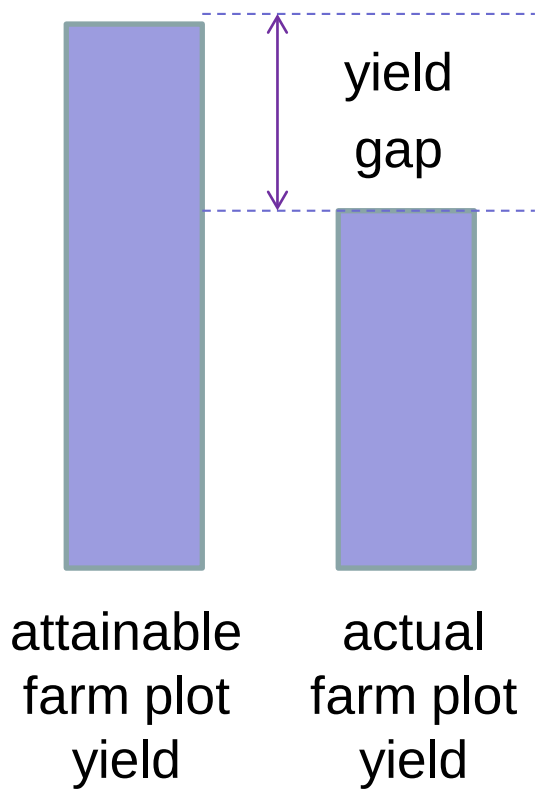
Working with farmers

farmers often manage their plots differently than we manage experimental small plots

their decisions often aim at reducing risks (if in Europe, strongly influenced by subsidies)

tend to keep doing things “as usual”

Farm plot yield gap



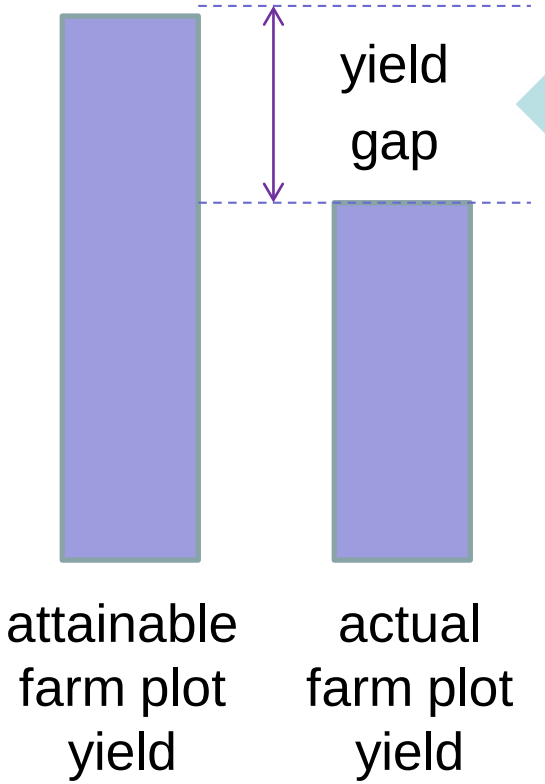
Management related constraints

- cultivar / crop / dual crop
- sowing / establishment
- weed / pest / disease control
- water / fertilization management
- soil compaction / fertility…

Socio-economic constraints

- costs/returns/benefits
- subsidies / policies / credit / market
- input / technology availability
- risk aversion / tradition / knowledge
- …

Farm plot yield gap



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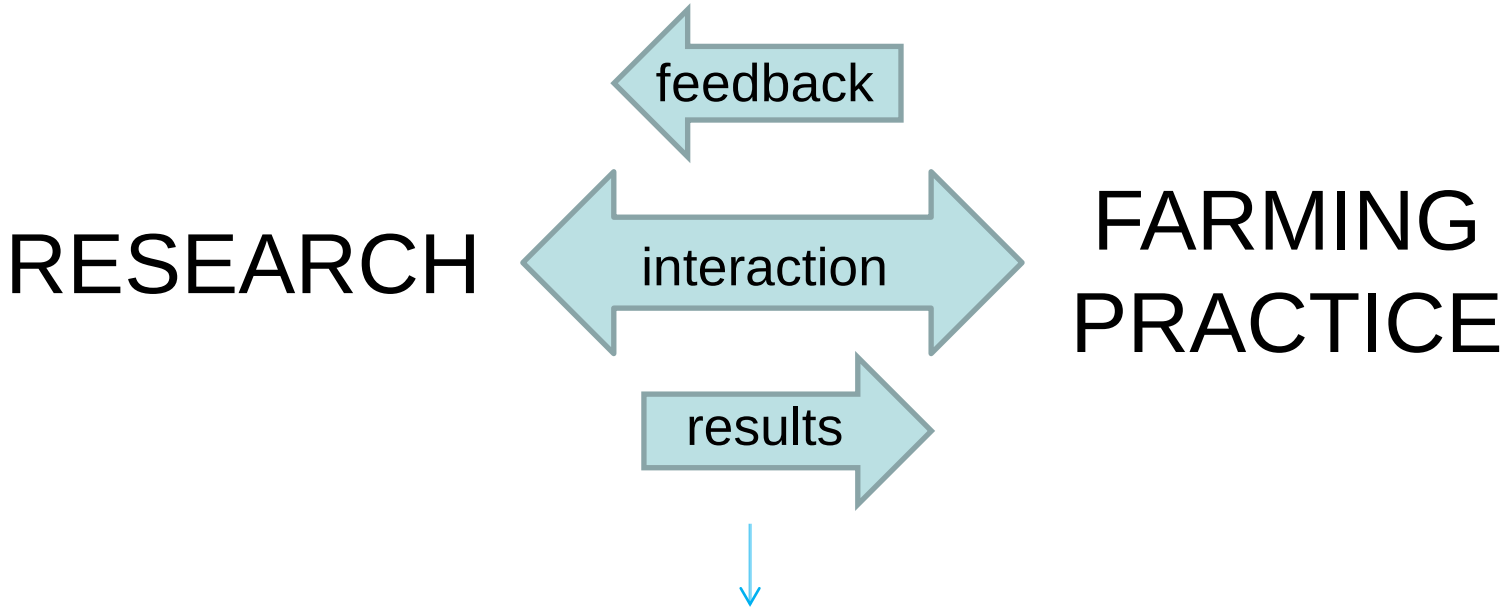
European Innovation Partnership

