Agricultural Runoff & Best Management Practices for Protection & Productivity

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Outline

- Why is Runoff a Protection & Productivity Issue?
- Runoff & Erosion Generation & Their Management
- Projects on BMPs for Protection & Productivity
- Next Steps...

Why is Runoff a Protection & Productivity Issue?

A protection issue: runoff needs managing to reduce

- River peak flow rates & flooding

- Sedimentation in water bodies

- Contamination of surface water
  - Nutrients & fertilisers
  - Pesticides & microbes

Why is Runoff a Protection & Productivity Issue?

A productivity issue: having to manage runoff stimulates

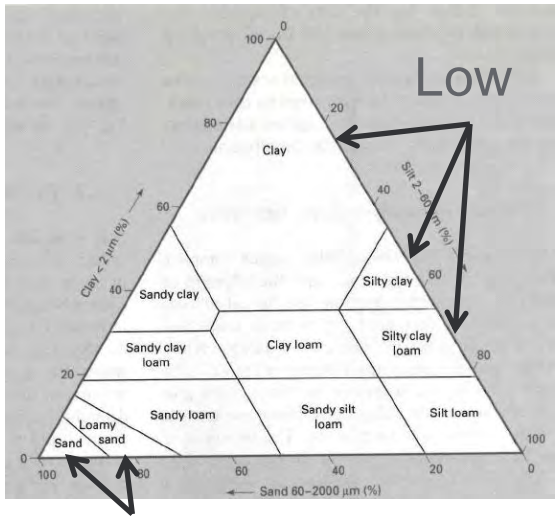
- Soil and water conservation, which reduces runoff & erosion

- Optimal fertiliser & pesticide use, crop rotations etc.

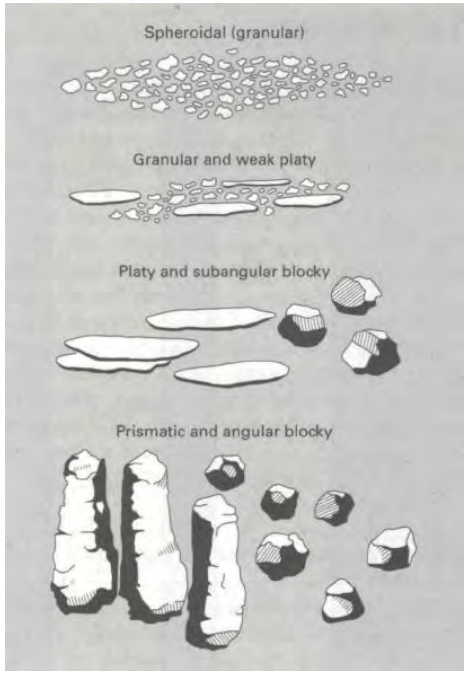
Runoff & Erosion Generation & Its Management

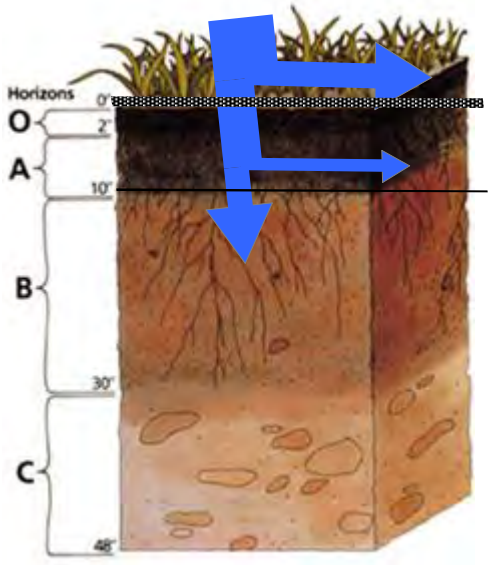
Runoff & erosion are *complex*, but basically controlled by:

