

syngenta
Biologicals

Biologicals Solutions and Regenerative Agriculture

TALETE™

Innovation
powered by nature

syngenta
Biologicals

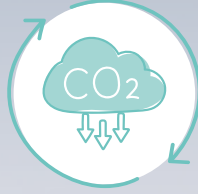


Biologicals' four benefits to Regenerative Agriculture



Healthier soils

Biologicals can help improve the biochemical activity of the soil, contributing to its capacity to function as a vital living ecosystem that sustains the life of plants, animals, and humans.



Reduced greenhouse gas emissions

The integration of biological inputs in crop management can help contain emissions through a more efficient use of resources and an increase in productivity.



Better water management

Biologicals for water use efficiency help farmers optimize the use of agricultural water, making the most of this precious resource.



Increased farm productivity and profitability

Biologicals can help crops be more productive and face the abiotic and biotic stresses that jeopardize their yield and quality, therefore protecting farmers' incomes and limiting the expansion of agricultural land.



Biologicals Solutions for Regenerative Agriculture: TALETE™

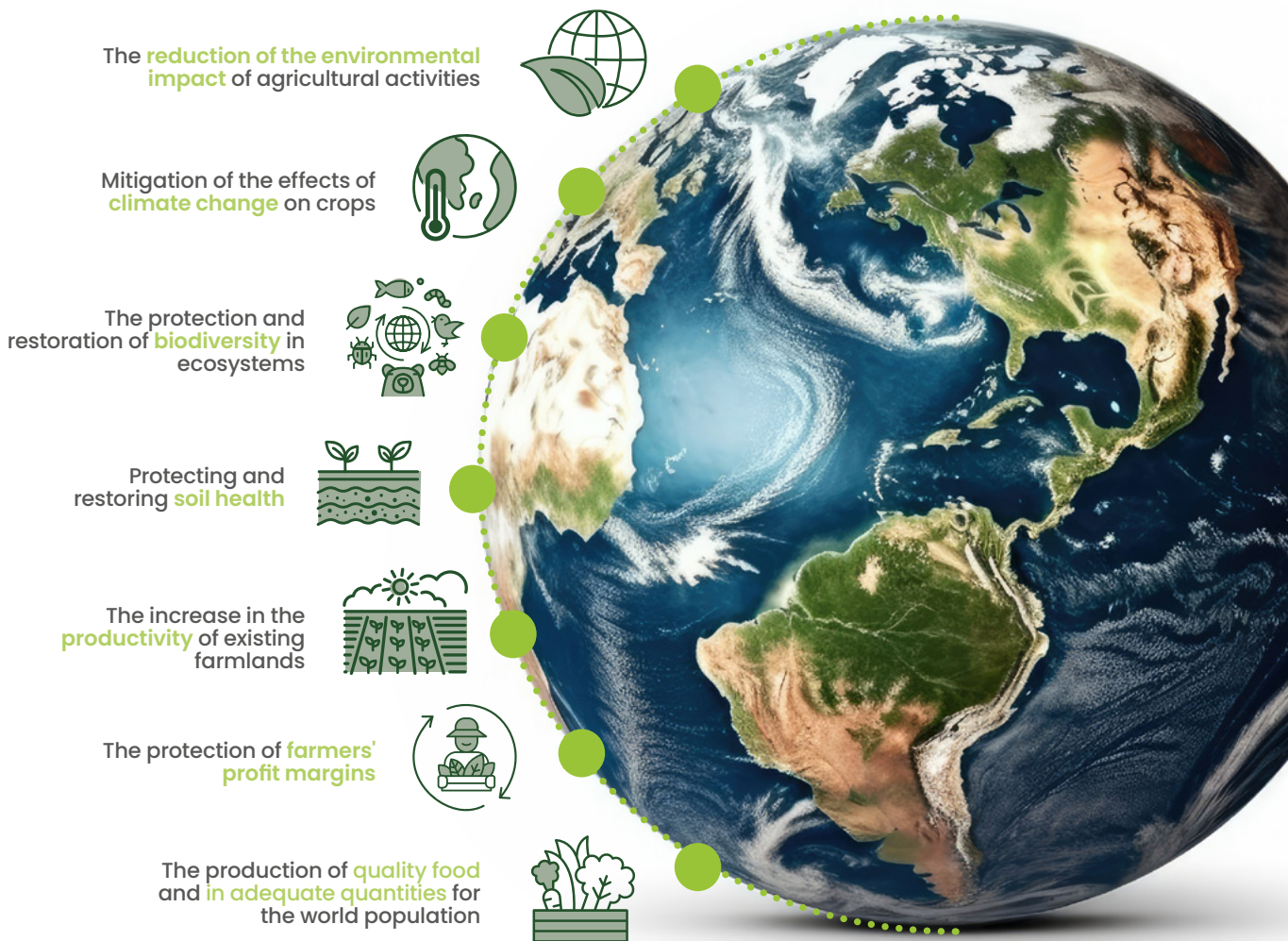
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What is Regenerative Agriculture?