EIP–AGRI



More competitive, productive and sustainable agriculture

Means to implement EIP–AGRI

Horizonte 2020 (EU Research Policy)

- ➔ **Multi-actor research** projects involving the agriculture community
- ➔ **Thematic networks**, unlocking and exchanging knowledge across the EU

Rural Development Programmes

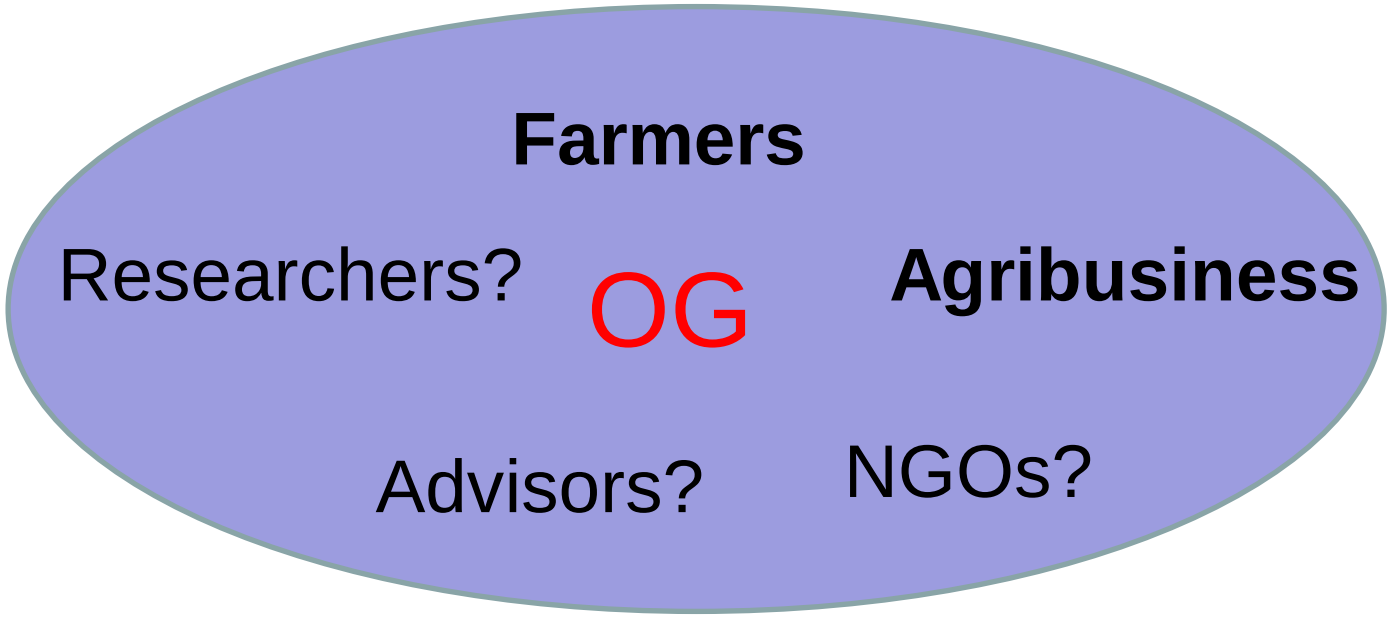
- ➔ **Operational Groups**
- ➔ Project funding
- ➔ Innovation support services

INOVAGRI
International Meeting

What is an **Operational Group**?

- Concrete innovation projects looking for innovative solutions
- Different competencies (practical and scientific)
- “Hands-on” groups
- Benefit from the interactions

What is an **Operational Group**?

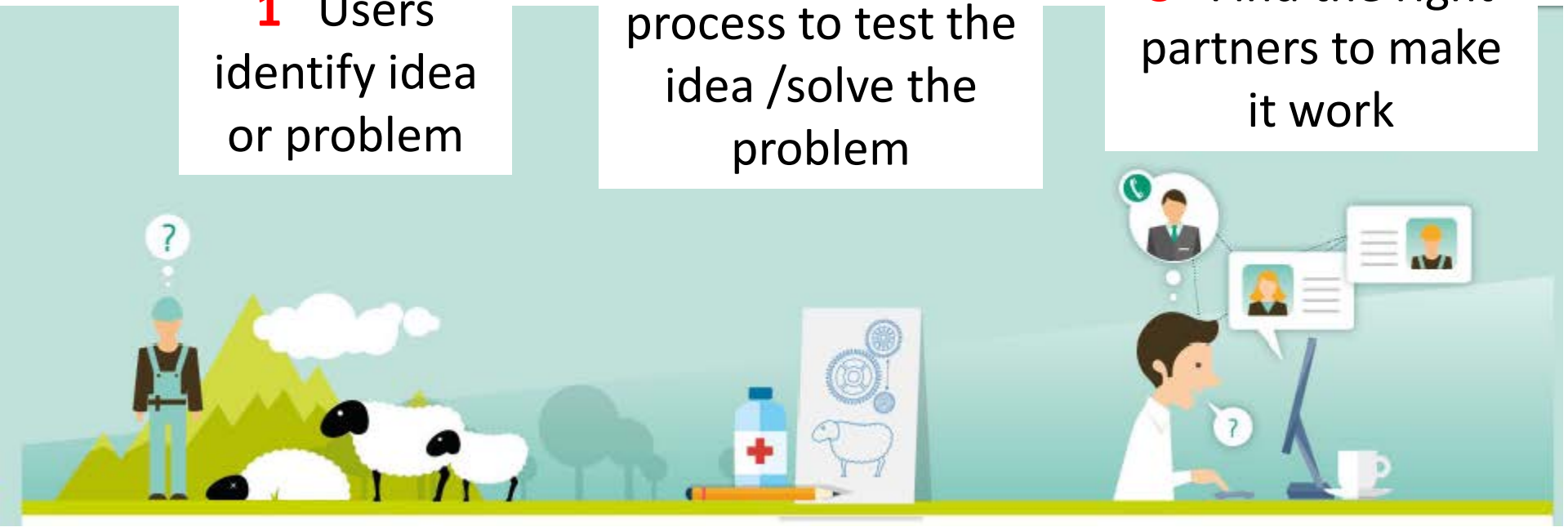


What is an **Operational Group**?

