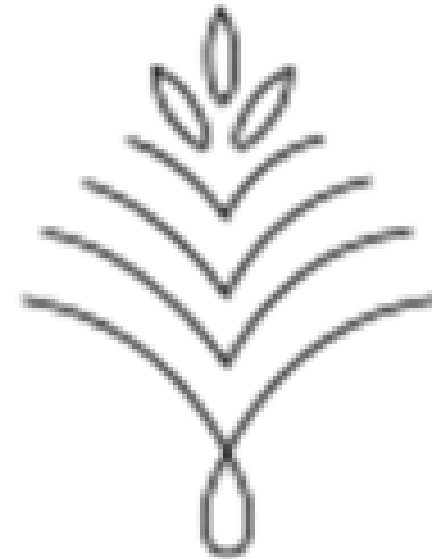# the CREA-Italy research areas & synergies

Marcello Mastrorirlli

Council for Agricultural Research and Economics
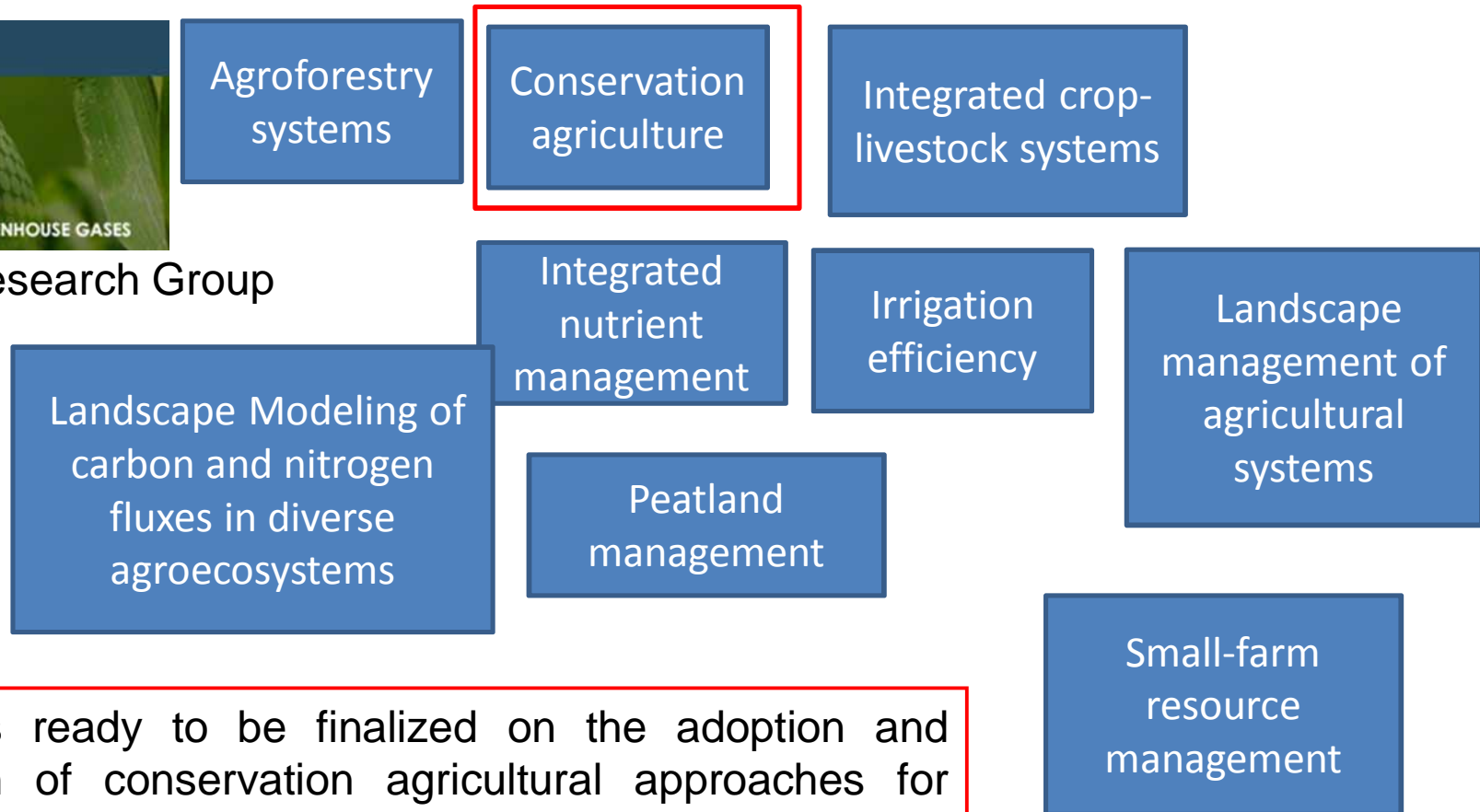
Cropland Research Group
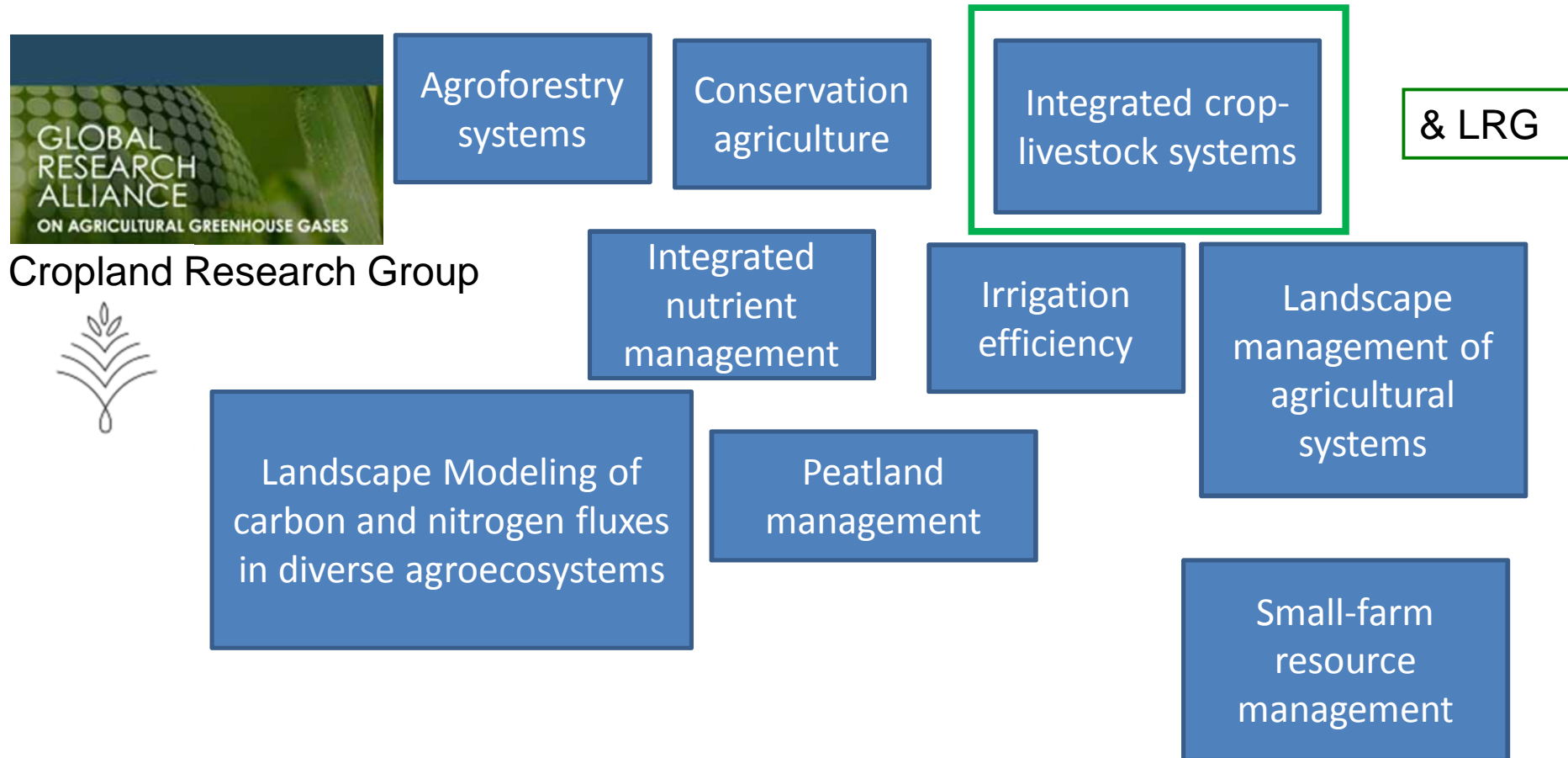
the potential CREA-Italy research areas for synergies

