

# Co-Innovation as a strategy to develop sustainable farm systems in South Uruguay

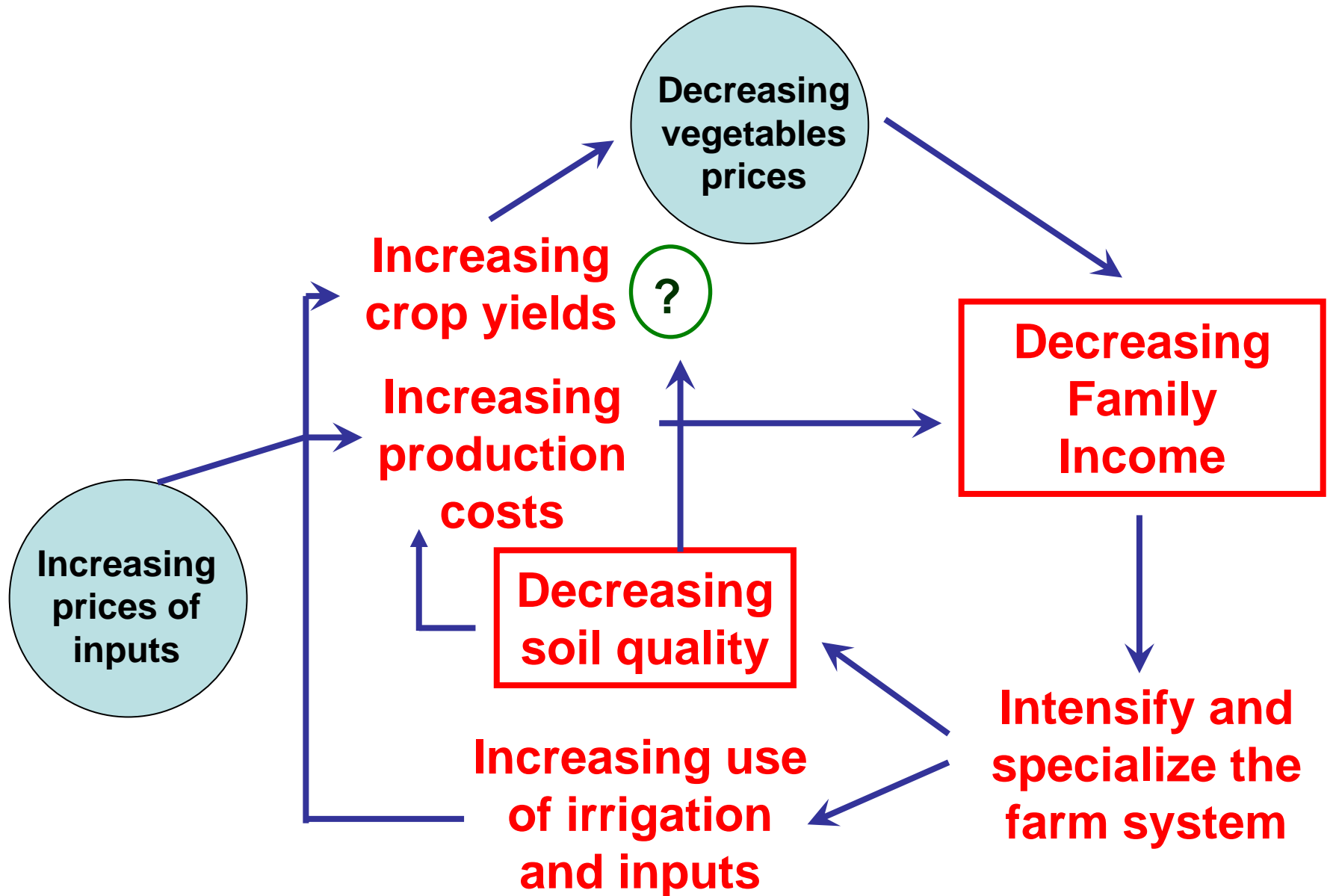
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# Problem description





# Background

## **Main problems of the “innovation system” in vegetable production:**

- Problem identification and solution design by system components, isolated from their interactions and emergent properties.
- Economic context and Policy instruments promoted specialization, production scale increase and concentration of production and markets.
- Lack of adoption by farmers was seen as caused by both, weakness of the extension service and by a general lack of willingness to change by farmers.