1 Users identify idea or problem

2 Design the process to test the idea /solve the problem

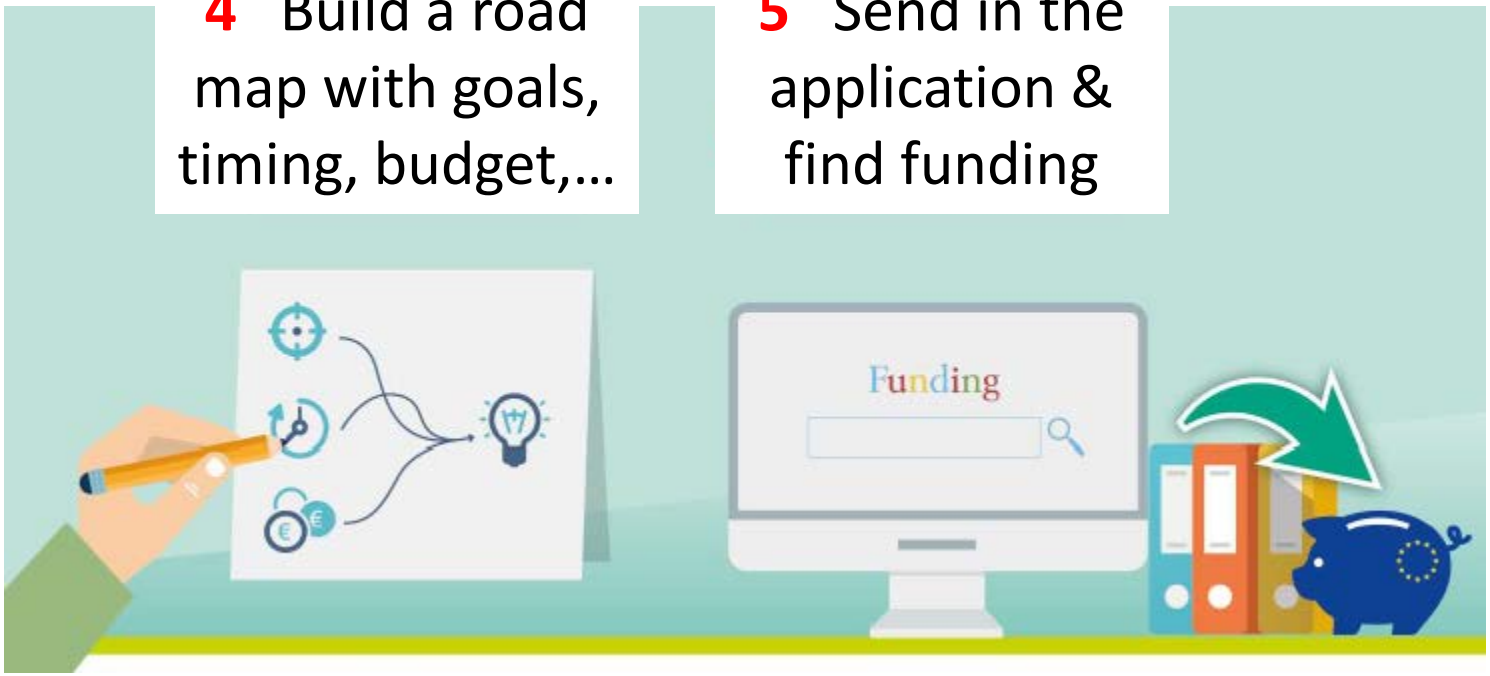
3 Find the right partners to make it work



What is an **Operational Group**?

4 Build a road map with goals, timing, budget,…

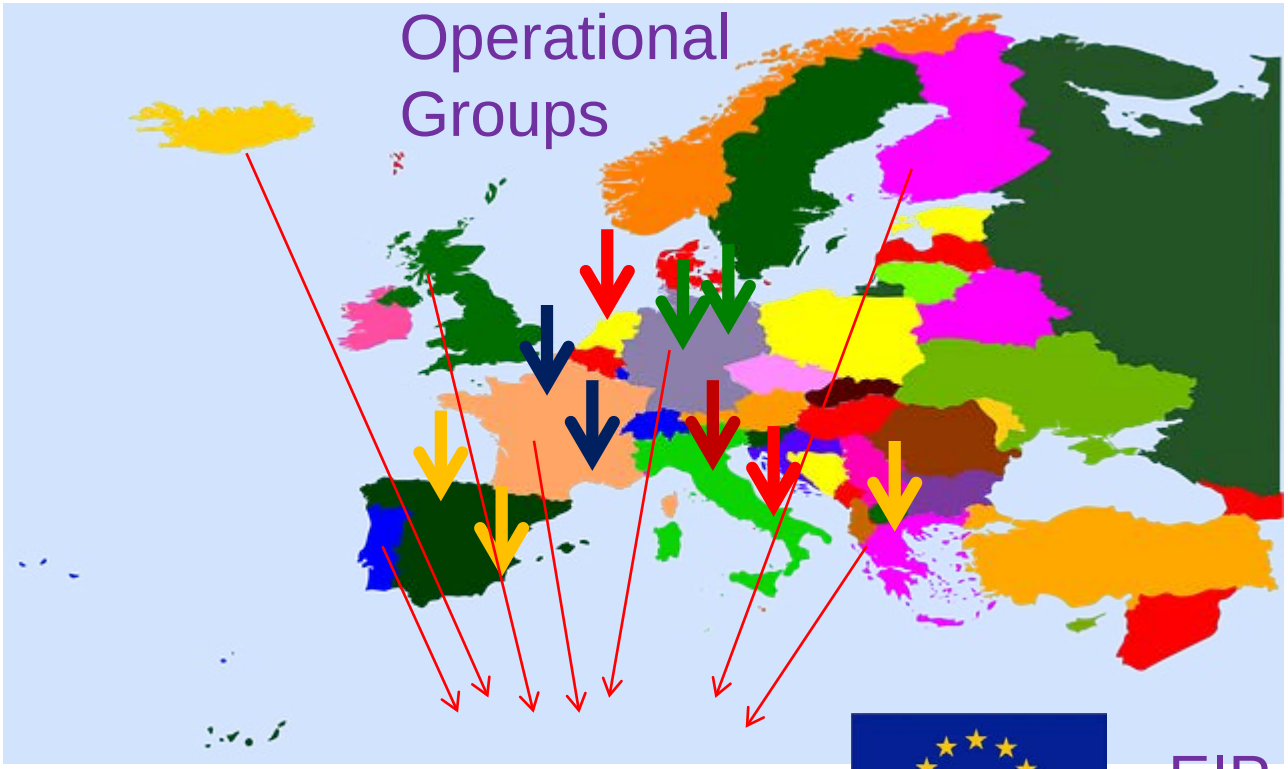
5 Send in the application & find funding