Cropland Research Group

Agroforestry systems

Conservation agriculture

Integrated crop-livestock systems

Integrated nutrient management

Irrigation efficiency

Landscape management of agricultural systems

Landscape Modeling of carbon and nitrogen fluxes in diverse agroecosystems

Peatland management

Small-farm resource management

A draft is ready to be finalized on the adoption and adaptation of conservation agricultural approaches for crop production across a diversity of ecoregions around the world to sequester soil organic carbon, mitigate greenhouse gas emissions, enhance soil quality, and improve agricultural resiliency

the potential CREA-Italy research areas for synergies

GLOBAL RESEARCH ALLIANCE
ON AGRICULTURAL GREENHOUSE GASES

Cropland Research Group

Agroforestry systems

Conservation agriculture

Integrated crop-livestock systems

& LRG

Integrated nutrient management

Irrigation efficiency

Landscape management of agricultural systems

Landscape Modeling of carbon and nitrogen fluxes in diverse agroecosystems

Peatland management

Small-farm resource management

A COST action focused on the Mediterranean area is starting to be built. It involves Countries from North & East Europe

CREA
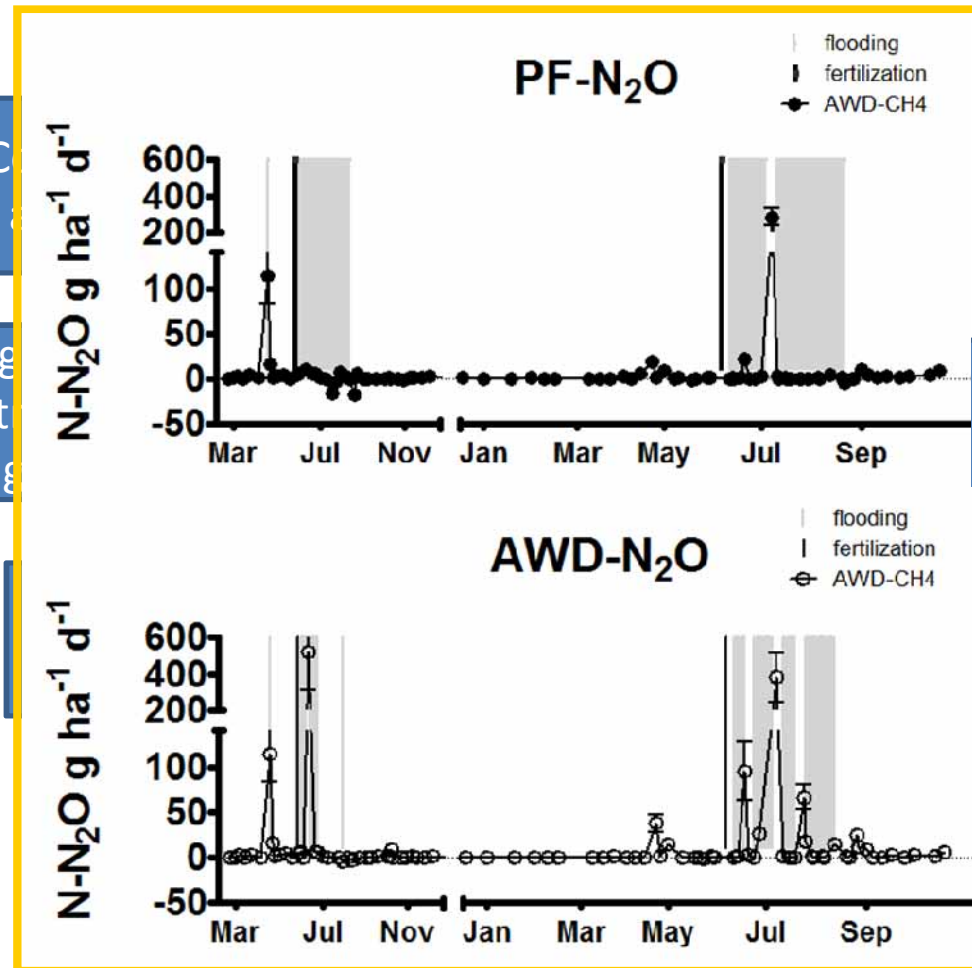Consiglio per la ricerca in agricoltura
e l'analisi dell'economia agraria

GLOBAL RESEARCH ALLIANCE
ON AGRICULTURAL GREENHOUSE GASES

Cropland Research Group

Agroforestry systems

Integrated nutrient management

Landscape Modeling of carbon and nitrogen fluxes in diverse agroecosystems

Field monitoring

Cropland Research Group

Agroforestry systems

Integrated nutrient management

Landscape Modeling of carbon and nitrogen fluxes in diverse agroecosystems
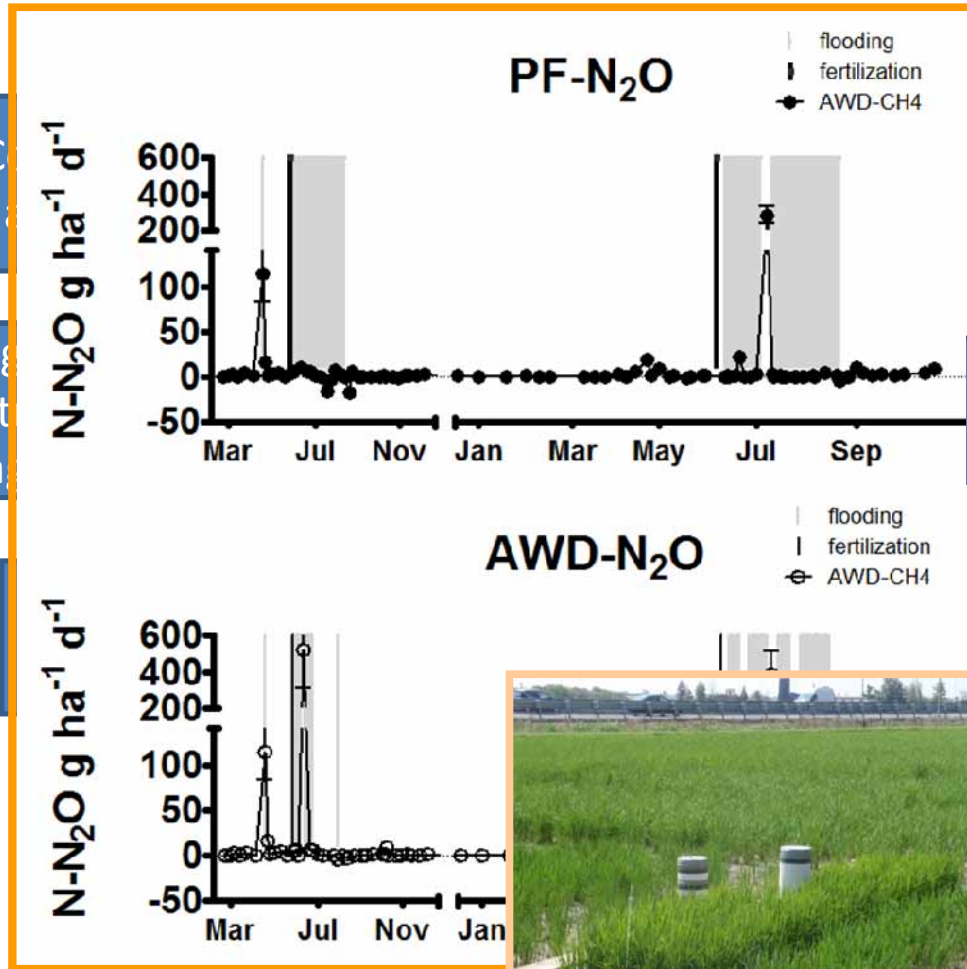
Field monitoring: the case of rice