# Background

A model-based explorative study (Dogliotti et al., 2005; 2006) showed that was theoretically possible to increase family income while improving soil quality:

- Strategies proposed to improve sustainability:
  - ✓ Lowering the area of vegetable crops
  - ✓ Introducing long crop rotations with pastures
  - ✓ Green manure and animal manure during the inter-crop periods
  - ✓ Integrating beef-cattle production into the farm systems
- Farmers attitude and skills to strategic and tactical planning need to be improved

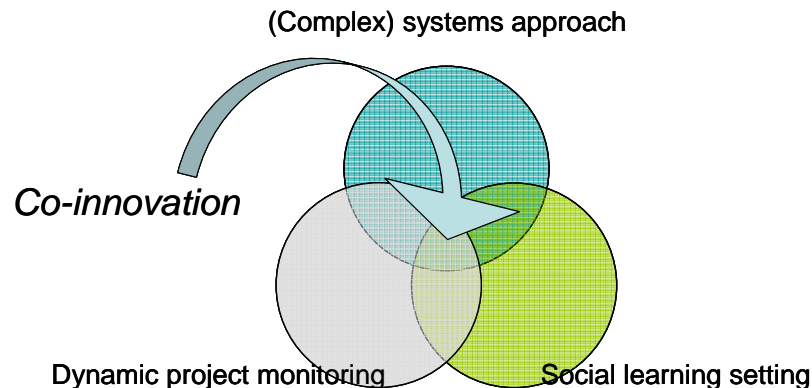
# Main Hypotheses

Improving the sustainability of vegetable family farms in South Uruguay require:

- A change in the mode of thinking of farmers and extension agents from tactical/operational to strategic
- A systems approach towards sustainability assessment and whole farm re-design
- A social learning process with farmers, extension agents and researchers as main participants
- Monitoring and evaluation tools to allow continuous reflection on project progress and to guide adjustments in project goals and activities.

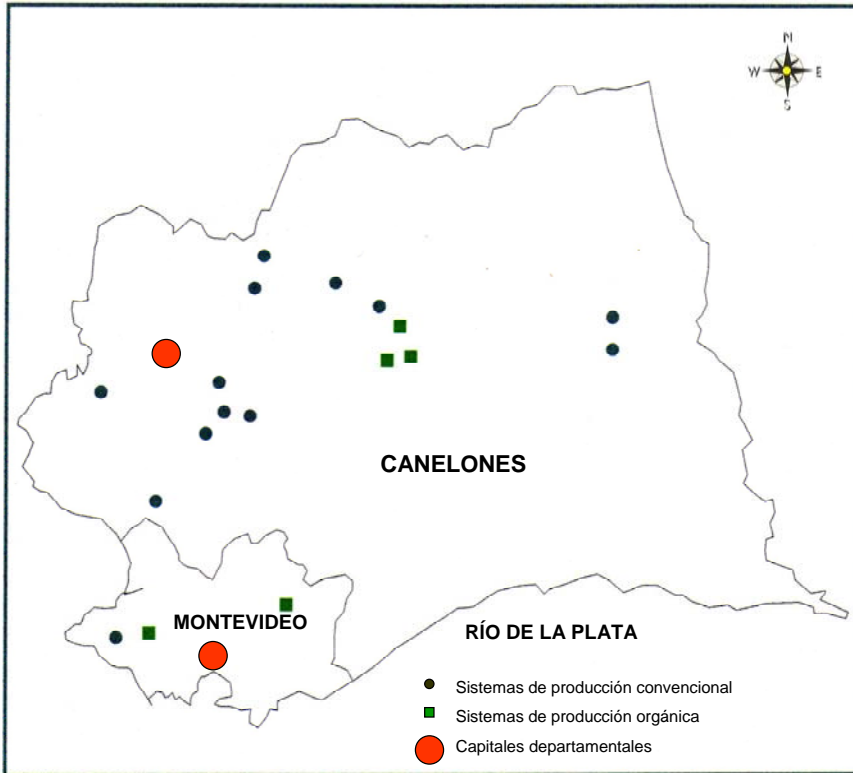
# Objective

We aimed to contribute to the improvement of sustainability of vegetable farming systems in South Uruguay by linking quantitative systems approaches to participatory learning processes and monitoring and evaluation tools with farmers, extension agents and researchers as participants.