OGs are funded by countries Rural Development Plans

The EIP-AGRI Network key building blocks

NEW!!! (some with base)

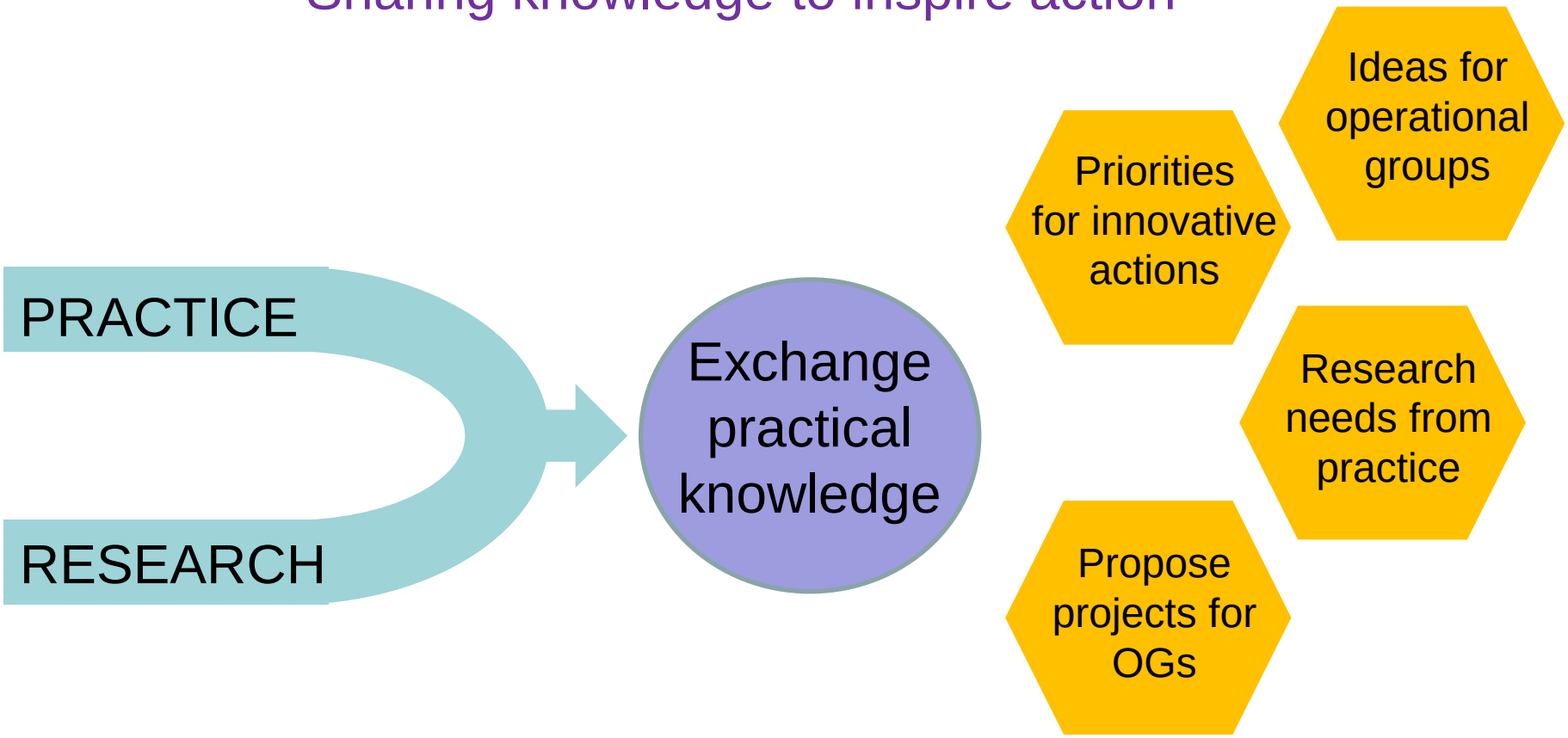


Thematic Network

EIP Service Point

EIP-AGRI **Focus** Groups

Sharing knowledge to inspire action



INOVAGRI
International Meeting

EIP-AGRI **Focus** Groups

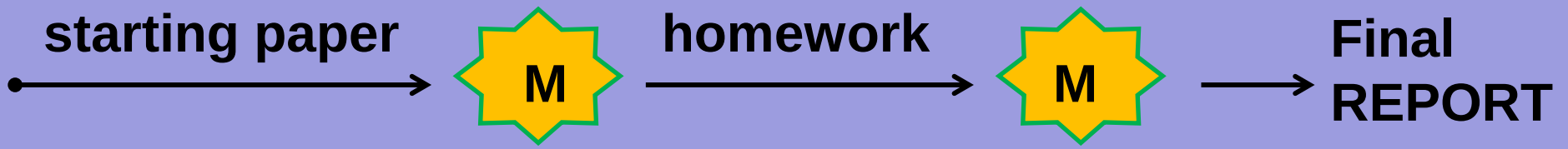
- Open calls for interest of participation
- 20 participants, different type of actors
- Short duration, focused
- Inspiration to set up Operational Groups
- 15 Focus Groups (+ 2 on the way)