GLOBAL RESEARCH ALLIANCE
ON AGRICULTURAL GREENHOUSE GASES
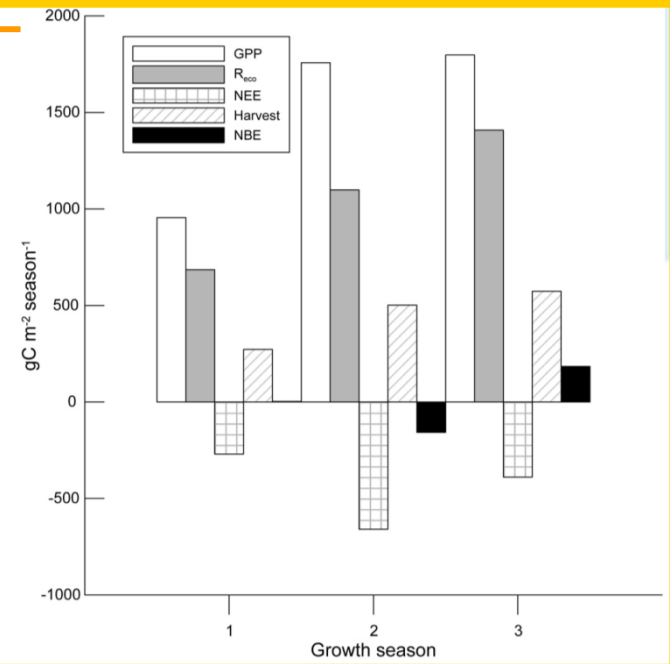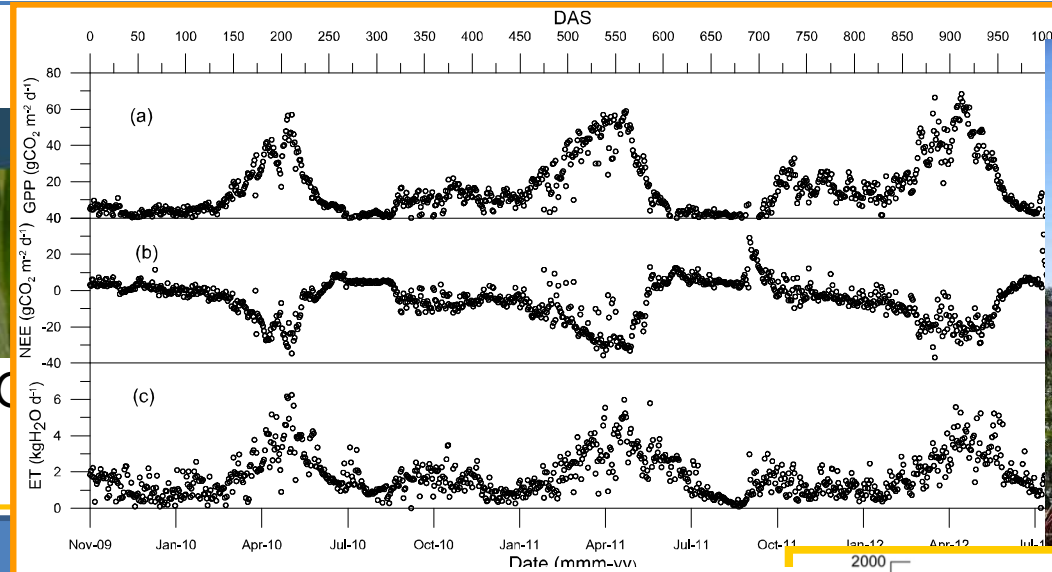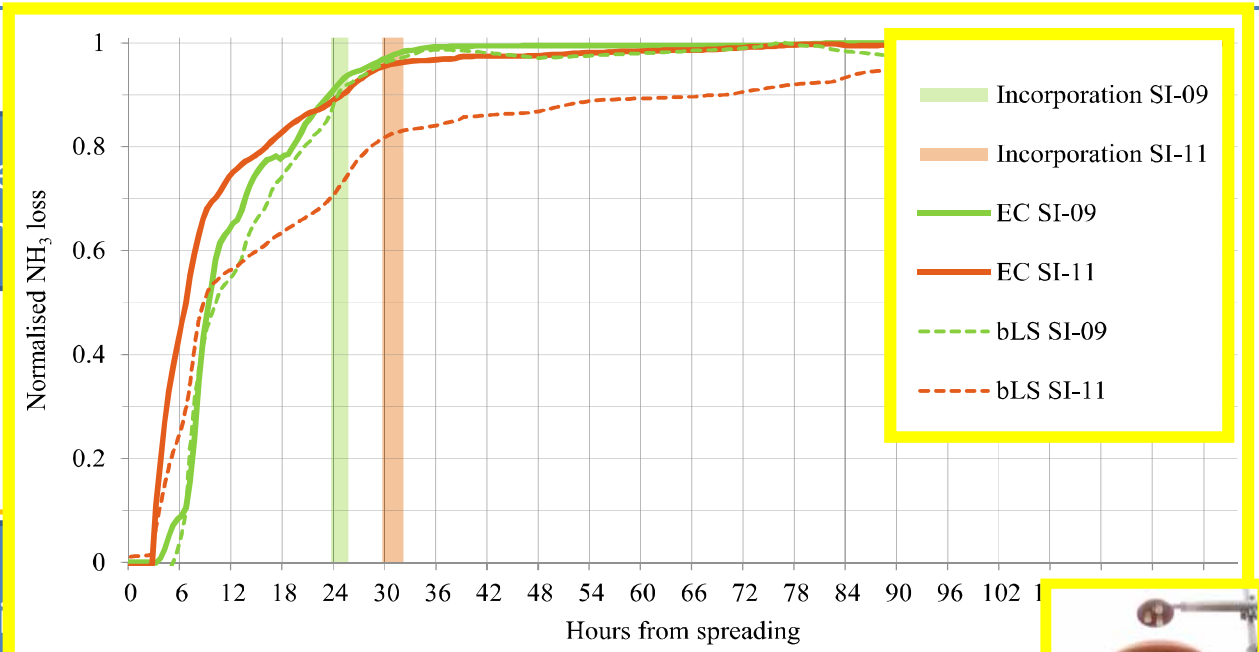
Cropland Research