- Soil permeability – soil texture, structure & layering



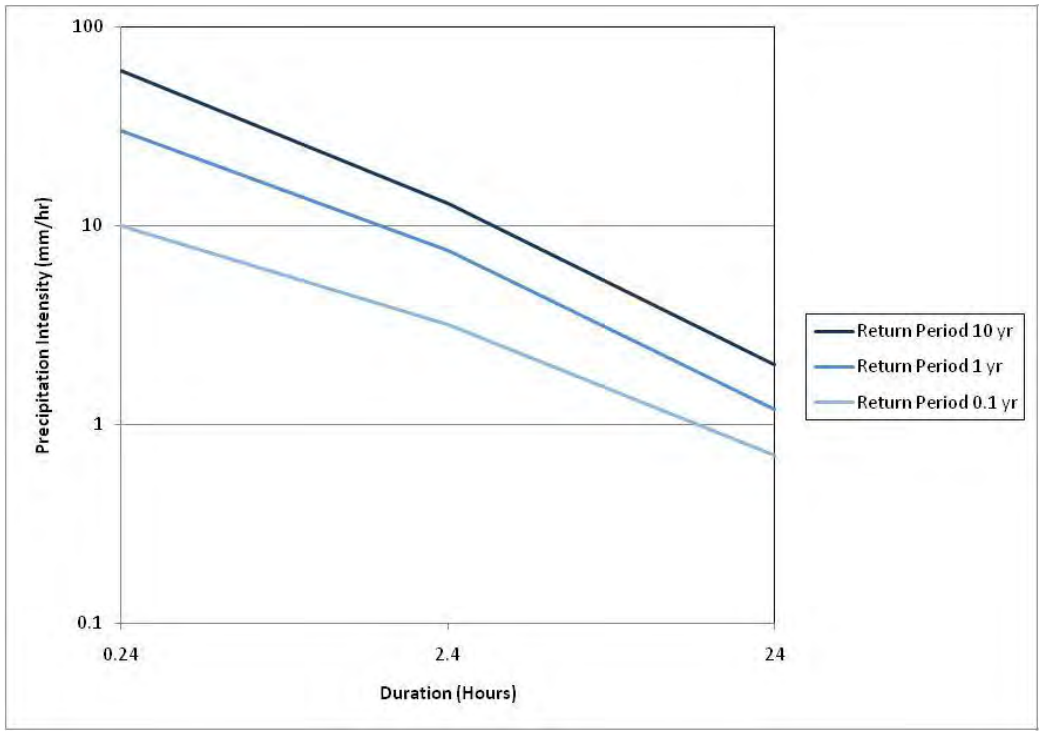
Very High





Runoff & Erosion Generation & Its Management

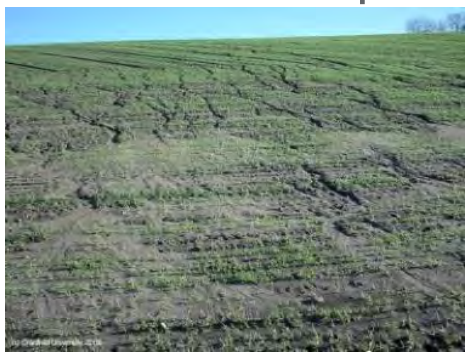
- Weather patterns – frequency, intensity & duration



Runoff & Erosion Generation & Its Management

- Topography – influences amount of time for infiltration

Slope steepness



Slope shape

Slope roughness

Slope length

Runoff & Erosion Generation & Its Management

Management starts by reducing generation at sources...

Soil surface capping

Near surface compaction

Tramline runoff & erosion

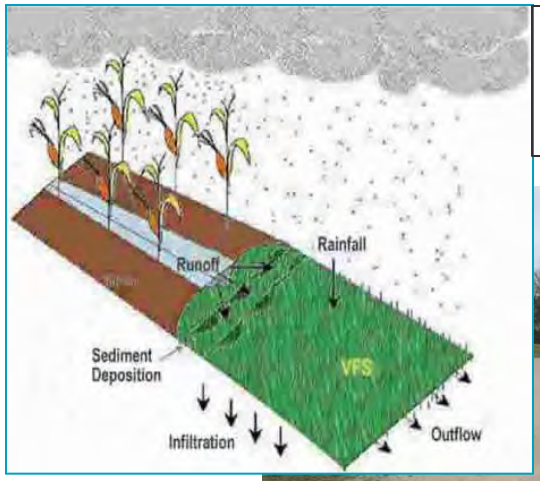
Low soil cover

Tillage & worm channels

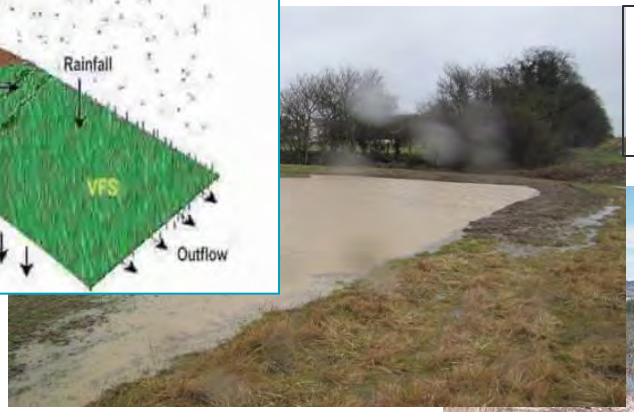
Good soil management ensures soil permeability is as high as possible

Runoff & Erosion Generation & Its Management

...& goes to a buffer network to prevent entry into water



Vegetative buffers in crop margins



Bunding on low slopes for impermeable soils

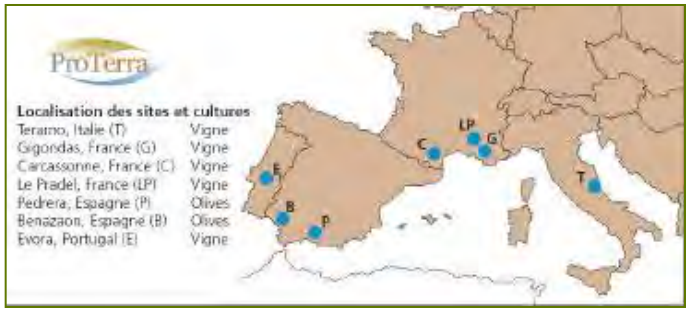
Retention ponds for better water quality

Riparian buffers in key locations

Projects on BMPs for Protection & Productivity

Vegetative Cover in Perennial Crops

- A proposed BMP, but it must balance



Protecting Soil & Water
(Autumn-Winter Rainfall)

Productivity Concerns
(Water Competition in Summer)

Can BMP protocols establish cover in winter & desiccate in summer?