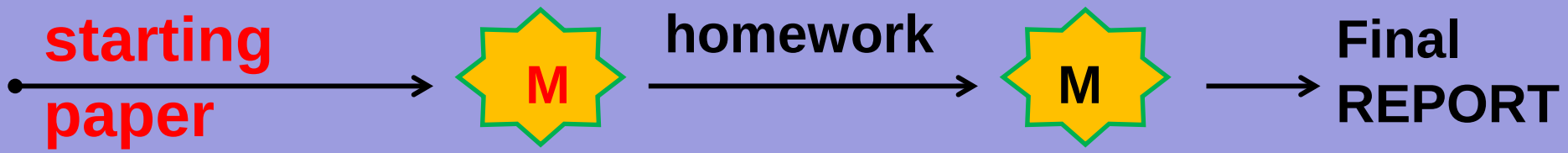
Focus Group “Water & Agriculture”

Focus Group “Water & Agriculture”

←Dealing with water scarcity

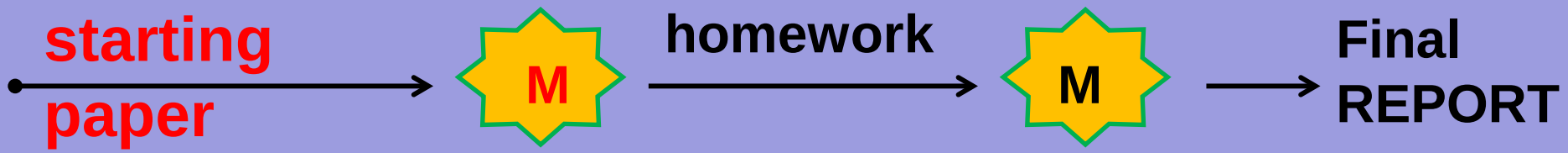
- Take stock (existing **projects, practice, research)**
- Explore the **role of innovation and knowledge transfer**
- Identify **needs from practice for further research**
- Propose priorities for innovative **actions**





Purpose of the Starting Paper

- Establish a common understanding
- Background on water functions & paths for improvement at crop and farm level
- Overview of current & potential adaptive strategies to water scarcity
- Key questions for discussion



FOCUS

Adaptive strategies at farm level

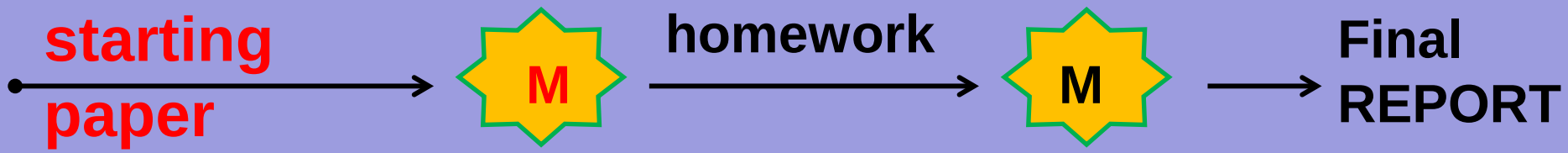
= changes in crop, livestock & farm management practices to reduce impact of water scarcity on farm productivity

NOT INCLUDED

Strategies at molecular to cell level

Strategies dealing with irrigation at scales above the farm level (scheme, basin, institutional levels)

Re-use of urban waste water



CLIMATE CHANGE SCENARIOS

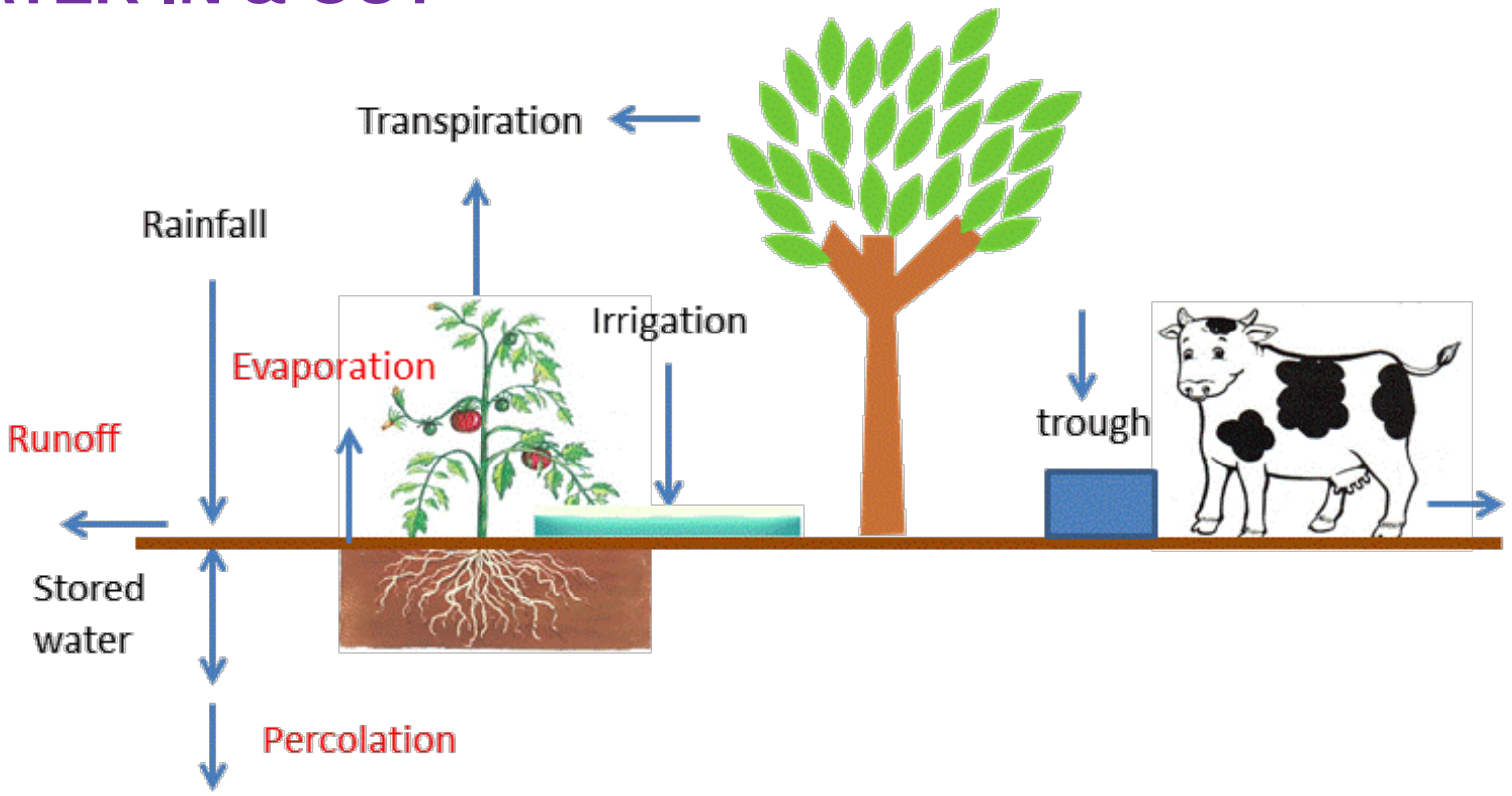
- Uncertainty
- Mediterranean: already scarce
  - ↑Tº
  - ↓ rainfall
  - ↑extreme events
- Northern Europe:
  - ↓ summer rainfall
  - ↑ winter rainfall
- More erratic rainfall