# Methods

## 1. Selection of Pilot Farms



**2005-2006: 6 pilot farms**

**2007-2010: 16 pilot farms**

**Farmers' unions**

**Local government**



# Methods

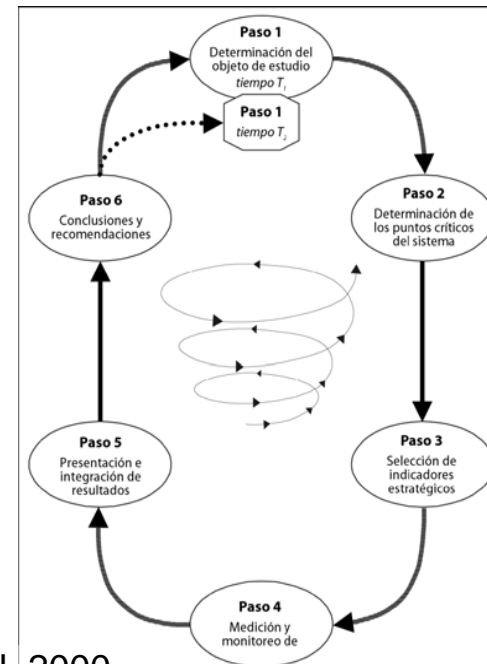
## 2. Pilot Farms characterization and diagnosis

### *How is the system to be improved?*

- On-farm survey: management system and production system
- Identification of farmers' objectives
- Determination of critical points
- Selection of relevant sustainability indicators

### *What will be considered an improvement?*

- Agreement between stakeholders on aims and targets for the design phase: drawing of a problem tree for each farm



# Methods

## **3. Design and 'ex ante' evaluation of alternative systems**

### **a. Fields layout, drainage and erosion control support measures**

### **b. Cropping plan design:**

- Selection of crops, animal production activities and target areas: production plan
- Evaluation of feasibility of the production plan according to agronomic rules and resource availability
- Allocation of crops to fields of the farm for a number of years according to agronomic rules
- Design of inter-crop activities and weed control measures

### **c. Evaluation of environmental impact and economic performance**

### **d. Information management system**



# Methods

## *4. Implementation and evaluation*

- **Periodic visits to pilot farms to monitor and advise implementation of the plan and for data recording.**

