Regione Emilia-Romagna

With the contribution of the
European Community Life financial tool

CLIMATE CHANGE-R

REDUCTION OF GREENHOUSE GASES FROM
AGRICULTURAL SYSTEMS OF EMILIA-ROMAGNA

LIFE12 ENV/IT/000404

Layman's Report

Barilla · coop · arpae · apo conerpo · GRANAROLO · PARMIGIANO REGGIANO · CSO · CRPV · INALCA · GRUPPO UNIPEG

Climate change in agriculture

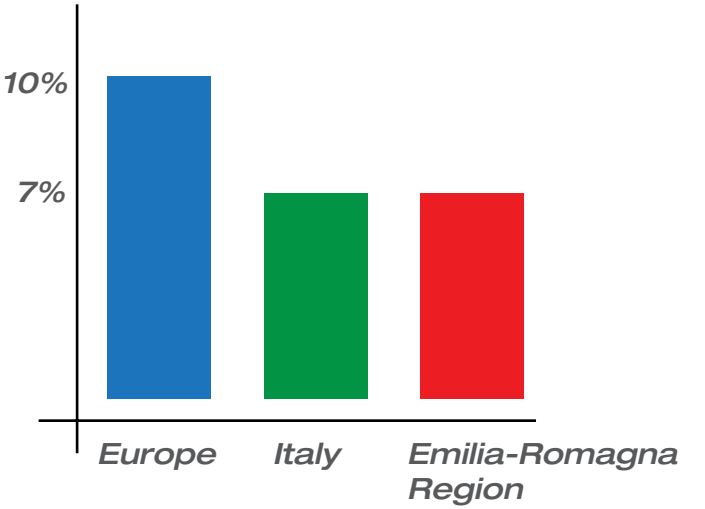
The association between the emission of greenhouse gases from human activities and climate change has been established. Climate change occurs worldwide, with rising temperatures, melting glaciers, rises in the average sea levels, and intensification of extreme weather events.

The sector which produces the most emissions is energy, which generates a good 83% of the total greenhouse gases, but agriculture is in second place, and ahead of industry.

Some time ago, the Emilia-Romagna Region had already begun to implement agri-environmental policies for safe agriculture, the careful use of energy and the protection of waters by adopting integrated production systems and regulations to govern the PDO and PGI products.

This commitment now needs to be consolidated and extended to mitigating climate change, which is altering the calendars for planting and harvesting and influencing the quantity and quality of production.

In Europe, agriculture produces about 10% of greenhouse gases (ISPRA 2014). In Italy and in Emilia-Romagna, this figure is around 7%.



With the Climate changE-R project, reforms have been made to some aspects of production systems that have direct implications for greenhouse gas emissions and therefore can be adopted as elements for mitigating climate change.

MAIN CLIMATE CHANGING GASES

Carbon Dioxide CO_2

Nitrous Oxide N_2O

Methane CH_4

Climate changE-R:
a great European laboratory for the reduction of greenhouse gases in agriculture

Climate changE-R, implemented with the support of the European Union under the program LIFE+ Environment and co-funded by the Consorzio del Formaggio Parmigiano Reggiano, aims to reduce greenhouse gases emitted into the atmosphere by agriculture in Emilia-Romagna, also giving value to aspects such as water and energy savings, reduced use of chemicals in agriculture, the introduction of advanced power management techniques on farms and livestock manure management.

For the four years since 2013, the Emilia-Romagna Region, in its role as lead partner, has coordinated the largest representative partners not only for the Emilia-Romagna region but also for the entire national agri-food world, making use of the whole system of regional research and experimentation.

It embarked on a virtuous process based on an integrated approach which horizontally involved the crop/plant and livestock/animal sectors, the different agricultural growers, from grains to fruit growing and the different sectors including the food industry and distribution.

Thanks to this, we have developed, tested and adopted growing and breeding techniques that, for the same crop yields and product quality, reduce emissions of carbon dioxide (CO_2), Nitrous Oxide (N_2O) and methane (CH_4).

The Industries

Beef cattle

Fresh milk

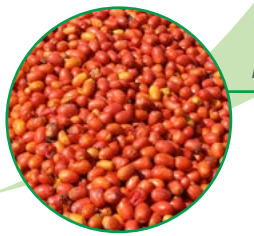
Milk for Parmigiano Reggiano cheese

Pears

Peaches and nectarines

Green beans for industry

Durum Wheat



Tomatoes for industry

A successful team

The success of the Climate changE-R project was ensured by the partners' representative requisites. Among them we find some of the most important national and international groups in the agri-food sector and large retailers, which have shared their experiences and committed organizational and professional resources for the development and diffusion of environmentally friendly techniques and production methods.