DEALING WITH WATER SCARCITY:

A GLOBAL CONCERN

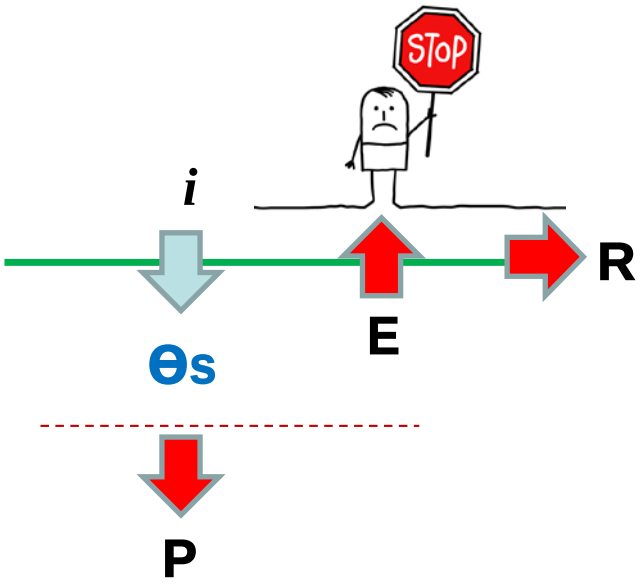
starting paper → M → homework → M → Final REPORT

WATER IN & OUT



1 Strategies at farm level to increase water availability for crops considering only rainfall

How to reduce water losses?



- **Conservation agriculture**
- **Stubble retention / mulching**
- **Early ground cover**

  ↑ *i* (P) ↓E,R
- **Deep rooting**

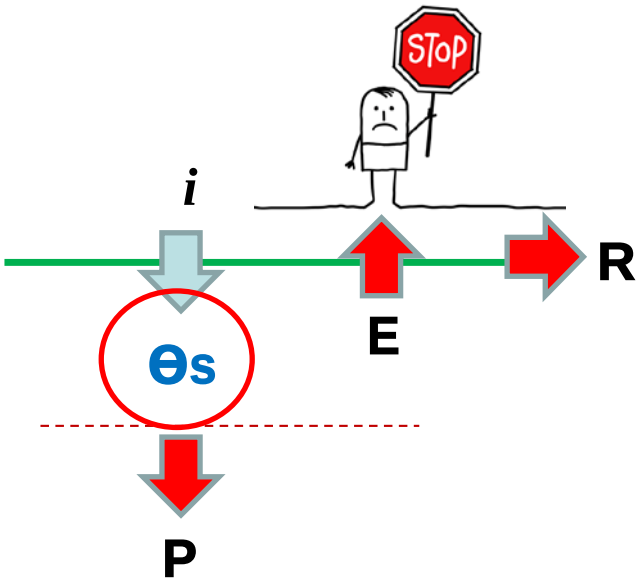
  ↓P
- **Effective weed control**

  ↑θs

...

1 Strategies at farm level to increase water availability for crops considering only rainfall

How to increase soil capacity to store water & how to access to that water?



- **↑ Soil organic matter (←CA)**
  ↑ capacity
- **Controlled traffic**
- **Deep rooting / rootstocks**
  ↑ access

…

2 Strategies at farm level to increase the efficient use of water considering only rainfall

Are there crops/cultivars with intrinsic higher water productivity?

- **Improved cultivars**
  ~"stay-green" in sorghum
  ~ short anthesis-to-silking interval in maize
  …
- **Deep rooting / rootstocks**

…

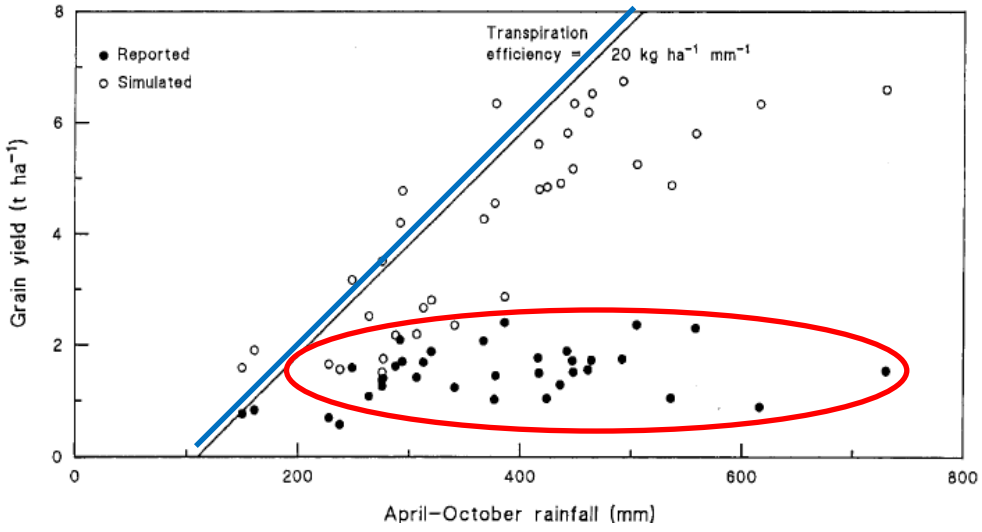
2 Strategies at farm level to increase the efficient use of water considering only rainfall

Which management options will help to use water more efficiently?