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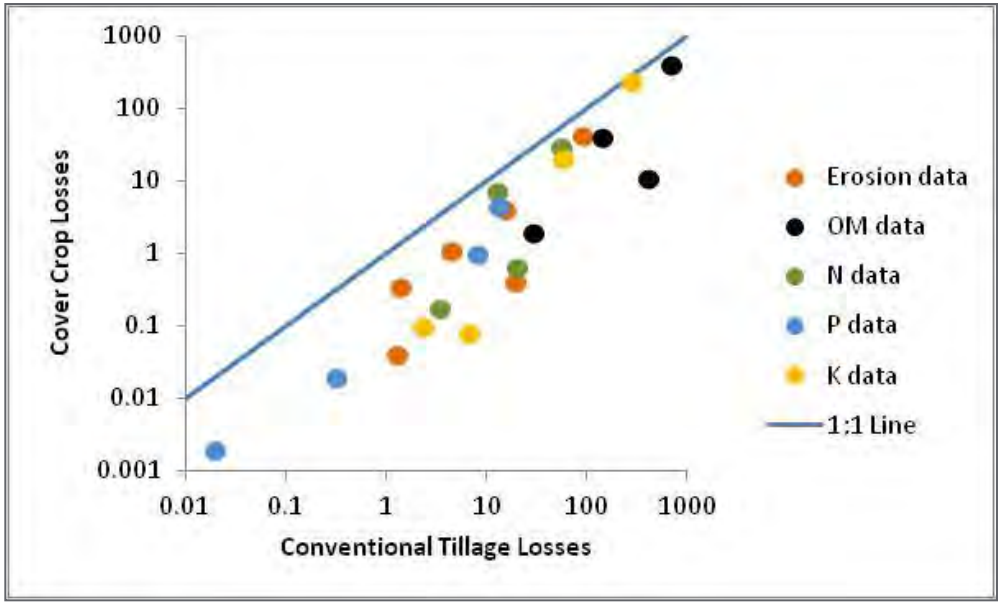
Projects on BMPs for Protection & Productivity

- How effective were the BMPs?
  - Establishment of covers was challenging
  - No impact on crop yields with desiccation
  - Runoff reductions on some soils (lighter soil textures etc.)
  - Erosion reductions on all soils (~10 fold)



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Projects on BMPs for Protection & Productivity

- Results relative to other practices for the site in the Ardèche

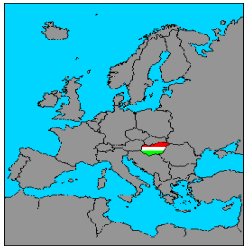
Silty clay (slope ~10%)

Relative Impact of Practice	Agricultural Practice			
	Vegetative Cover Between Rows (BMP)	Tillage Weed Control Between Rows	Post-emergent Weed Control Between Rows	Full Herbicide Weed Control Between Rows
Water Runoff	1.0	1.2	1.4	1.6
Soil Erosion	1.0	8.2	3.6	5.3
Pesticide Runoff	1.0	1.8	3.8	6.6

Vegetative covers can balance protection & productivity goals

Projects on BMPs for Protection & Productivity

Vegetative Buffers in Arable Crop Margins



- Proposed BMPs, but they must balance

Protecting Against Impacts
(Mostly Public Costs)

Productivity Concerns
(Mostly Farmer Costs)

Can BMPs supply public goods by integrating biodiversity & pay farmer costs?

Projects on BMPs for Protection & Productivity

- How effective were the BMPs for biodiversity?
  - Easy, low-cost establishment of high-quality habitat
  - Increased biodiversity & endangered species regeneration
  - Biodiverstiy & intensive cropping can benefit each other

OPERATION Pollinator

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Projects on BMPs for Protection & Productivity

- Did the BMPs reduce runoff, erosion & pesticide transfer?
  - When the soil is tilled by conventional mouldboard plough

Relative Impact of Practice	Agricultural Practice	
	Vegetative Buffer (BMP)	No Buffer
Water Runoff	1.0	1.1
Soil Erosion	1.0	4.0
Pesticide Runoff	1.0	1.9

Silty clay loam (slope ~10%)

  - However, conservation till BMPs on this capping soil prevents most runoff, erosion & pesticide runoff by improving soil permeability

Need integrated BMP decision tools...going from source to the water body

Next Steps...

- Take multi-functional approaches to meet a range of EU policy goals
- Develop BMP decision tools, so advisors identify & solve issues by priority
- Ensure BMPs get agri-environment funding to encourage farmer uptake
- Industry is engaging with other partners to stimulate the uptake process

European Crop Protection Association
member of CropLife International

TOPPS PROWADIS

The Voluntary Initiative
Promoting responsible pesticide use

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„Everything should be made as simple as possible, but no simpler“

Albert Einstein