

# Analysis of a productive system from a regenerative perspective

The elements of the production system on which it is possible **to intervene** and which are the basis for a Regenerative Productive Model are: **1) the diversity of plants; 2) the return of plant materials to the soil; 3) interventions that block the functioning of soil biological processes; 4) the functioning of the soil and the carbon cycle; and 5) water as a limiting factor for the productivity of the system.** Knowledge of these elements and their main components make it possible to evaluate how each system works and what interventions can help improve it.

## ■ Bases for a regenerative production model

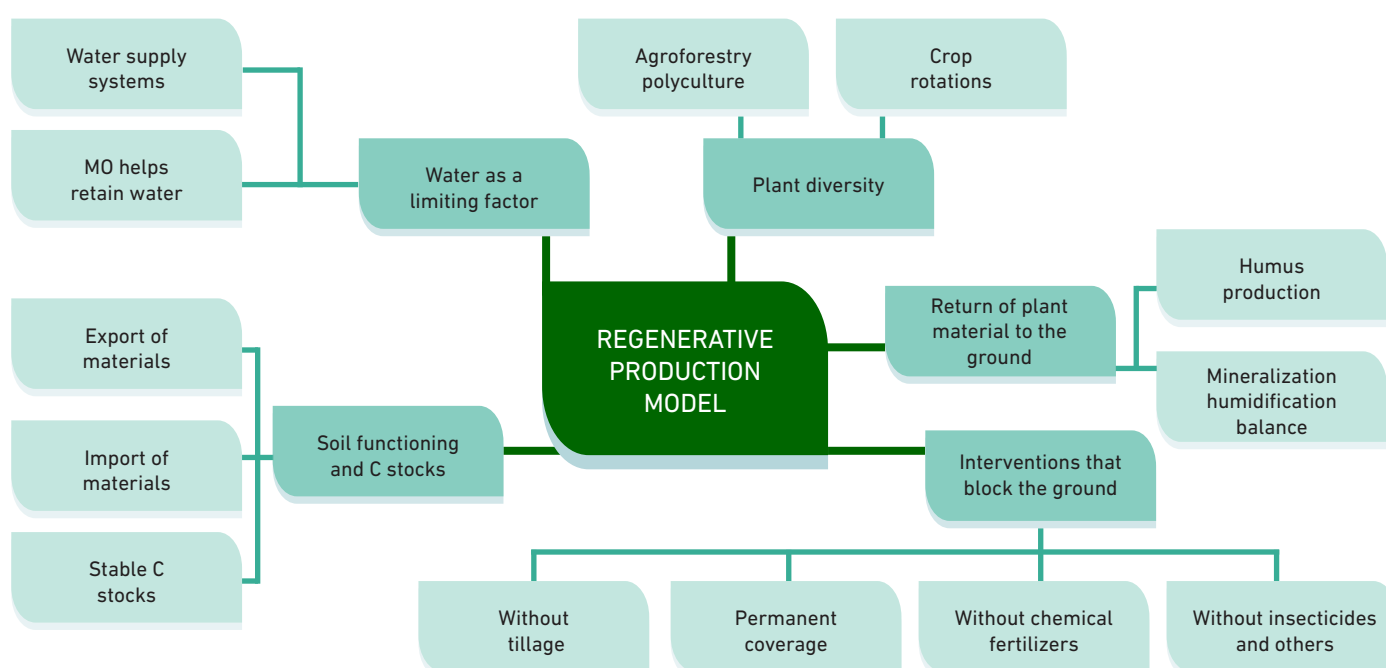
A sustainable agriculture model that guarantees **food sovereignty** must be based on **feeding the soil and improving the habitat for the soil food web**. There are five elements of the production system in which it is possible to intervene and which must be considered in each specific situation: **1) the diversity of plants; 2) the return of plant materials to the soil; 3) interventions that block the functioning of soil biological processes; 4) the functioning of the soil and the carbon cycle; and 5) water as a limiting factor for the productivity of the system.** Knowledge of these elements and their main components (Figure 1), together with an analysis of the indicators of the state of health of the soil, let you evaluate how the system is working and which interventions can help to improve most efficiently.