- **Understanding & closing yield gap**

  Tactical management

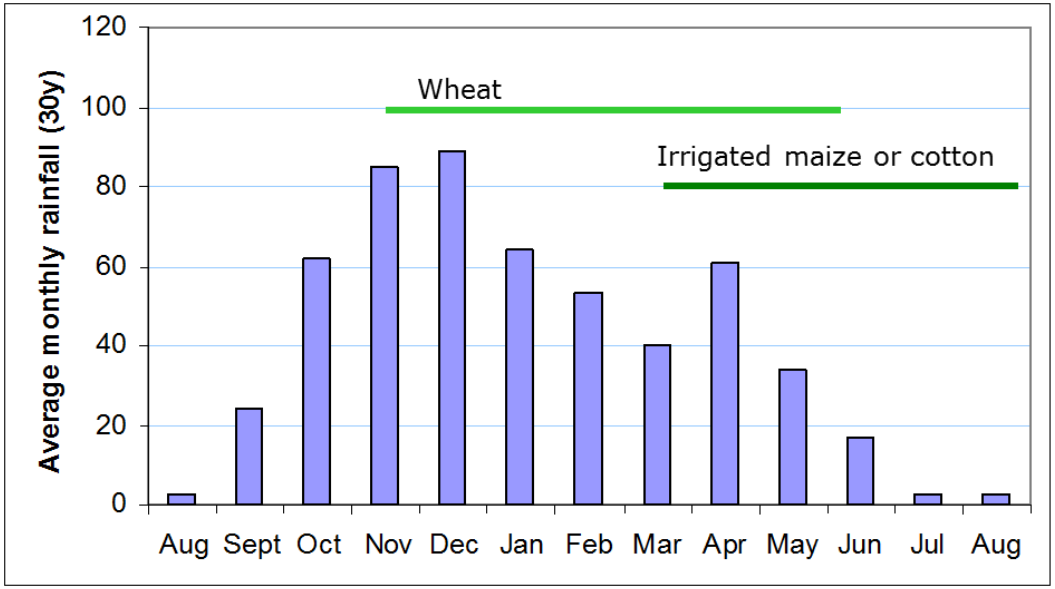
  ...



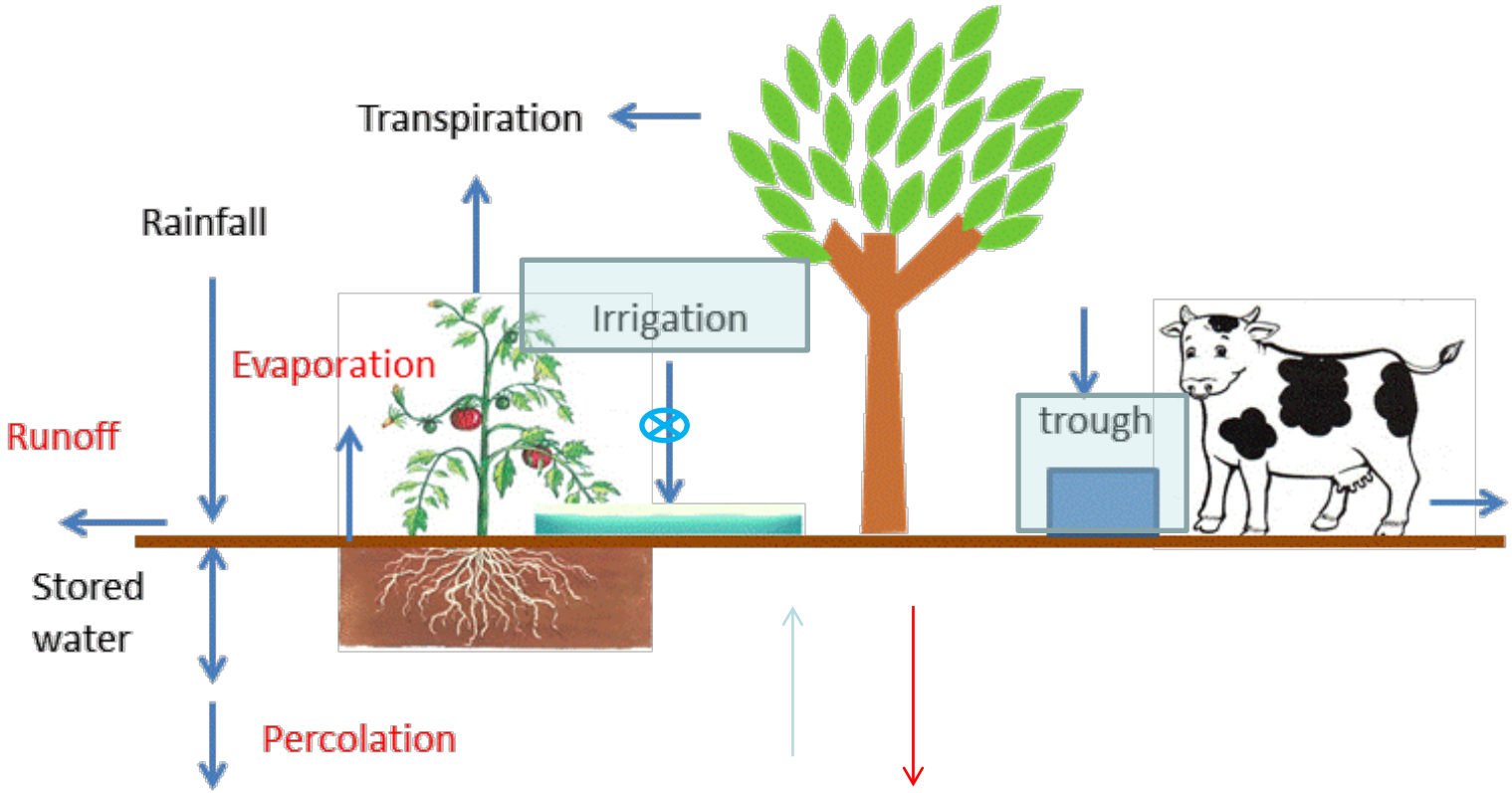
2 Strategies at farm level to increase the efficient use of water considering only rainfall

Which management options will help to use water more efficiently?