The partnership of the project Climate changE-R directly and indirectly represents about ***30% of the regional agricultural enterprises*** and more than ***8 million consumers***.

Project beneficiaries

Approved by the European Commission under the LIFE program, the project LIFE + Climate ChangE-R lasts three years (from 1 July 2013 to 31 December 2016) and has a cost of 1.8 million euros with 50% co-financed by the European Union.

The project Climate ChangE-R participates in the Directorate for Agriculture of the Emilia-Romagna Region as a coordinator. Participating as project partners are some of the most important companies in the agro-food and distribution sector: Apo Conerpo, Barilla, Coop Italia, Granarolo, Parmareggio, Inalca/Unipeg and CSO Italy. In addition, the Consortium of Parmigiano Reggiano participates as co-funder of the project.

Scientific partners also include: Arpae (Agenzia Prevenzione Ambiente Energia of Emilia-Romagna) and research institutions Centro Ricerche Produzioni Vegetali (Crpv) (Plant Production Research Centre of Cesena and Centro Ricerche Produzioni Animali (Crpa) (Animal Production Research Centre (CRPA)) of Reggio Emilia.

apo conerpo

arpae agenzia prevenzione ambiente energia emilia-romagna

PARMIGIANO REGGIANO

coop

Barilla The Italian Food Company. Since 1877.

CSO CENTRO SERVIZI ORTOFRUTTICOLI

PARMAREGGIO

C.R.P.A.

GRANAROLO

CRPV soc. coop. CENTRO RICERCHE PRODUZIONI VEGETALI

INALCA

GRUPPO UNIPEG

Methodology, Actions and Good Practices

During the demonstration activities with the adoption of Good Practices, the project LIFE + Climate changE-R enabled an overall reduction of 0.2 million tons of CO_2 equivalent in three years.
About half of this reduction is due to a natural decline of the agricultural sector emissions and equally, it is a consequence of applying the Good Practices proposals.

Cultivation and breeding techniques were tested and proven, techniques that with the same manufacturing yields and product quality guarantee the reduction of greenhouse gas emissions (Greenhouse Gasses-GHG). For this purpose, comparisons were made using Environmental Risk Levels (LAA).

To summarize, the main techniques used are:

- reduced use of agrochemicals (fertilizers and pesticides);
- techniques of minimum or reduced tillage;
- rational management of water resources;
- new management methods for food and animal manure creating less impact from the environmental point of view.

The data collected in demonstration farms was processed using the LCA (Life Cycle Assessment). Specific studies carried out also to evaluate environmental and economic sustainability, confirming that most of the demonstration techniques can be applied without excessive additional costs or even with an economic advantage related to using fewer technical means.

Database

With Climate changE-R, technical data from the Emilia-Romagna agricultural systems made available by the project partners from consolidated studies and experiments was collected.
The data was aimed at calculating the LCA and more generally GHG emissions, in the specific conditions of the Emilia-Romagna region.

(Direct Link to DATABASE: http://agricoltura.regione.emilia-romagna.it/climatechanger/temi/database)

Assessment methods

Environmental Life Cycle Assessment (LCA)

LCA or “Life Cycle Assessment” measures the impacts of the production chain, in a logic of overall sustainability.
According to this methodology the emissions that occur upstream and downstream of the agricultural production stage are also considered, such as, for example, some of the energy consumption required to obtain the final product, such as production of fertilizers, feed, or the energy used in the marketing phase (transport, processing, packaging, distribution, etc...).

Environmental Risk Levels (LAA)

These are codified indicators used to identify situations/techniques and production or farming methods that entail a different level of reduction of emissions.

PLANT PRODUCTS

LAA1 - Regulations that correspond to the minimum mandatory environmental standards required by the European Union (Cross compliance) used in the project as the base level

LAA2 - The Integrated Production Techniques (advanced methodologies of sustainable production governed by the regulations approved by the Emilia-Romagna Region)

LAA3 - The good practices shown with the project LIFE+ Climate changE-R, which include: Integrated Production + Decision Support Systems (DSS) + advanced agricultural techniques

LIVESTOCK PRODUCTS

LAA1 - Emissions calculated as they are for the national inventory
LAA2 - Emissions calculated by information from farms, considering:
- Composition of the ration
- Nitrogen balance

LAA3 - Emissions calculated by taking into consideration:
- Composition and digestibility of the diet
- Balance of nitrogen and potential methane-generating effluent

What does carbon footprint mean

The sum of the greenhouse gas emissions (in $kgCO_2eq$) attributable to the production of a product, taking into account the entire supply chain.