Landscape Modeling of carbon and nitrogen fluxes in diverse agroecosystems

Rana et al, 2016. Agricultural and Forest Meteorology

Field monitoring: the case of Cardoon – C balance

Cropland Research Group

Agrofore
syste

Landscape Model
carbon and nitrogen fluxes
in diverse agroecosystems

Normalised NH₃ loss vs Hours from spreading

Legend:
- Incorporation SI-09
- Incorporation SI-11
- EC SI-09
- EC SI-11
- bLS SI-09
- bLS SI-11

Ferrara et al, 2016. *Agriculture, Ecosystems and Environment*

Field monitoring: the case of slurry
(measurements vs modeling)

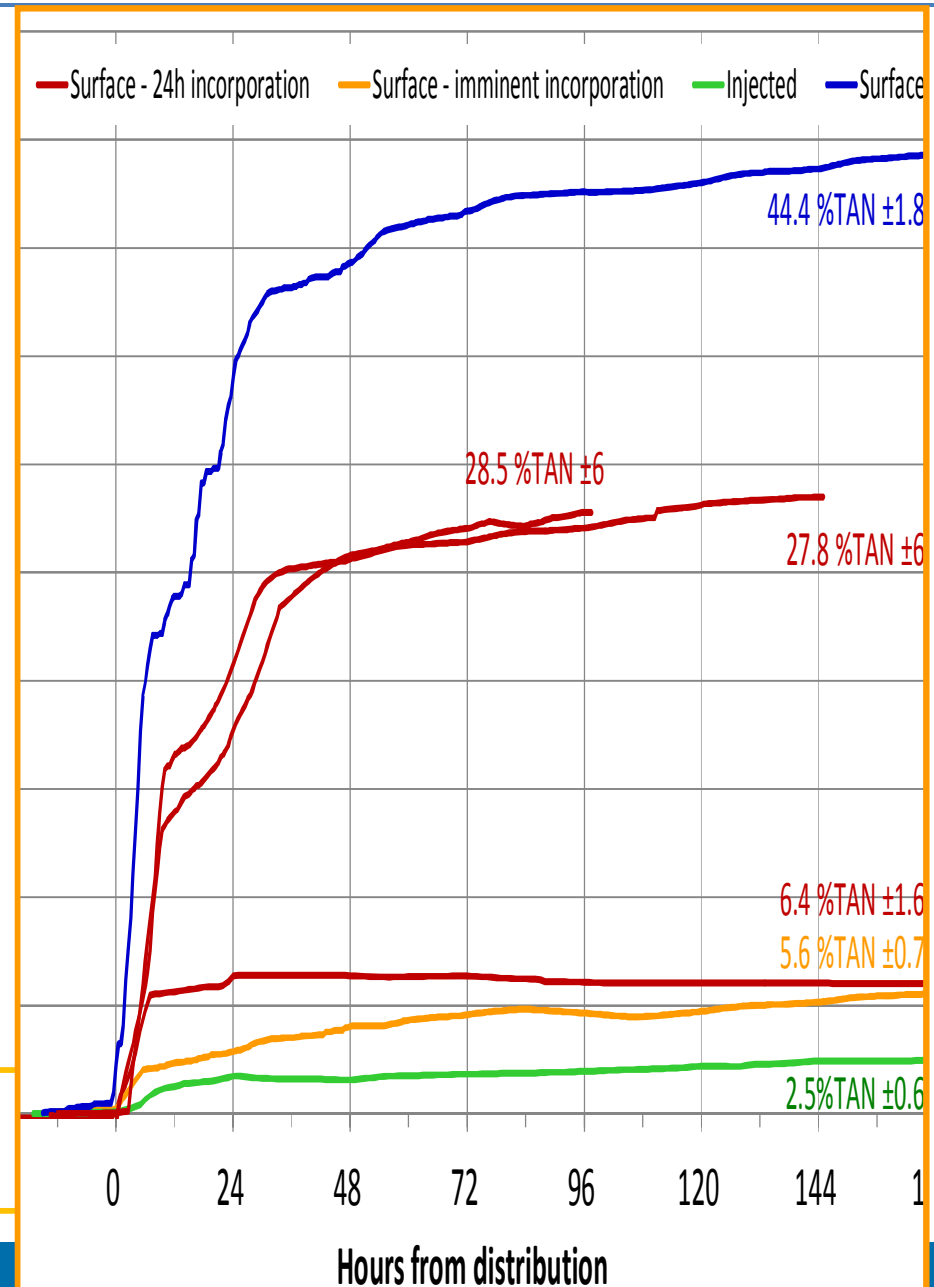Landscape Modeling of carbon and nitrogen fluxes in diverse agroecosystems