- **Growing when the evaporative demand is lower**
  - **match the rain**

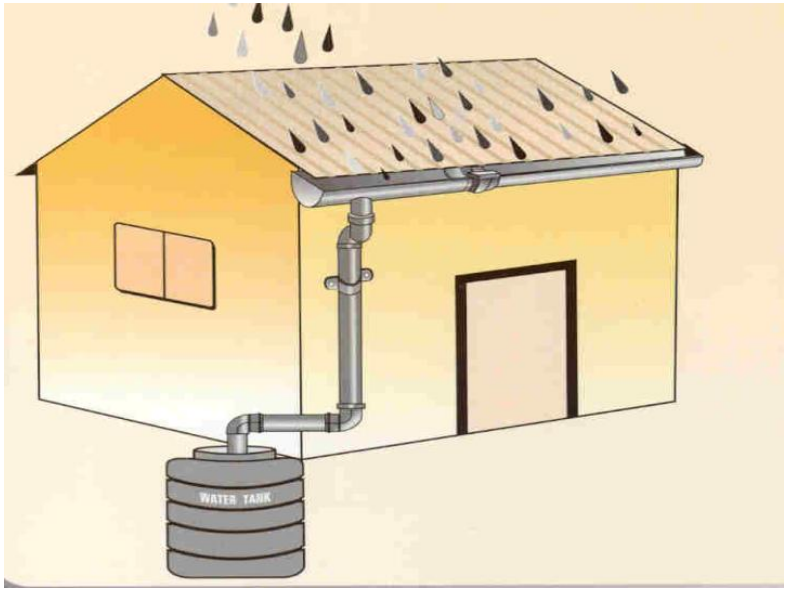


3 Strategies at farm level to increase water supply for irrigation / animal drink increase irrigation water efficiency



3 Strategies at farm level to increase water supply for irrigation / animal drink increase irrigation water efficiency

How to increase water supply ?



- Renovation of systems
- Use of farm waste-water
- New water sources
  - –rainwater harvest
- Controlled drainage

3 Strategies at farm level to increase water supply for irrigation / animal drink increase irrigation water efficiency

Which management options will increase irrigation efficiency?

IRRIGATION SYSTEMS

- **Flood irrigation**
  - **Laser levelling**
- **Sprinkler irrigation**
- **Drip irrigation**
- **Subsurface irrigation**

Uniformity
Water on demand *vs* turns
Maintenance
Energy
Cost

3 Strategies at farm level to increase water supply for irrigation / animal drink increase irrigation water efficiency

Which management options will increase irrigation efficiency?

IRRIGATION SCHEDULING

- **Water balance**
  - **Soil sensors**
  - **Soil, crop & seasonal data**
- **Supplemental irrigation**
- **Regulated deficit irrigation**
- **Alternate furrow irrigation**

Water on demand
Cost *vs* water savings?
Complexity / autonomy?
Risks?

3 Strategies at farm level to increase water supply for irrigation / animal drink increase irrigation water efficiency

Which management options will increase irrigation efficiency?

WATER EFFICIENCY TRAP

precision irrigation and more efficient systems may be accompanied by more intensive cropping or more irrigated area

↑ consumptive water use

4 Strategies at farm level to increase farm resilience under water scarcity

← spatial differences

- Landscape elements to capture runoff
- Reducing (diversifying) risks
  - –Diversification within the farm: livestock, agroforestry
  - –Rainfed / irrigated crops balance
  - –Best soils for crop with highest potential
  - –Insurance
- Limited access to technical knowledge & info
  - –Networks, water users associations, advise services

LARGE FARMS?

POTENTIAL NEW / NON ADOPTED STRATEGIES

Strategies identified for the same 4 groups. Examples:

New drought resistant cultivars:
less sensitive-to-low-temperature spring crops

More effective irrigation systems
oxygenation of water in subsurface irrigation

New techniques for irrigation scheduling
nano-sensors, sap-flow and eddy-covariance
site-specific variable rate irrigation

....

Some **questions** about current strategies

How effective is the strategy conserving water on-farm? (are there benchmarks to compare?) Is the impact diluted at irrigation scheme or watershed scales?

Is it labor intensive? Requires large capital investments? Is it complex to adopt?

Does it pose any environmental risk ?

Some **questions** about potential strategies

Same questions as for current strategies and…

Is it ready to be adopted?
requires some fine-tuning research?
requires extensive research?

Is it widely applicable or are they more indicated for specific environmental conditions ?

How to facilitate success of new potential strategies?

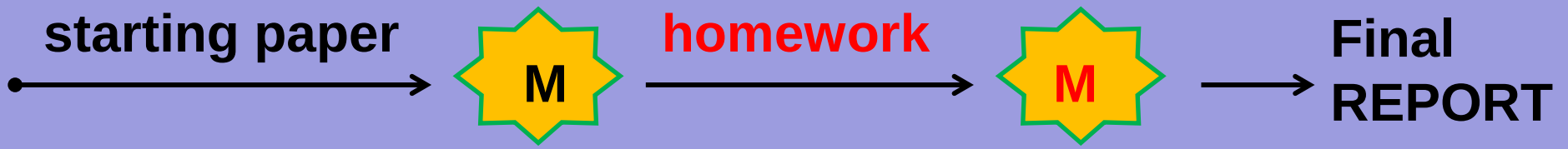
Focus Group "Water & Agriculture"
←Dealing with water scarcity

Addressing those questions

Preparing mini-papers (3-4 pages) on key issues

Research needs → H2020 Projects

Ideas for Operational Groups



INOVAGRI
International Meeting

An **Operational Group** in Western Andalusia?

Conservation agriculture

min soil disturbance + residues + rotation

Farmers

Researchers

Advisors

Seed companies

Herbicides companies

Machinery companies

Obrigada!

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