**(1) The diversity of plants.** The first question we must ask ourselves is whether it is possible to increase the production of the system and its biological activity (inevitably related) by increasing plant diversity, both in spatial and temporal

terms. To do this, it is very important to know the growth characteristics of the main elements of our system (trees, pasture plants, extensive vegetables, intensive vegetables and fruit trees), and, if possible, combine them in space (**polycultures, agroforestry**) or time (**crop rotations**) in order to improve the production of the system and the biological activity of the soil (Figure 2).

**(2) The return of plant materials to the soil.** The return of plant materials to the soil is a characteristic of the production system and the type of management. It is one of the aspects that must be changed when trying to modify the production model. What is sought is a return of plant materials (directly, from excrements or compost) that help protect the soil and the formation of a humus layer, and ultimately, nourish the plant.

It is necessary to know the factors that regulate the **balance between mineralisation and humification** of the supplied materials to prioritise the process that is of most interest



**Figure 1.** Scheme of the five main elements of the Regenerative Productive Model and the most important components of each one that must be analysed to evaluate how a given system is working.



**Figure 2.** Image of an organic polyculture field in Planeses, Girona (A) and a field with cereal monoculture (B). Photo: MJ Broncano

at all times. **The objective is that this can be achieved by closing the cycle on the field itself** (a clear example would be grazing), without the need to bring external materials or having to make transformations that make us spend time and energy. In some cases, such as intensive vegetable production (orchard), a contribution of transformed external materials (different types of compost) is required. In this case, the investment is acceptable because it is a use that occupies a very small part of the farm. **It is also necessary to provide external materials in situations in which a degraded system must be restored and the contribution of organic matter is the main element.**

**(3) Interventions that block the functioning of soil biological processes.** Some of the techniques used in conventional agriculture negatively affect the soil food web, to the point of destroying its habitat. Therefore, **the regenerative agriculture model includes eliminating tillage, minimising bare soil, avoiding soil compaction and the use of chemical fertilisers, insecticides, fungicides and herbicides.** For extensive plant production it is necessary to use machinery for sowing and harvesting. The use of heavy machinery can cause compaction of the ground, so it must be done in a way and at a time that the impact is as low as possible. When we are going to work on fields that come from the conventional productive system, it must be taken into account that the impacts of past management can remain on the ground for a more or less long time (which could last more than 5 years), so that it is necessary to act actively to restore the health of the soil.

**(4) Soil functioning and the carbon cycle.** The balance of inputs and outputs of organic materials defines the sustainability of the system. A productive system will always have outputs, but efficient management must ensure that outputs linked to harvesting do not represent a reduction in system stocks (especially soil stocks), and that

### The regenerative production model: economic costs of changing the model

The production model based on the natural feeding of the plant takes advantage of the resources of the area and the functioning of natural processes. This model **has a much lower operating cost than the conventional model.** But any change **requires an initial investment.** This investment is mainly focused on **introducing organic matter into the soil to feed the food chain and restore the habitat necessary for it to function.** It is a period in which we eliminate external production factors (tillage and agrochemicals), but in which the system still does not have its internal production factors working (because it is building them).

This can cause a temporary reduction in production. This period can be developed either with a low investment but over a longer time, or with a higher investment, making external contributions of organic matter, which will reduce the time necessary for the system to start working efficiently. In any case, this transition requires an investment that can be quantified in money, time and knowledge. These three areas function as communicating vessels and can partly offset each other. Thus, **knowledge of experiences that are already working can save a lot of time and money for a farmer who wants to initiate change.** Therefore, it is very important to disseminate experiences that are already underway, including the Polyfarming system.

they are offset by its own productivity. **When we go from a management with the conventional production system to a system based on the natural feeding of the plant, we are increasing the carbon stock of the soil and eliminating carbon from the atmosphere.** Normally, the production of the system itself is used, although on certain occasions it may be necessary to import external carbon into it. When making external carbon inputs, the costs and environmental impact of carbon removal at the source must be assessed.

**(5) Water as a limiting factor for the productivity of the system.** The increase in the organic matter content of the soil, a result of the regenerative production model, improves soils and helps to maintain a large amount of additional water in the system. Whenever possible, it is good to have systems that improve and increase the water supply. In addition to making an economic analysis of what obtaining this additional water may represent, **it is very important to study the short/medium/long-term availability of this resource, taking into account climatic conditions** (both current and forecasts linked to climate change) of our area.