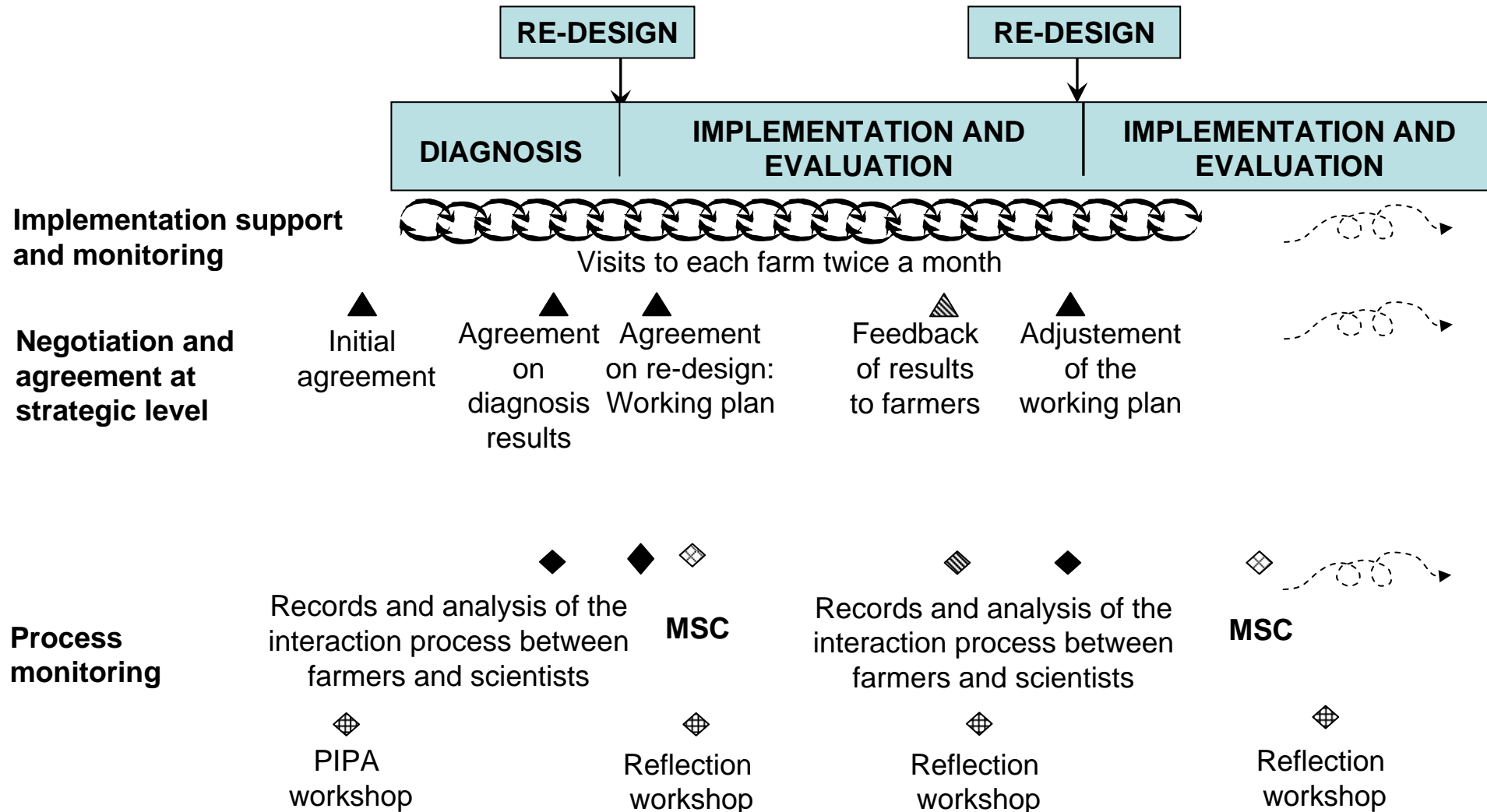


## *5. Dissemination*

- **Field days in pilot farms with participant farmers, neighbors and technical advisers**

# Methods

*Co-Innovation process steps, interactions among farmers and scientists and monitoring tools*



# Results

## 1. Observed implementation of planned activities

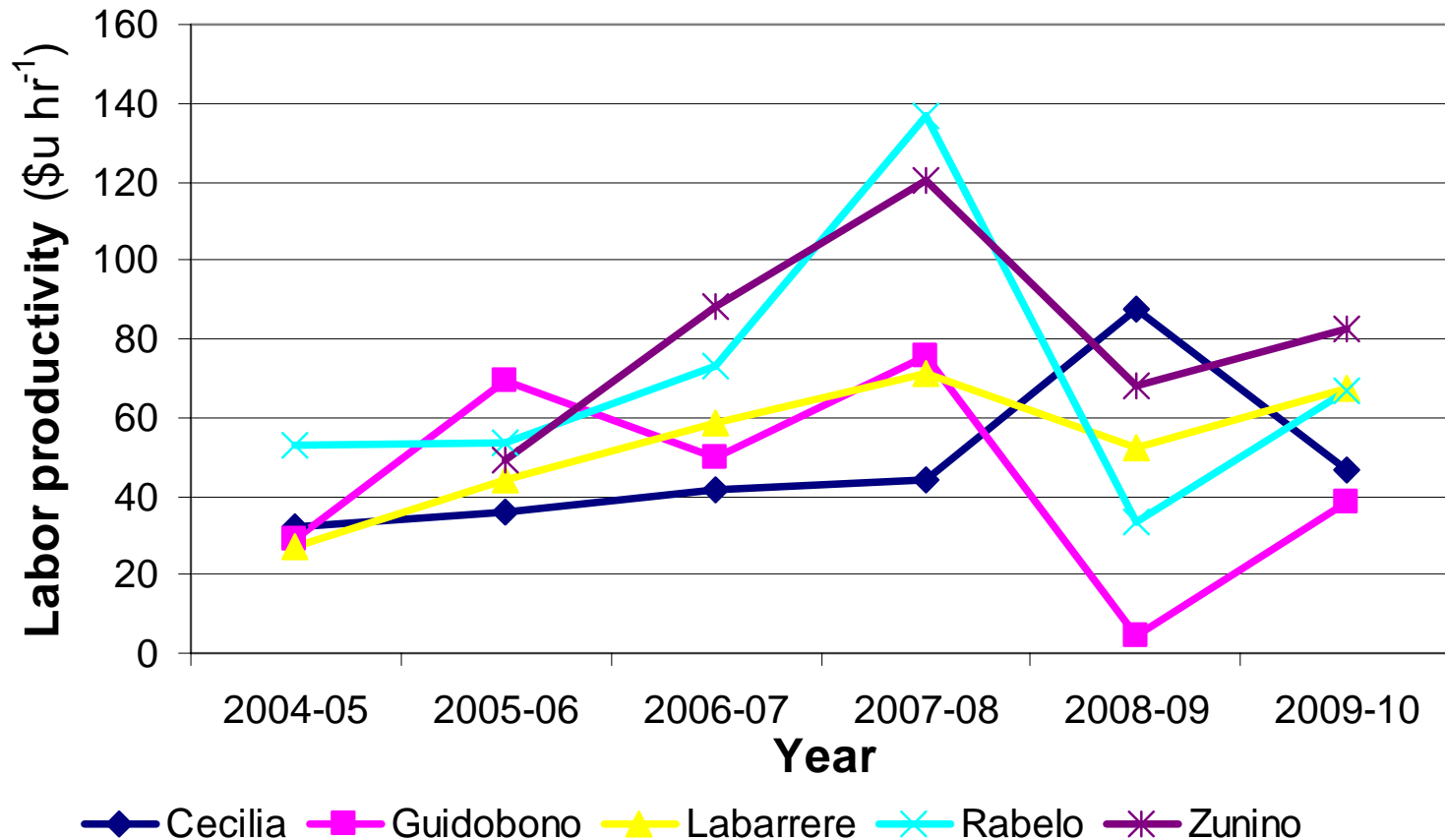
Planned improvements	% adoption
Drainage and erosion control	83
Green manures	88
Chicken manure	100
Crop Rotation	75
Rotation with pastures	64
Area of Crops	100
Crop manag	93
Strategic weed control	81
Record sheets	44