We define regenerative agriculture as an **outcome-based** approach, that is to say, oriented towards obtaining specific agronomic and ecological results. Some of these objectives are:



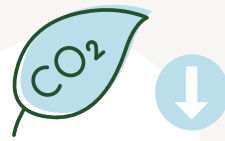
At the same time, we identify **principles and practices** that are functional to achieving these goals. According to the principles of regenerative agriculture, **traditional practices** such as minimal or no-tillage, the use of cover crops, or crop rotation meet with **innovative solutions and technologies** in accordance with the specific needs of crops and land, to tailor an approach that is simultaneously beneficial to humans, the environment and the entire value chain.

This strategy supports the UN-SDG Objective n.2 in its promotion of a "sustainable agriculture", with the idea that **only by safeguarding the well-being of the environment and of the crops themselves it is possible to obtain results that are sustainable in the long term from an economic, social and environmental point of view.**



Regenerative Ag in Germany: example

+60%
profits for farmers*



annual GHG savings of
35 million
tons**

↑ socio-economic benefits
8.5 billion
euros a year



* in the medium/long term

** Equivalent to the emissions of 1/3 of German private car traffic

Report from BGC Nabu, 2023



Regenerative agriculture requires rethinking not only the way of cultivating the land, but also the systemic agronomic strategy and the use of external inputs for crop nutrition and protection. The latter are still considered, but managed in the principle of **precision application**: administered in a targeted way, minimizing waste, and leveraging on the most innovative technologies to optimize treatments on the basis of the single crop or area.

In this context, an important help is provided by **Biologicals**, innovative products that **valorize the action of molecules and organisms present in nature** with the aim of improving crop performance and soil quality. These solutions are designed on

The role of Biologicals in Regenerative Agriculture

the basis of a **deep knowledge of the chemical and biological mechanisms underlying the physiology of plants** and their interactions with the environment, to ensure their **health and productivity** while respecting ecosystems.

Biologicals are made up of two main categories: **Biostimulants and Biocontrol**. The former improve the natural physiological processes of crops to increase their **quality, resilience to climatic stress and efficiency in the use of resources**, also benefiting the **microbial activity of the soil**; the latter help plants to face and overcome the pitfalls posed by **weeds or parasites**.

Biologicals are not born as alternative solutions to traditional inputs, but to be used in synergy with them and to optimize their use. In particular, Biostimulants improve the health and nutrition status of plants; by doing so, they allow crops to better react to adverse climatic events, or, depending on the type of product, to make the best use of the available resources, minimizing the waste of nutrients. In addition, Biofertilizers – often considered part of the Biostimulant category - can positively affect soil quality by improving the microbial processes that lead to the formation of nutrients.

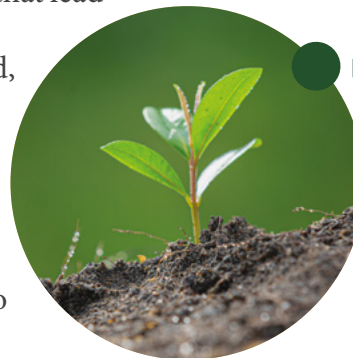
Products in the Biocontrol category, on the other hand, exploit molecules and substances present in nature to implement highly targeted, specific and low-impact crop defense strategies. An example is the use of pheromones, chemical substances used by parasites for signals between individuals, used to alter reproductive behavior in areas of agricultural interest without harm to the surrounding environment.