Where do we start and where do we stop

We consider emissions from the production of all the technical means used by the farm: feed, fertilizers, defense products, seeds, energy, detergents, etc ..
On leaving, we stop at the farm gate

Reference Unit

1 Kilo of product

THE RESULTS

Livestock Production Chain

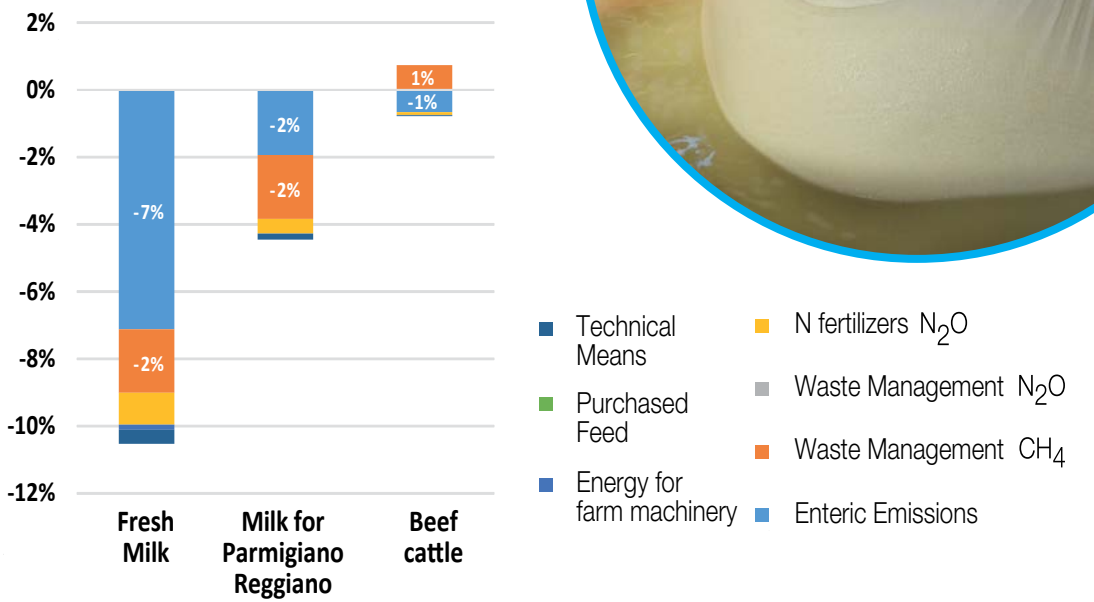
In the livestock sector, some measures were identified that make it possible to:

- increase the digestibility of the cattle feed ration;
- improve nitrogen efficiency in the barn and in the field;
- improve agronomic management of livestock manure;
- reduce the use of synthetic fertilizers.

The results obtained with the application of the Good Practices and estimated with LCA analysis are positive, with the percentage of carbon reductions ranging from a few percent up to over 30%, compared to the average impact of the individual chains. The average impact of individual sectors has been calculated as:

1,2 kg CO_2 eq/kg	*milk for fresh milk*;
1,3 kg CO_2 eq/kg	*milk for production of Parmigiano-Reggiano cheese*;
11,1 kg CO_2 eq/kg	live weight for beef.

Reduction of carbon footprint LAA3 on LAA2



THE RESULTS

Plant supply chain

For this production chain the results were based on the comparison of three different Environmental Risk Levels evaluated with LCA, to identify and quantify those techniques required to mitigate greenhouse gas (GHG) emissions from agricultural production.
The practices that contribute to the reduction of greenhouse gas emissions (GHG) are:

Durum wheat:

- correct choice of preceding crop (improving soil fertility);
- optimizing the methods for applying nitrogenous fertilizers through the use of decision support (DSS "Granoduro.net").

The introduction of these techniques enabled a reduction in emissions, compared to conventional techniques, ranging from 3% to 12%.

Green beans for industry:

- summer sowing (second crop), which allowed for a higher yield and greater efficiency of the resources employed compared to spring sowing (reduction of CF on average - 40%);
- preceding crop (average reduction of CF -18% for catch crop).