Farm	% adoption
1	50
2	20
3	94
4	88
5	100
6	100
7	72
8	78
9	89
10	78
11	94
12	86
13	88
14	100
15	44
16	75

# Results

## 2. Results from intervention in pilot farms

Evolution of labor productivity in constant pesos per year since the beginning of the project in five pilot farms starting intervention in 2005



# Results

## 2. Results from intervention in pilot farms

Estimated soil erosion using RUSLE and EROSION 5.91 on pilot farms before the start of the project intervention and after implementation of farm plans.

Soil and Farm	Erosion Rate (Mg ha <sup>-1</sup> yr <sup>-1</sup> )		Slope (%)	Tolerance limit
	Previous management	Improved management		
Typic Argiudoll - Olivieri	7.2	5	1	5
Typic Argiudoll - Labarrere	21.1	14.5	3	5
Typic Argiudoll - Cecilia	31.4	14.4	3	5
Typic Argiudoll - Labarrere	22.9	7.2	1.8	5
Typic Hapludert - Guidobono	13.1	7.3	3.5	7
Typic Hapludert - Rabelo	30.4	9.1	3.5	7
Typic Hapludert - Guidobono	4.0	3.7	3.2	7
Typic Hapludert - Rabelo	10.2	4.2	2.8	7

# Results

## *2. Results from intervention in pilot farms*

Estimated soil organic matter balance using ROTSOM on pilot farms before the start of the project intervention and after implementation of farms plans.

Soil and Farm	Initial SOM (%)	Clay + silt (%)	Rate of change (kg ha <sup>-1</sup> yr <sup>-1</sup> )	
			Previous management	Current management
Cecilia - field 2 - Typical Argiudoll	1.90	73	29	423
Cecilia - field 4 - Typical Argiudoll	1.90	79	38	359
Labarrere - field 3 - Typical Argiudoll	2.07	67	-144	886
Cecilia - field 5 - Typical Hapludert	1.20	78	27	371
González - Typical Hapludert	2.10	73	83	434
González - Typical Argiudoll	2.30	72	351	421



# Results

## *3. Perception of significant changes by farmers*

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In 2010 MSC interviews, all farmers identified clear and positive changes in their farms. Main changes identified were: soil management and quality (12 farmers), strategic planning (10 farmers), the relationship with the technical advisers (6 farmers) and the quality of their own work (6 farmers).

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Thank you !!!