Carrozzi et al, 2013. Science of the Total Environment,

Field monitoring: the case of slurry (mitigation NH₃ emissions)

Marcello Mastrorilli

Chart legend:
- Surface - 24h incorporation
- Surface - imminent incorporation
- Injected
- Surface

Chart annotations:
- 44.4 %TAN ±1.8
- 28.5 %TAN ±6
- 27.8 %TAN ±6
- 6.4 %TAN ±1.6
- 5.6 %TAN ±0.7
- 2.5 %TAN ±0.6

X-axis: 0, 24, 48, 72, 96, 120, 144
Hours from distribution

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GLOBAL RESEARCH ALLIANCE
ON AGRICULTURAL GREENHOUSE GASES

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| Agroforestry systems | Conservation agriculture | Integrated crop-livestock systems |

Integrated nutrient management

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Landscape Modeling of carbon and nitrogen fluxes in diverse agroecosystems

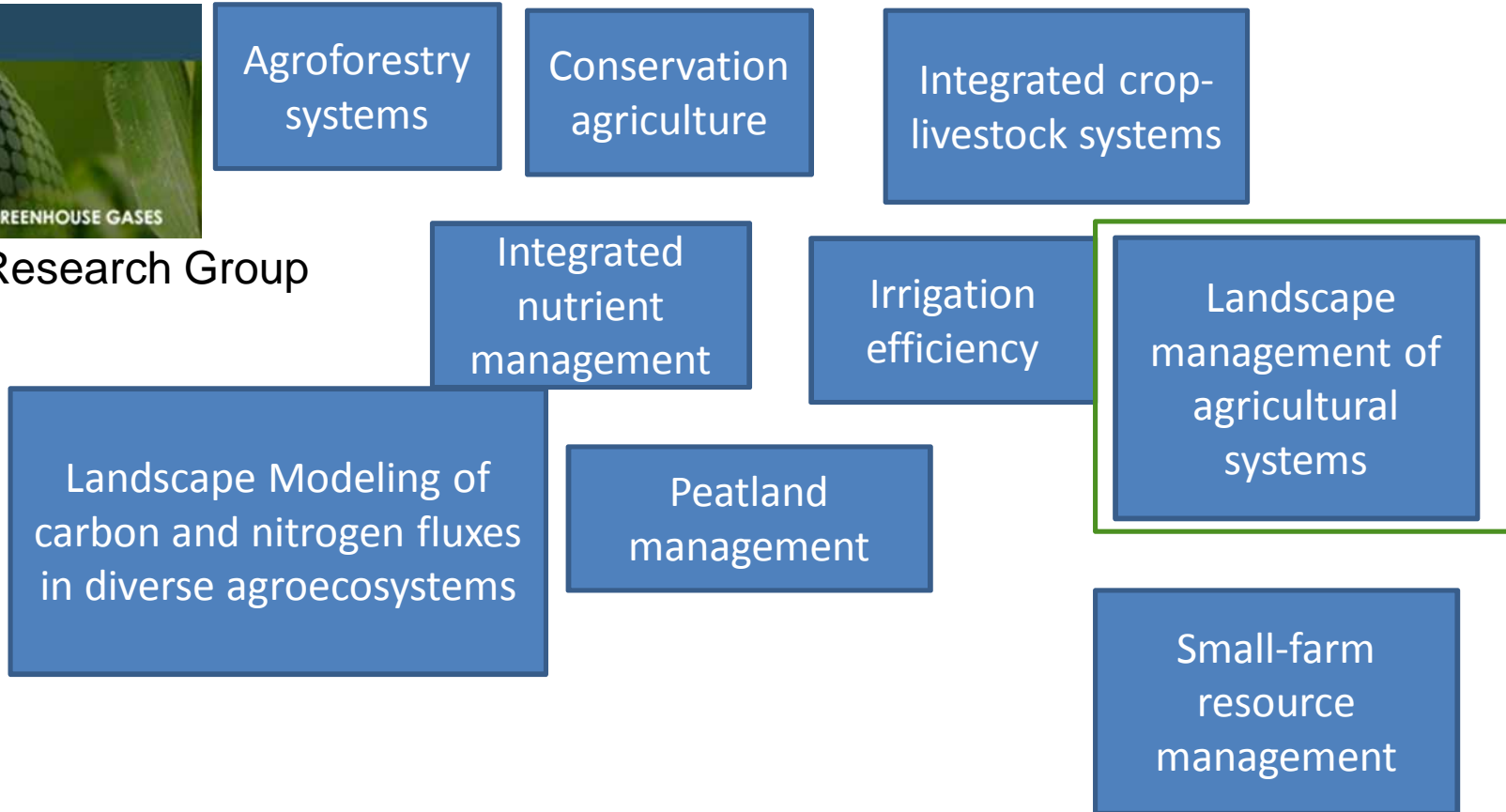Peatland management

Small-farm resource management

Data provider to:
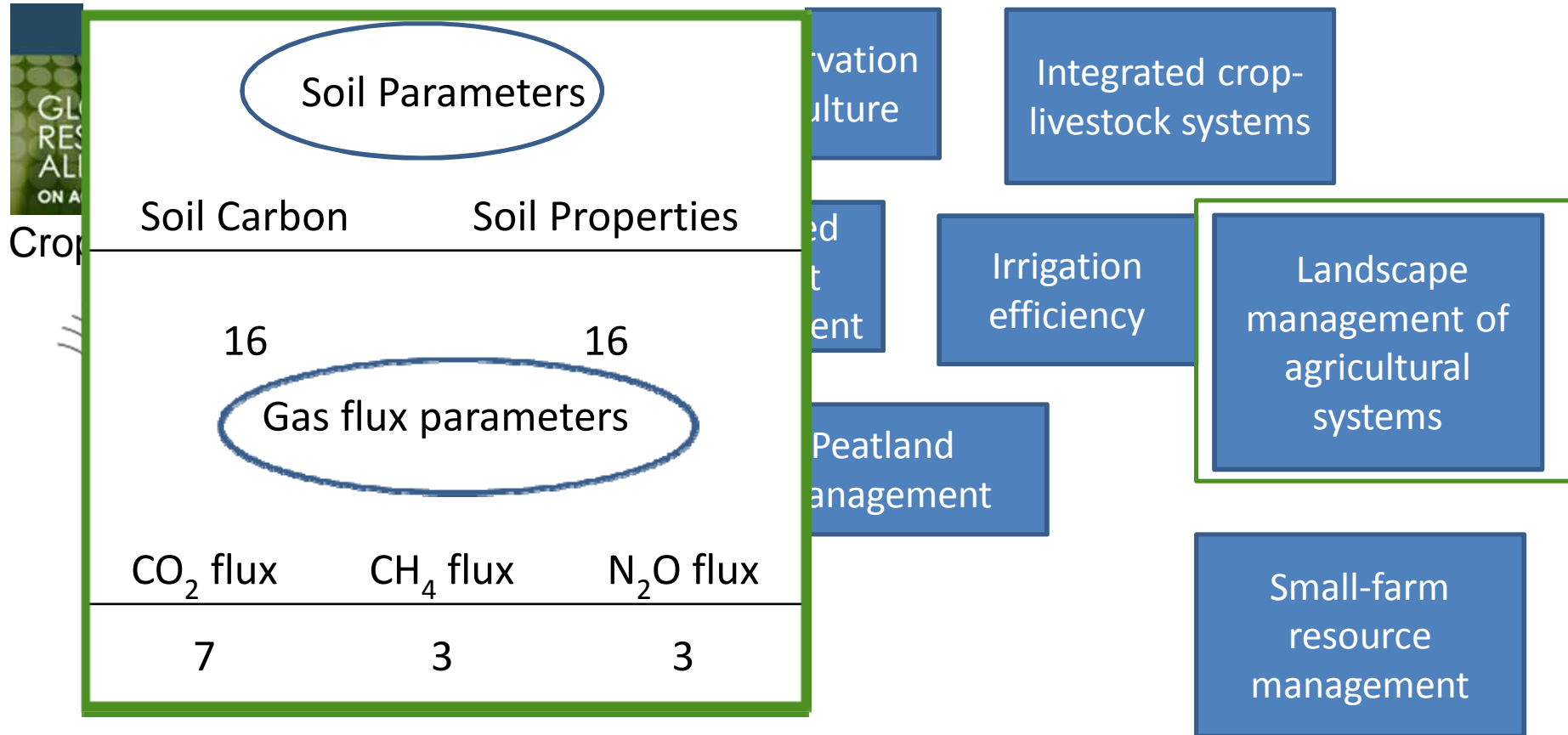**Managing Agricultural Greenhouse Gases Network (MAGGnet)**

MAGGnet is an international greenhouse gas network of experimental sites and research expertise within the Global Research Alliance Croplands Research Group

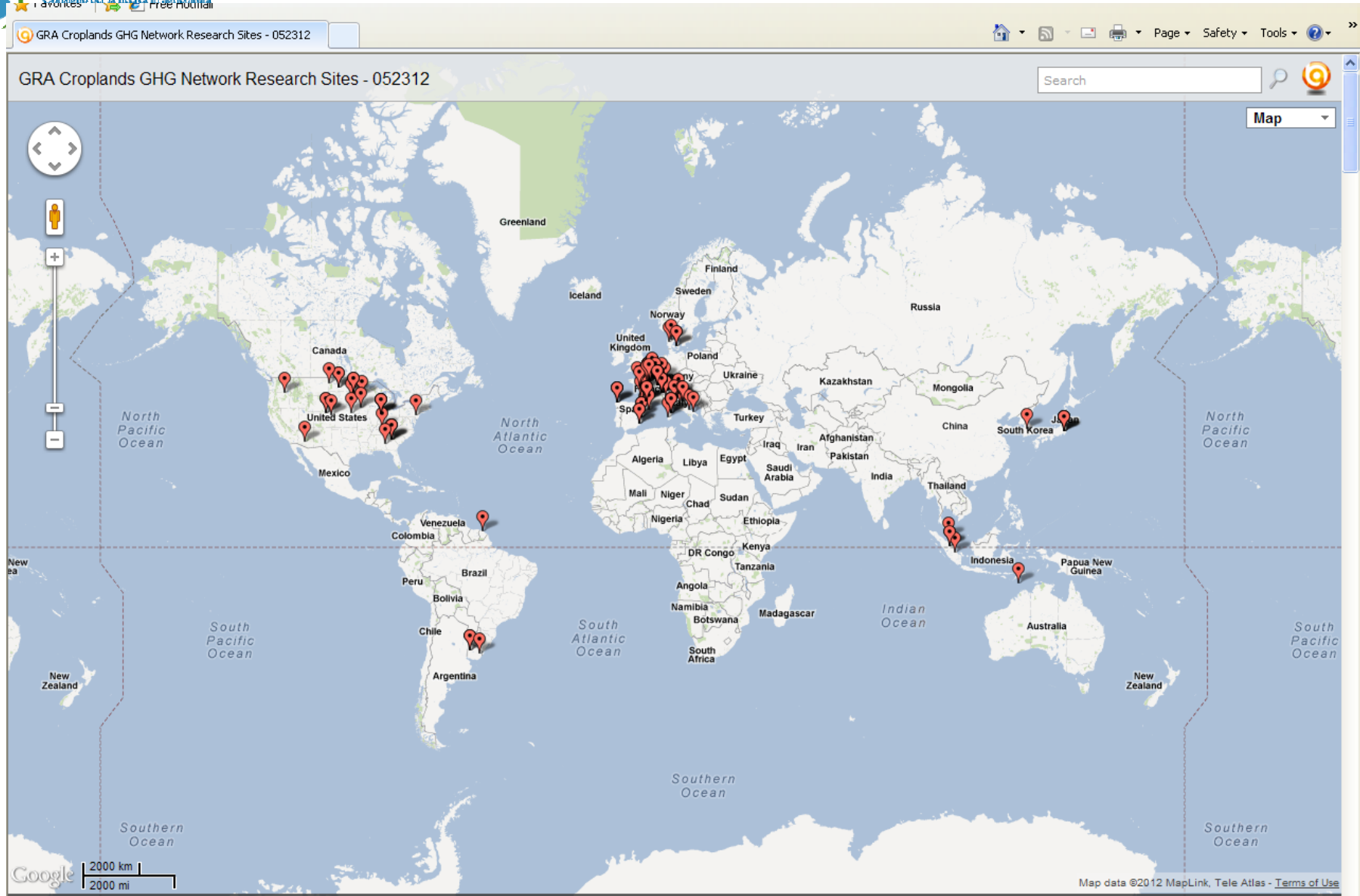the potential CREA-Italy research areas for synergies