Biostimulants

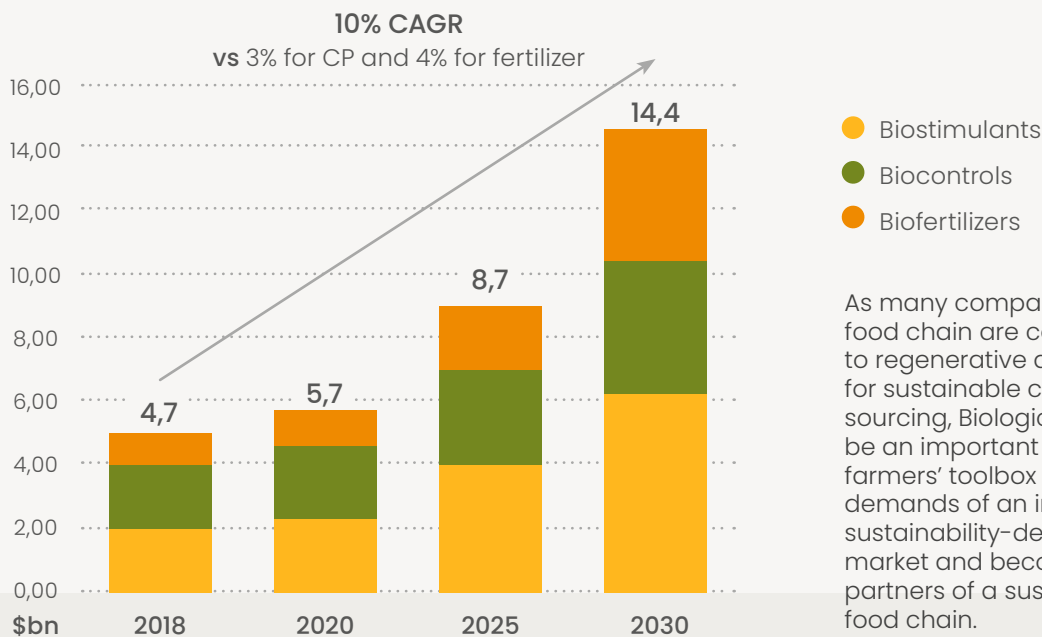


Biocontrol



Biofertilizers

Market perspectives reflect farmers' increasing interest in Biologicals.



As many companies in the food chain are committing to regenerative agriculture for sustainable commodity sourcing, Biologicals can be an important tool in the farmers' toolbox to meet the demands of an increasingly sustainability-demanding market and become chosen partners of a sustainable food chain.



**TALETE™ for
Regenerative
Agriculture**

Goal 6

6 CLEAN WATER AND SANITATION



Access to fresh water is essential for human life and wellbeing and is recognized by the United Nations (UN) as a human right. The Sustainable Development Goals, adopted by the UN as part of the 2030 Agenda for Sustainable Development, include key targets related to sustainable water management under Goal 6:

ENSURE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL.

TALETE™ also gives a specific contribution to this target.

TALETE™ is the solution that addresses a need of farmers that often remains unmet: that of an efficient use of water resources. Thanks to the use of this highly innovative biostimulant,

farmers can optimize the use of water in the management of their crops: in case of scarce availability, by securing productivity; in case of normal availability, by maximizing crop yield.



Water as key for the sustainability of food systems

Water is inextricably linked to the agricultural world and its availability is a necessary condition for an adequate food production: a condition that, due to population increase and climate change, is becoming increasingly hard to achieve.

70% of the world's freshwater is used for agricultural activities. An amount that is unsurprisingly high, considering that, according to the UN FAO, between 2,000 and 5,000 litres of water are needed to produce a person's daily food intake.

Improving water management is the first essential

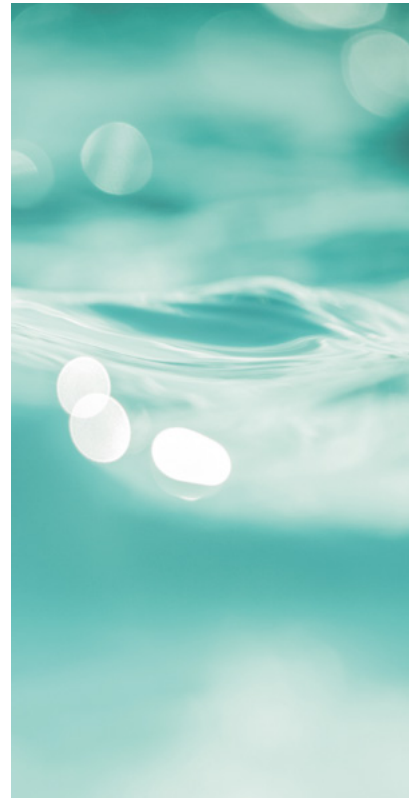
step to take in order to guarantee food security, looking at the growth of global population and at the consequent, inevitable increase of the use of this precious resource. It has been estimated that, in the 2000 - 2050 time window, the global crop water consumption will have increased by 41% (Zheng 2018). At the same time, the effects of global warming are expected to jeopardize water security by increasing the fluctuation in precipitations and surface water supply.

As a result, farmers in many regions will experience **increasing difficulty to water access**, also due to the competition with non-agricultural

use, and to the deterioration of water quality. According to an OECD assessment, without further action, regions such as Northeast China, Northwest India, and the Southwest United States will be among the most severely affected regions, this not excluding global repercussions as well.

In this context, **rethinking the way we use water is indispensable, and Regenerative Agriculture offers a precious help in that.** In fact, the connections between water and RA are multiple, complex and intertwined. Though they often focus on the **water-soil relationship** (Lankford 2022), another key aspect involves water-related yield and resilience benefits.