Tomatoes for industry:

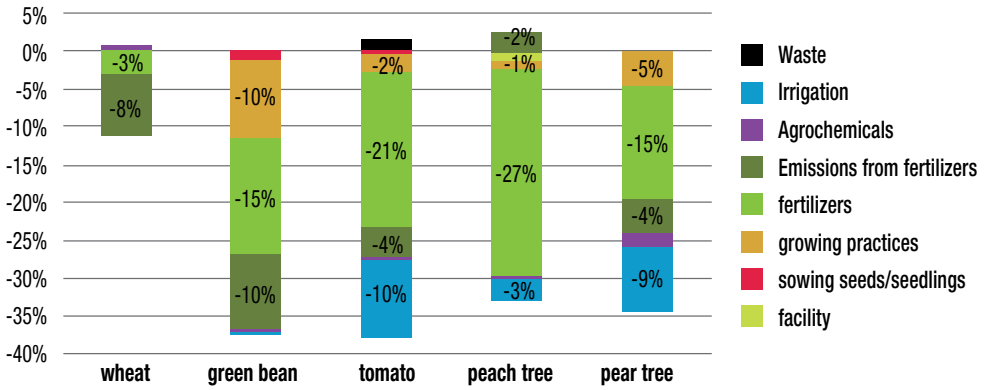
- fertigation (simultaneous distribution of water and fertilizers) with micro-irrigation drip instead of using sprinkling and open field fertilization (reduction in emissions of up to 50%).

Peach and pear:

- fertigation with drip distribution system to make more efficient use of water and fertilizers;
- use of local sensors and information systems for decision support to optimize irrigation;
- use of alternative energy source (solar) rather than fossil fuels for the operation of irrigation systems and machines for carrying out growing operations;
- use of wooden poles, rather than reinforced concrete, for supports in the orchard;
- mechanical thinning of the flowers, instead of manual thinning of fruits, to reduce the time that machines are used and consuming fuel;
- gender confusion: a method of defense against insects for reducing the use of chemical insecticides with benefits in reduced emissions and environmental quality.

Overall, the environmental LAA3 allowed for a savings of 22% even up to 46% compared to the level LAA1.

Reduction in carbon footprint LAA3 over LAA1



Governance and RDP
(Rural Development Program)

Project Governance

One of the project's strong points is its ability to render effective the actions identified for the reduction of greenhouse gas emissions in agriculture through agricultural policy measures, in order to encourage the spread of such techniques throughout farms in the Emilia-Romagna Region.

The connection between the results produced with Climate changE-R in the incentives of the Regional Rural Development Program make it possible to award the farms and agri-food companies that adopt the project's Good Practices, thus enhancing those products on the market.

In this context, the dual role of the Emilia-Romagna Region, as project leader but also the authority responsible for the implementation of EU agricultural policy tools, has made it possible to guide the choices, to the extent of potentially involving a great number of farmers in the territory.

This is defined as "Governance", the process that has made it possible, after an open and widespread consultation, to define regional agricultural policies that award actions to oppose climate change already applied in the Rural Development Program 2014 - 2020

The RDP of the Emilia-Romagna Region is part of the Europe 2020 Strategy for the environment, which aims at a growth that is:

- intelligent, through more effective measures in education, research and innovation;
- sustainable, respecting the environment and with low CO_2 emissions;
- inclusive, to create jobs and combat poverty.

The Environmental Strategy Europe 2020 pursues the following objectives:

- reduction of at least 20% GHG compared to 1990 levels;
- achieving 20% of the quota of renewable energy sources in final energy consumption;
- 20% improvement in energy efficiency.

In particular, in the RDP there is the chance to award the application off Good Practices through agri-climatic-environmental payment, consultancy investments and services for farms.

The involvement of agri-food businesses is also important and may require the introduction of Climate changE-R Best Practices for the supply of agricultural products.