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Long Term Experiments

Soil Parameters

Soil Carbon	Soil Properties
16	16

Gas flux parameters

CO_2 flux	CH_4 flux	N_2O flux
7	3	3

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Integrated crop-livestock systems

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Irrigation efficiency

Landscape management of agricultural systems

Peatland
anagement

Small-farm resource management

Crop

Long Term Experiments

Berchidda (Olbia-Tempio)	Quantification of soil C sink along a chronosequence of land uses and managements under Mediterranean conditions
	Ecological Function and Biodiversity Indicators in European Soils
	Ecosystem services of the large scale grazing systems: productivity, and carbon sequestration
Arborea (Oristano)	Organic and synthetic N fertilization of a corn-Italian ryegrass double cropping system
Agugliano (Ancona)	Long term experiment on tillage and N fertilization effects on soil fertility and crop productivity
Serra de' Conti (Ancona)	Watershed analysis: monitoring of cropping systems, runoff water (including sediments, nitrates and phosphorus) and soil organic carbon at catchment scale
Rutigliano (Bari)	Carbon balance of an energy crop (Cynara cardunulus var. altilis)
Foggia	Long term experiment about crop residue management
Pisa	CIMAS: Long-term experiment comparing Conventional vs. Integrated Management Systems in a six-year crop rotation.
Carmagnola (Torino)	Long-term experiment comparing maize-based cropping systems and fertilization managements, including manure
Legnaro (Padova)	Crop rotation, organic and mineral fertilisation LTE
Papiano (Perugia)	Crop residue management in non-irrigated cropping systems
	Organic vs conventional low-input cropping systems
	Organic fertilization x mineral fertilization
Cadriano (Bologna)	Crop rotation x mineral fertilization x organic fertilization
	Soil tillage x crop rotation

Long Term Experiment in Italy

the potential CREA-Italy research areas for synergies

JOIN THE 4%oo INITIATIVE

Soils for food security and climate

Pillar 1) Measuring/estimating soil C stock:

1. long term experiments in field
2. laboratory facilities
   - soil microorganisms involved in the C cycle
   - soil enzymatic activity
3. coupling in a GIS environment bio-physical models (RothC) with:
   - soil
   - crop
   - weather datasets

of big relevance for policy makers willing to apply the 4/1000 initiative because they will have a "certified" territorial baseline to:
- start with
- reference

This approach allows for estimation of stocks. It can be used to assess:
- Baseline
- Potential of selected management practices to sequester C

(CIS-Carbon in Italian Soils, MIPAAF)

Pillar 2) Developing agricultural systems management to sequester C and reduce emissions

Holistic studies on:
• agro-ecology
• organic farming sector

       (SOILVEG, CORE-ORGANIC)

• crops diversity within farms
• longer rotations
• cover crops
• intercropping

       (AGROCAMBIO, FATIMA)

• conservation agriculture
• reduced tillage
    measures to reduce erosion
    management practices to increase soil
    C sequestration
• rangeland management

    (EFFICOND and MONACO, funded by the MIPAAF)

Our way forward: Research, Modelling, ICT

- To increase the information availability on production system at national level, to allow scenario analysis
- To further develop our modelling platform to enhance data access and simulation capabilities
- To improve monitoring via the project `AgriDigit` – Digital Agriculture of the Ministry of Agriculture
- To disseminate knowledge and improve application of Precision Agriculture, estimating its potential mitigation effect in production systems

the CREA-Italy research areas & synergies

Marcello Mastrorirlli

Council for Agricultural

Research and Economics