In this regard, let us come back to three fundamental objectives of Regenerative Agriculture: productivity increase on existing farmlands, reduction of agricultural environmental impact, and resilience increase to climate change stresses in crops. **Water plays a crucial role in all of these outcomes.** A role that is clear if we consider, respectively, the huge impact of water availability on productivity, the increasing demand of water resources from agricultural activities, and, finally, how heavy is global warming impacting on water security, with repercussions on agriculture.



TALETE™: the value of every single drop

*Composed of biomolecules of plant origin developed as per our proprietary **GeaPower technology**, **TALETE™ acts directly on the plant physiology, helping the crops increase Crop Water Productivity both when water is available in adequate quantities and when there is a water scarcity, be it permanent or temporary.***

Crop Water Productivity (CWP) is defined by the UN FAO as the **economic or biophysical gain from the use of a unit of water consumed in crop production**, and is a useful parameter to quantify the relationship between the crop produced and the amount of water used.

TALETE™ increases the crop's absorption of water and water retention, supporting the increase of Crop Water Productivity both in case of water scarcity and adequate availability:



In water scarcity conditions, when water is the limiting factor,

TALETE™ acts on the plant physiology maximizing the yield without changing the volume of water used for irrigation. This acts as a sort of "water insurance" every time a grower faces problems of permanent or temporary water shortage.

$$\frac{\text{yield [Kg]}}{\text{water [m}^3\text{]}} \uparrow$$



In conditions of adequate water availability, when water is not the limiting factor, **TALETE™ improves CWP via the optimization of water provision by various irrigation techniques:**

among others, helping reduce possible water imbalances that can remain hidden among irrigations, or supporting in case of Regulated Deficit Irrigation regimens.

$$\frac{\text{yield [Kg]}}{\text{water [m}^3\text{]}} \uparrow$$



TALETE™ can be a valid technical tool to increase Crop Water Productivity, responding to the needs of a more “water-responsible” agriculture.

As such, this solution can give a significant support to the Water Use efficiency-related outcomes of Regenerative Agriculture



- Increase in the productivity of existing farmlands** as farmers are able to optimize productivity, maximizing the yield without changing the volume of water used for irrigation
- Reduction of the environmental impact of agricultural activities** as this means optimizing the use of water in agriculture, preserving this precious resources or making it available for other uses
- Mitigation of the effects of climate change on crops** as farmers have a tool to protect yield and quality of their crops even in condition of scarce water availability, an important effect of climate change.

On the field

Key crops performances

Trials Highlights

481 trials

All Crops: vegetables, orchards, row crops.

+9% yield increase

Water reduction/water scarcity

Average -20% of water

Crops	Average Yield Increase (%)
Fresh Tomato	12
Processing Tomato	8
Pepper	11
Melon	7
Almond	-
Table Grape	9
Plum	34
Citrus spp.	-
Olive	-
Mango	-
Cotton	18
Corn	11

Vegetables
+9% yield increase

Orchards
+8% yield increase

Bridge effect (no water reduction)

Crops	Average Yield Increase (%)
Fresh Tomato	8
Processing Tomato	12
Pepper	7
Melon	5
Almond	13
Table Grape	20
Plum	-
Citrus spp.	10
Olive	6
Mango	9
Cotton	8
Corn	-

Orchards
+11% yield increase

Vegetables
+7% yield increase

Total average yield increase on all crops refers to all trials done with TALETE™.

Average yield increase for vegetables, orchards and single crops with water reduction, water scarcity and bridge effect refer to 2019-2020 trials.

Water reduction does not refer to all crop cycle but to defined and established phenological phases, corresponding more or less to 1-1.5 month.

All data refer to the database updated on 31/05/2021.

Cultivating Sustainability

Sustainable practices and use of products such as Biologicals are good enablers of regenerative agriculture, but this is still not enough! First and foremost, a culture of sustainability must be cultivated along the whole supply chain, leading to a deeper awareness of the issues that we are facing, their repercussions on a global scale, and what tools can be used to address them. In addition, Biologicals such as TALETE™, although actually simple to use, require training and technical assistance for an optimal result configured on the precise needs of the customer. For this reason, we devote ourselves to providing farmers frequent technical trainings on the use of Biologicals solutions in the framework of Regenerative Agriculture. From region to region, a special focus is put on the management of the local key



crops and the main pain points for farmers, in order to close the knowledge gap that often hinders the adoption of new sustainable practices and products. In addition, we guarantee a system of continuous, widely distributed on-field support, with a technical support team composed of experienced specialists in the field of Biologicals, competent in the agronomic field and, at the same time, trusted advisors

for customers from plantation to harvest. These figures, combining excellent technical, commercial and human skills, have a strategic role in creating a link between the technology and its use, contributing to the goal of spreading Regenerative Agriculture practices, in order to create strategies that combine environmental and economic sustainability while respecting margins.



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