Communication of information

The information communication and demonstration activities were carried out to promote the transfer of knowledge and the adoption of Good Practices with measures aimed at: farmers, sector public technicians and researchers, students, teachers in schools specializing in agriculture and end users.
The communication/demonstration activities were as follows:

16 demonstration days

8 seminars at schools and universities

- State Agricultural Technical Institute "Marcora" - Piacenza
- Agricultural Technical Institute "F.lli Navarra" - Ferrara
- State Agricultural Technical Institute "Calvi" - Finale Emilia
- Agricultural Technical Institute "Scarabelli" - Imola (BO)
- Agricultural Technical Institute "Zanelli" - Reggio Emilia
- Professional Agricultural Institute "Persolino-Strocchi" - Faenza (RA)
- School of Agriculture, University of Bologna (two seminars)

In addition to

40 Articles

8 Newsletter

2 Films

Demonstration Farms

- Pratoverde - Bomporto (MO) - Beef cattle supply chain
- Tassona - Saletta di Copparo (FE) - Durum wheat supply chain
- Fontana - 23 Parma - Durum wheat supply chain
- Bonlatte Oppio - San Cesario sul Panaro (MO) - Milk for Parmigiano Reggiano cheese production chain
- Minzoni - Madonna dell'Albero Ravenna - Green beans for industry production chain
- Mengoli Farm - Castenaso (BO) - Fresh milk production chain
- Cenni Farm - Imola - Peaches and Nectarines production chain
- Alpi Farm - Imola - Peaches and Nectarines production chain
- Bersani Andrea Farm - Tomatoes for industry production chain
- Bertaccini and Conficconi Farm - Ravenna - Tomatoes for industry production chain
- Aldrovandi Adriano Farm - Carpi (MO) Pear production chain
- Pastorelli Franca Farm - Campogalliano (MO) – Pear production chain
- Dragoni Giuseppe Farm - S. Pancrazio (RA) – Green beans for industry production chain
- Bonlatte Oppio Farm - Castelfranco Emilia (MO) - Milk for Parmigiano Reggiano cheese production chain
- F.lli Visentini Farm - S.Giovanni Ostellato (FE) - Beef cattle production chain
- Il Paleotto Farm - Bentivoglio (BO) – Fresh milk production chain

Participation in national and international events

- Milan - Palazzo Italy "EXPO"
- Brussels - Office of the Emilia-Romagna Region representatives - "Presentation of preliminary results
- Saint Helena - California "Re Think Food"
- Rome - FAO "Global Alliance for Climate Smart Agriculture"
- Belfast - Northern Ireland "67th Annual Meeting of the European Federation of Animal Science"
- Johannesburg - Sud Africa South African-Italy Business Forum Ambrosetti

Glossary LIFE+ Programme

LIFE+	It is the main EU financial tool for directly promoting environmental protection and sustainable development through targeted projects
GHG (GreenHouse Gases)	Greenhouse gases. The main ones are: carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4). They have specific characteristic of absorbing and releasing the infrared radiation emitted by clouds, the atmosphere and the Earth's surface. This process has an impact on the energy balance and becomes the greenhouse effect which heats the Earth's surface. A very high concentration of such gases in the atmosphere impedes the natural process of absorption and release of infrared radiation.
BP/GP – Best Practices/Good Practices	Set of cultivation and breeding techniques aimed at reducing greenhouse gas emissions from agricultural production. The BPs may provide, among other things, reduction in the use of fertilizers and pesticides, a more streamlined management of water resources, soil processing techniques, different manure management methods, and new types of animal feed.
RDP - Rural Development Program	A programming and funding tool used by Member States to implement the interventions in the agriculture and forestry sector and rural development policy in the EU in the regional territories. It allows for the provision of economic incentives for producers and farmers who decide to follow specific regulations governing crop cultivation and/or livestock breeding. The current RDP lasts from 2014-2020.
DPI - Integrated Production Regulation	Integrated Production Regulation identifies regulations at the regional level that can be used by farmers/breeders and technicians to produce, in an environmentally sustainable fashion, both in the crops and livestock sectors. It offers consumers greater quality assurance. By adopting these regulations, farmers have access to some forms of incentive and promotion programs.
Agri-food supply/ production chain	This is the set of productive sectors involved in making foods, starting with the raw material before it reaches the consumers' tables. The players involved in the food chain are therefore the farmers, the transformation and packaging industries, transporters, distributors, wholesalers and retailers and finally, consumers.
Mitigation	This is any human intervention that reduces the sources that release gases or strengthens and enhances the sources that absorb greenhouse gases.
Integrated production	Integrated production is an agri-food production system that uses every means to defend itself from agricultural production adversity, to minimize the use of synthetic chemicals and streamline fertilization, in compliance with the ecological, economic and toxicological principles. It is part of the group of agricultural systems.

For more information about the project:

http://agricoltura.regione.emilia-romagna.it/climatechanger

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